Academic Scholars Publishing League (ASPL)
International Journal of Scholarly & Educational Research in Africa
ISSN: 2360-9981 | Volume 13, Issue 9 | July, 2024| pages 52 – 61
DOI: 7360-983-3-1396
arcnjournals@gmail.com
https://arcnjournals.org

Prescriptive Big Data Analytics and Organizational Performance of Deposit Money Banks (DMBs) in Rivers State, Nigeria

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Abstract: *This paper surveyed prescriptive big data analytics and performance of deposit money banks (DMBs) in Rivers State, Nigeria. Prescriptive big data analytics is described as rich data (structured, semi-structured and unstructured) analytical tool that enhanced effective decision taken in organizations. It is available in real time for users to explore the hidden details of data mined from distributed databases and data warehouses. The 21st century bank operates on a global scale as such the traditional tool or relational databases or data warehouses can no longer solve the current problems facing the banking industries. The cross sectional survey research design was adopted because of the nature of the nature of the study that requires data collection from the respondents. The population of the study consisted of the twenty two (22) deposit money banks in, Rivers State, Nigeria. Simple random sampling technique was used to select a total of one hundred and sixty eight (168) respondents from the population members which constitutes the sample size of the study. Also, structure questionnaire was designed on a 4-point Likert scale for effective data collection and analysis and simple linear regression analysis (parametric statistics) was used for the test of hypothesis (bivariate variables). The major findings revealed that there is significant linear relationship between prescriptive big data analytics and organizational performance of deposit money banks (DMBs) in Rivers State, Nigeria. It was concluded that big data analytics enhanced customers' satisfaction and return-on-investment (ROI) of deposit money banks in Rivers State, Nigeria. Therefore, organizations that desire to satisfy their customers and want to increase their returned-on-investment (ROI) should integrate prescriptive big data analytics in their management information system.*

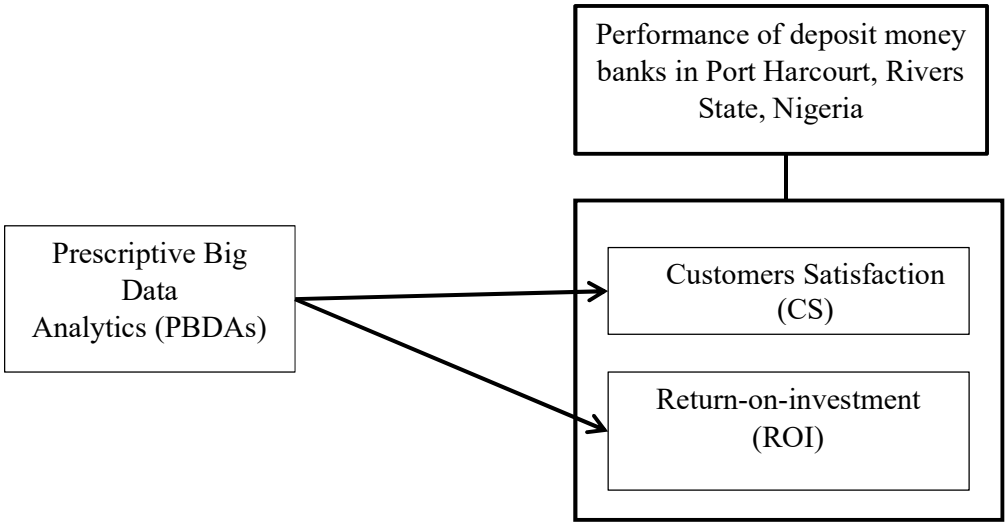
Keywords: *Big data analytics, Prescriptive analytics, Customers satisfaction and return-on-investment.*

INTRODUCTION

The last stage of big data analytics is the prescriptive analytics, its major objective to prescribe what actions to be taken out of the numerous potential outcomes of predictive analytics (Lawler & Joseph, 2017). Prescriptive analytics come into play when organization has too many alternatives to take definite decision (Chen & Zhang, 2014). It addresses the question of what should be done, it potentials has been applied in many decision making concept, in transportation, manufacturing, servicing organization etc. (Chen & Zhang, 2014). It is viewed as a recommender system for management and customers. The world today is moving towards the next generation of recommender system which provides better insight in data analysis and data visualization (Adomavisins, & Tuzhilin, 2005). The introduction of Internet of Things has made it difficult for organization to analyze the high volume, high velocity and varieties of data with the traditional or relational databases (Bestman & Dick, 2020). Decision making is a key factor in strategic management especially when it has to do with the financial institutions. Prescriptive big data analytics is capable of identifying the benefits of the predicted data in real time for management to take accurate decisions (Toader et al., 2018).

