Artificial Intelligence Adoption and Marketing Performance of Quoted Manufacturing Firms in Nigeria

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Abstract:- This study examined artificial intelligence adoption and marketing performance of quoted manufacturing firms in Nigeria. The study adopted the positivism research philosophy and correlational research design. The population of the study consisted of 426 managers drawn from the 71 quoted manufacturing firms in Nigeria. The managers include branch managers, operational managers, production managers, marketing managers and sales managers of the firms. A sample size of 206 managers was used for the study. The sample size was determined mathematically using the Taro Yamene's formula. A structured questionnaire was used to obtain data from the respondents. The data collected were analyzed statistically while the hypotheses were tested using Spearman Rank Order Correlation Coefficient (rho). The SPSS version 23.0 was used to perform the bivariate analysis. The findings revealed that the application of artificial intelligence technologies in marketing operations has a significant relationship with sales growth of quoted manufacturing firms in Nigeria. The study also revealed that the application of artificial intelligence technologies in marketing operations has a strong and significant relationship with market share growth of quoted manufacturing firms in Nigeria. The study equally confirmed that artificial intelligence capabilities have a strong and significant relationship with sales growth of quoted manufacturing firms in Nigeria. The study also reported that artificial intelligence capabilities has a strong and significant relationship with market share growth of quoted manufacturing firms in Nigeria. Based on these findings, it was concluded that artificial intelligence adoption significantly relate to marketing performance of quoted manufacturing firms in Nigeria. Based on these findings and conclusion, it was recommended that quoted manufacturing firms in Nigeria especially those that are experiencing poor marketing performance should adopt artificial intelligence technologies in their marketing operations as it would improve their marketing performance.

I. INTRODUCTION

One major criteria used to make investment decision is the marketing performance of firms. The marketing performance of a firm indicates how well the firm is doing in its marketing activities. A firm's marketing performance is judged by the percentage to which the firm increases its sales (sales growth), sales turnover rate (the speed at which a firm converts its inventory into cash) and market share (the proportion of the market served by a firm grows from year to year) (Shih, 2018). Investors often used the marketing performance of quoted firms in addition to their financial performance to decide which company to invest their funds on. They evaluate the sales turnover of different quoted firms from year to year and used the information to determine their financial strength of companies in near future. Chen (2019) stated that quoted manufacturing companies that experience steady sales growth from year to year are likely to attract more investors to their companies since investors place much emphasis on the marketing performance of firms when making their investment decision.

Considering the fact that investors attached more importance to the marketing performance of firms when making investment decision, it becomes necessary for quoted manufacturing firms in Nigeria to find a way to improve their marketing performance. Improving marketing performance is the only way for quoted manufacturing firms to grow their revenue and survive in the midst of competition (Shahid & Li, 2019). However, improving marketing performance is not an easy task for quoted manufacturing firms as a good marketing performance requires a lot of efforts. As Maohua (2009) rightly stated, improving marketing performance requires a lot of efforts as resources such as information, machines and other technologies have a role to play in order to improve firms' marketing performance. This implies that quoted

manufacturing firms need to adopt artificial intelligence to improve their marketing performance.

Artificial intelligence is a set of theories and techniques used to create machines that are capable of stimulating intelligence (Benko and Lanyi in Wamba-Taguimdje et al, 2020). Mikalef and Gupta in Enholm et al (2021) defined artificial intelligence as the process of giving computer human-like capabilities, meaning that computers are able to perform tasks that normally require human intelligence. These tasks include reasoning, learning, understanding and problem solving. Eriksson et al in Enholm et al (2021) stated that artificial intelligence emulates human performance by acting as an intelligent agent, which performs actions based on a specific understanding of input from the environment. The aim of artificial intelligence is to try to reproduce human cognition by emulating how humans learn and process information (Enholm et al, 2021). Artificial intelligence can replace human intelligence with cheap and faster algorithms in some roles and increase process efficiency. Although artificial intelligence is still far from equaling human intelligence, it is extremely effective in performing specific tasks in an organization (Blanchet, 2016).

Artificial intelligence is not a new concept; it is just that many organizations are just beginning to adopt it. Lee et al (2018) noted that America and China embarked on a frantic race for artificial intelligence since the early 2010 with a particular focus on its most promising component Learning Systems (Machine learning or Deep Learning). The benefits derived from artificial intelligence adoption make this information based technology a market of the future. Today, artificial intelligence has become the most spectacular IT application which has undergone series of development in the last decades (Blanchet, 2016). The adoption of artificial intelligence has transformed the world into a modern one characterized by supremacy of data in every business activity. Data are no long confined to data centers as sensors of any kind or object is capable of producing and measuring data (Wamba-Taguimdje et al, 2020).

Artificial intelligence and its components (machine learning, deep learning, Chabot, neural network, virtual assistant and others) are fundamentally reshaping the business processes (Kuzey et al, in Wamba-Taguimdje et al, 2020). They have transformed the way in which companies operate and reduce the costs of predictions (Agrawal et al, 2018). AlSheibani et al (2018) noted that firms adopting artificial intelligence have a strong propensity to grow as this data based technology would expand their economies of scale arising from a larger data available at the firm. The ability of artificial intelligence to improve forecasting can help firms to target customers better, optimize costs and improve their productivity (Kim et al, 2011). However, before adopting artificial intelligence, firms need to identify the key areas where an improved prediction by artificial intelligence will generate positive outcomes (Alekseeva et al, 2020). They need to provide answers to the following questions: what problem will artificial intelligence solves?

What data will be required to train the algorithm? What expertise is required to complement the artificial intelligence? And how the algorithm's output will be used to make decisions (Alekseeva et al, 2020). The answers to these questions will determine the successful adoption of artificial intelligence.

Organizations will have to rely more on artificial intelligence in order to improve their marketing performance. Artificial intelligence adoption facilitates better targeting of customers, thereby attracting more customers and improving the marketing performance of firms (Lichtenthaler, 2019). Alekseeva et al (2020) opined that adoption of artificial intelligence can increase forecasting which will in turn facilitate better decision making and cost reduction such as the reduction in the cost of handling customer orders and inventory management costs. Kuzey et al (2014) posited that artificial intelligence adoption can help a firm to increase its operational efficiency, improve its supply chain and maintenance operations, optimize costs, product improvement and provide a positive and pleasant customer experience which will in turn boost sales and improve the marketing performance of firms. It is against this backdrop that this study examines the relationship between artificial intelligence adoption and marketing performance of quoted manufacturing firms in Nigeria.

