African Journal of Mathematics and Statistics Studies
ISSN: 2689-5323
Volume 7, Issue 4, 2024 (pp. 162-173)
www.abjournals.org

ON THE COMPARATIVE STUDY OF THE SUPERVISED MACHINE LEARNING MODELS

Asogwa O. C.[1*], Eze N. M.[2], Christopher C. C.[3], Aruah K. E.[4] and Chimezie I. E.[5]

[1]Department of Mathematics and Statistics, Alex Ekwueme Federal University Ndufu Alike, Nigeria.
Email: qackasoo@yahoo.com

[2]Department of Statistics, University of Nigeria, Nsukka.
Email: ezemartinsemeka@yahoo.com

[3]Department of Management Information System, Australia.
Email: ccchrist@our.ecu.edu.au

[4]Department of Mathematics and Statistics, Alex Ekwueme Federal University Ndufu Alike, Nigeria.
Email: aruakelechi@gmail.com

[5]Department of Mathematics and Statistics, Alex Ekwueme Federal University Ndufu Alike, Nigeria.
Email: comchimezie543@yahoo.com

[*]Corresponding Author's Email: qackasoo@yahoo.com; Tel.: +2348036785840

Cite this article:

Asogwa, O. C., Eze, N. M., Christopher, C. C., Aruah, K. E., Chimezie, I. E. (2024), On the Comparative Study of the Supervised Machine Learning Models. African Journal of Mathematics and Statistics Studies 7(4), 162-173. DOI: 10.52589/AJMSS-ILF4K7JB

Manuscript History

Received: 18 Aug 2024

Accepted: 3 Nov 2024

Published: 14 Nov 2024

ABSTRACT: *This research empirically compared the performance of three supervised machine learning models which are Multinomial Logistic Regression (MLR), Multilayer back propagated Neural Networks (MNN) and Multinomial Decision Trees (MDT) based on a tested data set for the opinion of Nigerian citizens during the period of naira redesign policy using classification matrix criterion. About 600 copies of questionnaires on the opinion of Nigerian citizens on their welfare at the period of naira redesign. The result showed that ANN outperformed other models with 94.4% correct classification rates, followed by the MLR with correct classification rates of 93.5% and lastly by MDT with correct classification rates of 90.0%.*

KEYWORDS: Supervised machine learning, Algorithm**,** Naira redesign, Classification rates, Models.

Article DOI: 10.52589/AJMSS-ILF4K7JB
DOI URL: https://doi.org/10.52589/AJMSS-ILF4K7JB

INTRODUCTION

Government policies often significantly affect the economic, religious, political and social well-being of their citizens and the nature of this impact could be positive or negative and however might be intended or unintended. Recently, in October 2022, the Central Bank of Nigeria governor, Godwin Emefiele, announced the apex bank's plan to redesign and circulate a new series of three banknotes out of the existing eight. The redesigned ₦200, ₦500 and ₦1000 notes were due for circulation on December 15, 2023. Emefiele said the pre-existing notes would remain legal tender until January 31, 2023. The Central Bank of Nigeria governor explained that the decision was reached due to persisting concerns with the management of currency in circulation- particularly those outside the banking system and the need to manage inflation, combat counterfeiting, ransom payment, and insistent vote buying, among others. However, during this phase of redesigning of naira notes, currency in circulation was reduced drastically because the old notes of ₦200, ₦500 and ₦100 were gradually taken out of circulation. Bankers also reduced the amount an individual could withdraw at a time and the use of an alternative transaction mode, which is cash transfer was not efficient because people in the villages did not have access to gadgets and networks and some were illiterates who could not read or write, let alone transact electronically.

This particular act unleashed a lot of hardships and suffering on Nigerian citizens, especially those outside the corridors of power and affluence. The situation affected the economy of Nigeria, in the sense that a lot of social, religious, medical, business, etc. activities were affected. During this period, small-scale businesses and farming were also greatly affected. The phase was a very hard period that citizens can never forget in a hurry. Moreover, some people thought that the redesign of naira notes did not in any way affect the economy. It is in this note that this study was carried out to model a sampled citizenry's opinion on the challenges faced during the phase of the new naira redesign in Nigeria using machine learning classification algorithms. About three machine learning classification model algorithms were used to model the citizenry view as regards the transition phase of the naira redesign in Nigeria. Comparisons of accurate classification performances of those models were made.

