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Crystallising the Determinants of Human Capital Development in the Banking Industry: The Financial Perspective

Adeyinka M.A.
University of Lagos
Faculty of Management Sciences.
Department of Employment Relations and Human Resources Management
Email: adeyinkatie@yahoo.com
Tel No 08063206602

Gbajumo-Sherrif M.A.
University of Lagos
Faculty of Management Sciences.
Department of Employment Relations and Human Resources Management

Elegbede S.T.
University of Lagos
Faculty of Management Sciences.
Department of Employment Relations and Human Resources Management

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ABSTRACT

Human capital is the only active resource in any going concern with the ability to mobilise other resources to achieve organisational objectives. To achieve this, management often invests in organising and developing human capital. However, studies have not identified critical internal determinants of human capital development in the Nigerian banking sector. To fill this gap, the study examines the financial perspective to the determinants of human capital development in selected Nigerian deposit money banks (DMB). The study adopted a panel data analysis methodology. The data for the study was purely secondary obtained from audited financial reports of eight DMBs in Nigeria for a period that spanned from 2001 - 2023. For the analysis panel, data method was used. The result of the study shows that total asset, profit after tax, labour and interest rate are significant determinants of human capital development of the selected DMBs in Nigeria. This finding underscores the importance of staffing levels in enhancing human capital and this indicated that as the number of employees increases, so does the potential for human capital development. It was concluded that bank asset, profit after tax, labour and interest rate determine human capital development of DMBs. Based on the findings and conclusion, it was recommended that bank management and their boards should continuously strengthen their banks' asset, labour and size.

Keywords: Deposit money bank, Human capital, Interest rate, Labour, Profit after tax, Total asset

1. Introduction

The paradigm shift from traditional employee management to human capital development has presented both challenges and opportunities for organizations (Afolabi, Akanbi & Olayinka, 2023), including the banking sector. This shift, fueled by the need for a knowledge-driven workforce, reflects the importance of investing in human capital to sustain organizational competitiveness and improve performance metrics. Human capital development, which encompasses training, skills acquisition, and employee empowerment, has become a critical determinant of organizational success (Noe, 2019; Kraak, 2005). However, in the Nigerian banking sector, particularly among Deposit Money Banks (DMBs), there has been growing concern about the factors that influence investments in human capital. Despite the efforts of banks to develop skilled employees, the determinants of such investments remain underexplored, particularly in developing countries like Nigeria (Adeyemi, 2019; Ezekwesili & Ezejiofor, 2022). This gap in understanding necessitated the need for this study, which sought to examine the determinants of human capital development in the banking industry.

A key issue that justified this study was the role of profitability in driving human capital investments. Studies have suggested that profitability, often measured by profit after tax (PAT), significantly influences the ability of banks to allocate resources for employee development (Agbiogwu, Ihendinihu, & Azubike, 2016; Alao, *et al.* 2023). This is particularly relevant in DMBs, where profitability is not only a measure of success but also a determinant of the resources available for employee training, retraining, and compensation (Ogunbiyi & Ihejirika, 2017; Onuoha, 2022). However, fluctuations in profitability, coupled with economic uncertainties in Nigeria, have raised questions about the consistency of such investments. The study, therefore, examined how profitability influenced its human capital development strategies.

Another issue that underscored the importance of this study was the role of bank size, measured by total assets and employee size, in determining human capital development. Previous research has shown that larger banks with more extensive resources tend to have higher investments in employee training and development (Aladwan, 2015; Nwachukwu, 2024). However, in Nigeria, where the banking sector operates in a volatile economic environment, the relationship between bank size and human capital investments is not always straightforward. This study analyzed the size of workforce and total assets as potential determinants of its human capital development initiatives, addressing a gap in the literature on how internal characteristics of banks shape their human capital strategies (Ekundayo & Odhigu, 2016; Olowookere, *et al*. 2022).

The study also addressed the impact of interest rates, a critical external factor, on human capital development in banks. Interest rates, which influence the cost of credit and bank revenue, often dictate the availability of resources for developmental initiatives (Ogunbiyi & Ihejirika, 2017). Nigeria's volatile interest rate environment, characterized by frequent changes in the Central Bank of Nigeria's monetary policy rate, has posed challenges for banks in planning long-term investments in their workforce. By analyzing the impact of interest rates on human capital

development in the banking industry, this research provided insights into how external economic variables influence internal strategies for workforce development (Oleka, Sabina & Onyeze, 2017).

