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FINANCIAL PERFORMANCE IN BANKS: THE INTERACTION OF LABOR EFFICIENCY AND ASSET USE

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Abstract

The research investigates the role of asset utilization and labor productivity in the financial performance of Saudi banks, mainly in the case of large bank mergers within the Vision 2030 framework. It analyzes the financial performance, based on the size of the bank, using the panel regression model. The data, collected from the major banks covering 2016 to 2024, showcase direct effects, interactions, and moderation aspects. According to the finding of the study, higher staff productivity, measured in terms of profit per employee, leads to a significant increase in profitability, particularly in the case of ROA, ROE, and NPM. Moreover, the positive effect of labor efficiency is further intensified by sound asset management practices. The interaction model has proved the relationship between labor efficiency and asset utilization that results in overall profitability. Also, the moderation analysis shows that the beneficial effect of worker productivity becomes less intense as the bank size increases because larger banks usually have lower profitability ratios. The conclusion drawn from this research could be of great help to the bank management, the legislators, and the regulators, involved in the integration of fiscal policy and the performance of the financial sector, under the Vision 2030 economic framework.

Keywords: *Sustainable Finance, Employee Efficiency, Asset Utilization, Bank Performance*

JEL Code : *G21, G34, J24*

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1. Introduction

The structural transformation of the Saudi banking sector was driven by a series of high-profile mergers, aimed at consolidation through closing operations and improving the resilience of the financial system. In January 2022, Saudi National Bank (SNB) was formed upon the merger of the National Commercial Bank and Samba Financial Group and it was formed out of the largest financial institution in the Kingdom, with assets of over SAR 896 billion ($239 billion). In March 2021, the merger of Saudi British Bank (SABB) and Alawwal Bank led to the creation

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of a single entity whose assets exceeded SAR 278 billion. The M & A are in line with Saudi Arabia's Vision 2030 strategic goals, which aim at developing a strong, efficient, and varied financial system. Mergers will not only provide more market access and bigger size but also their success will be determined by internal resource management effectiveness, particularly the service quality, staff productivity in value creation and asset usage, which are very important factors in determining post-period profit and competition performance.

Mergers and acquisitions in the banking industry are generally performed to help the organization achieve strategic growth, market expansion, and operational synergies. Nevertheless, these mergers can be problematic to the degree to which integration ensuing from these mergers can prove to be difficult, primarily in terms of employee performance and realizing financial benefits. Internal operations, cultural clashes, management restructuring, along with other such things, can simultaneously influence the performance of employees and as a result, the overall profitability of the merged entities. **Alsharif (2023)** demonstrates that the merger between National Commercial Bank and Samba Financial Group resulted in improved efficiency figures while the merger between SABB and Alawwal Bank reported a post-merger efficiency decline. Likewise, **Gattoufi et al. (2009)** noted that the M&A activities in the GCC banking sector, including those in Saudi Arabia, have had a negative or negligible impact on the corporate performance of the acquiring banks. **Denison et al. (2011)** also emphasized that strategic and cultural mismatch often limits the effectiveness of integration in increasing long-term performance, especially in cross-border scenarios of mergers and acquisitions. This is especially applicable to the banks of Saudi Arabia, which desire changes through a combination of home reform visions and aspirations for being competitive internationally. According to **Berger et al. (2004)**, the market structures, that come after a merger, are crucial and that high concentration levels hurt competition and thus negatively impact the merger's expected benefits.

2. Review of Literature

Mergers and acquisitions in banks are carried out primarily to achieve strategic growth, enhance market share, and gain operating synergies **(Nazim-Ullah, 2023)**. However, the process of integration could prove to be considerably challenging, particularly in employee productivity and realization of capital returns. Organizational restructuring issues, cultural disparities, and business disruptions can negatively impact employee effectiveness and hence profitability. Bank mergers and acquisitions are generally identified as strategically planned actions that enable growth, higher efficiency, and stronger competition **(DeYoung et al., 2009)**. Mergers reinforce the financial robustness of the respective entities through various means such as cost reduction, better allocation of resources, and the acquisition of scale benefits **(Al-Binali et al., 2023; Alsharif, 2023)**.

According to **Alsharif (2023)**, while National Commercial Bank's merger with Samba Financial Group was associated with greater efficiency gains, the merger of SABB with Alawwal Bank was associated with a performance decline post-merger. Similarly, **Gattoufi et al. (2009)** cited that in the Gulf Cooperation Council's banking sector mergers and acquisitions had minimal or negative effects on the financial performance of the acquiring banks.