➤ *Statement of Problem*

The manufacturing sector in Nigeria remains crucial to the growth of the economy. This sector was estimated to contribute 32% value to the Nigerian economy with food and beverage products generating the greatest values of output (ThisDay Newspaper, 2020). Some of the key players in this sector are: Unilever Nigeria Plc., Dangote Foods, UAC Foods, Cadbury, Honeywell Flour Mills, Nigerian Breweries, Guinness Nigeria Plc., Nigerian Bottling Company, Nestle Friesland, amongst others. These companies are quoted on the floor of the Nigerian Stock Exchange and they engage in food and drink production. But recently the marketing performance of these firms have dropped significantly due to the harsh economic condition in Nigeria as well as the deadly covid-19 pandemic which crippled the Nigerian economy. The economic climate in Nigeria has remained bleak and unimpressive for quite sometimes, there is poor electricity supply and the cost of manufacturing is very high.

Given the high cost of manufacturing in Nigeria and the declining marketing performance of quoted manufacturing firms, it becomes imperative for these firms to integrate modern technologies into their business operations by adopting artificial intelligence. It is the researcher's argument that artificial intelligence adoption would help to improve the marketing performance of quoted manufacturing firms in Nigeria. However, substantial empirical evidence that support this claim is lacking within the Nigerian context. This uncovered area has created huge vacuum in literature which the present study intends to fill and contribute to existing knowledge on artificial intelligence adoption in business organizations.

➢ *Conceptual Framework*

The conceptual framework of artificial intelligence adoption and marketing performance of quoted manufacturing firms is shown in figure 1 below:
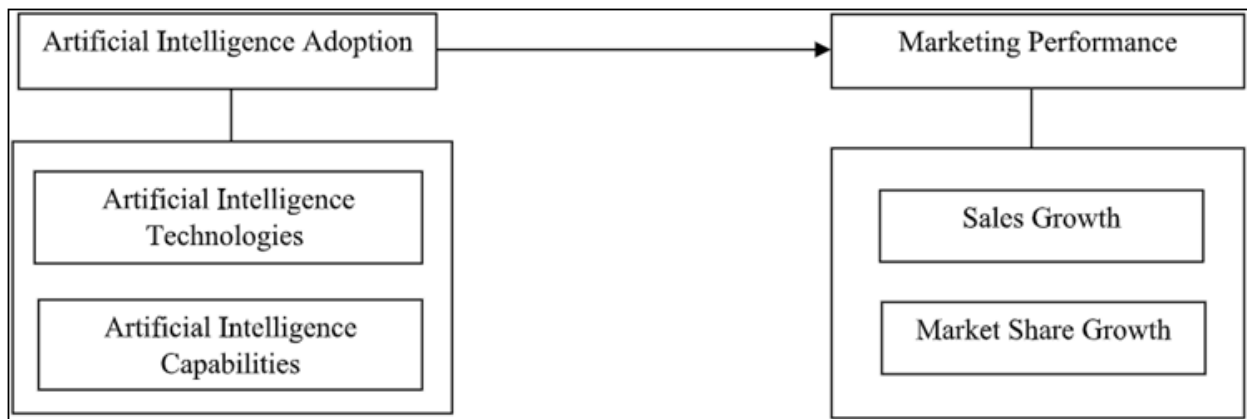

Fig.1: Conceptual framework of artificial intelligence adoption and marketing performance of quoted manufacturing firms
Source: Enholm et al (2021); Wamba-Taguimdje et al (2020); Githui (2019); Chen (2019).

➢ *Aim and Objectives of the Study*

The aim of this study was to examine the relationship between artificial intelligence adoption and marketing performance of quoted manufacturing firms in Nigeria. The objectives of the study are:

- To ascertain the relationship between application of artificial intelligence technologies in marketing operations and sales growth of quoted manufacturing firms in Nigeria.
- To explore the relationship between application of artificial intelligence technologies in marketing operations and market share growth of quoted manufacturing firms in Nigeria.
- To determine the relationship between artificial intelligence capabilities and sales growth of quoted manufacturing firms in Nigeria.
- To find out the relationship between artificial intelligence capabilities and market share growth of quoted manufacturing firms in Nigeria.

➢ *Research Questions*

In order to address the objectives of the study, the following research questions were developed:

- To what extent does the application of artificial intelligence technologies in marketing operations contributes to sales growth of quoted manufacturing firms in Nigeria?
- To what extent does the application of artificial intelligence technologies in marketing operations relate to market growth of quoted manufacturing firms in Nigeria?
- To what extent do artificial intelligence capabilities relate to sales growth of quoted manufacturing firms in Nigeria?
- To what extent do artificial intelligence capabilities relate to market share growth of quoted manufacturing firms in Nigeria?

➢ *Research Hypotheses*

The following hypotheses were formulated to guide this study:

- Ho_1: There is no significant relationship between application of artificial intelligence technologies in marketing operations and sales growth of quoted manufacturing firms in Nigeria.
- Ho_2: There is no significant relationship between application of artificial intelligence technologies in marketing operations and market share growth of quoted manufacturing firms in Nigeria.
- Ho_3: There is no significant relationship between artificial intelligence capabilities and sales growth of quoted manufacturing firms in Nigeria.
- Ho_4: There is no significant relationship between artificial intelligence capabilities and market share growth of quoted manufacturing firms in Nigeria.

II. REVIEW OF RELATED LITERATURE

➢ *Concept of Artificial Intelligence Adoption*

To understand the concept of artificial intelligence, it is important to first of all define what artificial is, and then what intelligence entails. According to Mikalef and Gupta (2021), artificial is something that is developed by humans rather than it occurring naturally while intelligence according to Lichtenthaler (2019) refers to mental activities, reasoning, learning and understanding. When the two concepts are combined together as artificial intelligence, it means the development of machines by human that is capable of stimulating intelligence. Mikalef and Gupta in Enholm et al (2021) defined artificial intelligence as the process of giving the computer human-like capabilities, meaning that computers are able to perform tasks that normally require human intelligence. These tasks include reasoning, learning, understanding and problem solving.

According to Benko and Lanyi in Wamba-Taguimdje et al (2020), artificial intelligence is a set of theories and techniques used to create machines that are capable of stimulating intelligence. Selfridge and Simon in Wamba-Taguimdje et al (2020) defined artificial intelligence as the use of computer to model intelligent behaviour with minimal human intervention. McCorduck et al in Wamba-Taguimdje et al (2020) described artificial intelligence as the use of technological devices to reproduce the cognitive abilities of humans to achieve objectives autonomously, taking into account any constraints that may be encountered.

