

## MACHINE LEARNING AND BUSINESS GROWTH OF MANUFACTURING COMPANIES IN RIVERS STATE

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### ABSTRACT

*This study investigated the effect of machine learning on business growth of manufacturing companies in Rivers State, Nigeria. The explanatory survey research design was adopted for the study. The population of the study comprised of 98 manufacturing companies and the entire population of 98 entities were used as the sample size for the study. The questionnaire was the main instrument used in data collection. 98 copies of the questionnaire were administered to the employees (representatives) of the manufacturing companies and all the copies of the questionnaire were completed and returned. The study employed the descriptive statistics like simple percentages and tables as well as mean and standard deviation to present and analyze the data from the respondents. Regression analysis technique was adopted in testing the hypotheses and it was found that all the machine learning has positive effect on business growth. Based on that, a further analysis was carried out using regression tool and it was discovered that machine learning had positive significant effect on market share, diversification and business expansion of the manufacturing firms that adopted machine learning. It was therefore concluded that machine learning has positive significant effect on business growth of manufacturing companies in Rivers State. Consequently, it was recommended that to improve the market share of manufacturing companies, robotics should be adopted and used in these companies in such areas of manufacturing operations and feedback system.*

**Keywords: Machine Learning, Market Share, Diversification, Business Growth**

### INTRODUCTION

Business organizations are focusing and taking a deeper dive into their data to find new and innovative ways of driving their business growth and competitiveness. The evolutionary advances in science and technology that has warranted the tremendous growth in capacity and improvement in data storage and data processing, particularly in machine learning is affording business organizations the opportunity of adopting larger and more all-inclusive and robust analytical strategies to advance their goals. Hall, Phan and Whitson (2016) opines that a smart phone or an i-phone which could conveniently be inserted into the pocket has more storage and computing power than a mainframe in the 80s, while large amounts of complex and unorganized data that is largely dirty, noisy, or unstructured, is widely available across a nearly infinite network of computing environments. This is especially as industry leaders have been working hard in developing new AI and machine learning technologies over the past decade and thus, Malik and Jeswani (2018) reiterate that many well-known companies are now using Machine learning to optimize business processes in ways that might have been deemed science fiction decades ago.

Obinwa (2017) describes business growth as expanding a firm's products and services or expanding its target markets, or some combination of each. Any increase in the volume of activities of a business is a clear indication of growth. Simply stated, **business growth** means an increase in the size or scale of operations of a firm usually accompanied by an increase in its resources and output. A business that does not grow may in the course of time have to be closed down because of its obsolete products and processes. The market is full of examples of very popular products vanishing from the marketplace for lack of growth plans and strategies. For example, pagers vanished from the market because better technological products i.e. cell phones were introduced and so down the

memory lane from 1980's came Dr Pepper, AfriCola, Canada Dry, Limca, Tandietc featured and fizzled out of the market.

There are good numbers of prior literature, which suggest that artificial intelligence has a link with business growth. Various scholars in existing literature such as Russell and Norvig (2003), McCorduck (2004), and Clark (2015) advocated that artificial intelligence is a veritable tool to achieve growth in business firms. The recognition that artificial intelligence is an investment that must deliver meaningful results is important to all modern businesses to reduce operational costs, increase efficiency, grow revenue and improve customer experience. It is upon this premise that this study is undertaken to investigate the relationship between machine learning and business growth in manufacturing companies in Rivers State.

### **Hypotheses**

H<sub>01</sub>: Machine learning has no significant effect on market share of manufacturing companies in Rivers State.

H<sub>02</sub>: Machine learning has no significant effect on diversification of manufacturing companies in Rivers State.

H<sub>03</sub>: Machine learning has no significant effect on business expansion of manufacturing companies in Rivers State.

