Bank Embranchment, Operating Efficiency and Profitability of Islamic Banks Selected Countries

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ABSTRACT

Despite the growing demand for non-interest banking products and services, inadequate embranchment and inefficiency of the branches tend to hamper the banks' profitability. This study therefore assessed the effects of bank embranchment and operating efficiency on profitability of non-interest banks in selected countries. Specifically, the study examined the effects of number of bank branches, cost to income ratio as well as their interaction, on return on assets of the banks. Data were extracted from IFSB database and were analysed using Fixed effects regression technique. Results of data analysis revealed that bank branches had positive significant (Coff= 2.28, p <0.05) effect while cost to income ratio had negative significant (Coeff=-0.11, p <0.05) effect on return on asset. The interactive effect of cost to income ratio was also found to significantly negative (Coeff=-0.03, p <0.05) on return on asset. The study concluded that bank embranchment and operating efficiency are key to improved profitability of non-interest banks in the selected countries. The study recommended that bank regulatory authorities should provide enabling environment to facilitate establishment of more branches of non-interest banks particularly in the rural communities. This will increase bank profitability and encourage financial inclusion. In addition, the management of non-interest banks should make efforts to control operating the cost of running the branches to have maximum benefit of embranchment on profitability.

KEYWORDS

Cost-to-income, Embranchment, Financial Inclusion, Islamic Banking, IFSB, Operating Efficiency, Profitability, Return on Asset.
JEL Codes: E44, G21, G32, G41, G53

INTRODUCTION

The development of financial sector has resulted in more financial innovation and services, especially credit, being available to businesses and consumers in many African countries. In a similar vein, new technologies like mobile money help financial services like savings and payment solutions grow (Abdu et al., 2018). Even though the majority of these countries have made significant advancements over the years, many still have weak financial systems when compared to other industrialized economies.

Indicators of how local firms and consumers use financial products and services show that there are still many barriers to building a more inclusive financial sector in many developing countries (Abdullahi, Sharofiddin, & Kasim, 2024). Among the main factors impeding the expansion of financial inclusion are inadequate infrastructure, low literacy, economic limitations, changes in regulations and policies, cultural and social norms, and religious beliefs (Ulwodi & Muriu, 2017). Religion plays a significant role in this regard, especially in areas with large percentage of Muslim population. As interest (riba) is forbidden in some religions, especially Islam, people avoid using traditional financial services (Abdullai & Nyaoga, 2017). As such, Islamic banking which offers financial services to people who were previously excluded because of their religious beliefs, was necessary to address the financial exclusion.

The aforementioned makes it abundantly evident that Islamic banking, which does not charge interest, has emerged to tackle the issue of financial exclusion resulting from religious beliefs. This endeavor has ultimately led to the expansion of the Islamic banking industry worldwide (Ahamed & Mallick, 2019). It is anticipated that non-interest banks will improve their financial performance as a result of their efforts to advance financial inclusion. This is expected as the banks expand through networks of branches to provide shariah compliant financial services to their various customers. Access to financial services and banking penetration will rise as a result of bringing business to the people through embranchment. Therefore, by giving access to bank branches, financial inclusion can significantly enhance financial performance of the banks. however, establishment of more branches does come with increased operating cost of running the branches (Olasojumi, Ugwuchi, & Partrick, 2018). In other words, high operating cost means operating inefficiency in branches which may affect the profitability and overall financial performance of the banks. Therefore, Islamic banks need to operate their branches in a more efficient way to enhance their performance because profitability is directly linked to operational efficiency (Shevchenko & Kopytko, 2025). High operational efficiency plays a significant role in increasing banks' profitability (Elmahdy, Abdelkader, & Shaker, 2025). Meanwhile, there is still little empirical evidence regarding how operating efficiency interacts with the relationship between Islamic banks' profitability and bank embranchment. Thus, the study was carried out to evaluate how bank embranchment and operational effectiveness affect Islamic banks' profitability in selected countries.

