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DATA MINING AND BUSINESS GROWTH OF MANUFACTURING COMPANIES IN RIVERS STATE

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ABSTRACT

This study investigated the effect of data mining 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 robotic has positive effect on business growth. Based on that, a further analysis was carried out using regression tool and it was discovered that data mining has positive significant effect on market share, diversification and business expansion of the manufacturing firms that adopted data mining. It was therefore concluded that data mining 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, data mining should be adopted and used in these companies in such areas of manufacturing operations and feedback system.

Keywords: Data Mining, Market Share, Diversification, Business Growth

INTRODUCTION

Knowledge is the most valuable asset of a manufacturing enterprise, as it enables a business to differentiate itself from competitors and to compete efficiently and effectively to the best of its ability and knowledge exists in all business functions, including purchasing, marketing, design, production, maintenance and distribution, but knowledge can be notoriously difficult to identify, capture, and manage (Harding & Kusiak 2006). Knowledge can be as simple as knowing who is best to contact when a specific material is becoming short or can be as complex as mathematical. The advancements in Information Technology (IT), data acquisition systems, storage technology and the developments in machine learning tools have enticed researchers to take steps towards discovering knowledge from databases (KDD) Data from almost all the processes of the organization such as product and process design, material planning and control, assembling, scheduling, maintenance, recycling, etc., are recorded. These data stores consequently, offer enormous potentials as sources of new knowledge. Making use of collected data is becoming an issue and data mining has positioned itself as a natural solution for converting the data into useful knowledge. The extracted knowledge can be used to model, classify, and make predictions for numerous applications and therefore creating much value for the business. Data mining has been attracting a significant interest and amount of research, media and various industry attention in recent years. Across a wide variety of fields, data are being collected and accumulated at a dramatic pace with supersonic speed. Business growth is a natural process of adaptation and development that occurs under favorable conditions. The growth of a business firm is similar to that of a human being who passes through the stages of infancy, childhood, adulthood and maturity. Many business firms started small and have become big through continuous growth. However, business growth is not a homogeneous process. The rate and pattern of growth varies from firm to firm. As a matter of fact, growth is precondition for the survival of a business firm.

An enterprise that does not grow may in course of time have to be closed down because of its obsolete products. The market is full of examples of very popular products disappearing from the scene for lack of growth plans. For example, pagers vanished from the market because better technology product i.e. cell phones were introduced (Abey 2017). 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 datamining and business growth in manufacturing companies in Rivers State.

Hypotheses

H_{01}: Data mining has no significant effect on market share of manufacturing companies in Rivers State.

H_{02}: Data mining has no significant effect on diversification of manufacturing companies in Rivers State.

H_{03}: Data mining has no significant effect on business expansion of manufacturing companies in Rivers State.

Conceptual Review

Data Mining

The encyclopedia Britannica advance that data mining, also called knowledge discovery in databases (KDD) is the process of discovering interesting and useful patterns and relationships in large volumes of data. It is an interdisciplinary subfield of computer science and statistics combining tools from these fields with database management to analyze large digital collections with an objective of extracting information (with intelligent methods) from data sets and transforming the information into a comprehensible structure for further use. It is also, the analysis step of the "knowledge discovery in databases" process. Beyond the raw analysis step, data mining also involves database and data management aspects, data pre-processing, model and inference considerations, interestingness metrics, complexity considerations, post-processing of discovered structures, visualization, and online updating. There are many definitions of the data mining method, which is often used by data analysts. According to Kleinber and Zeileis (2008), data mining is "an interesting pattern extraction process from the raw data". According to the Gartner Group (2007), data mining is the process of "discovering new correlations, patterns and trends that are meaningful by passing a large number of data stored in a vault". According to Fayyad (2011), data mining is "a systematic process that is a step in the process of information discovery and is based on algorithms to produce patterns and data analysis applications". According to another definition, data mining is the process of accessing valuable information among the mass data collected by the enterprises. In other words, data mining is the process used to extract usable data from a larger set of any raw data. It implies analysing data patterns in large batches of data. The Wikipedia posit that data mining is a buzzword and is frequently applied to any form of large-scale data or information processing(collection, extraction, warehousing, analysis, and statistics) as well as any application of computer decision support system, including artificial intelligence (e.g., machine learning) and business intelligence. From a comparatively unknown technique, adopted by some credit institutions and retailers, data mining has developed into a billion-dollar business. Banks use data mining to define the credit worthiness of their applicants, retailers adopt it to choose the optimal layout for their shops and insurance companies rely on DM to recognize possible fake or fraudulent claims (Huysmans et al 2005). DM has also found numerous applications in banking, finance, marketing and telecommunication and the few

