

---

## DIAGNOSTIC BIG DATA ANALYTICS AND PERFORMANCE OF DEPOSIT MONEY BANKS IN RIVERS STATE, NIGERIA

**DICK, Aa-nu Sunday**

Department of Office and Information Management  
Faculty of Management Sciences  
Rivers State University, Port Harcourt  
aa-nu.dick@ust.edu.ng

**ELEKWACHI, Happiness Nwanyi**

Department of Office and Information Management  
Faculty of Management Sciences  
Rivers State University, Port Harcourt

**WOSU, Samuel**

Department of Office and Information Management  
Faculty of Management Sciences  
Rivers State University, Port Harcourt

### ABSTRACT

Diagnostic big data analytics reveals hidden patterns that exist in the firm and proffer quick solution in real time. It is the second stage of big data analytics. This study examined Diagnostic big data analytics and performance of deposit money banks in Rivers State, Nigeria. The study adopted the cross-sectional survey design. 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 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 diagnostic big data analytics enhanced the performance of deposit money banks in terms of customer satisfaction and return-on-investment (ROI). Therefore, the study concluded that diagnostic big data analytics is essential to improve the performance of deposit money banks in Rivers State, Nigeria and recommended that deposit money banks in Rivers State that desire to enhance their performance in terms of customers' satisfaction and greater return on investment should integrate diagnostic big data analytics as a key data management tool.

**Keywords:** Big data analytics, diagnostic analytics, customer satisfaction and return-on-investment

### INTRODUCTION

The Internet of Things (IoTs) has made data ubiquitous. Sensor devices, databases, website etc. have all facilitated data acquisition. Today, data exist in different forms: structured, semi-structure and unstructured. The traditional or relational databases are not adequately equipped to handle these data (Favaretto et al., 2020). Big data analytics is now the solution to this problem. Diagnostic analytics as a dimension of big data analytics uses descriptive output to diagnose the problem for predictive and prescriptive analyses (Opara & Dick, 2022).

Businesses today are globalized, and majority of them rely on the Internet for their operations. Thus, they require sophisticated tools that can enhance customers' experience (satisfaction) and high return-on-investment (ROI). The business environment today is highly competitive, moving towards the next generation of recommender system that are faster, capable of providing accurate and timely data/information for solving business problems (Adomavisins & Tuzhilin, 2005).

Deposit Money Banks plays financial intermediation roles that require analytical insight, to effectively undertake and carryout these roles, there is the need for modern tool like diagnostic big data analytics. In today digital economy, data constitutes assets to banks (Ajao & Omoregie, 2021; Bassey & Ogar, 2019), and like other assets, data depreciates; It is subject to government regulations and market forces, hence, requires effective tools for timely analysis and management (Goundar, et al., 2021).

Banks depends on customer data for the achievement of their objective (Akintola & Adesanya, 2021). Their success depends on how much customers' information they have acquired and analyzed, and how well they are able to use the information to deliver quality product and services to their customers (Cornelius et al., 2015). In spite of the huge benefits, relatively little is known about how well banks engage in big data analytics (BDA) and the effect of BDA on the performance of banks. Thus, this study is designed to assess the correlations between BDA (with a particular focus on diagnostic big data analytics) and performance of deposit money banks in Rivers State, Nigeria. In this study, Banks' performance is represented by customer satisfaction and ROI. The study is underpinned by the agency theory (Jensen & Meckling, 1976) which explains the conflicting interest between various contracting parties (shareholders, corporate managers and debtors).

The following null hypotheses are formulated to guide the study:

Ho<sub>1</sub>: Diagnostic big analytics does not have significant influence on satisfaction of deposit money banks' customers in Rivers State.

Ho<sub>2</sub>: Diagnostic big analytics does not enhance ROI of deposit money banks in Rivers State.

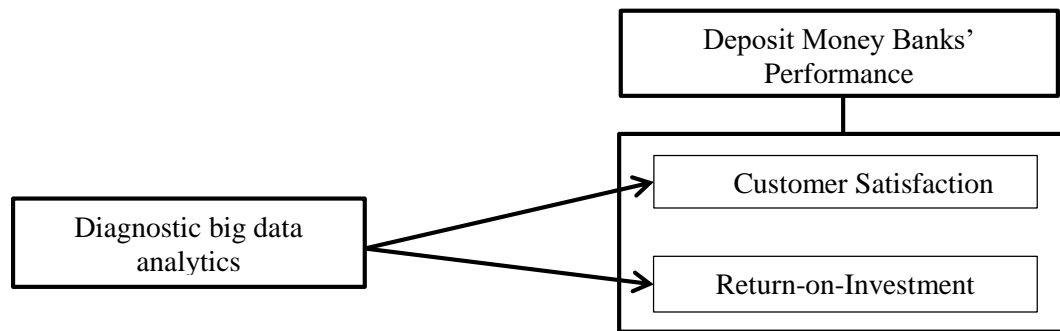


Fig. 1: Relationship between diagnostic big data analytics and performance of deposit money banks