Several studies have been conducted on the human capital dynamics in the banking

sectors after the merger **(Alnehabi, 2025; Alsharif, 2023)**. The research shows that the workforce commitment has a positive effect on the corporate reputation where employee performance is a mediating factor. **Alsharif (2023)** investigated the merger of SABB-Alawwal Bank from an employee efficiency perspective and concluded that effective communication, training, and HR policy alignment are necessary to realize operational efficiency gains from the merger. These studies confirm the importance of the integration of the employees for the M&A advantages **(Alnehabi, 2025; Alsharif, 2023)**.

Other researchers have investigated the structural and operational factors, that have an impact on banking performance, resulting from mergers and acquisitions. **Berger et al. (2004)** theorized that mergers and acquisitions might not always impact operational effectiveness negatively and could even be the preferred choice of smaller banks over larger ones. However, very large market concentration, commonly calculated by using the Herfindahl–Hirschman Index, may prevent the desired benefits from the mergers. **Saif-Alyousfi et al. (2017)** emphasized that capital strength, profitability, size, and quality of assets are the main factors, influencing the operational efficiency of Saudi Arabia's commercial banks.

Scholars used Resource-Based View (RBV) and Efficiency Theory, to analyze bank performance after mergers. RBV states that competitive advantage is given by resources that are valuable, rare, and hard to replicate, such as human capital, technology, and organizational capabilities **(Barney, 2011; Nason & Wiklund, 2018)**. RBV shows how the internal resources can help the company to assess performance after a merger. On the other hand, Efficiency Theory argues that companies profit maximization can only be achieved through proper utilization of the resources at their disposal. In other words, productive staff and asset management would lead to the banks' superior performance **(Trabelsi & Trad, 2017)**. Thus, RBV and Efficiency Theory, in conjunction, constitute a narrow lens through which to study the resource and resource efficiency factors, influencing post-merger bank performance in Saudi Arabia.

3. Statement of the Problem

The research is highly significant for Saudi banks, that are involved in national reforms and strive to be competitive in the global market. Saudi Arabia's rapid economic changes have made the country more dependent on the profitable research and studies of the patterns of profitability deviation in the local financial performance because of the merging of banks. This issue brings to the fore the necessity of studying the impact of factors like employee efficiency and asset utilization on profitability.

4. Need of the Study

In the setting of Saudi banking organizations, the research increases the knowledge base of firm performance during post-mergers. The results of the research hold significant implications for regulators, investors, and policymakers. By contributing to the current literature on the topic of post-merger strategic choice and mergers' implementation, the research assists in complementing Saudi Arabia's financial industry overall objectives to help increase governance effectiveness and propel economic growth and development in line with the Vision 2030.

5. Objectives of the Study

The research investigates the relationship between employee productivity and asset utilization in assessing the profitability of Saudi

banks and explores bank size as a moderating variable. The research aims to identify the optimal trade-off between asset productivity and labor costs, in addition to examining the relationship between these factors in different banking institutions. The main aims of the research are to assess the effect of Saudi banks' employee efficiency on their profitability, explore the effect of asset utilization on bettering financial performance, to determine whether employee efficiency is associated with profitability for banks of different sizes and to determine an optimal balance between the cost of employees and the use of assets to maximize the profitability. In addition, the studies examined the role of moderation of bank size across employee productivity, mergers, and financial performance of the firm. Based on Saudi banks panel data, panel regression models were employed to examine the effect of institution size on the performance of mergers.

6. Hypotheses of the Study

This research employed the RBV and Efficiency Theory, to analyze the effect of internal resources on the profitability of banks. By looking at the RBV, the optimal use of the company's human resources and the operational capacity would assist the company to gain a competitive advantage **(Barney, 2011)**. Conversely, the Efficiency Theory claims that companies increase their profits mainly by more effective use of their resources, especially through better labor productivity and asset utilization **(Berger & Humphrey, 1997)**. Hence the following hypothesis:

H_1: Staff efficiency positively affects bank profitability.

The efficiency of employees, as indicated by metrics like Profit Per Employee (PPE), is viewed as the most important factor, that in a direct way affects the success of an organization, according to the RBV framework. Human capital is seen as a resource that is valuable, rare, and cannot be replaced and those banks that are able to make full use of the productivity of their employees, are likely to produce excellent financial results **(Crook et al. 2011)**. Therefore, the improvement in employee efficiency is expected to be a factor in total profitability **(Goddard et al. 2011)**.

H_2: Asset usage has a positive effect on bank profitability.