Uddin *et al.* (2019) compared different supervised machine learning algorithms for disease prediction to identify the learning with the best prediction accuracy. The findings suggested that support vector machines ranked at the top followed by others. Delen *et al.* (2005) compared the prediction capability of three machine learning algorithms on a total record of 202,932 breast cancer patient on their survivability. It was observed that the Artificial Neural Network (ANN) model outperformed Decision Tree (DT) and Linear Regression (LR). Asogwa *et al.* (2015) Classified students' academic performances using two machine learning algorithms; Artificial Neural Network (ANN) and Multinomial Logistic Regression (MLR) and it was observed that ANN has a higher correct classification rate, thereby classifying the students' academic performance more accurately. Ziweritin *et al.* (2022) looked at the detection of result anomalies by comparing two machine learning algorithms (ANN & DT) and realized that the ANN algorithm outperformed DT in accuracy for detection of the result anomalies. Amri *et al. (*2020) compared Multinomial Logistic Discriminant (MLD) analysis, Classification Algorithm (CA) and Regression Tree (RT) performance in classifying the impact of working children. The results show that the best classification was produced by MLD analysis.

Article DOI: 10.52589/AJMSS-ILF4K7JB
DOI URL: https://doi.org/10.52589/AJMSS-ILF4K7JB

MATERIALS AND METHOD

Source of Data

The data used in this work were primary data collected through a questionnaire. A total number of 600 questionnaires were sent through social media across the six geopolitical zones in Nigeria. In each geopolitical zone, a random sample technique was used to select five States, and in each State, twenty friends in my social media accounts were administered the questionnaire.

The geopolitical zones and the states that were randomly selected in each were as follows: North Central - Benue, Kogi, Niger, Plateau and Kwara states; North East - Adamawa, Bauchi, Taraba, Borno and Yobe States; North West - Zamfara, Kano, Kebbi, Jigawa and Sokoto States; South East - Anambra, Enugu, Ebonyi, Abia and Imo States; South South - Akwa Ibom, Bayelsa, Rivers, Cross River and Delta States; and South West - Lagos, Ondo, Ogun, Oyo and Ekiti States.

However, through extensive online interviews and questionnaire reviews from the respondents, on the currency redesign policy in Nigeria, several factors which impacted directly or indirectly on the welfare of Nigerian citizens during the redesign policy were discovered. Some of these factors centered on religious activities, education, economy, transportation, trading, security, health, family peace, social activities, clubbing, prostitution, etc. Total evaluation of these impacts of currency redesign policy on the welfare of Nigerian citizens during the period of the redesign as responses were carefully studied and harmonized into a manageable number suitable for computer coding within the context of the supervised machine learning algorithms; Artificial Neural Network (ANN), Multinomial Logistic Regression (MLR) and Multilayer Decision Tree (MDT) to model the situation. These influencing factors were categorized as input variables. The output variables on the other hand represented the total evaluation of the impact of the naira redesign policy on the welfare of Nigerian citizens during the period of implementation (Above 50% - Positive Impact, below 50% - Negative Impact, Unaffected). That is, the output was categorically classified. SPSS version 28 was used as a statistical tool for the analysis.

Artificial Neural Network Model

The Artificial Neural Network (ANN) model proposed by Anders (1960) was used. The model which considered a transfer function as softmax, is given below as;

$$\tau = \emptyset + e_i \tag{1}$$

where; $\emptyset = f(y, \omega)$.