## LITERATURE REVIEW

### Big Data Analytics (BDA)

Riahi and Riahi (2018) describe big data as the amount of information available to a firm, as well as its varieties, complexity and speed by which the data has to be analyzed or delivered. Big data provide the right users, with the right data in real time (Bogdan, 2019; Riahi & Riahi, 2018). It has significantly impacted many sectors of developed economy, including transportation, marketing, healthcare, and manufacturing (Al-Sai et al., 2022; Doko & Miskovski, 2019). It is thus leveraged by public and private sector organizations to enhance their performance.

BDA is a real time analytical tool, capable of solving business problems in real time (Bestman & Dick, 2020). It facilitates the analysis of huge volume of data available to the firms, especially in real time. There are basically four types of BDA; they are descriptive, diagnostic, predictive and prescriptive analytics (Riahi & Riahi, 2018). This study focused on diagnostic big data analytics and performance of deposit money banks in Rivers State, Nigeria. The application of diagnostic BDA enables organization to achieve competitive edge by minimizing costs, converting challenges to opportunities and minimizing risks (Subarna & Smys, 2021; Candice & Brain, 2020).

Diagnostics BDA is concerned with investigating what has happened in the organization, how it happened and reports the result(s) or output to predictive analytics for further analysis (Riahi & Riahi, 2018). As a real time analytical tool, it is capable of exploiting hidden pattern that exists in the firms and other information about the customers based on existing records. Diagnostic BDA develop memory to store various activities that has taken place in the firm, evaluates these activities and present the results to predictive and prescriptive analytics for better decision-making (Klaas et al., 2016).

Professionals in financial sector uses diagnostic BDA to examine and understand what has happened, what is happening and how they happen in the organization, for example, the behavior of customers, what is responsible for poor performance, etc. (Zhou et al., 2015). Diagnostic BDA identifies the reasons for any occurrence for predictive and prescriptive actions (Spacey, 2017). It aids in error correction, detect fraud, and verify processes, find out what trigger an event and reports to predictive and prescriptive analytics for further analytical insight (Sharma, & Wang, 2017).

### **Banks' Performance**

Performance in business describes 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 level to which the firm achieves its elected 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. 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). Agarwal et al. (2007) argue 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). Diagnostic 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. Diagnostic 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 organization 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 diagnostic 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 diagnostic BDA and banks' performance. The linear regression statistic was used for data analyses.

## DATA ANALYSES, RESULTS AND INTERPRETATION

**Table 1: Descriptive statistics on diagnostic big data analytics**

	N	Sum	Mean	Std. Dev.
To what extent does diagnostic big data analytic helps the employees to understand why customers are not willing to bank with your bank?	150	501.00	3.3400	.92562
To what extent are you able to identify problems in your bank using diagnostic big data analytic in real time?	150	467.00	3.1133	.84771
To what extent does your bank application able to recover from major fault and still regain the actual result/stage using diagnostic big data analytic?	150	466.00	3.1067	.76979
To what extent are you able to carry out deep analytical insight that reviewed hidden details patterns of employees and customers?	150	451.00	3.0067	.85528
To what extent are you able to determine what factor or events that contributes greatly to the organizational performance?	150	448.00	2.9867	.85911
Valid N (listwise)	150			

Source: Research survey, 2023.

Table 1 showed that respondents understand the concept of diagnostics BDA and use the concept to a greater extent. The result showed that diagnostics 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 diagnostics 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 diagnostic big data analytics and customers satisfaction**

Model	R	R Square	Adjusted R Square	Std. Error of the Estimate
1	.586 <sup>a</sup>	.344	.339	.69471

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

Source: Research survey, 2023.

**Table 4b: ANOVA of diagnostic big data analytics and customers' satisfaction**

Model	ANOVA <sup>a</sup>					
		Sum of Squares	Df	Mean Square	F	Sig.
1	Regression	37.422	1	37.422	77.538	.000 <sup>b</sup>
	Residual	71.429	148	.483		
	Total	108.850	149			

a. Dependent Variable: Customer satisfaction

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

Source: Research survey, 2023.

**Table 4c: Coefficient of diagnostic big data analytics and customer satisfaction**

Model	Coefficients <sup>a</sup>					
		Unstandardized Coefficients		Standardized Coefficients	T	Sig.
		B	Std. Error	Beta		
1	(Constant)	.429	.310		1.385	.168
	Diagnostic big data analytics	.861	.098	.586	8.806	.000

a. Dependent Variable: Customers Satisfaction

Source: Research survey, 2023.