### **Conceptual Review**

#### **Machine Learning**

Hall et al (2016) advanced that Machine Learning first appeared in computer science research in the 1950s. The question therefore becomes why, after all these decades, has it become so popular? This is due to the fact that the data storage and data processing capacities have grown tremendously, to the point where it is now profitable for businesses to use machine learning. A smart phone in modern time has more storage and computes power than a mainframe computer in the 80s, and large amounts of complex and unorganized data largely dirty, noisy, or unstructured, is now widely available across a nearly infinite network of computing environments.

Shai and Shai (2014) puts it that the input to a learning algorithm is training data, representing experience, and the output is some expertise, which usually takes the form of another computer program that can perform some task.

In the era of digitalization and big data, the vast amount of information about processes and their environments – even during execution of a process instantly opens new opportunities to foster and improve predictive business process monitoring Di Francescomarino et al (2015). Organizations could make proper use of this fast-growing available amount of data. The idea of using past experiences and historical information for predictions as human beings are used to in a private context can be applied to the field of business processes. To exploit the potential of this data in order to use it for predictions, specific techniques are required (Di Francescomarino et al., 2015). Machine Learning techniques provide the possibility to extract information from raw data which can be used for various purposes (Witten et al., 2011). In this specific context, Machine Learning techniques are used to extract information from process logs of historical process instances, i.e. to discover patterns which make a certain outcome very likely, and subsequently, perform predictions on uncompleted process instances where this pattern has been recognized.

#### **Business Growth**

Growth can occur in many different aspects of a firm's operations, such as its cash flow, net income, customer base, sales, employment, and market share (Murphy, Trailer, & Hill, 1996). Suffice this to say that there is no single overriding measure of new venture growth, as suggested in the study by Gilbert et al (2006) which opines that the most important measures of new venture growth are in terms of sales, employment, and market share.

The business firm however, cannot grow indefinitely. Business growth according to Smith (2015) and Abey (2017) has its own limitations which are:

- **Finance:** Growth, especially external growth, requires additional capital investment which is sometimes difficult for a small firm to arrange.
- **Market:** Growth can be achieved to the extent that the size of market permits. If a firm grows faster than increase in the size of the market, it is likely to face failure.
- **Human Relations Problems:** In a big firm, management loses personal touch with employees and customers. Motivation and morale tend to be low resulting in inefficiency.
- **Management:** Growth increases the functions and complexities of operations. As the number of functions and departments increase, coordination and control become very difficult. If the organization and management structure is not capable of accommodating them, growth may be harmful.
- **Lack of knowledge:** Under conglomerate growth, a firm enters new industries and new markets about which the managers know little. Managers find it difficult to find and develop managers who can quickly handle new units and improve their earning potential against heavy odds. Many growing firms could not succeed because their managers felt that they could manage anything anywhere.
- **Social problems:** From social point of view also big firms may be undesirable as they may lead to concentration of economic power and creation of monopolies which may exploit consumers. In their desire for growth firms indulge in combative advertising. The quickening growth creates a cultural gap when society finds it difficult to cope with technological change.

### **Theory of Socio-Economic Development**

The theory of socio-economic development was propounded by Joseph Alois Schumpeter (1883 - 1950). A renowned economist who ranked amongst the greatest intellectuals of the 20th century. This theory elaborates that in the cyclical development of the economy, long waves, which result in increase in production volumes, higher productivity, improved product quality, lower prices and increase in income is driven by advancement in the technological revolution as part of the socio-economic evolution which consists of an incessant process of creative destruction that modernizes the modus operandi of the society as a whole, including its economic, social, cultural, and political organization. This cyclic development was described by the theorist as "creative destruction", during which there is a continuous updating of the productive apparatus and the transition to a higher stage of development. The major focus of this theory is its main provisions and its relationship with new and emerging markets focusing on both technological and economic evolution. Thus, artificial intelligence which is a trending technology aimed at automating and improving technological advancement of the business to deliver more economic values to the shareholders quickly comes to mind. The socio-economic evolution theory takes a multi-dimensional approach of contemporary society, explaining the principles of operation and the laws of evolution of the economy at all levels. Thus, creating a "synthesized" theoretical system, taking the best from existing modern and past economic thoughts.