Then equation (1) will be

$$\tau = f(y, \omega) + e_i \tag{2}$$

From equation (2) above,

Article DOI: 10.52589/AJMSS-ILF4K7JB
DOI URL: https://doi.org/10.52589/AJMSS-ILF4K7JB

$$\tau = \alpha y + \sum_{j=1}^{J} \beta_h g(\xi)\{\sum_{i=0}^{I} \gamma_{h_i} y_i\} + e_i \qquad (3)$$

This equation (3) can rewritten as,

$$\tau = \alpha y + \sum_{j=1}^{J} \beta_h \left(\frac{e^{\alpha_i}}{\sum_{h=1}^{H} e^{\alpha_h}}\right)\{\sum_{i=0}^{I} \gamma_{h_i} y_i\} + e_i \qquad (4)$$

where; $g(\xi) = \frac{e^{\alpha_i}}{\sum_{h=1}^{H} e^{\alpha_h}}$

$y = (y_0 = 0,\ y_{1,}\ y_{2,} \dots, y_J)$ and $\omega = (\alpha, \beta, \gamma)$

where: τ is the output variable; y is the input variables; α is the weight of the input unit(s); β is the weight of the hidden unit(s); γ is the weight of the output unit(s); $g(\xi)$ is the softmax transfer function which classifies the output; and e_i is the error term.

Network Architecture and Design

Multi-layer Perceptions (MLPs) are layered feed-forward networks typically trained with static backpropagation. These networks have found their way into countless applications requiring static pattern classification, Asogwa *et al.* (2015). Therefore, given the computational capabilities of a multilayer perception as a classifier, a three-layered feed-forward neural network was programmed in this research work. The first layer (input level) comprised eighteen neurons (processing elements) - one for each profile parameter (input). The third layer (output level) comprised of three neurons ("positive impact", "negative impact" & "unaffected") as seen in the appendix. One hidden-layer network was used in this study because is sufficient to model any complex system. Hence the network model was designed with only one hidden layer. Besides, three neurons in the hidden layer were most suitable, as the network performance was most favoured. The network was trained with a back-propagation learning algorithm and softmax activation function adopted at the hidden layer.

The Artificial Neural Network Structure

The structure of the feed-forward neural network that reorganizes classification, image recognition, etc. is a supervised learning algorithm and Figure 1, schematically represents the structure. The structure contains the input layers, the hidden layers and the output layers.

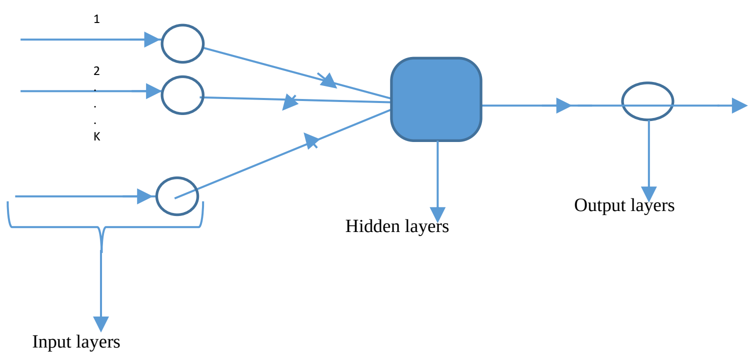

Figure 1: The schematic structure of the model

Article DOI: 10.52589/AJMSS-ILF4K7JB
DOI URL: https://doi.org/10.52589/AJMSS-ILF4K7JB

African Journal of Mathematics and Statistics Studies
ISSN: 2689-5323
Volume 7, Issue 4, 2024 (pp. 162-173)
www.abjournals.org

Data Set Grouping

The data were divided into three categories in supervised training; the training set, the verification set (hideout) and the testing set. The training set enables the system to observe relationships between input data and resulting outputs so that it can develop the relationship between the input and the expected output, Asogwa *et al.* (2015). A total of 600 respondents were used in the analysis. About 70% of the total data was used as the training set, 30% as the testing set, and 0% was used for cross-validation as each network was run for 1000 epochs.

Model Performance Measures

There are many performance measures for predictors; the most important measure of performance is the prediction accuracy that can be achieved with the training data, Asogwa *et al.* (2015). The most frequently used is the Mean Correct Classification Rate (CC_R), El-Sebakhy *et al.* (2007), which is defined as;

$$CC_R = \frac{\sum_{K=0}^{C-1} CC_R}{n} \tag{5}$$

Where CC_R the number of correctly classified observations and n is the number of observations in the class. A model with a high Correct Classification Rate (CC_R) has a better performance. In general, CC_R is used to judge the functional network classifier performance. The better classifier is the one with a high CC_R value.