areas in which data mining is used for strategic benefits are direct marketing, trend analysis and fraud detection (Groth, 1998; Cabena et al., 1998).

Business Growth

In explaining the pattern of business growth, many theories rely on "the life-cycle approach. This approach posits that just as humans pass through stages of physiological and psychological development from infancy to adulthood, businesses also evolve in predictable ways and encounter similar problems in their growth" (Bhide, 2000). It is proposed that businesses pass through infancy, growth, maturity and then decline or even close shop. Some scholars suggest more or fewer stages of development. However, there is no consensus on the number of stages, nor on how they are related. Moreover, the proposition that all businesses follow the set sequence is not at all supported by the empirical evidence. The main issue is that companies are started at one point and they need to be nurtured and managed to grow bigger and bigger. There are companies around the world that survive decades or centuries. The question is why do some businesses survive and grow while others do not? Researchers have shown that more than half of all businesses fail in less than two years of commencement. Also, a large number of those businesses that survive the first two years hardly grow. It is only few businesses that survive, grow, regenerate and even create other businesses. Conventionally, people ascribe businesses success or failures to fate/chance or certain environmental conditions including family background. Even though one could not entirely rule out the influence of changes in the environmental factors, the entrepreneur's positive attitude, discipline, skills, competences, resilience and experience are real factors determining the transition of an enterprise form state up to a fully grow or diversifies venture (Abey, 2017).

Unifying Grand Theory

In the 1950s and ’60s, artificial intelligence researchers saw themselves as trying to uncover the rules of thought. But those rules turned out to be more complicated than anyone had imagined. Since then, artificial-intelligence (AI) research has come to rely, instead, on probabilities - statistical patterns that computers can learn from large sets of training data (Wang 2012).

The probabilistic approach has been responsible for most of the recent progress in artificial intelligence, such as voice recognition systems, or the system that recommends movies to Netflix subscribers. In 2011 Noah Goodman, an MIT research scientist, developed the unifying grand theory and posits that artificial intelligence researchers in the late 1950s and early 1960s gave up too much when it gave up rules. Noah Goodman, therefore combined the old rule-based systems with insights from the new probabilistic systems, and modeled thought that could have broad implications for both AI and cognitive science. According to him, early AI researchers saw thinking as logical inference: if you know that birds can fly and are told that the waxwing is a bird, you can infer that waxwings can fly. One of AI’s first projects was the development of a mathematical language - much like a computer language - in which researchers could encode assertions like “birds can fly” and “waxwings are birds.” If the language was rigorous enough, computer algorithms would be able to comb through assertions written in it and calculate all the logically valid inferences. Once they’d developed such languages, AI researchers started using them to encode lots of commonsense assertions, which they stored in huge databases (Larry, 2010). Although this theory was based on assumption and inferences, these could be wrong and could be counterproductive. This could be likened to assume that whatever has a big engine and can run on the runway with a metal body can fly. A helicopter can run on the runway and do have a metal body just like a car. Whereas a helicopter can fly, a car cannot. Therefore, to assume that whatever could rummage through large volumes of data can dutifully convert the data into valuable data for an organization may be wrong and could lead the organization into losses that may make the firm difficult to survive. This theory is critical for this study due to the fact that one of our Artificial Intelligence (AI) variables is ML which searches through volumes of data to establish

predictable patterns and be able to make assumptions that will guide business decisions for the business.

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

Data mining has no significant effect on market share of manufacturing companies in Rivers State.