New combinations of factors of production are called "innovations". An innovation, according to the theorist, is the basis of a new type of competition, which is much more effective than price competition. Thus, innovations represent an opportunity to change not only the technology and products, but to influence the structure of demand, conditions of formation costs and prices. Creation of a new product: the use of new technologies of production; use the new organization of production; opening new markets and sources of raw materials. Unfortunately, Schumpeter deems innovation as the main cause of economic development which might be distinct from actuality because economic development of a business may not depend on innovations only but also on many other economic and social factors. More so, the theory could be found to be inadequate for

underdeveloped countries as the class of innovators is very small because of the small size of markets and low expectation of profits.

## METHODOLOGY

### Research Design

For the purpose of this study, the explanatory survey research design was adopted.

### Population of the Study

The population for the study comprised of 98 manufacturing companies in Port Harcourt. This is based on information available to the researcher from Manufacturers Association of Nigeria (MAN) membership directory and Nigeria directory as at September, 2019.

### Instrumentation

The questionnaire was the major instrument for data collection.

### Method of Data Analysis

Data was analyzed and interpreted using descriptive statistics such as percentages, mean and standard deviation. In testing the stated hypotheses in this study, regression analysis was adopted by the researcher and the significance of the effect was tested at 5% level of significance. These statistical techniques seem appropriate considering the fact that the nature of the research hypotheses which were intended to measure the relationship or effect of one variable on the other suggests the use of these statistical tools. These analyses were conducted with the aid of the Statistical Package for Social Sciences (SPSS) version 25.

## Results

### Hypothesis one

Machine learning has no significant effect on market share of manufacturing companies in Rivers State.

**Table 1 ANOVA Associated with Simple Regression on the Effect of Machine Learning on Market Share of Manufacturing Companies**

| ANOVA <sup>a</sup> |            |                |    |             |       |                   |
|--------------------|------------|----------------|----|-------------|-------|-------------------|
| Model              |            | Sum of Squares | Df | Mean Square | F     | Sig.              |
| 1                  | Regression | 294.252        | 1  | 294.252     | 3.842 | .007 <sup>b</sup> |
|                    | Residual   | 7361.513       | 96 | 76.582      |       |                   |
|                    | Total      | 7655.765       | 97 |             |       |                   |

a. Dependent Variable: Market Share

b. Predictors: (Constant) Machine Learning

Table 1 indicates that the effect of machine learning on market share in manufacturing companies is significant ( $F = 3.842$ ,  $df = 1, 97$ ,  $p < 0.05$ ). Therefore  $H_0$  is rejected, indicating that machine learning have significant effect on market share in manufacturing companies in Rivers State.

**Table 2 Regression Coefficients<sup>a</sup>**

| Model |                  | Unstandardized Coefficient |           | Standardized Coefficients | T      | Sig  |
|-------|------------------|----------------------------|-----------|---------------------------|--------|------|
|       |                  | $\beta$                    | Std Error | Beta                      |        |      |
| 1     | (Constant)       | 58.305                     | 3.082     |                           | 19.014 | .000 |
|       | Machine Learning | .296                       | .105      | .164                      | 3.121  | .003 |

a. Dependent Variable: Market Share

Table 2 reveals that for every increase by 1 unit in the score on machine learning, there will be an increase of 0.16 unit in market share of manufacturing companies in Rivers State.

**Hypothesis Two**

Machine learning has no significant effect on Diversification of manufacturing companies in Rivers State.