Artificial intelligence and its components (machine learning, deep learning, Chabot, neural network, virtual assistant and others) are fundamentally reshaping the business processes (Kuzey et al, in Wamba-Taguimdje et al, 2020). Since the emergence of machine learning (automatic learning: machines learn from the datasets offered to them), whose latest development is Deep Learning (which relies on neural networks), artificial intelligence has made significant progress (Buchanan, in Wamba-Taguimdje et al, 2020). Machine learning algorithms are used to train the deep layers of networks rather than modeling vast amounts of information, neural networks learn by digesting millions of test data (Zemouri et al, in Wamba-Taguimdje et al, 2020). When combined with big data, machine learning and neural network processing perform operations and actions that exceed human actions in terms of speed and relevance (Wamba-Taguimdje et al, 2020).

Artificial intelligence adoption can help a firm to increase its operational efficiency, improve its supply chain and maintenance operations, optimize costs, product improvement and provide a positive and pleasant customer experience (Kuzey et al, 2014). It can also ensure quick and automatic adaptation to the changing market conditions, strengthen their relationship with their customers and suppliers, create a new business model and improve planning capacity and forecasting (Kuzey et al, 2014). Artificial intelligence adoption can equally help firms to detect fraud, automate threat information and intelligence systems, automate quality control, manage logistics operations, optimize sales processes and assist in decision making (Johnson et al, 2018). To ensure the successful application of artificial intelligence in an organization, certain elements such as data, technologies, information technology and artificial intelligence talent, domain knowledge, scalable infrastructure and external partnership (Jadhav, 2012).

Recently, organizations are increasingly adopting artificial intelligence due to its deluge of date and strong computational capacity (Zebec & Stemberger, 2020). These organizations believe that artificial intelligence adoption would help to maximize their business value. AlSheibani et al (2020) stated that firms that effectively adopt artificial intelligence stand to gain in terms of increasing their business value in the areas of revenue growth, cost reduction and operational efficiency. A study conducted by Ransbortham et al (2017) revealed that 80% of companies considered artificial intelligence as a strategic opportunity

while 85% view artificial intelligence as a strategy for gaining competitive advantage over their rivals. However, some organizations are struggling to effectively adopt artificial intelligence because of lack of proper understanding of its technologies and application (Fountaine et al, 2019). Makarius et al (2020) confirmed that many companies invest their money and time in artificial intelligence adoption but fail to realize its full benefits due to poor application of the technologies.

➢ *Dimensions of Artificial Intelligence Adoption*
Artificial intelligence adoption can take the form of artificial intelligence technologies application and artificial intelligence capabilities. These two dimensions of artificial intelligence adoption are discussed below:

➢ *Artificial Intelligence Technologies*
Artificial intelligence technologies are the techniques and tools used in the implementation of artificial intelligence in an organization (Lichtenthaler, 2019). These technologies can be applied in all organizations that engage in business and marketing activities. Examples of artificial intelligence technologies include machine learning or deep learning, natural language processing, computer vision, expert systems, planning and scheduling, and speech synthesis systems (Afiouni, 2019; Lichtenthalar, 2019; Chen, 2019; Schmidt, 2020; Enholm et al, 2021). Machine learning is a subset of artificial intelligence that is capable of learning from data and making predictions and/or decision without human dictated rules (Schmidt, in Enholm et al, 2021). The principle of machine learning incorporates training algorithms to enable machines to learn how to make accurate predictions (Wang et al, in Enholm et al, 2021). Wang et al (2019) stated that machine learning can take the form of supervised, semi-supervised and unsupervised and reinforcement. The aim of machine learning is to train a chine to be able to learn from data and make inferences predictions, and identify associations which can guide decisions (Afiouni in Enholm et al, 2021). Machine learning technology accomplish this task by parsing data, learning from data and making decision based on what it has learnt (Wang et al, 2019).

Neural language processing is the process through which machines can understand and analyze language as used by humans (Jarrahi, in Enholm et al, 2021). Computer vision is an algorithmic inspection and analysis of images (Jarrahi, in Enholm et al, 2021). Expert systems are directed at imitating human decision-making by capturing and representing the expertise of experts for other organizational members to use, serving as a knowledge base (Afiouni in Enholm et al, 2021). Planning and scheduling is the development of action strategies and sequences for subsequent execution (Lichtenthalar, in Enholm et al, 2021). Speech synthesis systems include text-to-speech and speech-to-text solutions (Ghadage & Shelke in Enholm et al, 2021). According to them, text-to-speech is the production of speech by machines by automatic conversion of text to a phonemic specification of pronunciation of the sentences to utter while speech-to-test systems take a human speech

utterance as an input and requires a string of words as output.

Among the artificial intelligence technologies, machine learning applications appear to be dominating research interest. However, the other artificial intelligence technologies are combined with machine learning or deep learning to provide solutions to problems. For example, in chatbots' case, neural language processing is combined with machine learning in such a way that neural language processing allows chatbots to comprehend and respond using the human language while machine learning algorithm enable chatbots to evolve and learn as they access more data (Castillo et al, 2020).

The application of artificial intelligence technologies can enable manufacturing firms to improve their sales forecasting. For instance, B2B sales forecasting provides substantial evidence that artificial intelligence technologies such as machine learning techniques can be used to augment the selling capabilities of a firm, and improve its sales performance (Chang et al, 2005). In terms of customer relationship management, Chang et al in Chen (2019) noted that machine learning technique can be used to improve the quality of customer relationship management by identifying customer emotions and using them to improve services. Machine learning technique can also be used to simplify new product development process. According to Cheng (2019), the newly developed machine learning techniques change the traditional paradigm in new product development and their applications suggest new avenues to explore more artificial intelligence based tools in new product development.

Promotion and advertising are another crucial areas that have been improved by machine learning techniques. Kwok and Yu (2013) noted that spreading messages about products on social media platforms such as Facebook, Twitter, Snapchat, Instagram, etc. has been facilitated through the application of machine learning techniques. Cui et al (2006) stated that machine learning technique is used to identify prospective customers online and promote products and services at a reduced costs. Although artificial intelligence technologies are promising, the application of these technologies in business operations is still at the infancy stage as some marketers are not confident in using them (Schmidt et al, 2020). A 2016 survey conducted among 15 marketing managers in US firms revealed that 98% of them see benefits in using artificial intelligence technologies (Demand Base, in Cheng, 2019).. However, only 28% feel confident of using artificial intelligence technologies while currently only 10% of the 15 marketing managers are using it (Demand Base, in Cheng, 2019).