The consequences of neglecting human capital development in the banking sector are significant and far-reaching. Without strategic investments in employee training, banks risk diminished productivity, reduced employee satisfaction, and increased turnover, which ultimately affect profitability and competitiveness (Osibanjo et al., 2016; Nwachukwu, 2024). Furthermore, underdeveloped human capital can hinder a bank's ability to adapt to technological advancements and changing customer demands, particularly in a knowledge-driven global economy (Salau et al., 2015; Gidado, Adedeji & Ali, 2023). These potential consequences highlight the importance of understanding the determinants of human capital development, as this knowledge enables banks to adopt proactive and sustainable workforce strategies.

Specifically, this study intends to test the size of employees of the selected DMBs as the determinant of human capital development. In the case of interest rate, Central Bank of Nigeria (2020) described it as that rental payment on credit by customers and returned for releasing liquidity by lenders. Although not all banks pay interest on loan and deposit, interest-paying banks do pay interest on deposits and charge interest on loans. In Nigeria, the interest rate is officially expressed in the monetary policy rate (MPR) of the Central Bank of Nigeria (CBN). The record has it that over the years in Nigeria, interest rates have been subject to frequent changes. The constant change in interest rates is assumed in this study to be of significant impact on DMBs human capital development in the long run. It is against this backdrop that this study examines the determinants of human capital development in the Nigerian DMBs. It was firmly believed that a study of this nature had added value to the banking sector of developing countries through the empirical study of those factors that affect the development of human input in DMBs.

2. Methods

The study adopted panel data analysis using secondary data to achieve its objectives. Panel data methodology was chosen due to its numerous advantages, including the ability to control for individual heterogeneity, reduce collinearity among variables, and track trends over time. These benefits made it particularly suitable for analyzing the determinants of human capital development across selected Nigerian Deposit Money Banks (DMBs) over a specific period. The use of panel data allowed the study to account for variations across banks while observing changes over time, ensuring robust and reliable results. This approach was informed by the study's focus on examining trends and relationships over a 23-year period (2001–2023), making panel data the most appropriate method for achieving the research objectives.

The population of the study comprised all 24 DMBs in Nigeria as of December 2022, according to the Central Bank of Nigeria (CBN). However, the study selected eight banks based on specific criteria. First, the banks had to be among the "Big 10" Nigerian banks ranked in the top 500 banks globally. Second, the banks needed to have operated consistently during the study period, with

audited financial statements available for all 23 years. These criteria ensured that the selected banks were representative of the Nigerian banking sector and provided sufficient data for analysis. By focusing on these eight banks, the study was able to generate insights into the determinants of human capital development in a way that was both comprehensive and contextually relevant to the Nigerian banking industry. Based on the above criteria, the study made use of eight (8) deposit money banks that met the requirements identified, and these banks were listed in Table 1.

Table 1: List of Selected Nigerian Deposit Money Banks

S/N	Selected Nigerian Deposit Money Banks
1	Access Bank Plc
2	Ecobank Nigeria
3	First Bank of Nigeria
4	Fidelity Bank
5	Guaranty Trust Bank Plc
6	Union Bank of Nigeria Plc.
7	United Bank for Africa
8	Zenith Bank

The sample size of 33% (8 out of 24) was deemed adequate for the study, as it aligned with established guidelines suggesting that a good sample should represent at least 10% of the total population. This selection of banks effectively ensured a representative analysis of the Nigerian banking sector, enabling the study to draw meaningful conclusions about the determinants of human capital development among Deposit Money Banks (DMBs). By choosing a sample that exceeded the minimum threshold, the research enhanced the reliability and validity of its findings. Data for the study were extracted from the audited financial reports of the selected banks and covered the period from 2001 to 2023. The data collected included key variables such as total assets, profit after tax (PAT), number of employees, and interest rates. This comprehensive dataset allowed for a thorough analysis of the relationships between these variables and human capital development. This dataset provided valuable insights into the factors influencing employee investment within the Nigerian banking sector. The timeframe of 19 years offered a robust basis for examining trends and changes. From this, the models for the study were expressed below:

3. Model Specification

$$lnH_{i,t} = lnA + \alpha_1 lnTA_{i,t} + \alpha_2 lnPAT_{i,t} + \alpha_3 lnL_{i,t} + \alpha_4 lnintr_t + e_i \ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots(1)$$

Where: $H_{i,t}$ is the human capital development of bank i at period t and proxy by expenditure on human capital which is summed up in the personnel cost of the banks that also include expenses on training and re-training of staff on the job:

- A is a constant in the model or the intercept.
- $TA_{i,t}$ is the total asset of bank i at period t (a proxy for physical capital).
- $PAT_{i,t}$ is the profit after tax of bank i at period t.