Multinomial Logistic Regression

When a model considers two categorically possible outcomes of a countable experiment, a binary logistic regression is modelled. However, the Multinomial Logistic Regression model is an upgraded case of the binary logistic regression model where more than two categorically possible outcomes are expected. It allows the response probabilities to depend on the nonlinear transformation of the linear function of equation (6).

$$x_i'\beta_i = \sum_{k=o}^{K} \beta_{jk} x_{ik} \tag{6}$$

where k stands for the number of predictors, i stands for i^{th} individual, x represents independent variable and j is the category dependent variable.

That is to estimate the probabilities for the j categories of a qualitative dependent variable (y), using a set of explanatory variables (x);

$$P(y_{ik}) = P(y_{ik} = k | x_i', \beta_1, \beta_2, \dots, \beta_k) = \frac{expexp\ (\beta_{0k}) + x_i'\beta_k}{\sum_{j=1}^{m} expexp\ (\beta_{0j}) + x_i\beta_j}\ ; m = 1,2, \dots, m \tag{7}$$

β_k is the row vector of regression coefficients x for the k^{th}category of y.

In this study, the multinomial logistic model can now be expressed in three categories (J-3) as in equations (8, 9 and 10).

$$P_{i1} = P(x_i) = \frac{1}{1 + expexp\ (x_i'\beta_2) + exp\ (x_i'\beta_3)} \tag{8}$$

Article DOI: 10.52589/AJMSS-ILF4K7JB
DOI URL: https://doi.org/10.52589/AJMSS-ILF4K7JB

$$P_{i2} = P(x_i) = \frac{expexp\ (x_i'\beta_2)}{1+expexp\ (x_i'\beta_2)\ +exp\ (x_i'\beta_3)} \tag{9}$$

$$P_{i3} = P(x_i) = \frac{exp\ (x_i'\beta_3)}{1+expexp\ (x_i'\beta_2)\ +exp\ (x_i'\beta_3)} \tag{10}$$

where β_1 and β_2 represent the covariate effects specifically for the second and third response categories with the first category as the baseline category (for more details, see: Ejeh *et al.*, 2022).

The backpropagation training structure of Multinomial Logistic Regression

In general, Multinomial Logistic Regression analysis passes through three stages or layers. These stages or layers are the input layer, the hidden layer and the output layer which can be represented below according to (Ejeh *et al.*, 2022);

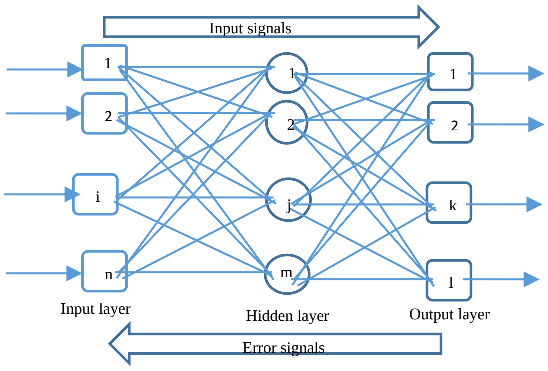

Figure 2: Structure of Multinomial Logistic Regression with back-propagated training cycle.

In the case of this study, the independent variables are denoted as $(x = \overset{\dots}{18})$ and the output variable as $(y = 3)$ there are a number of the input layers (as default), hidden layers (as default) and output layers (as default), in addition to the attached weight as seen in the above structure. A classification matrix (Correct classification rate) was used here as a classification criterion to model our case problem.

Multilayer Decision Tree (MDT)

This is a supervised machine learning algorithm, where data are continuously split into smaller groups of the same feature values until they reach their class. However, a Decision tree is one of the earliest and most prominent machine learning algorithms. A decision tree models the decision logic i.e., tests and corresponds outcomes for classifying data items into a tree-like structure. The nodes of a DT tree normally have multiple levels where the first or top-most node is called the root node. All internal nodes represent tests on input variables or attributes. Depending on the test outcome, the classification algorithm branches towards the appropriate child node where the process of test and branching repeats until it reaches the leaf node (Quinlan, 1986). The leaf or terminal nodes correspond to the decision outcomes. When traversing the tree for the classification of a sample, the outcomes of all tests at each node along the path will provide sufficient information to conjecture about its class.