➤ *Artificial Intelligence Capabilities*
Artificial intelligence capabilities refer to a firm's ability to create a bundle of organizational, personnel and artificial intelligence resources for business value creation and capture (Kim et al, in Wamba-Taguimdje et al, 2020). Mikalef and Gupta in Enholm et al (2021) defined artificial intelligence capability as the ability of a firm to select,

orchestrate and leverage its artificial intelligence specific resources. Schmidt et al in Enholm et al (2021) described artificial intelligence capabilities as digital capabilities that integrate artificial specific assets such as artificial intelligence algorithms, training data, etc. in order to enable value creation.

Artificial intelligence capabilities are made up of artificial intelligence management capability, artificial intelligence personal expertise and artificial intelligence infrastructure flexibility (Wamba-Taguimdje et al, 2020). According to Kim et al in Wamba-Taguimdje et al (2020), artificial intelligence management capability is the ability of an organization and its staff to administer or to model intelligent behavior in a computer or technology to create added value for the organization's sustainability. Artificial intelligence management capability is crucial to strategic planning, investment decision, coordinating and control of artificial intelligence technologies (Hamet & Treblay, 2017).

Artificial intelligence personal expertise is the professional skills and knowledge of artificial intelligence related technologies, business functions and relational (or interpersonal domains required by the organization's staff for modeling and/or using intelligent behaviour in a computer or technology to accomplish the tasks assigned to it (Ha & Jeong, in Wamba-Taguimdje et al, 2020). The information technology staff of an organization must possessed the required knowledge and skills to be able to handle the resources of artificial intelligence at their disposal (Wang et al, 2019). Afiouni (2019) stated that artificial intelligence technologies would be implemented successfully if the IT personnel of the organization must the required skills and knowledge. Abijith and Wamba (2012) noted that the expertise of artificial intelligence staff will be enhanced if they understand how their top management blend the corporate strategies with their artificial intelligence skills. Liu et al (2013) opined that a firm with competence artificial intelligence staff is more likely to adapt to the fast changing environment brought about by technology advancement. The firm can easily develop a reliable and cost effective intelligent and align its strategies with them.

Artificial intelligence infrastructure flexibility refers to the composition of all technological assets (software, hardware and data), systems and their components, network and telecommunications installations and applications that are necessary for the implementation of an artificial intelligence system capable of performing tasks (Kim et al in Wamba-Taguimdje et al, 2020). Abijith and Wamba in Wamba-Taguimdje et al (2020) stated that the flexibility of deploying artificial intelligence infrastructure for organizational operations allows the organization's staff to rapidly support various system components and adapt to changing business conditions and business strategies such as economic pressures, strategic alliance, acquisitions, global partnerships or mergers. Kim et al (2011) posited that a firm with an improved IT infrastructure can easily adapt to the use of artificial intelligence resources and deploy artificial intelligence technologies. Kim et al (2011) disclosed that

an infrastructure that is perform self-configuration, self-healing and self-optimization functions can easily prevent problems, promote process innovation, optimize resources usage and proactively improve performance.

➤ *Concept of Marketing Performance*

Marketing performance is a crucial concept in marketing research and it is often used as a dependent variable. According to Raza (2014), marketing performance is frequently investigated in most marketing research while other strategic issues in marketing are correlated to it. The term marketing performance refers to the marketing outcomes of a firm which can be measured through sales growth, market share, competitive advantage, customer satisfaction and loyalty (Jayapal & Omar, 2017). It can also be defined as the behaviour of a valuable asset in the marketplace (Jayapal & Omar, 2017). Sarker et al (2001) defined a firm's marketing performance in terms of sales growth, market share, market development and product development. Similarly, Ritala (2012) posited that a firm's marketing performance is the rate at which a firm's products or services are patronized by customers in the market (sales) and the portion of the market which the firm has been able to capture (market share).

A firm's market performance is a measure of consumers' preference for its product/service over similar products/services (Dwyer & Mellor, 1993). A firm can use its marketing performance to ascertain how consumers react to its products offerings. A higher market performance is an indicator that the consumers are satisfied with the products/service rendered and vice versa. Hence, every company wants to increase their market performance since it is the only way to improve financial performance and achieve their desired goals of the organization (Ogunnaike et al, 2014).

Measuring a firm's marketing performance is crucial to the growth and survival of an organization. When an organization is doing well consistently in terms of increasing sales and market share from year to year, the company will be able to make more profit and expand its operations. But when the marketing performance of the company is poor in all ramifications (sales and market share), the company will find it difficult to grow and sustain in its industry (Samwel, 2018). For this reason, shareholders and business owners are interested in knowing how well their product is doing in the market. If an organization experienced massive increase in sales (sales growth) and market share, the company is said to have a good market performance in the period under review (Niazi, 2011).

Improving marketing performance is one of the major objectives of business firms irrespective of the sector they belong (Ogunnaike et al, 2014). When a company's market performance is improved, it will manifest in the profit margin of the organization. Santos and Brito (2012) stated that a good marketing performance is an indication that the company is enjoying a competitive advantage over its rivals. It also implies that the company is enjoying greater sales, market share, customer loyalty and increased profit margin

(Santos & Brito, 2012). In this regards, strategic planners, managers and marketing executives are more concerned with their marketing performance of their company. They now use a balanced scorecard method to measure their marketing performance (sales growth, sales turnover and market share) (Gawankar et al, 2015).

➤ *Measures of Marketing Performance*

The marketing performance of a firm can be measured using various criteria. Previous studies (e.g. Niazi, 2011; Santos & Brito, 2012; Samwel, 2018; Chen, 2019) used sales growth, market share, profitability, competitive advantage, customer satisfaction and loyalty. However, in this study, marketing performance is measured using sales growth and market share. These measures of marketing performance are discussed below:

➤ *Sales Growth*

Sales growth is defined as a company's annual and quarterly rate of increase in sales revenues (Kotler & Armstrong, 2004). The Business Dictionary defines sales growth as the amount by which the average sales volume of a company's products or services has grown, typically from year to year. Sales growth helps to increase the profit margin of a company. As Reibstein et al (2006) stated, an increase in sales means a corresponding increase in revenue for the company and this lead to increase in shareholders' dividend. By selling more products from year to year, company increases its profit margin and expands its operations. Sales growth helps to increase the general health of a company; it indicates whether or not a company is meeting its target (McKinsey et al, 2016).