Conceptual Framework

The conceptualization of this topic prescriptive big data analytics and performance of deposit money banks (DMBs) in Rivers State was based on the work of different scholars who have done related work in this area. Prescriptive big data analytics (PBDA) and organizational performance of Deposit Money Banks (DMBs) in Rivers State is a necessary end to proffer solution to deposit money banks especially in a global economy. The dimension prescriptive big data analytics measures customers' satisfaction and return-on-investment of deposit money banks in Rivers State, Nigeria.



Source: (*Sofiaya & Aishwarya, 2015;* Hammami & Smida, 2022*)*

Big data analytics

Riahi and Riahi (2018) describe big data not only by the amount of information but also its variety and complexity as well as the speed by which the data has to be analyzed or delivered. Ingram Micro Advisor (2018) distinguishes big data from congenital (disorderliness) data with its three 3Vs, namely; Volume, Velocity and Varieties. The quantity of analyzed data exceeds the capability of conventional analytics and statistical modeling tools (Chen & Zhang, 2014). A study on big data analytics and performance by Ikegwuru and Acee-Eke (2020) reveal that the rudiments of big data analytics significantly envisage performance.

Prescriptive Analytics

The last stage of analytics is the prescriptive analytics, the objective is to prescribe what actions to take so that a potential issue can be eliminated and a promising trend can be fully utilized, example of prescriptive analytics is that of large-scale IoT surveillance system that can timely prevent the occurrence of large queue in banks and possible internet fraud online (Lawler & Joseph, 2017). It comes into play when organization (Deposit Money Banks) has too many alternatives to take definite decision on (Chen & Zhang, 2014). It is the fourth dimension after considering descriptive, diagnostic and predictive analytics. Prescriptive analytics is normative, addressing the question of what should be done. It is used in many decision making concept in transportation, manufacturing, servicing organization. For example, one

may determine the maximum number of visit within a specified period and value added to the bank (profitability). The banking sectors has gone beyond the ordinary banking system to a personalized banking and evidence-based customers focus, these are both supported by prescriptive analytics (Chen & Zhang, 2014).

Prescriptive analytics divulges "what actions should be taken to maximize good outcomes, and minimize bad outcomes," within a giving period of time. Essentially, prescriptive analytics is concerned with "deterministic and stochastic optimization to support better decision making" (Haas et al., 2011). This is a very valuable analytics type, although quite difficult to implement. Prescriptive analytics involves deriving optimal planning decisions given the predicted future and addressing questions such as "what shall we do?" and "why we shall implement the action?" (Evans, 2012).

Banks' Performance

Performance is the magnitude to which organization meet their specified objectives (Ikegwuru & Pokubo, 2019). This is because enhancement of performance in an organization is an uninterrupted route that have necessitated a particular performance measurement system (Ikegwuru & Harcourt, 2018). Organizational performance described the health of a firm as an outcome of business activities and programmes, and in reference to stated objectives or compared to the health of competing firms (Ateke & Nwulu, 2017). It is an indication of the level to which the firm achieves its selected objectives. Daft (1991, as cited in Ateke & Simeon, 2018) states that business performance is a measure of how well a firm achieves its set goals by optimizing scarce resources, and by undertaking activities designed to better their lot.

Organizational performance measurement systems are important to evaluating the accomplishments of firms' goals (Osiegbu & Onuorah, 2018). Deposit money bank performance measurement is based on financial and non-financial output, including customer satisfaction, efficiency, profitability, capital adequacy, asset quality, growth and market value (Senyo, Liu & Effah, 2019).). Taking a cue from Islam (2014) and Olubukunola et al. (2012), this study adopts customer satisfaction and ROI as indicators of banks' performance.

Customer satisfaction

Customer satisfaction is rooted in the expectation-confirmation paradigm, and is taken to mean customers' positive assessment of their purchase and consumption experience (Buttle, 1995, as cited in Amangala & Ateke, 2018). It is also individuals' feeling of pleasure, which emanates from a comparison of product's perceived performance in relation to expected (or promised) performance levels. Customer satisfaction stems from multiple psychological, social and situational variables (Lynn, 2002). Fodness and Murray (2007) argued that the perception of satisfaction is influenced by ideal, expected and promised standards, as well as perceived value of competitor's offerings. Satisfied customers are easier to retain; they become loyalty and improves firms' market share (Martey, 2015, as cited in Amangala & Ateke, 2018).