Article DOI: 10.52589/AJMSS-ILF4K7JB
DOI URL: https://doi.org/10.52589/AJMSS-ILF4K7JB

African Journal of Mathematics and Statistics Studies
ISSN: 2689-5323
Volume 7, Issue 4, 2024 (pp. 162-173)

The training structure of Multilayer Decision Tree

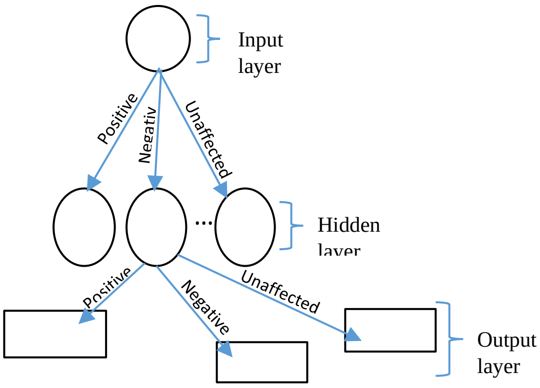

Figure 3: An illustration of the Multilayer Decision tree. Each variable $(C_1, C_2, C_3, \ldots, C_k)$ is represented by a circle and the decision outcomes$(Class\ A,\ Class\ B,\ \ldots, Class\ K)$ are shown by rectangles. In order to successfully classify a sample into a class, each branch is labelled with either 'Positive impact', Negative impact, or 'Unaffected' based on the outcome value from the investigation of this study.

RESULTS AND DISCUSSION

Correct Classification Matrix

The results of the study were presented in tables and discussed as well.

Table 1. Classification Table of Artificial Neural Networks

Classification					
Prediction					
Sample	Observed	Above 50%	Below 50%	Unaffected	Percent Correct
Training	Above 50%	74	15	0	83.1%
	Below 50%	0	269	0	100.0%
	Unaffected	0	15	39	72.2%
	Overall %	18.0%	72.6%	9.5%	92.7%
Testing	Above 50%	13	3	0	81.3%
	Below 50%	0	64	0	100.0%
	Unaffected	0	2	7	77.8%
	Overall %	14.6%	77.5%	7.9%	94.4%
Holdout	Above 50%	13	2	0	86.7%
	Below 50%	0	67	0	100.0%
	Unaffected	0	3	14	82.4%
	Overall %	13.1%	72.7%	14.1%	94.9%

From the table above, the correct classification rate as computed considering the testing set is 94.4%. This suggested that the diagonal entries of the testing data set comply with the total number of observed opinions of the individuals during this phase of the naira redesign policy in Nigeria. That is 64 individuals suggested that citizens were negatively affected during this

Article DOI: 10.52589/AJMSS-ILF4K7JB
DOI URL: https://doi.org/10.52589/AJMSS-ILF4K7JB

naira redesign period, and 13 individuals agreed that the naira redesign phase encouraged economic growth and alleviated difficulties. 7 individuals were neither positive nor negative about the situation as at the time.

Table 2. Classification table for Multinomial Logistic Regression

Classification				
Prediction				
Observed	Above 50%	Below 50%	Unaffected	Percent Correct
Above 50%	101	19	0	84.2%
Below 50%	1	399	0	99.8%
Unaffected	0	19	61	76.3%
Overall %	17.0%	72.8%	10.2%	93.5%

From Table 2 above, the correct classification rate considering the testing set is 93.5%. The table contains only the training and testing components. From Table 2 above, about 101 individuals believed that citizens were positively influenced during the naira redesign period, and 399 individuals agreed that the naira redesign phase demoted economic growth and improved difficulties. 61 individuals were neither positive nor negative about the situation at the time.

Table 3. Classification table for Multinomial Decision Tree.