LITERATURE REVIEW
Contemporary Banking Theory
This study was carried out with the framework of the Contemporary Banking Theory. The theory was propounded by Bhattacharya and Thakor (1993) as a major expansion of financial intermediation theory. According to the theory, commercial banks and other financial intermediaries play significant roles in ensuring that capital resources are distributed appropriately across the economy. By lowering the transaction costs for services, financial intermediaries contribute significantly to the economy. The theory incorporates the components of financial intermediation theory and expanded the scope of financial intermediation. As a result, regulation of financial intermediaries more complex (Bhattacharya & Thakor, 1993). Regarding the bank branch dispersion variable, the modern banking theory is pertinent to this investigation. The fact that commercial banks run a network of branches due to competitiveness and the need for financial inclusion makes the theory applicable to this study. Proponents of the theory believe that contemporary banks are able to close the gap between customers and services through embranchment. Relating the theory to this study, it is believed that bank embranchment, that is founding and operating bank branches, comes with high operational cost (Zoubida, Imed, & Djamel, 2025), requiring high efficiency for profitable operation.

Empirical Review
Nguyen (2014) investigated whether branch network matters for financial service accessibility in the US. Data were collected for period from 1999 to 201 and analysed. The study revealed that bank branches are

still important especially in somedisadvantaged areas. It was also reported that branch closures resulted in credit shortage for small scale enterprises. Similarly, Jegede (2014) looked into how Nigerian banks performed in relation to ATMs mounted across different bank branches and reported positive effect on bank performance.

Kondo (2017) investigated branch network expansions and bank embranchment and their impact performance of Japanese regional banks. Result of panel data regression analysis indicated that branche network increased total loans and bills discounting activities of banks. In another study, Nzyuko, Jagongo and Kenyanya (2017) assessed the impact branch banking, ATMs, internet banking, mobile banking, and agency banking on financial performance. Data were analysed via multiple regression and correlation techniques. Result of data analysis showed that positive correlation exists between performance and financial inclusion initiatives including bank embranchment. This means that the study supported the positive impact of embranchment on bank performance.

In the like manner, Shihadeh and Liu (2019) studied the relationship between bank branch network as an indicator of financial inclusion and performance. 701 banks from 189 countries were selected for the study. The results show that increase in number of bank branches will have positive effect on banks' performance. Similarly, Jimoh, Shittu and Attah (2019) investigated the impact of financial inclusion tools on the performance of Nigerian banks. Findings of the study revealed that bank embranchment had positive and significant impact on performance of the banks. Furthermore, Ditta and Saputra (2020) evaluated the impact of branch offices on performance. Random effect regression analysis was conducted and the results indicated that bank embranchment promotes financial inclusion. That is, embranchment as an indicator of financial inclusion was found to have significantly positive correlation with bank performance.

However, there is still a dearth of research on how efficient banks are at providing services across a large number of branches, particularly for non-interest (Islamic) banks. Therefore, this study contributes to the body of knowledge by incorporating operational efficiency while modeling relationship between embranchment and profitability of Islamic banks in selected countries.

METHODOLOGY
Ex-post facto design was adopted for the study while IFSB database provides access to Islamic banking data for nine countries that were chosen for the study. The selected countries are Indonesia, Iraq, Jordan, Kuwait, Malaysia, Nigeria, Oman, Saudi Arabia, and Sudan. Quarterly data were extracted for nine (9) years from 2014Q1 to 2022Q4.

The following model was specified to relate profitability measure to the explanatory variables.
$$ROA_{it}=\beta_0+\beta_1 NBB_{it}+\beta_2 CIR_{it}+\beta_3 CIR*NBB_{it}+\beta_4 ATM_{it}+\beta_5 TDL_{it}+\beta_6 BSZ_{it}+\epsilon_{it}$$

Where:

ROA = return on asset
NBB= Number of bank branches
CIR= cost to income ratio'
ATM = number of Automated Teller Machine installed by non-interest banks
TDL = total deposit liability
BSZ = Bank size
ϵ_{it} = error term

Fixed effects regression analysis was conducted, and results were interpreted and discussed.

RESULT AND DISCUSSION

Table 1: Descriptive Statistics.