Sales growth of a company can be measured using the sales growth metrics (Kotler & Armstrong, 2004). Sales growth metrics measure the pace at which an organization's sales revenue is increasing or decreasing. This is a key metric for any organization to monitor since it is a part of growth projections and is instrumental in strategic decision making. Monitoring sales level periodically helps to gain a clear indication of growth trends and normalize company value. This will help the company account for monthly or quarterly spikes in revenue. At the highest level, the sales growth metric is used to provide executives and sales directors with an assessment of the market performance of the company.

Sales growth is key indicator of marketing performance. It indicates that the company is doing well in the market (Roberge, 2014). Cross (2012) stated that sales growth is a crucial competitive factor because it demonstrates to investors that the company is doing well as against its competitors. When an investor look at the financial statement of a company, he try to concentrate more on the sales figure to know whether the company's sales is growing consistently from year to year. The reason for this is that the investor would to determine how well the company is doing in the market particularly against its competitors. If an investor discovers that the sales of the company are growing consistently from year to year, he or

she may decide to buy its share and make profit through dividend.

Many investors attach more importance to sales growth when evaluating the financial statements of companies for investment decision. This is based on the fact that sales growth signifies a firm's financial stability and business growth (Schenk et al, 2015). Cross (2012) stated that companies need to have a consistent sales growth rate because it would enable them to manage the growth of the business. According to him, a company wouldn't exist for long if its sales drop consistently from year to year. It will require a lot of money to revive the business when sales drop consistently; hence there is need for companies to manage their sales growth rate efficiently. A company that is looking for investors needs to give them the confidence that the company is growing and that its sales figure do not fall outside its growth metrics. The company's sales growth should also look profitable. It is of no use selling more products and losing money on every item sold. A company that make more sales on a daily basis and continue to lose money on every item sold will not last for long. The company will only be around for the period that it has cash to cover the loss (Reibstein et al, 2006).

➢ Market Share Growth

According to Kotler and Armstrong (2004), market share is the percentage or proportion of the total available market or market segment that is being served by a company. It is determined by dividing a brand's sales volume by the total category sales volume. It is necessary to commission market research (generally desk/secondary research) to determine the firm's market share. A company's market share can be ascertained by calculating the sales made by the company at a given period and divide the figure by the total sales of the industry over the same period. The result which is expressed in percentage enables the company to know how customers value its products in relation to competitors' offerings. For instance, if a company like Toyota sold N200 million worth of cars in Nigeria for the year 2017, and the total cars sold in Nigeria was N400 million at the same period, Toyota's Nigeria market share for cars would be 50%.

Market share is one of the most important criteria used to measure market performance of a firm (Misumi & Peterson, 2005). The main advantage of using market share as a measure of market performance is that it is less dependent upon macro-environmental variables such as the state of the economy or changes in tax policy. A firm's marketing performance in relation to competitors can be measured by the proportion of the market that the firm is able to capture (Misumi & Peterson, 2005).

Increasing market share is the most important goal for companies because it has a direct impact on revenue (Amelia, 2017). In many instances, market share is often considered as an important asset for competing firms because it helps to increase revenue and enhance business growth. However, a company that experiences a decline in market share will have a serious problem on the long-run.

Armstrong & Greene (2007) stated that companies whose market share is below a certain level will not be profitable and may cease from operation anytime soon. Many investors who intend to buy the share of a company use the company's market share index to make decision. They carefully look at the rate of increase and decrease of the market share from one period to the other because it signifies the relative competitiveness of the company's products in the market. If the market share of the company is growing steadily, it indicates that the company's revenue is growing at the same rate as its market share. Amelia (2017) stated that a company whose market share is growing from year to year grows its revenue faster than its rivals in the same industry. When the market share of a company increases from year to year, it enables the company to expand its operation and increase profit. Nigerian companies are determined to increase their market share by drawing the attention of the public to their products through advertising, reducing prices and granting discounts.

➢ Theoretical Review

This study is anchored on the innovation diffusion theory which was developed by Roger (1983). The innovation diffusion theory denotes individuals' intention to adopt a technology as a modality to perform a traditional activity (Simon & Senaji, 2016). The motivating factor that drives individuals' intention to adopt modern technology to perform traditional activities is relative advantage which is expected to be gain. This theory is more concerned about the manner in which technological idea is put to use. It explains how individuals and business organizations intend to use modern technology to perform their operations. Olannyei et al (2017) stated that innovation diffusion theory tends to describe the manner in which individuals and corporate organizations accept technology as a modality to perform their traditional operations. It is all about the intention of the individuals or organization to embrace modern technology to perform their activities efficiently.

The innovation diffusion theory is very useful in studying the motives behind the adoption of artificial intelligence technologies in manufacturing firms. The theory explains that the motive behind the adoption of technology is to improve business operations and gain a competitive advantage over their larger rivals. According to Idowu et al (2016), companies considered it beneficial to adopt artificial intelligence technologies in their operation because of its potentials in improving their marketing performance. This has led to the development of machine learning technologies which makes it possible to learn from data and perform that humans can perform. With artificial intelligence technologies, quoted manufacturing firms in Nigeria can develop new products, promote and advertise the products using modern technology and deliver quality products to their target customers (Simon & Senaji, 2016).

The innovation diffusion theory supports the fact that quoted manufacturing firms in Nigeria can use artificial intelligence technologies to improve their marketing performance. The theory explains that modern technology enables quoted manufacturing firms in Nigeria to adopt

artificial intelligence in their business operations and improve their marketing performance. With these artificial intelligence tools, quoted manufacturing firms can satisfy their customers, retain them for a longer term, attract new customers to their firm and improve their overall marketing performance.

> *Empirical Review*

Some related empirical studies have been conducted on artificial intelligence adoption and marketing performance of firms. For instance, Omar et al (2017) examined the diffusion of artificial intelligence in governance of public listed companies in Malaysia. Their study used content analysis to determine the extent of artificial intelligence awareness and the stages in corporate annual reports of 806 companies listed in the Main Market of Bursa. The researchers focused on big data and machine learning and used the annual financial reports to analyze and determine the diffusion stage of artificial intelligence adoption in the management of the companies for the period 2017. After a thorough content analysis, it was reported that public listed companies in Malaysia are yet to infuse the innovation and that the adoption of artificial intelligence in their operations and management of their business is still at the early or infancy stage. The study reported that only 1% or less than 20 public listed companies mentioned artificial intelligence, big data and machine learning in their annual reports.