The model summary in table 4a, showed the effect of diagnostic analytics on customer satisfaction of deposit money banks in Rivers State, Nigeria, with coefficient of correlation ( $R = 0.586$ ) and  $R^2 = 0.344$  indicating 34.4% (percent) contribution of diagnostic big data analytics to customers satisfaction. The ANOVA table 4b, showed that diagnostic big data analytics is fit predicting customers satisfaction of deposit money banks in Rivers State, Nigeria with ( $p = 0.000 < 0.05$ ), 95% level of freedom. Also, in the coefficient table 4c,  $B = 0.861$  and ( $p = 0.000 < 0.05$ ), 95% level of freedom. This showed that diagnostic big data analytics significantly influenced customers' satisfaction of deposit money banks in Rivers State, Nigeria.

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

Model	R	R Square	Adjusted R Square	Std. Error of the Estimate
1	.586 <sup>a</sup>	.344	.339	.69471

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

Source: Research survey, 2023.

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

Model		Sum of Squares	Df	Mean Square	F	Sig.
1	Regression	37.422	1	37.422	77.538	.000 <sup>b</sup>
	Residual	71.429	148	.483		
	Total	108.850	149			

a. Dependent Variable: Return on Investment

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

Source: Research survey, 2023.

**Table 5c: Coefficient of diagnostic big data analytics and return-on-investment**

Model		Unstandardized Coefficients		Standardized Coefficients	T	Sig.
		B	Std. Error	Beta		
1	(Constant)	.429	.310		1.385	.168
	Diagnostic big data Analytics	.861	.098	.586	8.806	.000

a. Dependent Variable: Return-on-investment

Source: Research survey, 2023

The model summary in table 5a showed the effect of diagnostic big data analytics on return on investment of deposit money banks in Rivers State, Nigeria with coefficient of correlation ( $R = 0.586$ ) and  $R^2 = 0.344$  indicating 34.4% (percent) contribution of diagnostic big data analytics to return on investment of deposit money banks in Rivers State, Nigeria. The ANOVA table 5b showed that descriptive big data analytics is fit for predicting 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,  $B = 0.861$  and ( $p = 0.000 < 0.05$ ), 95% level of freedom. This showed that diagnostic big data analytics significantly influenced the contribution of return on investment of deposit money banks in Rivers State.

## CONCLUSION AND RECOMMENDATIONS

From the literature review conducted and the data analyses performed, it is determined that diagnostic 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 rates and low ROI. Diagnostic BDA is a real time tool that is capable of solving customers demand and analyzes the various investment or product contributions to overall organizational performance. DMBs that effectively implement diagnostic BDA will satisfy their customers better and effectively measure the different product contribute to overall organizational performance. Thus, we recommended that DMBs in Rivers

State, Nigeria, should adopt diagnostic BDA if they seek to improve performance in terms of increase customers' satisfaction ratings and improved ROI.

## REFERENCES

- Adomavisins, G., & Tuzhilin, A. (2005). Towards the next Generation of Recommender System: A survey of the state-of-the-art and possible extension. *Data and Knowledge Engineering*, 17(6), 734-747.
- Akintola, A. F., & Adesanya, O. A. (2021). Contribution of deposit money banks to economic growth in Nigeria. *International journal of scientific and research publications*, 11(1), 779-786.
- Amangala, E. A., & Ateke, B. W. (2018). Market orientation, job satisfaction and customer orientation of service employees: The moderating effect of transformational leadership. *Ignatius Ajuru University of Education Journal of Multidisciplinary Research*, 4(2), 165-177.
- Ateke, B. W., & Nwulu, C. S. (2018). Corporate branding and marketing success of quick service restaurants. *International Journal of Business and Law Research*, 6(2), 9-19.
- Ateke, B. W., & Simeon, B. (2018). Marketing alliance and business wellness of deposit money banks. *International Journal of Innovations in Marketing Research and Entrepreneurial Studies*, 7(4), 126-136.
- Bassey, J., & Ogar, A. (2019). Effect of deposit money banks on real estate growth in Nigeria. *Euro-Asian Journal of Economic and Finance*, 2(3), 176-184.
- Bestman, E. A. & Dick, A. S. (2020). Leveraging big data acquisition tool and health sector performance in curbing the spread of Covid-19 pandemic in Rivers State, Nigeria. *International academic conference proceeding*, 507-519.
- Bogdan, M. (2019). Big Data Analytics and Organizational Performance: A Meta Analytics Study. *Journal of Management and Economic Review*, 4(2), 147 – 162.
- Botchkarev A. (2015). Estimating the Accuracy of the Return on Investment (ROI) Performance Evaluations. *International Journal of Information, Knowledge, Manage*, 10, 217-33.
- Candice, W. & Brain B. (2020). Success Factors of big data to achieve organizational performance. *Expert Journal of Business and Management*, 8(1), 1-16.
- Cornelius M. O., Oka, F. A. & Ogar, A. (2015). The role of deposit money banks on the growth of SMES in Cross Rivers State, Nigeria. *Journal of Social Science Research*, 6(2), 1049- 1053.
- Doko, F. & Miskovski, I. (2019). An overview of big data analytics in banking application: Challenges and issues. *UBT International Conference*, 270, 11 – 16.
- Favaretto, M., DeClercq, E., Schneble, B., & Elger, S. (2020). What is your definition of big data? Researchers Understanding of the Phenomenon of the Decade.
- Goundar, S. et al., (2021). Big data and big data analytics: A review of tools and its applications. Retrieved from <https://www.researchgate.net/publication>
- Hassanzadel, M., & Bigdeli, T. B. (2018) Return-on-investment in research and development. *Proceedings of 14th International Conference on Webometrics, Informetrics and Scientometrics*, 19th COLLNET Meeting, 31-39.
- Hewko, S. J. (2016). Performance management in healthcare: A critical analysis. *Leadership in Health Services*, 29(1), 52-68.
- Inoubli, W. Aridhi, S., Mezni, H., & Maddouri, M. (2018). An experimental survey on big data frameworks. *Future Generation Computer Systems*, 86(5), 546-564.
- Islam, M. D. (2014). An analysis of the financial performance of National Bank Limited using financial ratio. *Journal of Behaviour Economic, Finance, Entrepreneurship, Accounting and Transport*. 2(5), 121 – 129.