Classification				
Prediction				
Observed	Above 50%	Below 50%	Unaffected	Percent Correct
Above 50%	100	20	0	83.3%
Below 50%	20	380	0	95.0%
Unaffected	0	20	60	75.0%
Overall %	20.0%	70.0%	10.0%	90.0%

From Table 3 above, the correct classification rate considering the testing set is 90.0%. The table contains only the training and testing components. From Table 3 above, 100 individuals believed that citizens were positively sighted during the naira redesign period, and 380 individuals agreed that the naira redesign phase demoted economic growth and improved difficulties. 60 individuals were neither of the sides of positive nor negative situation as at the time.

Article DOI: 10.52589/AJMSS-ILF4K7JB
DOI URL: https://doi.org/10.52589/AJMSS-ILF4K7JB

Table 4. Comparison table of different Algorithms.

Machine Learning Algorithms	Model Performances (accurate classification)
ANNs	94.4% - Most Accurate
MLR	93.5% - Moderate accurate
MDT	90.0% - Least accurate

CONCLUSION

This research studied the comparative performances of different supervised machine-learning algorithms in human policy classification. However, since historical data and research scope vary widely in prediction studies, a comparison is only possible when a common benchmark on the dataset and scope is established. Therefore, we only chose a study approach that implemented multiple machine learning methods on the same data and Nigerian opinions on the Naira redesign policy for comparison. Regardless of the variations in frequency and performances, the results show the potential of these families of algorithms in their predictions. It was realized that artificial neural networks performed outstandingly, followed by the multinomial logistic regression algorithm and lastly by the multinomial decision tree algorithm.

ACKNOWLEDGEMENTS

The author sincerely appreciated those social media friends who helped in one way or the other to provide the data set needed for this study. We are indeed grateful.

REFERENCE

Anders, U. (1996) Model selection in neural networks, ZEW Discussion Papers 96-21

Amri, M. Z. A., Sumertajaya, M. I., & Syafitri, U. D. (2020). Comparison of Multinomial Logistic Discriminant Analysis (MLGDA) and Classification and Regression Tree Performance (CART) in classifying the impact of working children. *Journal of Physics: Conference Series*, 1490, (012033), 1-12.

Asogwa, O. C. & Oladugba, A. V. (2015). Of Students Academic Performance Rates Using Artificial Neural Networks (ANNs). *American Journal of Applied Mathematics and Statistics*, 3, 151-155.

Asogwa, O. C. & Oladugba, A. V. (2015). On the Comparison of Artificial Neural Network (ANN) and Multinomial Logistic Regression. *West African Journal of Industrial and Academic Research*, 13, 1-7.

Delen, D., Walker, G. & Kadam, A. (2005). Predicting breast cancer survivability: a comparison of three data mining methods. Artificial Intelligence in Medicine, 34,113–27.

Ejeh, S. O., Alabi, O. O., Ogungbola, O. O., Olatunde, O. O. & Dere, Z. O.(2022). A Comparison of Multinomial Logistic Regression and Artificial Neural Network Classification Techniques Applied to TB/HIV Data. *American Journal of Epidemiology and Public Health*, 6, 014-018.

El-Sebakhy, E. A., Hadi, A. S. & Faisal, K. A. (2007) Iterative Least Squares Functional Networks Classifier. *IEEE Transactions on Neural Networks*, 18, 844-850.

Quinlan, J.R. (1986) Induction of Decision Trees. *Machine Learning*, 1, 81-106.

Stanley, Z., Barilee, B. B., & Ugochi, A. O. (2022). A Comparative Analysis of Neural Network and Decision Tree Model for Detecting Result Anomalies. *Open Access Library Journal*, 9, 1-15.

Tomas, P. & Virginijus, M. (2017). Comparison of Naïve Bayes, Random Forest, Decision Tree, Support Vector Machines, and Logistic Regression Classifiers for Text Reviews Classification. *Baltic Journal of Modern Computing*, 5, 221-232

Uddin, S., Khan, A., Hossain, M., & Ali Moni, M. (2019).Comparing different supervised machine learning algorithms for disease prediction. *BMC Medical Informatics and Decision Making*, 19, 281

APPENDIX

This questionnaire will enable us to research on **the impact of the new naira redesign on some major sectors of Nigeria Economy**. It is for research purposes.