Var	Mean	Std Dev	Min	Max	Obs
ROA	1.85	0.55	0.60	3.10	324
NBB	59.00	1.30	9.80	97.10	324
CIR	5.00	1.40	2.20	14.00	324
ATM	227.00	5.50	78.00	546.00	324
TDL	510.00	110.00	300.00	750.00	324
BSZ	5.100	0.011	2.20	9.05	324

Source: The author's computation (2025)

The findings of the profitability and financial inclusion factors' descriptive statistics are as displayed in Table 1. According to Table 1, non-interest banks in the chosen nations had an average return on assets (ROA) of 1.85% from 2014Q1 to 2022Q4. In other words, the standard deviation is 0.55 and the average ROA is 1.85%. Given the relatively narrow range between the minimum (0.60%) and maximum (3.10%) values, which indicates rather stable performance, this points to moderate profitability among the examined institutions. The average bank embranchment, as determined by the number of bank branches (NBB), is 59.00, with a standard deviation of 1.30. 9.80 (about ten) branches is the bare minimum. The table also indicates that there can be no more than 97 branches of non-interest banks. In summary, the average number of Islamic bank branches is 59, with a 1.30 standard deviation. The numbers range from 9.80 to 97, indicating a moderate increase of branch networks. Differences in infrastructure development are implied by the dispersion.

The average cost to income ratio (CIR) for non-interest banks in each of the chosen countries increased by 5% over the study period, according to the CIR's mean value of 5.0. However, some nations' records fell short of the mean. This is demonstrated by the minimum value of 2.20, which shows that at least one of the chosen nations has an annual variation in CIR of roughly 2%. The biggest percentage change for the chosen countries is 14%, as indicated by the maximum figure of 14.00. Stated otherwise, the standard deviation is 1.40 and the mean CIR is 5.10. The range, which runs from 2.20 to 14.00, shows that non-interest banks' operational efficiency varies depending on the observation.

According to the report in Table 1, there were 227 (ATMs), on average over the relevant time period. Table 1 shows a minimum installation of 78.00, maximum installation of 546, and a standard deviation of 5.50 for the period under review. ATM availability shows a wider range with a mean value of 227.00 and a standard deviation of 5.50. This implies different levels of technical infrastructure and customer service outreach.

Total deposit liability (TDL) has a broad range of 300.00 to 750.00 withmean of 510.00 and standard deviation of 110.00. This variability reflects significant differences in the size of banking operations across organizations. Bank Size (BSZ) BSZ shows comparable size measurements across institutions having an average score of 5.10 and with small standard deviation of 0.011. Despite the low standard deviation, the results show some variability, ranging from 2.20 to 9.05. This could be due to the use of logarithmic or normalized size measures. Furthermore, CIR was averaged 17.89 with 3.20 as its standard deviation. The minimum and maximum values are 2.55 and 35.99 respectively. Generally speaking, a lower CIR indicates higher operational efficiency and vice versa.

According to the descriptive study presented in Table 1, the factors are not constant but rather have a range of values that allow them to influence ROA, a metric used to assess Islamic banks' profitability in selected countries.

Table 2: Pair-Wise Correlation.

	ROA	CIR	NBB	ATM	BSZ	TDL
ROA	1.00000	0.38271	-0.63423	0.17791	-0.06399	0.17702
CIR	0.38271	1.00000	-0.56397	0.07027	0.11367	0.16693
NBB	-0.63423	-0.56397	1.00000	-0.40896	0.11100	-0.53721
ATM	0.17791	0.07027	-0.40896	1.00000	0.08707	0.66964
BSZ	-0.06399	0.11367	0.11100	0.08707	1.00000	-0.01591
TDL	0.17702	0.16693	-0.53721	0.66964	-0.01591	1.00000

Source: Author's computation (2025)

The correlation between each pair of factors was displayed in Table 2. The findings show that there is no multicollinearity since collinearity causes errors in regression model coefficient estimations when the variables are highly linked (often > 0.80). According to Table 2, no pair surpasses 0.80, thus while several variables indicate significant connections, they are slightly below the standard multicollinearity warning level. Consequently, the outcome shown in Table 2 indicates that no multicollinearity problem is observed in the model.