- Jatau, S., Ali, J. I., & Ashami, P. I. (2016). Deposit money banks' credit and investment drive of developing economies. Empirical Evidence from Nigeria. *Asian Journal of Agricultural Extension, Economics & Sociology*, 11(1), 1-12.
- Jensen, M.C., & Meckling, W.H. (1976). Theory of the firm: Managerial behaviour, agency costs and ownership structure. *Journal of Financial Economics*, 3(4), 305 -360.
- Klaas, J.A., Khalilova, M. H. & Tufetulov, A. M. (2016). Diagnostic of regional banking systems stability as an instrument of integration. *Academy of Strategic Management Journal*, 15(1), 26-67.
- Kulik, J. (2017). Technical efficiency and the methods of its measurement. *Econometrics*, 3(57), 74 -87.
- Lynn, M. (2002). Turnover's Relationships with sales, tips, and service across restaurants in a chain. *Cornell Hotel and Restaurant Administration Quarterly*, 37(3), 24-29.
- Mahmouh, A. T., & Amir, A. S. (2014). The determinant of the return of investment. An empirical study of Egyptian listed corporations. *Journal of Applied Finance & Banking*, 4(4), 127-139.
- Minnis, M., & Shroff, N. (2017). Why regulate private firm disclosure and auditing? *Accounting and Business Research*, 47(5), 473 – 502.
- Olubukunola, O. O. et al. (2012). Empirical study on measurement of performance of Nigerian money deposit banks. *Journal of Humanities Social Sciences Creative Arts*, 7, 61-73.
- Opara, D. N., & Dick, A. S. (2022). Big data: Descriptive analytics and performance of commercial banks in Port Harcourt, Rivers State, Nigeria. *Journal of Accounting Management and Information Technology*, 8(3), 35 – 55.
- Osiegbu, P. I. & Onuorah, A. C. (2018). Service quality delivery and deposit money banks performance in Nigeria. *International Journal of Management*, 13(1), 162 – 176.
- Riahi, Y. & Riahi, S. (2018). Big Data and Data Analytics: Concepts, types and technologies. *International Journal of Research and Engineering*, 5(9), 524– 528.
- Sharma, S. K., & Wang, X. (2017). Live data analytics with collaborative edge and cloud processing in wireless IoT networks. *IEEE Access*, 5(99), 4621–4635.
- Spacey, J. (2019). Examples of diagnostic Data. Retrieved from: <https://simeple.com/new/diagnostic>
- Subarna, A., & Smys, S. (2021). Big data analytics for improved risk management and customer segregation in banking application. *Journal of Islamic*, 3(3), 235 – 249.
- Warimegbe, P. M., Abosede, A. J., & Worimegbe, T. M. (2018). Efficiency, customer satisfaction and deposit money banks' performance in Nigeria. *International Journal of Management and Economic*, 31(1), 133 – 148.
- Zhou, J., Cao, Z. Dong, X. Lin, X. (2015). Security and Privacy in Cloud-Assisted Wireless Wearable Communications: Challenges, Solutions, and Future Directions. *IEEE Wireless Communication*, 22(2), 136–144.