s/n	Variables		Data	Location	Code	Select no
a.	Gender		Categorical	Input	0 = Female, 1 = Male	
b.	State		String	Input		
c.	Geographical zone		Categorical	Input	0=North Central,1=North East, 2=North West, 3 = South East, 4 = South South, 5 = South West	
d.	Age		Categorical	Input	0 = Adult, 1 = Adolescence	
e.	Marital status		Categorical	Input	0 = married, 1 = Single, 2 = Divorced	
f.	Occupation		Categorical	Input	0 = public servant., 1= Private servant., 2 = Company worker, 3=Apprentice, 4=Freelance, 5 = Unemployed, 6 = others	
g.	Religious status		Categorical	Input	0 = Christianity, 1 = Africa Tradition Religion, 2 = Islamic Religion	
h.	Education status		Categorical	Input	0 = Uneducated, 1 = Educated, 2 = Others	
1.	Transportation	• What is the effect of the new naira redesign on the daily income of the citizens?	Categorical	Input	0 = Positive effect, 1 = Negative effect, 2 = Unaffected.	
		• Does the new naira redesign interrupt your business trips?	Categorical	Input	0 = Yes, 1 = No, 2 = Can't say	

Article DOI: 10.52589/AJMSS-ILF4K7JB
DOI URL: https://doi.org/10.52589/AJMSS-ILF4K7JB

		• The new naira introduction encouraged hardship in society	Categorical	Input	0 = Yes, 1 = No, 2 = Can't say	
		• Was the movement of people, goods and services effective during this period of new naira adoption?	Categorical	Input	0 = Yes, 1 = No, 2 = Can't say	
2.	Health	• Were you able to access medical assistance during this period of new naira use?	Categorical	Input	0 = Yes, 1 = No, 2 = Can't say	
		• Does the adoption of new naira notes improve the health status of Nigerian citizens?	Categorical	Input	0 = Yes, 1 = No, 2 = Can't say	
		• There were massive health issues, deaths & hardships during this period	Categorical	Input	0 = Yes, 1 = No, 2 = Can't say	
3.	Financial Institutions	• There was peace & harmony at the Banks/financial institutions during this period of naira redesign.	Categorical	Input	0 = Yes, 1 = No, 2 = Can't say	
		• Does the new naira redesign policy encourage corruption in the banking/financial institutions?	Categorical	Input	0 = Yes, 1 = No, 2 = Can't say	
		• Does this policy bring about unemployment/destruction of the Bank's properties?	Categorical	Input	0 = Yes, 1 = No, 2 = Can't say	
4.	Trade/Agric. & Commerce	• Does this policy encourage production and supply?	Categorical	Input	0 = Yes, 1 = No, 2 = Can't say	
		• The buying and selling of goods and services were affected both at local and township markets.	Categorical	Input	0 = Yes, 1 = No, 2 = Can't say	

Article DOI: 10.52589/AJMSS-ILF4K7JB
DOI URL: https://doi.org/10.52589/AJMSS-ILF4K7JB

		● Hunger and unrest were promoted during this period	Categorical	Input	0 = Yes, 1 = No, 2 = Can't say	
5.	Education	● Studying and learning were affected during this said period	Categorical	Input	0 = Yes, 1 = No, 2 = Can't say	
		● Punctuality to school/work, etc was affected.	Categorical	Input	0 = Yes, 1 = No, 2 = Can't say	
6.	Religious	● Worship gatherings were affected during this new naira adoption policy	Categorical	Input	0 = Yes, 1 = No, 2 = Can't say	
		● Does this policy affect Seed/Tiete and its offerings?	Categorical	Input	0 = Yes, 1 = No, 2 = Can't say	
		● Does the policy affect the sacrifices to the gods?	Categorical	Input	0 = Yes, 1 = No, 2 = Can't say	
7.	What was the level of the effect of the new naira redesign policy on some major sectors of Nigeria's economy?		Categorical	Output	0 = Above 50% (Positive Impact) 1 = Below 50% (Negative Impact) 2 = Unaffected	

Article DOI: 10.52589/AJMSS-ILF4K7JB
DOI URL: https://doi.org/10.52589/AJMSS-ILF4K7JB