Basri (2020) carried out a study to determine the impact of artificial intelligence on the performance of small and medium enterprises in Saudi Arabia. The researcher adopted the descriptive survey research design where data were collected from business owners, managers and employees of start-up SMEs in Saudi Arabia. The data were collected with the aid of a structured questionnaire while the Partial Least Square (PLS) and Structural Equation Modeling (SEM). The findings showed that the adoption of artificial intelligence alongside with social media marketing in SMEs contribute to the increase in the customer base of the firms. The study also revealed that artificial intelligence accompany with social media marketing enhance effective business management and improve the profitability of SMEs.

Shahid and Li (2019) explored the application of artificial intelligence in marketing in Pakistan. Their study adopted the qualitative research approach and used a semi-structured interview to obtain data from 10 marketing professionals in different firms in Pakistan. After analyzing the information gathered from the interview conducted among the marketing professionals, it was revealed that artificial intelligence is adopted in marketing because of competitive pressure, digital maturity, media attention and customers. The study revealed that artificial intelligence adoption brings about increased efficiency, time saving when performing the marketing functions, improved conversion rates, better marketing decision making, better understanding of customer information, increased return on investment and enhanced services and customer satisfaction. The study however revealed that technical compatibility is

the major challenge facing the adoption of artificial intelligence in marketing.

Mikalef and Gupta (2013) empirically examined the impact of artificial intelligence capability on organizational creativity and firm performance. The researchers adopted a descriptive survey design and develop a model to test the relationship between the variables of the study. The researcher used the hierarchical model to represent the indicators of artificial intelligence and measures of organizational creativity and firm performance. The PLS-SEM analysis specifically the software SmartPLS 3.0 was used to test the relationship between artificial intelligence capability and organizational creativity/firm performance. The findings showed that artificial intelligence capability significantly increase organizational creativity. The study also revealed that artificial intelligence capability significantly improve firm performance.

Chen (2019) conducted a study to determine the augmenting effects of artificial intelligence on marketing performance. His study used technological opportunisms, top management support, customer orientation and normative pressure as the dimensions of firm's artificial intelligence adoption while customer satisfaction, sales growth and market share were used to measure marketing performance. The researcher adopted the survey research design where data were collected from 250 managers comprising of marketing managers, brand managers and sales managers of manufacturing firms in China using a structured questionnaire. The data collected were using percentage and frequency tables, mean and standard deviation, exploratory factor analysis, confirmatory composite analysis, structural equation modelling, SPSS 25.0 and AMOS vision 25. The findings revealed that artificial intelligence has significant effect on marketing performance of manufacturing firms in China.

Alekseeva et al (2020) examined the relationship between artificial intelligence adoption and firm performance. The researchers developed a model to analyze the relationship between artificial intelligence and firm performance as measured by firm growth, investment decision and productivity. After analyzing the data gathered using the firm-level artificial adoption, the researchers found out firm size and policy have significant influence on the artificial intelligence adoption by management. The study found a robust relationship between artificial intelligence adoption and total investment. The study also discovered a robust relationship between artificial intelligence adoption and firm growth. However, no robust relationship was reported between artificial intelligence adoption and productivity.

Wamba-Taguimdje et al (2020) carried out a study to determine the influence of artificial intelligence on firm performance. The researchers adopted the descriptive survey research design and used a structured questionnaire to collect data from managers of different firms in Cameroon. The data collected were analyzed using percentages, means, standard deviations and frequencies while the hypotheses

were tested using descriptive statistical tools such as Statistical Package for Social Sciences (SPSS), MS Excel and regression analysis. The result showed that artificial intelligence has significant influence on marketing, financial and administrative performance. The study also reported that artificial intelligence improve organizational process. The study equally revealed that artificial intelligence enhance business value of their transformed projects.

Chen (2019) examined the success factors impacting artificial intelligence adoption in the telecom industry in China. The study employed the survey research design where data were collected from managers of telecom companies using a structured questionnaire. The data collected were analyzed using Structural Equation Modeling (SEM). After analyzing the data collected, the researcher discovered that managerial support, compatibility, relative advantage, government involvement and vendor partnership significantly influence the adoption of artificial intelligence in telecom industry in China.

➢ *Gap in Literature*

This study has reviewed relevant literature on artificial intelligence adoption in corporate organizations. From the literature review, it was observed that a good number of studies have been conducted on artificial intelligence adoption in business organizations. However most of the studies conducted on artificial intelligence adoption and marketing performance were conducted in China, Pakistan, Kenya, Cameroon, Saudi Arabia and Malaysia while empirical studies that examined the relationship between artificial intelligence adoption and marketing performance of quoted manufacturing firms in Nigeria are absent or limited. Even the dimensions of artificial intelligence adoption (artificial intelligence technology application and artificial intelligence capabilities) are yet to be related to the measures of marketing performance (sales growth and market share growth) of quoted manufacturing firms in Nigeria. This has created a gap in literature which this study intended to fill.

➢ *Operational Framework*

The operational framework of artificial intelligence adoption and marketing performance of quoted manufacturing firms is shown in figure 2 below:
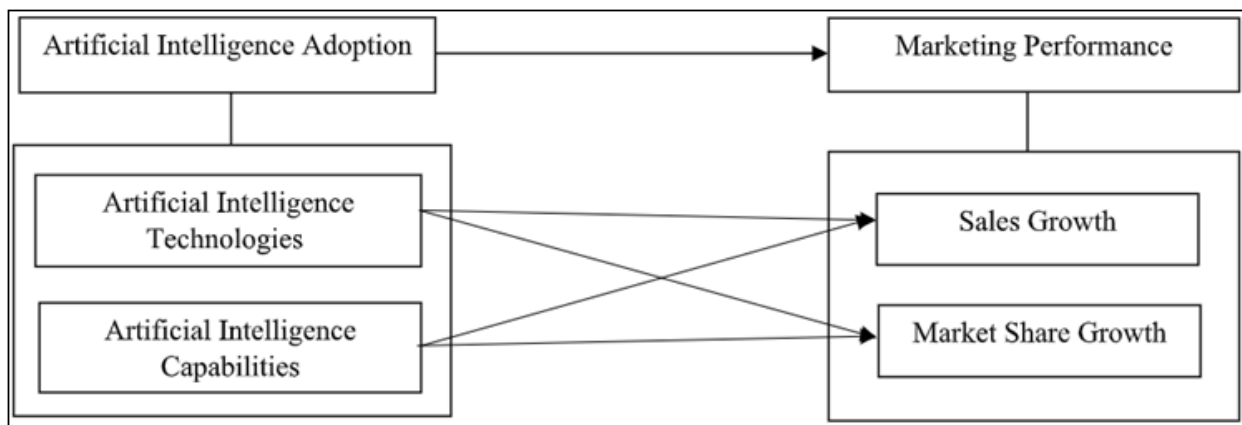

Fig.2: Operational framework of artificial intelligence adoption and marketing performance of quoted manufacturing firms
Source: Researcher's operationalization, 2022.