Table 3: Variance Inflation Factor.

Variable	VIF	TOLs
NBB	2.14	0.47
CIR	1.97	0.50
ATM	2.15	0.47
BSZ	1.51	0.66
TDL	1.88	0.53
TFN	1.11	0.90
Average	1.79	

Source: Author's Computation, 2025

Table 3 presents the result of Variance Inflation Factor (VIF). In general, a variable is deemed non collinear if its VIF is less than 10, but very collinear if it is larger than 10. A VIF of exactly 1 indicates that there is no association. Table 3 shows that there is no strong relations between variables, as VIFs are only slightly greater than 1. Tolerance levels (TOLs), the reverse of VIFs, provide evidence in support of VIF result. TOLs of values higher than conventional benchmark of 0.20 indicate that standard errors of the coefficients could not have been incorrectly inflated. It follows that OLS regression can be carried out without necessarily worrying about the results' reliability. This is due to the fact that multicollinearity between independent variables leads to inaccurate findings. The results of OLS regression will be unreliable due to inaccurate estimations of T-, F-, and R-squared statistics. However, as Tables 2 and 3 show, this is not the case in this investigation. OLS regression can therefore be carried out with reliability.

Table 4: LM Test of Breusch-Pagan.

Breusch- Pagan LM	Statistics	Df.	Prob.
Values	25.946	10	0.0038

Source': Author's Computation (2025)

Table 4 presents the Breusch Pagan Lagrange Multiplier (BP/LM) test for comparing simple OLS and Effect models. BP/LM Test's p-value of 0.0038 is less than 0.05, as seen in the table. This implies that the hypothesis of zero variance for random effect is rejected. Thus, Pooled OLS estimator was inappropriate and the study resorts to a more suitable estimator between fixed and random effects models. Selecting between fixed and random effects models necessitated Hausman test procedure whose result was displayed in Table 5.

Table 5: Hausman Test.

Test summar'	Chi-Sq Statistics	Chi-Sq Df	Prob
Cross-section random	105.770	228	0.0000

Source: Author's Computation (2025)

According to Table 5, the Hausman test estimate (105.770) is high and significant because its estimated p-value (0.0000) was found to be less than 5%. This implies that fixed effects model is more suitable for the analysis. This suggests that the investigation's model produces better results when the fixed effects method is applied.

Table 6: Regression Analysis.

ROA	POOLED OLS	FIXED EFFECTS'	RADOM EFFECTS'
Constant	2.5803***	4.3055	-1.6601
	(0.4897)	(3.1926)	(1.2651)
CIR	0.2201	- 0.1101**	-0.9400
	(0.2511)	(0.0133)	(1.2962)
NBB	0.9921**	2.2777**	0.5210**
	(0.1011)	(0.2210)	(0.0113)
CIR*NBB	-0.8431**	-0.0319**	-2.8817**
	(0.2000)	(0.0009)	(0.1104)
ATM	5.5691	1.1812***	9.1212
	(3.1111)	(0.002)	(6.7780)
TDL	0.6121**	0.7842***	0.1380**
	(0.0225)	(0.0530)	(0.0216)
BSZ	0.1710	0.4419**	1.4500**
	(0.3409)	(0.1005)	(0.0249)
F-stat/Wald X^2	11.12***	9.05***	17.68***
R-squared	0.79	0.81	0.83

Source: Author's computation, 2025. ***Significant at 1%, **Significant at 5%, *Significant at 10%, ( ) standard error in brackets.

According to Table 6, positive, significant correlation was found between number of bank branches (NBB) and return on assets of Islamic banks. A unit increase in NBB will lead to 2.27% increase in return on asset. Conversely, ROA and CIR have an inverse relationship; for non-interest banks in the selected countries, 1% increase in CIR will result in 0.11% decrease in ROA. The relationship was found to be significant at the 5% significance level. ROA was also significantly impacted negatively by the interplay of NBB and CIR (CIR*NBB). This indicates that 1% increase in CIR*NBB will result in drop of about 0.03% in ROA.

