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

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Abstract: *Data analytics is the new concept in information management. Big data uses applications, sensors, cameras and databases to capture data/information in real time. Analytics is important to review the hidden patterns in database and data warehouses. Predictive big data analytics enables management of deposit money banks to forecast the behaviors of customers in terms of customer's satisfaction and also increase returns on return-on-investment. It is third stage of big data analytics after descriptive and diagnostics analytics. It helps management to forecast the contribution of every little increase in investment. This study examined predictive big data analytics and organizational performance of deposit money banks in Rivers State, Nigeria. The study adopted the cross-sectional survey design. For effective data collection and analysis, structured questionnaire was used to collect data from respondents while linear regression analysis was used as the test statistic. The population of the study comprised of twenty (21) deposit money banks in Rivers State, Nigeria. A total of one hundred and sixty-eight (168) respondents were drawn from the study population using simple random sampling techniques. However, final data analyses were based on 150 retrieved questionnaires. The study found that predictive big data analytics revealed the level of customer's satisfaction and the contribution of each banks product contributed to return-on-investment (ROI). The study showed that predictive big data analytics is an essential indicator for predicting organizational performance especially in deposit money banks in Rivers State, Nigeria and therefore recommended that deposit money banks in Rivers State that are desiring to know the products and services that will enhance customers satisfaction and increase return-on-investment should integrate predictive big data analytics in their information management system.*

Keywords: *E Big data analytics, predictive analytics, customers' satisfaction and return-on-investment.*

INTRODUCTION

The business environment today is dynamic; it is difficult to understand customers' behavior with the traditional tool. The introduction of information and communication technology has placed high demand from customers on the organization. The economic today is described as global economic and it is a global system where competition is high. Only organizations that are able to embrace the new technology stand the changes of reaching out to the global market. Predictive big data analytics solve the changes posed by the high volumes, velocity, varieties (3Vs) of the organizations are facing today. It is quite unfortunate that in spite of these benefits, many of the

deposit money banks in River State, Nigeria still don't understand or familiar with this tool. Predictive big analytics enable management to an insight of the development in the area of data analytics. There are basically four stages of big data analytics; descriptive, diagnostics, predictive and prescriptive analytics. Predictive big data analytics is the third stage of analytics after descriptive and diagnostics analytics (Rustagi & Goel, 2022 Descriptive analytics described historical data from the field using statistical tool such as text, graph tables, maps etc. (Opara & Dick, 2020), while diagnostics analytics investigate into while things an event happened based on descriptive information (Dick, Elekwachi & Wosu, 2023). Predictive analytics leverage on the data from descriptive and diagnostic analytics to predict future events or events in the near future (Delen & Ram. 2018). Before this time deposit money banks relied on the traditional method of forecasting. This is no longer possible in a global economy where data created or available for processing exist in different structure. Business now uses structured, semi structure and unstructured (text, graphs, map, pictures etc.) data that the relational databases and data warehouses find it difficult to handle (Bestman & Dick, 2020). Predictive big data analytics is a real time tool that is able to provide solution or output in real time or demand (Selvaraj & Marudappa, 2018).

As information communication technology research, it is underpinned in Absorptive capacity theory propounded by Cohen and Levinthal in 1989. Cohen and Levinthal in 1989 first coined the term; absorptive capacity as "the ability of a firm to recognise the value of new technology, capture external and internal information, assimilates it, and apply it to commercial ends". They claimed that this was critical for innovativeness. In 1990 they summarized their article from the individual learning context to organizational context. The article identified that principle guiding knowledge which tends to enhance subsequent learning because memory is associative. At the organizational level they see the acquisition of new knowledge as being mediated by individual gatekeepers and boundary-spanners, and ideally distributed around the organization and possessing diverse expertise and contacts. Over the years the concept has gained popularities in the information system research. Zahra and George (2002) updated it by providing four construct, Acquisition, Assimilation, Transformation and Application. This theory today plays a critical role in Big Data capability literature (Candice & Brian, 2020).

Conceptual Framework

The conceptualization of this topic predictive 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. Predictive 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 predictive big data analytics measures customers' satisfaction and return-on-investment of deposit money banks in Rivers State, Nigeria.