In view of the valence of customer satisfaction, it will be proper to adduce that rather, than focusing on profitability, firms, especially banks, should focus on customer satisfaction. This is based on the conviction that customer satisfaction is the purveyor of all other indicators of

performance (Kulik, 2017; Lynn, 2002). Predictive BDA as a real time tool is capable of attending to customers in real time and distribute funds to enable customers to meet their individual and corporate objectives; it is a necessity for banks in Rivers State, Nigeria. Predictive BDA develops several delivery systems that eliminate overlapping offices and other duplicative resources and services (Osiegbu & Onuorah, 2018). It thus minimizes cost, increase earnings, satisfy customers and improve analytical insight (Warimegbe et al., 2018).

Return-on-investment (ROI)

ROI is a performance tool used to evaluate the profitability of an investment or compare the efficiency of a number of different investments (Botchkarev, 2015). It measures the direct amount of return on a product, relative to its investment cost. ROI is also used to forecasts financial returns or profit from an investment (Botchkarev, 2015). According to Hassanzadel and Bigdeli (2018), ROI is the ratio of gains from investment and is normally used to measure the performance and to evaluate the efficiency of an investment. It gives a better picture of how efficiently the firm is using capital that has been invested to generate income (Mahmouh & Amir, 2014). This enables investors and creditors to decide the right products and services to invest their limited resources (Minnis & Shroff, 2017; Hewko, 2016).

METHODOLOGY

The research design adopted in this study is the cross-sectional survey design. Structured questionnaire was designed based on the current trend on predictive BDA and performance of deposit money banks in Rivers State, Nigeria. The respondents were selected from 21 DMBs in Rivers State, Nigeria, using simple random sampling techniques. The data collected entailed demographic profiles and data on descriptive and diagnostics BDA and banks' performance. The linear regression statistic was used for data analyses.

DATA ANALYSES, RESULTS AND INTERPRETATION

Table 1: Descriptive statistics on prescriptive big data analytics

Questions/Likert Scale	N	Min.	Max.	Sum	Mean ($\bar{x}$)	Std. Deviation
To what extent does your bank able to carry out personalized banking system?	150	1.00	4.00	467.00	3.1133	.84771
To what extent does management able to take the best action out of possible outcome?	150	1.00	4.00	454.00	3.0267	.91920
To what extent are you able to provide management with information that will help in taking timely and accurate decision?	150	1.00	4.00	442.00	2.9037	.93388
To what extent does your system able to automate decision based on customers operation (feedback)?	150	1.00	4.00	501.00	3.3000	.90162
To what extent are you able to select the best action from possible multiple alternative?	150	1.00	4.00	467.00	3.1033	.82371
Valid N (listwise)	150					

Source: Research survey, 2024.

The value of the mean in the table greater than the criterion mean of 2.50 for a 4-point Likert Scale showed that the respondents understand the important of prescriptive big data analytics to the deposit money banks in terms of decision taking.

Table 2: Descriptive statistics on customer satisfaction

Questions/Likert Scale	N	Sum	Mean	Std. Dev.
To what extent does your bank considered customers' satisfaction more important than just to make profit?	150	467.00	2.9133	.81771
To what extent does your bank able to provide technical efficiency on specific customers especially in critical time (when faced with problem)?	150	454.00	3.0237	.91320
To what extent does your bank able to define employee functions that will eliminate overlapping offices (functions)?	150	442.00	2.9467	.95388
To what extent does your customers appreciates the level of your service and are willing to continue with your bank?	150	501.00	3.3400	.92562
To what extent does your bank able to measure customers' satisfaction using feedback mechanism?	150	467.00	3.1133	.84771
Valid N (listwise)	150			

Source: Research survey, 2024.

Table 2 showed that the respondents considered customers' satisfaction more important than just to make profit, with the application of prescriptive big data analytics, customers problems are solved in real time.

Table 3: Respondents rate on Return-on-Investment (ROI)

Questions/Likert Scale	N	Min.	Mean	Std. Dev.
To what extent is your organization able to evaluate the efficiency of profitability of an investment or compare the efficiency of a number of different banks product	150	1.00	3.1133	.84771
To what extent are the investors and creditors willing to invest their limited resources with your bank?	150	1.00	3.0267	.91920
To what extent does your bank able to formulate policies that addresses the national economy?	150	1.00	2.8367	.84388
How effective are the logical implementation of diagnostic big data analytic that will enhance the effective measurement of ROI?	150	1.00	3.1133	.84771
To what extent does your bank able to adopt ROI in other area of investment?	150	1.00	3.3000	.92442
Valid N (listwise)	150			

Source: Research survey, 2024.