- $L_{i,t}$ is the number of employees in bank i at period t.
- $intr_t$ is the monetary policy rate, and
- e_i is the error term.

Leveraging on equation 1, human capital is made the subject of the formula, and the evolving equation is given as follows:

$$lnH_{i,t} = lnA + \beta_1 lnK_{i,t} - \beta_2 lnY_{i,t} + \beta_3 lnH_{i,t}^e + \mu_i \text{.......................................} (2)$$

Therefore:

$$lnH_{i,t} = lnA + \alpha_1 lnK_{i,t} + \alpha_2 lnY_{i,t} + \alpha_3 lnH_{i,t}^e + \mu_i \text{.......................................} (3)$$

Where β_1 is α_1, $-\beta_2$ is α_2, and β_3 is α_3. All these represent the parameter estimates that were estimated in the panel models. The model is equated as:

$$lnH_{i,t} = lnA + \alpha_1 lnTA_{i,t} + \alpha_2 lnPAT_{i,t} + \alpha_3 lnL_{i,t} + \alpha_4 lnintr_t + e_i \text{..............................} (4)$$

With the help of STATA statistical package to run the observations from the annual reports of the selected DMBs, Panel unit root tests, Hausman test, cross-sectional dependence test, cross-sectional time-series, auto-correlation test among other statistical methods were used to achieve the objectives of the study.

4. Analysis

The static panel data approach was adopted in this study to mitigate the issues associated with cross-sectional dependence and to produce more consistent parameter estimates. This methodology was particularly relevant given the nature of the data, which involved multiple banks observed over time. An essential criterion for employing static panel data analysis was ensuring that all variables included in the model were stationary. Stationarity is crucial as it prevents spurious results, which can lead to misleading interpretations of the relationships between variables. Therefore, the analysis commenced with a panel unit root test to assess the stationarity of the data.

4.1 Panel Unit Root Test

To determine the order of integration of the variables included in the model, both the Levin-Lin-Chu (LLC) and the Augmented Dickey-Fuller (ADF) panel unit root tests were utilized. The rationale for employing these two tests was to confirm the consistency of the results obtained from the panel unit root tests. By using multiple tests, the study aimed to ensure that all variables were stationary before proceeding with the static panel data estimation. This step was critical in validating the robustness of the analysis and ensuring that the estimated parameters would accurately reflect the underlying relationships among the variables. The results of the panel unit

root tests indicated that some variables were stationary at different levels, necessitating further transformation to achieve stationarity across all variables. This process involved differencing the non-stationary variables, which allowed for a more accurate representation of the relationships being studied. By ensuring that all variables were stationary, the study minimized the risk of obtaining spurious correlations, thereby enhancing the credibility of the findings. This rigorous approach to data preparation underscored the importance of adhering to statistical assumptions in panel data analysis. Following the successful establishment of stationarity, the study proceeded with the static panel data estimation. This analysis aimed to explore the determinants of human capital development within the selected Nigerian DMBs. The findings from this analysis provided valuable insights into how various factors, such as profitability, total assets, and employee size, influenced human capital development in the banking sector. By employing a robust methodological framework, the study contributed to a deeper understanding of the dynamics at play in the Nigerian banking industry (See Table 2).

Table 2: ADF, IPS and LLC Panel Unit Root Tests

Variable	ADF Panel unit root test		LLC Panel unit root test		IPS unit root test	
	Chi squatter stat	Order of integration	Unadjusted stat	Order of integration	t-bar	Order of integration
TA	73.3110	I(1)	-6.9964	I(1)	-3.179	I(1)
PAT	43.4102	I(0)	-8.9403	I(1)	-5.221	I(1)
L	100.284	I(1)	-8.2094	I(1)	-3.707	I(1)
H	118.675	I(1)	-6.5875	I(1)	-3.997	I(1)
INTR	73.8065	I(1)	-4.2180	I(0)	-3.431	I(0)

Source: Authors Computation, 2023.