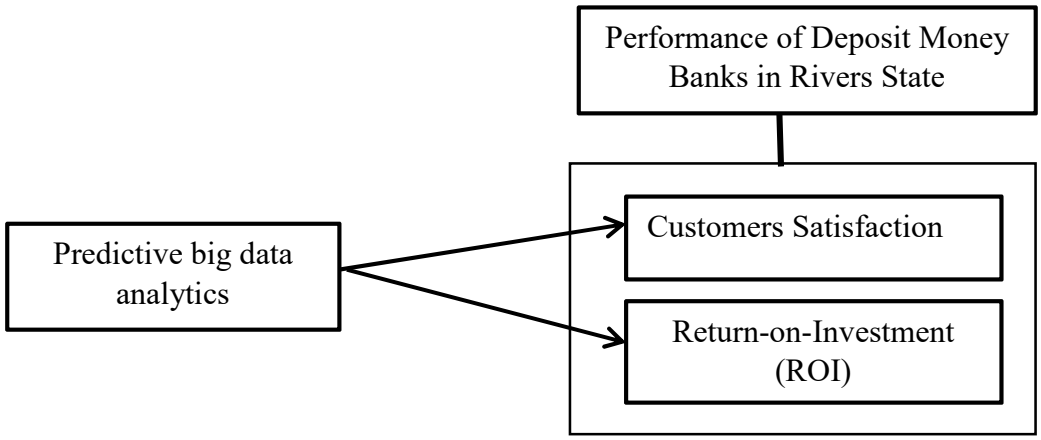

Figure 1: Predictive big data analytics and performance of deposit money banks in Rivers State, Nigeria.

Predictive Big Data Analytics (BDA)

Predictive big data analytics is the combination of art and science for discovering meaningful and novel insight from volume and various data via applying techniques such as machine learning, mathematical and statistical algorithms, for supporting timely decision-making (Youssra & Sam, 2018). As demonstrated, in a simple taxonomy of analytics, whereas, descriptive and diagnostic analytics focus on what happened and why it happened, the predictive analytics, uses data mining techniques (e.g., data mining, text mining, and web mining) for forecasting the future behavior and events (Bharathi & Mandel, 2015). Predictive analytics is a slightly more advanced type of analytics, it emphasizes the use of forecasting information (data), looking at past performance in an effort to predict the future, it examine historical or summarized customers data from descriptive and diagnostics analytics (Bag & Anand, 2015). Predictive big data analytics anticipate risk and find relationships between patterns, the initiates actions to prevent negative occurrence now and in the future (Ajah, & Nweke, 2019). Predictive analytics is adopted to sense veiled designs in distributed database, categorize data segment, cluster the data into comprehensible sets, and envisage the data behavior and the broad-minded inclinations inside a specified period of time (Berger & Doban, 2014).

Predictive analytics is concerned with "forecasting, or the probabilities of an event, and trends, it uses "what-if analyses" (Haas et al., 2011). Predictive data analytics is instituted on prompt data analysis and historical data to envisage the likelihood of forthcoming proceedings (Ikegwuru & Acee, 2020). In order to be able to evaluate beforehand, it employed strategic or tactical move so as to plan optimal strategies to reach it desire goals, provide decision makers with reliable information. It uses What-if analysis. What-if analysis is a data- intensive simulation whose goal is to inspect the behavior of a complex system, such as the corporate business or a part of it. This is done under some given hypotheses called scenarios, what-if analysis measures how change in a set of independent variables impact a set of dependent variables with reference to a given replication model, such a model is a simplified representation of the business, tuned according to the historical corporate data (Amitha et al., 2013).

Banks' Performance

Performance is the degree to which organization meet their specified objectives (Ikegwuru & Pokubo, 2019). 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 (Olubukunola et al., 2012). 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 (Islam, 2014). 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). The craving to satisfy the customer empowers the supply chain member to amass buffers stocks (Ogonu, Ikegwuru & Nwokah, 2016).

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 predictive big data analytics

Questions/Likert Scale	N	Min.	Max.	Sum	Mean ($\bar{x}$)	Std. Deviation
To what extent does your bank able to discover meaningful and novel insight from the volume of information/data using predictive analytics?	150	1.00	4.00	467.00	3.1133	.84771
To what extent are you able to use the result from descriptive and diagnostic analytics to forecast the future behavior of customers?	150	1.00	4.00	454.00	3.0267	.91920
To what extent is your bank able to take decisive action(s) on future market operation using predictive analytics?	150	1.00	4.00	442.00	2.9467	.95388
To what extent are you able to anticipate risk and find relationship between customers operation using predictive analytics?	150	1.00	4.00	501.00	3.3400	.92562
To what extent does your bank application able to provide precise data/information to/from other banks?	150	1.00	4.00	467.00	3.1133	.84771
Valid N (listwise)	150					

Source: Research survey, 2022.

Table 1 showed that respondents understand the concept of predictive BDA and use the concept to a greater extent. The result showed that predictive BDA is an effective tool for enhancing the performance of DMBs in Rivers State.