However, it was shown that automated teller machines (ATMs) significantly improved ROA. A one-unit increase in ATM installation usually translates into a 1.18% gain in ROA, according to Table 6's statistics, which reveal a favorable association between ATM and ROA. Similarly, ROA usually increases by 0.78% for every 1% increase in total deposit liability (TDL). The link was determined to be significant at 1% level of significance, as shown in Table 6. Furthermore, return on asset and bank size (BSZ) were significantly, positively correlated. This suggests that a 0.44% increase in ROA is likely to follow a unit increase in bank size (BSZ). In terms of the model's goodness of fit, R-squared value of 0.81 implies that about 81% of the systematic variations in returns on assets were explained by changes in the explanatory variables. This means that the model is good and that no specification flaws can be inferred.

Favourable effects of total financing and bank embranchment were found on ROA. Furthermore, the ROA of Islamic banks is strongly correlated with their size. Bank embranchment has positive and significant impact on non-interest banks' ROA. This suggests that, as non-interest banks expand their branch networks

(embranchment), their ability to generate revenue from their assets improves. Non-interest banks sometimes cater underbanked, such as those who live in rural or religiously conservative communities. Having more branches allows banks to access more customers, mobilize deposits, and boost lending activities, all of which promote profitability. The study's findings about the relationship between bank embranchment and ROA were previously reported by Oranga and Ondabu (2018). The study's findings also corroborate those of Jimoh et al. (2019), who discovered that bank embranchment is necessary for improved performance.

Operating efficiency was found to have a considerable detrimental impact. This suggests that the bank's low level of operating efficiency as determined by the CIR had impact on profitability. The results were consistent with those of Umoh (2024), who found that operating efficiency had a comparable impact on profitability. The study's findings about the connection between profitability and operating efficiency are likewise in line with those of Aranda and Wardani (2024). Significant negative effects were also found in respect to the interactive effect of operating efficiency in the link between bank profitability and bank embranchment. The implication of this result is that, while profitability tends to increase by operating from more branches, efficiency at which the branches operate has affected the level of profitability.

Positive correlation was however found between ROA and ATM was discovered. That as ATMs services increased the banks' chances for more profits. This will be particularly so with high level of asset utilization. This seems conceivable as ATMs are generally linked to service expansion and customers convenience. The findings of this ATM study corroborated those of earlier research by Khatib et al. (2022), Abu Eid et al. (2023), and Banna et al. (2022), which claimed that the installation of ATMs had a positive and substantial effect on bank profitability.

Another factor that has a positive and substantial influence is bank size. The results demonstrated that return on assets was much enhanced by bank size. Bigger banks are frequently more efficient at using their resources to generate profits, according to a substantial and positive link with ROA. The study backs up the conclusions of Vo and Nguyen (2021) about how bank size affects return on assets.

CONCLUSION
Regression analysis revealed that number of branches, cost to income ratio, automated teller machines, total deposit liabilities, and bank size had positive and significant impact on ROA of Islamic banks in selected countries. It was therefore concluded that bank embranchment and efficiency with which the branches operate, are crucial for increasing the profitability of Islamic banks in selected African countries.

Practical Implication of the Research
This study will serve as information sources to regulatory authorities on how to provide enabling environment and facilitate establishment of more branches of Islamic banks particularly in the rural communities. This research also shows that efficient operation of Islamic bank branches will boost profitability of the banks and propel higher level of financial inclusion. Finding of the study equally revealed that management of Islamic banks need to make efforts to control the cost of running the branches for maximum benefit of embranchment on profitability.

Future Research Direction
The efficient operation of Islamic bank branches for increased profitability was the main emphasis of this study. However, because the analysis was limited to secondary data from the IFSB database, country-specific regulatory differences were not taken into account. Although this does not invalidate the study's findings, future research endeavours should incorporate variables that take into consideration country-specific regulatory factors that may impact bank profitability. Additionally, this study used the fixed effect regression technique, which allowed the researcher to account for some of the model's unobservable heterogeneities. However, problems with potential endogeneity, such as the causal relationship between

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profitability and embranchment, and operational efficiency and profitability, could not be resolved by the method used. Testing for causality between the factors could also be the focus of future research.

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