The results presented in Table 2 from the ADF, IPS, and LLC panel unit root tests indicate the order of integration for various variables relevant to the study. The findings revealed that total assets (TA), labor (L), human capital (H), and interest rates (INTR) were integrated of order I(1), meaning they became stationary after first differencing. In contrast, profit after tax (PAT) was stationary at level I(0), while interest rates showed mixed results, being stationary at level for the IPS test but integrated of order I(0) for the LLC test. These results suggest that while some variables required differencing to achieve stationarity, others were already stationary, which is crucial for ensuring the validity of subsequent analyses. The implications of these findings for the banking industry are significant. The fact that most of the key variables, such as total assets and labor, required differencing indicates that their relationships with human capital development may be influenced by underlying trends over time. This suggests that banks need to adopt dynamic strategies that account for these trends when planning their human capital investments. Additionally, the stationarity of PAT at level implies that profitability can be analyzed in its current form, allowing banks to focus on immediate financial performance as a determinant of human capital development.

4.2 Static Panel Estimation for Determinants of Human Capital Development

In this study, both fixed and random effects methods of static panel model estimation were employed to analyze the data, allowing for a comprehensive evaluation of the relationships among the variables of interest. The results from these two approaches were presented in Tables 3 and 4, respectively, to determine which model was more suitable for the study's objectives. By comparing the outcomes of the fixed and random effects models, the analysis aimed to ascertain the level of consistency in the empirical results, which is crucial for validating the findings. The fixed effects model focuses on variations within the same entity over time, effectively controlling for unobserved heterogeneity, while the random effects model assumes that individual-specific effects are uncorrelated with the independent variables. This dual approach not only provided insights into the robustness of the results but also highlighted the importance of model selection in panel data analysis, as the choice between fixed and random effects can significantly influence the interpretation of the data and the conclusions drawn regarding the determinants of human capital development in the Nigerian banking sector. The results of the fixed and random effects model were presented in Tables 3 and 4, respectively.

Table 3: Fixed effect Results for the Determinants of Human Capital Development

Variables	Coefficient	Standard Error
Constant	9988243	9628494
TA	.0212696***	.0017045
PAT	-.1945743**	.0295984
L	.6189177	.6098883
INTR	-.4290884	447967

R^2 = 0.7535 (within) R^2 =0.7473 (overall) F(4,116) =88.66Prob> F = 0.0000

Source: Authors Computation, 2023.

Table 4: Random effect Results for the Determinants of Human Capital Development

Variables	Coefficient	Standard Error
Constant	8047560	9510616
TA	.0212403***	.0016765
PAT	-.1944149**	.0292469
L	.8162187	.5289543
INTR	-.3660508	.438261

R^2 =0.7533 (within) R^2 =0.7498 (overall)

Wald chi^2(4) = 374.04Prob> chi2 = 0.0000

Source: Authors Computation, 2023.

The results of the static panel models demonstrated a notable consistency between the fixed and random effects estimates, indicating a strong reliability in the findings. Both models showed similar outcomes, which highlighted minimal discrepancies in the results. This consistency reinforces the robustness of the static panel models, as it suggests that the conclusions drawn from the analysis are not overly sensitive to the choice of model. The alignment of the results across both estimation techniques enhances confidence in the empirical findings regarding the factors influencing human capital development within the banking sector.

From the parameter estimates, it was evident that both profits after tax (PAT) and total assets (TA) significantly impacted human capital development in the banks. These two variables emerged as the only substantial determinants of human capital development within the model. Despite their significant effects, the coefficients for these variables varied slightly. For instance, the coefficient for total assets in the fixed effects model was 0.0212696, while in the random effects model, it was 0.0212403. This finding implies that a unit increase in total assets could result in approximately a 2% increase in human capital development. Thus, as banks focus on expanding their asset base, it is likely to promote the development of their human capital.

Conversely, the analysis revealed that profit after tax exhibited an inverse relationship with human capital development. The coefficients for profit after tax in the fixed and random effects models were -0.1945743 and -0.1944149, respectively. This suggests that reducing expenditure on human capital could potentially lead to an increase in profits after tax. Additionally, while other variables such as interest rate and labor (number of employees) did not have a statistically significant impact on human capital development, they exhibited a positive relationship, indicating that a rise in labor might correspond with increased human capital development expenditure. However, the coefficients for these variables were not significant.