**Table 3 ANOVA Associated with Simple Regression on the Effect on Diversification of Manufacturing Companies**

| ANOVA <sup>a</sup> |            |                |    |             |       |                   |
|--------------------|------------|----------------|----|-------------|-------|-------------------|
| Model              |            | Sum of Squares | Df | Mean Square | F     | Sig.              |
| 1                  | Regression | 308.314        | 1  | 308.314     | 4.172 | .002 <sup>b</sup> |
|                    | Residual   | 7215.122       | 96 | 75.158      |       |                   |
|                    | Total      | 7523.436       | 97 |             |       |                   |

a. Dependent Variable: Diversification

b. Predictors: (Constant) Machine Learning

Table 3 reveals that the effect of machine learning on diversification in manufacturing companies is significant (F = 4.172, df = 1, 97, p < 0.05). Therefore, H<sub>05</sub> is rejected, indicating that machine learning have significant effect on diversification in manufacturing companies in Rivers State.

**Table 4 Regression Coefficients<sup>a</sup>**

| Model |                  | Unstandardized Coefficient |           | Standardized Coefficients | T      | Sig  |
|-------|------------------|----------------------------|-----------|---------------------------|--------|------|
|       |                  | $\beta$                    | Std Error | Beta                      |        |      |
| 1     | (Constant)       | 64.107                     | 3.216     |                           | 20.342 | .000 |
|       | Machine Learning | .312                       | .113      | .167                      | 3.411  | .002 |

a. Dependent Variable: Diversification

Table 4 indicates that for every increase by 1 unit in the score on business expansion, there will be an increase of 0.17 unit in diversification of manufacturing companies in Rivers State.

**Hypothesis Three**

Machine learning has no significant effect on business expansion of manufacturing companies in Rivers State.

**Table 5: ANOVA Associated with Simple Regression on the Effect of Machine Learning on Business Expansion of Manufacturing Companies**

| ANOVA <sup>a</sup> |            |                |    |             |       |                   |
|--------------------|------------|----------------|----|-------------|-------|-------------------|
| Model              |            | Sum of Squares | Df | Mean Square | F     | Sig.              |
| 1                  | Regression | 344.724        | 1  | 344.724     | 4.870 | .001 <sup>b</sup> |
|                    | Residual   | 6894.126       | 96 | 71.814      |       |                   |
|                    | Total      | 7238.850       | 97 |             |       |                   |

a. Dependent Variable: Business Expansion

b. Predictors: (Constant) Machine Learning

Table 5 shows that the effect of machine learning on business expansion in manufacturing companies is significant (F = 4.870, df = 1, 97, p < 0.05). Therefore, H<sub>06</sub> is rejected, indicating that machine learning have significant effect on business expansion in manufacturing companies in Rivers State.

**Table 6 Regression Coefficients<sup>a</sup>**

| Model            | Unstandardized Coefficient |           | Standardized Coefficients | T      | Sig  |
|------------------|----------------------------|-----------|---------------------------|--------|------|
|                  | $\beta$                    | Std Error | Beta                      |        |      |
| 1 (Constant)     | 65.311                     | 2.432     |                           | 25.549 | .000 |
| Machine Learning | .334                       | .049      | .327                      | 3.683  | .002 |

a. Dependent Variable: Business Expansion

Table 6 shows that for every increase by 1 unit in the score on machine learning, there will be an increase of 0.33 unit in business expansion of manufacturing companies in Rivers State.

## CONCLUSION

An appraisal of the effect of machine learning on business growth of manufacturing companies in Rivers State was undertaken using primary data. The objectives of the study sought to establish the effects of machine learning on the measures of the dependent variable. Hence, the study concluded that machine learning has positive significant effect on business growth of manufacturing companies in Rivers State Nigeria.

## RECOMMENDATIONS

1. Manufacturing companies should promote the use of Machine Learning in picking up cyber security threats, detecting manufacturing hitches as well as fraud as this will help improve their market share through customers patronage and business growth.
2. In order to ensure quality of products, manufacturing companies should adopt data mining which will improve their performance, help to diversify and increase their market share as well as improve growth of their business.
3. Government should work with the various industries and experts to establish AI Council to help coordinate and grow AI in Nigeria.

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