In accordance with the Efficiency Theory, resource optimization results in better yield, which enables banks to extract the most revenues from their resources in a holistic manner. A higher asset turnover signifies that the financial institution is successfully transforming its investments into income **(Athanasoglou et al. 2008)**. Hence it is justified to propose that banks with more efficient asset utilization practices, will show greater profitability.

H_3: Employees' efficiency and asset utilization, when combined would enhance bank profitability.

While the performance of an organization can be improved by increasing employee efficiency and asset utilization separately, the combination and coordination of these factors are likely to yield synergistic effects, that are even more than the sum of their individual contributions. Based on the RBV's idea of complementary resources, it is believed that the collaborative and simultaneous management of human capital and physical assets will significantly boost the bank's profits **(Sirmon et al. 2007)**.

H_4: Bank size moderates the relationship between employee efficiency and profitability.

The productivity of employees in a bank can be affected by the organizational scale and

thus, the way internal resources are used has a different impact on financial performance. Larger banks might use their size to get cheaper costs but they also should deal with the inefficiency brought about by bureaucracy that would lessen the effects of productive employees **(Berger & Mester, 1997)**. Hence it is hypothesized that the effect of employees' efficiency on the bank's profitability depends on the bank's size, with the large banks possibly experiencing reduced or changed efficiency effects.

The foregoing hypotheses presented a systematic framework for analyzing the dynamics between operational efficiency, organizational dynamics, and financial performance, particularly in the evolving Saudi banking sector.

7. Research Methodology

7.1 Sample Selection

This research included all commercial banks, listed on the Saudi Exchange Market (Tadawul) over the period 2016–2024, which allowed complete assessment of the banking sector and prevented research bias through sample selection. The research studied ten banks, which included Al Rajhi, Alinma, Albilad, AlJazira, The Saudi Investment Bank, Arab National Bank, Riyad Bank, Banque Saudi Fransi (BSF), Saudi British Bank (SAB), and Saudi National Bank (SNB). Banks were selected, based on continuous listing on Tadawul and the availability of complete financial data throughout the study period. A balanced panel data framework was employed, to capture both cross-sectional and time-series variations, enabling the analysis of long-term financial performance and its key determinants. The dataset included variables like profitability, operational efficiency, bank size, employee productivity, and digitalization, which enabled a complete evaluation of Saudi banking sector performance.

7.2 Period of Study

This research was conducted during the period from Feb 2025 to Aug 2025. The data collection took about one month, from Mar 2025 to Apr 2025.

7.3 Sources of Data

Secondary data were used for this research. The data were collected from the Tadawul website, banks' websites and Refinitiv Eikon website.

7.4 Tools used in the Study

This study employed secondary bank-level data and financial ratio analysis, to evaluate banking efficiency and profitability. The dataset contained financial and operational data, collected over multiple years for different banks, which enabled the analysis of efficiency and profitability trends. The dependent variables were used to measure the most important financial performance and core profitability measures. The independent variables would capture employee efficiency and asset efficiency. **Table-1** presents the definition and measurement of variables, used in the analysis.

8. Data Analysis and Interpretation

8.1 Descriptive Statistics

The descriptive statistics of study variables are shown in **Table-2**. The ROA was 1.5% and the ROE was 10.6%, indicating modest returns on assets and comparatively higher returns on equity across the sampled banks. The NPM mean values were at 42%, suggesting relatively strong net profit margins on an average. But NPMs were very volatile, reflecting the difference in their profitability capability. Researchers considers ECH, PPE, and EPR to be the major factors since their greater standard deviations point to big differences in cost and efficiency among banks.

On the other hand, even though asset utilization ratios such as ATR and ETR were low (36% and 25.3%), their min-max ranges and standard deviations still pointed to better performance than others in terms of asset utilization and revenue generation. The control variables, which were Bank Size, Leverage, and Provision Policy, reported distributions which were stable and their low standard deviations were typical of such distributions. In other words, descriptive statistics revealed that although banks were quite similar to each other in terms of structural characteristics like size and leverage, differences were quite pronounced in the areas of profitability, cost structure, and operational efficiency.

Following the descriptive analysis, the study applied the panel regression techniques, to test the hypotheses in a logical way. The analysis of panel regression model revealed the direct and interaction effects simultaneously of the two main in-house performance metrics, namely, the efficiency of employees and the utilization of assets, on the profitability of banks. Profitability was estimated through three major financial metrics: ROA, ROE, and NPM. To provide a stronger prediction, the model included control variables, which were bank size, leverage, and provisioning policy. The presence of these controls revealed the isolation of firm-specific effects, thus enhancing the accuracy of the coefficient estimates.