By implication, the analysis indicated strong evidence of the combined impact of all variables on human capital development, as reflected in both the R-squared values and the F statistics. The R-squared values for the fixed and random effects models were 0.7473 and 0.7498, respectively, suggesting that approximately 74.7% and 74.9% of the systemic variations in human capital development could be explained by the included variables. Furthermore, the F test results confirmed that both models passed the overall tests for statistical significance, affirming the relevance of the included determinants. The fixed effects model showed $F(4,116) = 88.66$ with a probability level of 0.000, indicating its significance, while the random effects model chi-square value was $chi2(4) = 374.04$, also significant at 0.00. Given the slight differences in outcomes between the two models, it was deemed necessary to conduct the Hausman test to determine the more appropriate model for analysis.

4.3 Hausman Test for the Determinants of Human Capital Development

In panel data analysis utilizing static models, it is essential to assess the suitability of the two primary methods: fixed effects and random effects. To determine which method is more appropriate for this study, the coefficients obtained from both the fixed and random effects models were analyzed using the Hausman test. This statistical test evaluates the consistency of the estimators and helps identify any significant differences between the two models. The results of the Hausman test, which are crucial for guiding the choice of model, are presented in Table 5.

Table 5: Hausman Test for Static Panel Models on the Determinants of Human Capital Development

Variables	Fixed Effects (b)	Random Effects (B)	Difference (b-B)	Standard Error (V_b-V_B))
TA	.0212696	.0212403	.0000293	.0002516
PAT	-.1945743	-.1944149	-.0001593	.0033573
L	618.9177	816.2187	-197.301	296.9402
INTR	-429088.4	-366050.8	-63037.63	80281.32

Test: Ho: difference in coefficients not systematic chiSq(11) = (b-B)'[(V_b-V_B)^(-1)](b-B)=0.62, Prob>chiSq = = 0.7341, (V_b-V_B is not positive definite)

The results of the Hausman test, as presented in Table 5, indicate a chi-square value of 0.62 with a probability level of 0.7341. This outcome suggests that the null hypothesis, which posits that the difference in coefficients between the fixed and random effects models is not systematic, cannot be rejected. Consequently, this implies that the random effects model is more suitable for the analysis conducted in this study, as it indicates that the individual-specific effects are uncorrelated with the independent variables. Therefore, the findings derived from the random effects model are deemed valid and reliable for interpreting the determinants of human capital development in the banking sector.

The implications of these findings are significant for the banking industry. By confirming the appropriateness of the random effects model, the study underscores the importance of considering individual bank characteristics that do not change over time when analyzing human capital development. This approach allows for a more nuanced understanding of how various factors, such as total assets and profits after tax, influence human capital investments across different banks. As a result, banking institutions can leverage these insights to tailor their human capital strategies more effectively, ensuring that they allocate resources in a manner that maximizes development and enhances overall performance.

4.4 Cross-Sectional Dependence Test for Human Capital Development

To ensure the accuracy of parameter estimates in the pooled Ordinary Least Squares (OLS) model, it is crucial to account for the potential influence of common factors among the cross-sections before estimating the fixed and random effects models. Therefore, a test for cross-sectional dependence was conducted, and the results of this analysis are presented in Table 6. This test helps identify whether the residuals from different cross-sectional units are correlated, which can lead to biased estimates if not addressed. By examining cross-sectional dependence, the study aims to enhance the robustness of the subsequent model estimations and ensure that the findings regarding the determinants of human capital development are reliable and valid.

Table 6: Breush-Pagan/Pesaran Cross-Sectional Dependence Test for the Determinants of Human Capital Development

Test	Statistic	d.f.	Prob.
Breusch-Pagan LM	101.1829	28	0.0000
Pesaran scaled LM	8.710431		0.0000
Pesaran CD	0.215735		0.8292

Source: Authors Computation, 2023

The results presented in Table 6 indicate a rejection of the null hypothesis of no cross-sectional dependence among the banks analyzed, as evidenced by the significant Breusch-Pagan and Pesaran statistics at the 1% level. Specifically, the Breusch-Pagan LM statistic of 101.1829 and the Pesaran scaled LM statistic of 8.710431 both suggest that there are systematic correlations in the residuals across the cross-sections. This finding implies that the banks possess unique characteristics that differentiate them from one another, which can influence the estimation of the determinants of human capital development. As a result, pooling the data using the pooled OLS method may not be appropriate, as it could lead to biased estimates due to the unaccounted cross-sectional dependence.