III. METHODOLOGY

This study adopted the positivism research philosophy and the correlational research design. The population of this study consisted of all the quoted manufacturing firms in Nigeria. According to the information made available in the Nigerian Stock Exchange Factbook 2021 Edition, there are 71 manufacturing firms quoted on the Nigerian Stock Exchange. The unit of analysis consisted of managers of the quoted manufacturing firms in Nigeria. The managers include branch managers, operational managers, production managers, IT managers, marketing managers and sales managers of the firms. Four hundred and twenty-six (426) managers of the above categories were identified in the 71 quoted manufacturing firms. A sample size of 206 managers was used for the study. The sample size was determined using the Taro Yamen's formula. The 206 managers were

drawn from the quoted manufacturing firms in South-South Nigeria. A structured questionnaire was used to collect data from the respondents (managers). The questionnaire was structured on a four points Likert scale which range from Strongly Agree, Agree, Disagree and Strongly Disagree. The validity of the instrument (questionnaire) was determined through face and content analysis while its reliability was confirmed using the Cronbach's alpha reliability test method. A total copy of 206 questionnaires was administered to the respondents (managers) of quoted manufacturing firms in South-South Nigeria and 136 copies were collected. The data collected were analyzed using descriptive statistics while the hypotheses were tested using the Spearman Rank Order Correlation Coefficient (rho). The bivariate analysis was performed with the aid of SPSS version 23.0.

IV. EMPIRICAL RESULTS

The result of the analysis carried out on the study variables were presented in this section. The data collected on artificial intelligence adoption (artificial intelligence technologies and artificial intelligence capabilities) were correlated with those obtained on marketing performance (sales growth and market share growth) using the SPSS version 23.0. The results of the bivariate analysis were presented in the tables below:

Table 1 Result of Bivariate Analysis between Application of Artificial Intelligence Technologies and Sales Growth of Quoted Manufacturing Firms

			Artificial Intelligence Technologies	Sales Growth
Spearman (rho)	Artificial Intelligence Technologies	Correlation Coefficient	1.000	.710**
		Sig. (2 tailed)	.	.001
		N	136	136
	Sales Growth	Correlation Coefficient	.710**	1.000
		Sig. (2 tailed)	.001	.
		N	136	136

**Correlation is significant at 0.01 levels (2 tailed)
*Correlation is significant at 0.05 levels (2 tailed)
Source: SPSS-generated Output

Table 1 shows the result of the bivariate analysis carried out between application of artificial intelligence technologies in marketing operations and sales growth of quoted manufacturing firms in Nigeria. The result indicates that application of artificial intelligence technologies in marketing operations has a strong and positive correlation with sales growth of quoted manufacturing firms in Nigeria (rho = .710**) and this correlation is significant at 0.01 level as indicated by the symbol **. Consequently, the null hypothesis (Ho_1) is rejected and the alternate hypothesis is accepted. This means we then accept that there is strong positive and significant relationship between application of artificial intelligence technologies in marketing operations and sales growth of quoted manufacturing firms in Nigeria.

Table 2: Result of Bivariate Analysis between Application of Artificial Intelligence Technologies and Market Share Growth of Quoted Manufacturing Firms

			Artificial Intelligence Technologies	Market Share Growth
Spearman (rho)	Artificial Intelligence Technologies	Correlation Coefficient	1.000	.622**
		Sig. (2 tailed)	.	.001
		N	136	136
	Market Share Growth	Correlation Coefficient	.622**	1.000
		Sig. (2 tailed)	.001	.
		N	136	136

*Correlation is significant at 0.05 levels (2 tailed)
Source: SPSS-generated Output

Table 2 contains the result of the bivariate analysis carried out between application of artificial intelligence technologies in marketing operations and market share growth of quoted manufacturing firms in Nigeria. The result indicates that application of artificial intelligence technologies in marketing operations is strongly and positively correlated to market share growth of quoted manufacturing firms in Nigeria (rho = .622**) and this correlation is significant at 0.01 level as indicated by the symbol **. Based on this result, the null hypothesis (Ho_2) is rejected and the alternate hypothesis is accepted. This implies that we then accept that there is strong positive and significant relationship between application of artificial intelligence technologies in marketing operations and market share growth of quoted manufacturing firms in Nigeria.

Table 3: Result of Bivariate Analysis between Artificial Intelligence Capabilities and Sales Growth of Quoted Manufacturing Firms

			Artificial Intelligence Capabilities	Sales Growth
Spearman (rho)	Artificial Intelligence Capabilities	Correlation Coefficient	1.000	.745**
		Sig. (2 tailed)	.	.001
		N	136	136
	Sales Growth	Correlation Coefficient	.745**	1.000
		Sig. (2 tailed)	.001	.
		N	136	136

**Correlation is significant at 0.01 levels (2 tailed)
*Correlation is significant at 0.05 levels (2 tailed)
Source: SPSS-generated Output

Table 3 presents the result of the bivariate analysis carried out between artificial intelligence capabilities and sales growth of quoted manufacturing firms in Nigeria. The result shows a strong positive correlation between artificial intelligence capabilities and sales growth of quoted manufacturing firms in Nigeria (rho = .745**) and the symbol ** indicates that this correlation is significant at 0.01 level. As a result of this, we then reject the null hypothesis (Ho3) and accept the alternate hypothesis. This means that we then accept that there is strong positive and significant relationship between artificial intelligence capabilities and sales growth of quoted manufacturing firms in Nigeria.