8.2 Baseline Model

At the first level of analysis, the baseline model directly examined the impact of labor efficiency , measured by ECH, PPE, and EPR and asset utilization, measured by ATR and ETR on banks' profitability indicators **(Alvarez-Marsal, 2024)**. This baseline panel regression explained only the direct effects of ROA, ROE, and NPM. Results in **Table-3** confirm that PPE was a positive and significant determinant of profitability for all measures—ROA (0.013, p=0.000), ROE (0.038, p=0.000), and NPM (0.373, p=0.000), indicating that H_1 was accepted. This highlights the most important reason for allowing employees' profitability to increase bank performance. ATR did have positive effect on ROA (0.259, p=0.048) whereas ECH, EPR, and ETR were mostly inconsequential, indicating that H_2 was accepted.

$$ROA_{it} = \beta_0 + \beta_1 ECH_{it} + \beta_2 PPE_{it} + \beta_3 EPR_{it} + \beta_4 ATR_{it} + \beta_5 ETR_{it} + \gamma_1 Size_{it} + \gamma_2 Leverage_{it} + \gamma_3 Provisioning\ Policy_{it} + \epsilon_{it} \quad (1)$$

$$ROE_{it} = \beta_0 + \beta_1 ECH_{it} + \beta_2 PPE_{it} + \beta_3 EPR_{it} + \beta_4 ATR_{it} + \beta_5 ETR_{it} + \gamma_1 Size_{it} + \gamma_2 Leverage_{it} + \gamma_3 Provisioning\ Policy_{it} + \epsilon_{it} \quad (2)$$

$$NPM_{it} = \beta_0 + \beta_1 ECH_{it} + \beta_2 PPE_{it} + \beta_3 EPR_{it} + \beta_4 ATR_{it} + \beta_5 ETR_{it} + \gamma_1 Size_{it} + \gamma_2 Leverage_{it} + \gamma_3 Provisioning\ Policy_{it} + \epsilon_{it} \quad (3)$$

8.3 Interaction Effect Models

The second level analysis covered the interaction terms, to evaluate the combined effect of employee efficiency and asset utilization on profitability. The study wanted to find out whether the combined use of human and asset efficiency leads to financial performance in line with RBV and Efficiency Theory **(Sayed & Nefzi, 2024)**. **Table-4** shows that the correlation of ECH with ROA was negative and statistically significant (-0.175, P = 0.032), which indicated that the employees' cost exerted negative effect on the asset return **(Berger & Mester, 1997)**. EPR exercised positive effect

on ROA but negative effect on ROE. The point of interest is that ECH×ETR, (0.728, p = 0.030) and PPE×ETR (0.070, p = 0.000) revealed positive correlation with ROA, indicating that H_3 could be accepted, as the impact of employee efficiency was positive when supported by the proper utilization of assets. The effect of leverage on ROA was negative (-0.101, p = 0.002).

$$ROA_{it} = \beta_0 + \beta_1 ECH_{it} + \beta_2 PPE_{it} + \beta_3 EPR_{it} + \beta_4 ATR_{it} + \beta_5 ETR_{it} + \beta_6 (ECH_{it} \times ATR_{it}) + \beta_7 (ECH_{it} \times ETR_{it}) + \beta_7 (PPE_{it} \times ATR_{it}) + \beta_8 (PPE_{it} \times ETR_{it}) + \beta_9 (EPR_{it} \times ATR_{it}) + \beta_{10} (EPR_{it} \times ETR_{it}) + \gamma_1 Size_{it} + \gamma_2 Leverage_{it} + \gamma_3 Provisioning\ Policy_{it} + \epsilon_{it} \quad (4)$$

$$ROE_{it} = \beta_0 + \beta_1 ECH_{it} + \beta_2 PPE_{it} + \beta_3 EPR_{it} + \beta_4 ATR_{it} + \beta_5 ETR_{it} + \beta_6 (ECH_{it} \times ATR_{it}) + \beta_7 (ECH_{it} \times ETR_{it}) + \beta_7 (PPE_{it} \times ATR_{it}) + \beta_8 (PPE_{it} \times ETR_{it}) + \beta_9 (EPR_{it} \times ATR_{it}) + \beta_{10} (EPR_{it} \times ETR_{it}) + \gamma_1 Size_{it} + \gamma_2 Leverage_{it} + \gamma_3 Provisioning\ Policy_{it} + \epsilon_{it} \quad (5)$$