Given the presence of cross-sectional dependence, it is essential to adjust the estimated models to account for these correlations to ensure the validity of the results. The studyThe results presented in Table 6 indicate the presence of cross-sectional dependence among the banks included in the analysis. The Breusch-Pagan LM test statistic of 101.1829 and the Pesaran scaled LM statistic of 8.710431 both have probability values of 0.0000, which are significant at the 1% level. This suggests that the null hypothesis of no cross-sectional dependence should be rejected, and the alternative hypothesis of the existence of cross-sectional dependence is accepted. The implication of this finding is that the pooling of data from the banks to estimate the determinants of human capital development may yield biased results, as some banks possess unique characteristics that distinguish them from others. This finding highlights the importance of accounting for cross-sectional dependence when estimating panel data models, as ignoring this issue can lead to inaccurate parameter estimates and misleading conclusions. To ensure the consistency and

reliability of the results, the study further adjusted the estimated models for cross-sectional correlations, and the findings are presented in Table 7.

Table 7: Cross-Sectional Time-Series FGLS Regression for the Determinants of Human Capital Development

Coefficients: Generalised least squares		
Panels: Homoscedastic		
Correlation: Common AR(1) coefficient for all panels (0.7914)		
Variables	Coefficient	Standard Error
TA	.0149029***	.0020127
L	.1296361**	.006281017
PAT	-.2156155**	.0149068
INTR	-.8439464	.429113

Wald chi2(4) = 260.08, Prob> chi2 = 0.0000

Source: Authors Computation, 2023.

The results presented in Table 7 indicate that after correcting the static models for cross-sectional dependence, there is a notable consistency in the parameter estimates regarding their signs and levels of statistical significance. The key difference observed is that labor now has a significant impact on human capital development, which is a more realistic outcome given that the number of employees in banks is closely related to the volume of expenditure on human capital initiatives. This finding underscores the importance of workforce size in shaping human capital investments, suggesting that banks should prioritize employee recruitment and retention strategies to enhance their human capital development. Additionally, other variables maintained their signs and significance levels, reinforcing the reliability of the model's findings. For the banking industry, these insights imply that a strategic focus on human capital, particularly through labor management, can lead to improved performance and competitiveness in an increasingly dynamic financial landscape.

4.5 Dynamic Panel Data as Robustness Check Determinants of Human Capital Development

The study employed the generalized method of moments (SYS-GMM) dynamic panel model as a robust check for the estimates obtained from the static panel models. This systemic dynamic panel model not only provides consistent parameter estimates but also generates efficient estimates, enhancing the reliability of the analysis. Notably, the SYS-GMM method represents an improvement over traditional dynamic panel data methods, addressing issues such as endogeneity bias that can lead to inconsistent estimates. For the banking industry, the implications of utilizing the SYS-GMM dynamic panel model are significant. This method allows for a deeper understanding of the dynamic relationships between various factors influencing human capital development, such as employee training, recruitment, and retention strategies. The results derived from the SYS-GMM model are presented in Table 8.

Table 8: The Systemic GMM Dynamic Panel Results Determinants of Human Capital Development

Variables	Coefficient	Standard Error
HL1	.4688674	.0467242
TA	.0127301***	.0011531
PAT	-.2536163**	.0184932
L	.8352357**	.03392371
INTR	-.7226261	.2634349
Constant	1.50e+07	5655364

Wald chi2(5) = 1183.79, Prob> chi2 = 0.0000

Source: Authors Computation, 2023.

Table 8 reveals that there are notable similarities between the results of the estimated dynamic panel model and the static panel model, indicating a consistency in the findings. The estimates derived from the dynamic panel model are generally regarded as efficient parameter estimates, confirming that the strength of the determinants is highly relevant to human capital development among banks. The overall significance test under the static models suggests that all variables considered as determinants of human capital development significantly influence it when analyzed collectively. However, the dynamic panel data analysis further demonstrates that all variables, including labor and interest rates—which were not significant in the static models—individually exert a significant influence on human capital development.

These results highlight that total assets, profit after tax, labor (number of banking staff), and interest rates are critical determinants of human capital among deposit money banks in Nigeria. Importantly, the signs of the parameter estimates remain consistent with those from the static panel models; for instance, profit after tax retains its negative relationship while total assets maintain a positive relationship. This consistency reinforces the reliability of the findings and suggests that banks should focus on these key determinants when formulating strategies for human capital development. By understanding the individual and collective impacts of these factors, banks can better allocate resources and implement policies that enhance their workforce capabilities.