Table 3 showed that the banks are aware of the new technology and it has been logically integrated into the organization as indicated on the table with the various mean above the criterion mean of 2.50 for a 4-point Likert scale.

Bivariate Analysis

The bivariate analysis is used to determine how prescriptive big data analytics enhanced the performance of deposit money banks (DMBs) in Rivers State.

Table 4a: Model summary of prescriptive analytics and customers' satisfaction

Model	R	R Square	Adjusted R Square	Std. Error of the Estimate
1	.908[a]	.824	.823	.000

a. Predictors: (Constant), Prescriptive analytics

Source: Research survey, 2024.

Table 4b: ANOVA of prescriptive analytics and customers satisfaction

Model		Sum of Squares	Df	Mean Square	F	Sig.
1	Regression	669.557	1	669.557	552.723.	.000[b]
	Residual	142.943	118	1.211		
	Total	812.500	119			

a. Dependent Variable: Customers satisfaction

b. Predictors: (Constant), Prescriptive

Source: Research survey, 2024.

Table 4c: Coefficients of prescriptive analytics and customers' satisfaction

Model		Unstandardized Coefficients		Standardized Coefficients	T	Sig.
		B	Std. Error	Beta		
1	(Constant)	2.165	.358		6.041	.000
	Prescriptive analytics	.786	.033	.908	23.510	.000

a. Dependent Variable: Customers satisfaction

Source: Research survey, 2024.

The model summary in table 4a showed the effect of prescriptive analytics on customers satisfaction of deposit money banks in Rivers State with coefficient of correlation (R = 0.908) and R^2 = 0.824 indicating 82.4% (percent) contribution of prescriptive analytics to customers satisfaction. The ANOVA table 4b showed that prescriptive analytics is fit as a dimension of big data analytics for prescribing solutions to customers satisfaction of deposit money banks in Rivers State, Nigeria with (p = 0.000 < 0.05), 95% level of freedom. Also, in the coefficients table 4c, B = 0.786 and (p= 0.000 < 0.05), 95% level of freedom. This showed that prescriptive big data analytics significantly enhanced customers' satisfaction of deposit money banks in Rivers State, Nigeria.

Table 5a: Model summary of prescriptive big data analytics and return-on-investment

Model	R	R Square	Adjusted R Square	Std. Error of the Estimate
1	.836[a]	.698	.696	.000

a. Predictors: (Constant), Prescriptive big data analytics

Source: Research survey, 2024.

Table 5b: ANOVA of prescriptive big data analytics and return-on-investment

Model		Sum of Squares	Df	Mean Square	F	Sig.
1	Regression	567.199	1	567.199	272.846.	.000[b]
	Residual	245.301	118	2.079		
	Total	812.500	119			

a. Dependent Variable: Return-on-investment

b. Predictors: (Constant), Prescriptive big data analytics

Source: Research survey, 2024.

Table 5c: Coefficients of prescriptive big data analytics and return-on-investment

Model		Unstandardized Coefficients		Standardized Coefficients	t	Sig.
		B	Std. Error	Beta		
1	(Constant)	2.524	.486		5.195	.000
	Prescriptive analytics	.736	.045	.836	16.518	.000

a. Dependent Variable: Return-on-investment

Source: Research survey, 2024.

The model summary in table 5a showed the effect of prescriptive analytics on the return-on-investment of deposit money banks in Rivers State with coefficient of correlation (R = 0.836) and R^2 = 0.698 indicating 69.8% contribution of prescriptive analytics to return-on-investment of deposit money banks in Rivers State, Nigeria. The ANOVA table 5b showed that prescriptive big data analytics is fit as a dimension of big data analytics for prescribing solution to return-on-investment of deposit money banks in Rivers State, Nigeria with (p = 0.000 < 0.05), 95% level of freedom. Also, the coefficient table 5c, B = 0.736 and (p= 0.000 < 0.05), 95% level of freedom. This showed that prescriptive big data analytics significantly enhanced the customer's satisfaction and return-on-investment of deposit money banks in Rivers State, Nigeria.

CONCLUSION AND RECOMMENDATIONS

Prescriptive big data analytics is a timely intervention tool that enables management to choose the best decision out of the numerous potential outcomes. Banks that effectively integrate this tool in their management information systems stands the change of enhancing customers satisfaction and high return-on-investment. Therefore, it is imperative that DMBs in Rivers State fully implement prescriptive BDA if they seek to improve their performance in terms of increase customers' satisfaction ratings and improved ROI having understood the danger of wrong decision taking in organizations.

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