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, 2023.

Table 2 showed that the respondents considered customers' satisfaction more important than just to make profit, with the application of predictive 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, 2023.

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.

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

Model	R	R Square	Adjusted R Square	Std. Error of the Estimate
1	0.758[a]	0.575	0.572	.000

a. Predictors: (Constant), Predictive analytics

Source: Research survey, 2023.

Table 4b: ANOVA of Predictive big analytics and customers' satisfaction

Model		Sum of Squares	Df	Mean Square	F	Sig.
1	Regression	409.848	1	409.848	159.789.	.000[b]
	Residual	302.652	118	2.565		
	Total	712,500	119			

a. Dependent Variable: Customers satisfaction

b. Predictors: (Constant), Predictive analytics

Source: Research survey, 2023.

Table 4c: Coefficient of predictive analytics and customers satisfaction

Model		Unstandardized Coefficients		Standardized Coefficients	t	Sig.
		B	Std. Error	Beta		
1	(Constant)	.429	.310		1.285	.158
	Predictive Analytics	.851	.098	.586	8.706	.000

a. Dependent Variable: Customers satisfaction

Source: Research survey, 2023.

The model summary in table 4a showed the effect of predictive analytics on customers satisfaction of deposit money banks in Port Harcourt, Rivers State with coefficient of correlation (R = 0.758) and R^2 = 0.575 indicating 57.5% (percent) contribution of predictive analytics to customers satisfaction. The ANOVA table 4b showed that predictive analytics is fit as a dimension of big data analytics for predicting customers satisfaction of deposit money banks in Port Harcourt, Rivers State, Nigeria with (p = 0.000 < 0.05), 95% level of freedom. Also, in the coefficient table 4c, B = 0.851 and (p= 0.000 < 0.05), 95% level of freedom. This showed that predictive analytics significantly influenced customers' satisfaction of deposit money banks in Port Harcourt, Rivers State, Nigeria.

Table 5a: Model summary of predictive analytics and return on investment (ROI)

Model	R	R Square	Adjusted R Square	Std. Error of the Estimate
1	.857[a]	.734	.732	.000

a. Predictors: (Constant), Predictive analytics

Table 5b: ANOVA of predictive analytics and return on investment

Model		Sum of Squares	Df	Mean Square	F	Sig.
1	Regression	598.178	1	596.178	325.205.	.000[b]
	Residual	216.322	118	1.833		
	Total	812.500	119			

a. Dependent Variable: return on investment

b. Predictors: (Constant), Predictive analytics

Table 5c: Coefficient of predictive analytics and return on investment (ROI)

Model		Unstandardized Coefficients		Standardized Coefficients	t	Sig.
		B	Std. Error	Beta		
1	(Constant)	2.893	.455		6.352	.000
	Predictive analytics	.666	.042	1.000	15.685	.000

a. Dependent Variable: return on investment

Source: Research survey, 2023.

The model summary in table 5a showed the effect of predictive analytics on return on investment of deposit money banks in Port Harcourt, Rivers State with coefficient of correlation (R = 0.857) and R^2 = 0.734 indicating 73.4% (percent) influence of predictive analytics on return on investment of deposit money banks in Port Harcourt, Rivers State, Nigeria. The ANOVA table 5b showed that predictive analytics is fit as a dimension of big data analytics for predicting the contribution of the various products to the performance of deposit money banks in Port Harcourt,

Rivers State, Nigeria with (p = 0.000 < 0.05), 95% level of freedom. Also, the coefficient table 5c, B = 0.812 and (p= 0.000 < 0.05), 95% level of freedom. This showed that predictive analytics significantly influenced the performance of deposit money banks in Port Harcourt, Rivers State, Nigeria.

CONCLUSION AND RECOMMENDATIONS

This paper critically reviewed the concept of predictive big data analytics and organizational performance of deposit money banks in Rivers State, Nigeria. Based on the literature review conducted and the data analyses performed, it is determined that predictive BDA significantly influence the performance of DMBs in Rivers State, Nigeria. Banks that have not implemented this tool are liable to poor analytical insight, hence, poor customer satisfaction and low ROI. Predictive BDA is a real time tool, able to look into the future, capable of finding solutions to customers' demand and predict the various investment or product contributions to overall organizational performance. DMBs that effectively implement predictive BDA will stands the chances of satisfying their customers better and can effectively measure the different product contribute to overall organizational performance. It is imperative that DMBs in Rivers State fully implement predictive BDA if they seek to improve their performance in terms of increase customers' satisfaction ratings and improved ROI.

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