4.6 Dynamic Panel Model Diagnostic Tests for the Determinants of Human Capital Development

The estimated dynamic panel model underwent a series of diagnostic tests to assess the robustness and validity of the parameter estimates. These diagnostic evaluations are crucial as they help identify any potential issues such as model specification errors or the presence of heteroskedasticity, which could distort the findings. Specifically, Table 9 presents the F-test results, which gauge the overall significance of the model by testing whether the independent variables collectively have a statistically significant effect on the dependent variable. A significant

F-test indicates that the model explains a substantial portion of the variability in human capital development.

Table 9: Test for Overall Significance of the Dynamic Panel Model for the Determinants of Human Capital Development

Wald $chi^2(13)$	1183.79
Prob> chi^2	0.0000

Source: Authors Computation, 2023.

From Table 9, the Wald chi-square value of 1183.79 is significant at the 1% level, indicating that the estimated dynamic panel data model is statistically significant. This result suggests that all the variables included in the model are relevant and can significantly influence human capital development among banks. The significance of the Wald chi-square test reinforces the validity of the model, providing confidence that the relationships identified are not due to random chance. Additionally, an over-identification test was conducted to evaluate the strength of the instruments used in the dynamic panel model, which is crucial for ensuring that the model's estimates are reliable and not biased. The results of this over-identification test are presented in Table 10 and this further contributed to the robustness of the findings.

Table 10: Sargan Test of Over-identification for the Determinants of Human Capital Development

chi2(103)	13.9941
Prob> chi2	0.0637

Source: Authors Computation, 2023.

The hypothesis that the overidentifying restrictions are not valid has been rejected at the 5% significance level, leading to the acceptance of the null hypothesis that these restrictions are indeed valid. This conclusion affirms that the instruments utilized in the dynamic panel model are appropriate and reliable for the analysis. The validity of the instruments enhances the credibility of the dynamic panel data results. Furthermore, this finding supports the subsequent tests for serial correlation within the dynamic panel model, which are essential for confirming the robustness of the model's assumptions. For the banking industry, these results imply that the analytical framework employed is sound and this allowed banks to confidently utilize the insights gained from the model to inform their strategies regarding human capital development and resource allocation. By relying on valid instruments, banks can make more informed decisions that are likely to lead to improved operational efficiency and competitive advantage in the market.

Table 11: Test for Autocorrelation for Determinants of Human Capital Development

Order	Z	Prob>z
AR1	-3.15	0.002
AR2	1.21	0.225

Source: Authors Computation, 2023.

Table 11 presents the results of the test for autocorrelation concerning the determinants of human capital development. The findings indicate that the null hypothesis of no autocorrelation is accepted at the AR2 level, which is favorable for the results of the study. Specifically, the Z-value for AR1 is -3.15 with a probability of 0.002 and this suggested significant autocorrelation at the first order, while the Z-value for AR2 is 1.21 with a probability of 0.225, indicating no significant autocorrelation at the second order. This outcome implies that the estimated dynamic panel model does not suffer from autocorrelation issues, which is crucial for the integrity of the parameter estimates. The absence of serial correlation ensures that the estimates are efficient and reliable, allowing for more accurate interpretations of the relationships between the variables. For the banking sector, this means that the insights derived from the model regarding human capital development are robust, enabling banks to make informed decisions based on sound statistical evidence. By confirming that the model is free from autocorrelation, stakeholders can trust that the strategies developed from this analysis will effectively enhance human capital initiatives within their institutions.

5. Discussions

The analysis of the panel data reveals that human capital development is significantly associated with total assets (TA), profit after tax (PAT), labor (L), and interest rates, all of which are statistically significant determinants for deposit money banks in Nigeria. Specifically, the findings indicate that an increase in total assets correlates with approximately a 2% rise in human capital development within these banks. Conversely, the coefficient for profit after tax shows an inverse relationship with human capital development, recorded at -0.1945 and -0.1944 in both fixed and random effects models. This suggests that banks may experience an increase in profit after tax if they reduce expenditures on human capital. This highlighted a potential conflict between immediate financial performance and long-term investment in workforce development.

Furthermore, the analysis demonstrates a strong positive correlation between labor, defined as the number of staff, and human capital development. This finding underscores the importance of staffing levels in enhancing human capital, indicating that as the number of employees increases, so does the potential for human capital development. This aligns with previous studies that emphasize the critical role of human resources in the banking sector, particularly in Nigeria, where banks often reduce staff numbers to cut training and development costs. Such practices may undermine the long-term growth and efficiency of the workforce, as suggested by the literature.