Table 1: ANOVA Associated with Simple Regression on the Effect of Data Mining on Marketing Share of Manufacturing Companies

ANOVA[a]

Model		Sum of Squares	Df	Mean Square	F	Sig.
1	Regression	385.321	1	385.321	4.974	.002[b]
	Residual	6765.042	96	77.469		
	Total	7150.363	97			

a. Dependent Variable: Market Share
b. Predictors: (Constant) Data Mining

Table 1 shows that the effect of data mining on market share in manufacturing companies in Rivers State is significant ($F = 4.974$, $df = 1, 97$, $p < 0.05$). Therefore, $H0_7$ is rejected, indicating that data mining have significant effect on market share in manufacturing companies in Rivers State.

Table 2 Regression Coefficients[a]

Model		Unstandardized Coefficient		Standardized Coefficients	T	Sig
		β	Std Error	Beta		
1	(Constant)	68.004	2.112		28.046	.000
	Data Mining	.338	.044	.454	3.691	.002

a. Dependent Variable: Market Share

Table 2 indicates that for every increase by 1 unit in the score on data mining, there will be an increase of 0.45 unit in market share of manufacturing companies in Rivers State.

Hypothesis Two

Data mining has no significant effect on Diversification of Manufacturing Companies in Rivers State.

Table 2: ANOVA Associated with Simple Regression on the Effect of Data Mining on Diversification of Manufacturing Companies

ANOVA[a]

Model		Sum of Squares	Df	Mean Square	F	Sig.
1	Regression	398.433	1	398.433	5.731	.002[b]
	Residual	6674.218	96	69.523		
	Total	7072.651	97			

a. Dependent Variable: Diversification
b. Predictors: (Constant) Data Mining

Table 3 indicates that the effect of data mining on Diversification in manufacturing companies in Rivers State is significant ($F = 5.731$, $df = 1, 97$, $p < 0.05$). Therefore, $H0_8$ is rejected, indicating that data mining have significant effect on diversification in manufacturing companies in Rivers State.

Table 4 Regression Coefficients[a]

Model		Unstandardized Coefficient		Standardized Coefficients	T	Sig
		β	Std Error	Beta		
1	(Constant)	69.314	2.013		30.152	.000
	Data Mining	.341	.041	.458	3.711	.002

a. Dependent Variable: Diversification
Table 4 shows that for every increase by 1 unit in the score on data mining, there will be an increase of 0.46 units in diversification of manufacturing companies in Rivers State.

Hypothesis Three
Data mining has no significant effect on business expansion of manufacturing companies in Rivers State.

Table 5: ANOVA Associated with Simple Regression on the Effect of data mining on Business Growth of Manufacturing Companies

ANOVA[a]

Model		Sum of Squares	Df	Mean Square	F	Sig.
1	Regression	379.603	1	379.603	4.574	.002[b]
	Residual	7997.864	96	83.311		
	Total	7223.467	97			

a. Dependent Variable: Business Growth
b. Predictors: (Constant) Data Mining

Table 5 reveals that the effect of data mining on business growth of manufacturing companies in Rivers State is significant ($F = 4.574$, $df = 1, 97$, $p < 0.05$). Therefore, $H0_9$ is rejected, indicating that data mining have significant effect on business growth of manufacturing companies in Rivers State.

Table 6 Regression Coefficients[a]

Model		Unstandardized Coefficient		Standardized Coefficients	T	Sig
		β	Std Error	Beta		
1	(Constant)	66.416	2.075		27.132	.000
	Data Mining	.337	.062	.452	.389	.002

a. Dependent Variable: Business Growth

Table 6 shows that for every increase by 1 unit in the score on data mining, there will be an increase of 0.45 units in business growth of manufacturing companies in Rivers State.

CONCLUSION

An appraisal of the effect of data mining 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 data mining on the measures of the dependent variable. The analysis revealed that data mining has effect on measures of the dependent. Hence, the study concluded that data mining has positive significant effect on business growth of manufacturing companies in Rivers State Nigeria.

RECOMMENDATIONS

Sequel to the findings and conclusion, the following recommendations were made.

1. To improve the market share of manufacturing companies, Artificial Intelligence should be adopted and used in the manufacturing companies to enhance operations, design and the production system.
2. 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.
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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