Table 4: Result of Bivariate Analysis between Application of Artificial Intelligence Capabilities and Market Share Growth of Quoted Manufacturing Firms

			Artificial Intelligence Capabilities	Market Share Growth
Spearman (rho)	Artificial Intelligence Capabilities	Correlation Coefficient	1.000	.688**
		Sig. (2 tailed)	.	.001
		N	136	136
	Market Share Growth	Correlation Coefficient	.688**	1.000
		Sig. (2 tailed)	.001	.
		N	136	136

**Correlation is significant at 0.01 levels (2 tailed)
*Correlation is significant at 0.05 levels (2 tailed)
Source: SPSS-generated Output

Table 4 shows the result of the bivariate analysis carried out between artificial intelligence capabilities and market share growth of quoted manufacturing firms in Nigeria. The result indicates that artificial intelligence capabilities have a strong positive correlation with market share growth of quoted manufacturing firms in Nigeria (rho = .688**) and the symbol ** indicates that this correlation is significant at 0.01 level. Based on this result, the null hypothesis (Ho4) is rejected and the alternate hypothesis is accepted. This means that we then accept that there is strong positive and significant relationship between artificial intelligence capabilities and market share growth of quoted manufacturing firms in Nigeria.

V. DISCUSSION OF FINDINGS

This study discovered a strong positive and significant relationship between application of artificial intelligence technologies in marketing operations and sales growth of quoted manufacturing firms in Nigeria. This finding was derived from the result of the bivariate analysis carried out on the two variables. The result revealed that the application of artificial intelligence technologies in marketing operations has a strong and positive correlation with sales growth of quoted manufacturing firms in Nigeria (rho = .710**) and this correlation is significant at 0.01 level. Consequently, the null hypothesis (Ho1) was rejected and the alternate hypothesis was accepted. This means we then accepted that there is strong positive and significant relationship between application of artificial intelligence technologies in marketing operations and sales growth of quoted manufacturing firms in Nigeria. This finding is supported by Basri (2020) and Chen (2019) as both studies confirmed that artificial intelligence technologies in advertising and promotional activities increase the level of customer patronage and ensure sales growth of firms.

This study also found a strong positive and significant relationship between application of artificial intelligence technologies in marketing operations and market share growth of quoted manufacturing firms in Nigeria. This finding emerged from the result of the bivariate analysis carried out on the two variables. The result revealed that application of artificial intelligence technologies in marketing operations is strongly and positively correlated to market share growth of quoted manufacturing firms in Nigeria (rho = .622**) and this correlation is significant at 0.01 level. Based on this result, the null hypothesis (Ho2) was rejected and the alternate hypothesis was accepted. This implies that we then accepted that there is strong positive and significant relationship between application of artificial intelligence technologies in marketing operations and market share growth of quoted manufacturing firms in Nigeria. This finding is in line with Zebec and Stemberger (2020)'s proclamation that the application of artificial intelligence technologies in marketing activities of a company would improve the marketing performance of the organization. Alekseeva et al (2020) also agreed with this finding when they revealed that the adoption of artificial intelligence technologies significantly improve the marketing process and increase the market share of a firm.

This study reported a strong positive and significant relationship between artificial intelligence capabilities and sales growth of quoted manufacturing firms in Nigeria. This finding emanated from the result of the bivariate analysis carried out on the two variables. The result showed a strong positive correlation between artificial intelligence capabilities and sales growth of quoted manufacturing firms in Nigeria (rho = .745**) and this correlation is significant at 0.01 level. As a result of this, we then rejected the null hypothesis (Ho3) and accepted the alternate hypothesis. This means that we then accepted that there is strong positive and significant relationship between artificial intelligence capabilities and sales growth of quoted manufacturing firms in Nigeria. This finding is consistent with the research conducted by Chen (2019) which reported that artificial intelligence has the capabilities of improving sales and marketing performance of a firm. Shahid and Li (2019) also agreed with this finding when they stated that the

capabilities of artificial intelligence have been proved within the marketing context in terms of improving marketing performance of firms.

Finally, it was revealed that artificial intelligence capabilities have a strong positive and significant relationship with market share growth of quoted manufacturing firms in Nigeria. This finding emerged from the result of the bivariate analysis carried out on the two variables. The result revealed that indicates that artificial intelligence capabilities have a strong positive correlation with market share growth of quoted manufacturing firms in Nigeria (rho = .688**) and this correlation is significant at 0.01 level. Based on this result, the null hypothesis (Ho4) was rejected and the alternate hypothesis was accepted. This means that we then accepted that there is strong positive and significant relationship between artificial intelligence capabilities and market share growth of quoted manufacturing firms in Nigeria. This finding is supported by Enholm et al (2021) and Mikalef and Gupta (2013) as both studies revealed that artificial intelligence capabilities significantly increase market share of firms.

VI. CONCLUSION

From the forgoing analysis, it is evident that artificial intelligence adoption is capable of improving the marketing performance of quoted manufacturing firms in Nigeria. The empirical results of this study confirmed this as a strong and significant relationship was found between the application of artificial intelligence technologies and sales growth of quoted manufacturing firms in Nigeria. The application of artificial intelligence technologies was also found to be a strong and significant predictor of market share growth of quoted manufacturing firms in Nigeria. The study also confirmed that artificial intelligence capabilities have a strong and significant relationship with sales growth of quoted manufacturing firms in Nigeria. Artificial intelligence capabilities were also reported to be a strong and significant predictor of market share growth of quoted manufacturing firms in Nigeria. Based on these findings, it was concluded that artificial intelligence adoption significantly help to improve the marketing performance of quoted manufacturing firms in Nigeria.

RECOMMENDATIONS

➤ *The following Recommendations are Provided for the Study:*

- That, quoted manufacturing firms in Nigeria especially those that are experiencing poor marketing performance should adopt artificial intelligence in their marketing operations as it would help to improve their marketing performance.
- That, quoted manufacturing firms in Nigeria that are currently experiencing low sales and declining market share should apply artificial intelligence technologies in their advertising and promotional activities as it would help to attract more customers to the firm and increase their sales and market share.

- That, quoted manufacturing firms in Nigeria that are currently experiencing poor marketing performance should leverage on artificial intelligence capabilities as it would help to improve their marketing performance.
- That, quoted manufacturing firms in Nigeria that are experiencing high level of customer defection should apply artificial intelligence technologies in their customer relationship management as it would help to build a long-term relationship with their customers, increase customer loyalty and retention and improve their overall marketing performance.
- Finally, it is recommended that quoted manufacturing firms in Nigeria that are planning to adopt artificial intelligence technologies in their marketing operations should adequately train their IT personnel on the use of these modern devices as this would enable handle these technologies perfectly.

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