Additionally, the interest rate, as determined by the Central Bank of Nigeria's monetary policy, also plays a significant role in human capital development. The study reveals a strong relationship between interest rates and profit after tax, suggesting that both are key financial indicators for banks. This relationship highlights the interconnectedness of financial performance and human capital investment, and this reinforces the notion that banks' ability to invest in employee training and development is contingent upon their financial health.

Overall, the study concludes that human capital development among deposit money banks in Nigeria is influenced by total assets, profit after tax, labor, and interest rates. These findings resonate with the works of Adeyemi (2019) and Gidado, *et al*. (2023), who discussed the importance of human capital investment in developing economies, and Agbiogwu et al. (2016) and Fagbemi, *et al*. (2022), who explored the effects of human resource costs on bank profitability. The results corroborate the assertions of Aluko and Aluko (2019) regarding the challenges of human capital development in Nigeria. Their findings emphasized that banks must balance financial performance with the need for workforce development. The implications of this study suggest that banks should prioritize human capital initiatives, as these investments are crucial for enhancing operational efficiency and competitiveness in the financial sector.

6. Conclusion

This study has thoroughly examined the determinants of human capital development among selected deposit money banks (DMBs) in Nigeria, focusing on financial perspectives that have often been overlooked in previous research. By utilizing key financial indicators such as total assets, profit after tax, the number of employees, and interest rates, this research provides valuable insights into how these elements influence human capital development within the banking sector. The findings reveal that total assets serve as a crucial measure of capital formation, which is essential for acquiring the necessary resources and tools for effective staff training. Additionally, profit after tax highlights the financial capacity of banks to invest in training programs, while the number of employees signifies the available human resources that can undergo training and development. Interest rates, as a financial indicator, reflect the cost of capital and its impact on the banks' ability to support human capital initiatives.

In conclusion, this study contributes significantly to the understanding of the financial determinants of human capital development in the Nigerian banking industry. The identification of total assets, profit after tax, labor, and interest rates as key factors provides a framework for banks to enhance their human capital strategies. The implications for the banking industry are profound; banks must recognize that financial performance directly influences their ability to invest in workforce development, ultimately impacting their operational efficiency and competitiveness. By prioritizing these financial indicators, banks can better allocate resources toward training and development initiatives, thereby fostering a more skilled workforce that can adapt to the evolving demands of the industry. This research not only fills a gap in the existing

literature but also serves as a guide for banking institutions aiming to leverage human capital as a critical asset for sustainable growth and success.

7. Recommendations and Policy Implications

Based on the findings from the analysis, several recommendations are proposed for the management, boards, and regulatory bodies of deposit money banks (DMBs) in Nigeria. Firstly, it is crucial for the management of these banks to focus on strengthening their total assets. A robust asset base will not only provide the necessary resources for staff training but also facilitate sustained investment in human capital development. By prioritizing capital formation, banks can ensure that they have the financial capacity to enhance their workforce's skills and capabilities.

Secondly, it is essential for the management and boards of DMBs to establish a fixed percentage of the bank's profit after tax that will be allocated annually for staff training and development. This proactive approach not only underscores the importance of investing in human capital but also helps in creating a culture of continuous improvement within the organization. By committing a portion of profits to training initiatives, banks can enhance employee skills, which in turn can lead to increased profitability over time. This strategy aligns with the findings of the study that highlight the positive relationship between profit after tax and human capital development.

Lastly, banks should reassess their staff composition regarding the number and distribution of employees. It is important to ensure that training and development expenditures are appropriately allocated, focusing more on middle and supervisory staff rather than disproportionately investing in top management. This approach will enhance the overall effectiveness of training programs and ensure that a larger segment of the workforce benefits from professional development opportunities. Additionally, the regulatory body responsible for interest rate management should strive for greater stability in interest rates, as fluctuations can significantly impact the banks' ability to invest in human capital development. By implementing these recommendations, DMBs in Nigeria can foster a more skilled and capable workforce that is essential for navigating the challenges of the banking industry.

8. Limitations and Suggestions for Further Studies

This study is limited by its reliance on secondary data, which may not capture the most current trends or nuances in human capital development among deposit money banks in Nigeria. Additionally, the use of secondary data can also introduce biases or inaccuracies inherent in the original data sources. Furthermore, the study does not account for qualitative factors that may influence human capital development. For further studies, it is recommended to explore human capital development in other sectors, such as telecommunications or manufacturing, to compare findings across different industries. Incorporating primary data collection methods, such as surveys or interviews, would allow researchers to gather firsthand insights from employees and management.

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