$$NPM_{it} = \beta_0 + \beta_1 ECH_{it} + \beta_2 PPE_{it} + \beta_3 EPR_{it} + \beta_4 ATR_{it} + \beta_5 ETR_{it} + \beta_6 (ECH_{it} \times ATR_{it}) + \beta_7 (ECH_{it} \times ETR_{it}) + \beta_7 (PPE_{it} \times ATR_{it}) + \beta_8 (PPE_{it} \times ETR_{it}) + \beta_9 (EPR_{it} \times ATR_{it}) + \beta_{10} (EPR_{it} \times ETR_{it}) + \gamma_1 Size_{it} + \gamma_2 Leverage_{it} + \gamma_3 Provisioning\ Policy_{it} + \epsilon_{it} \quad (6)$$

8.4 Moderation Effect Models

The third stage of analysis was testing of moderation effects, with size as the intervening variable. The primary purpose was to evaluate if size reported any overall effect of either intensifying or reducing the results of employees' efficiency **(Elmahgop, 2024)**. **Table-5** presents regression results of this model. PPE was still positively significant in ROA, ROE, and NPM, with coefficients of 0.017 (p = 0.000), 0.076 (p = 0.001), and 0.407 (p = 0.000), respectively. Its overall significance was thus confirmed even after size moderation. ECH was non-significant for ROA (0.038, p = 0.080) and non-significant for ROE and NPM while EPR reported negative and nearly significant relationship with NPM (-0.368, p = 0.076). The ECH × Size interaction exerted lowering effect on ROA (-0.493, p = 0.041) whereas EPR×Size recorded lifting effect on ROA, indicating that H_4 could be accepted. In other words, smaller banks can turn employee costs into ROA effectively while larger banks can use productivity to create profits on assets. Bank size also reported beneficial effect on both ROE and NPM.

$$ROA_{it} = \beta_0 + \beta_1 ECH_{it} + \beta_2 PPE_{it} + \beta_3 EPR_{it} + \beta_4 ATR_{it} + \beta_5 ETR_{it} + \beta_6 (ECH_{it} \times Size_{it}) + \beta_7 (PPE_{it} \times Size_{it}) + \beta_8 (ERP_{it} \times Size_{it}) + \gamma_1 Size_{it} + \gamma_2 Leverage_{it} + \gamma_3 Provisioning\ Policy_{it} + \epsilon_{it} \quad (7)$$

$$ROE_{it} = \beta_0 + \beta_1 ECH_{it} + \beta_2 PPE_{it} + \beta_3 EPR_{it} + \beta_4 ATR_{it} + \beta_5 ETR_{it} + \beta_6 (ECH_{it} \times Size_{it}) + \beta_7 (PPE_{it} \times Size_{it}) + \beta_8 (ERP_{it} \times Size_{it}) + \gamma_1 Size_{it} + \gamma_2 Leverage_{it} + \gamma_3 Provisioning\ Policy_{it} + \epsilon_{it} \quad (8)$$

$$NMP_{it} = \beta_0 + \beta_1 ECH_{it} + \beta_2 PPE_{it} + \beta_3 EPR_{it} + \beta_4 ATR_{it} + \beta_5 ETR_{it} + \beta_6 (ECH_{it} \times Size_{it}) + \beta_7 (PPE_{it} \times Size_{it}) + \beta_8 (ERP_{it} \times Size_{it}) + \gamma_1 Size_{it} + \gamma_2 Leverage_{it} + \gamma_3 Provisioning\ Policy_{it} + \epsilon_{it} \quad (9)$$

9. Findings of the Study

The findings of baseline model revealed that Profit per Employee (PPE) was the main factor for bank profit. This outcome corroborated the human capital theory **(Crook et al., 2011)**. Further, good asset management and operational efficiency were also revealed to be the most important financial performance drivers. It is also reported that high financial leverage exerted negative impact on banks' profits, which indicated the dangers of heavy dependence on debt financing. Generally, the results revealed that the balanced control of employee productivity, asset utilization, and financing structure is needed for the long-term profitability of banks.

The Interaction Effect models indicated that the higher employee cost per head (ECH) was linked to the lesser asset-based profitability. In other words, increase in personnel costs will lead to the banks' performance reduction. Conversely, PPE exerted positive impact on the net profit margins, thus the argument that worker productivity contributes to profitability, was confirmed. The results also revealed that the productivity of staff reported an upward impact on the asset-based returns, but the opposite could be true for the equity-based returns, thus reflecting the measures of profitability as having different impacts. Further, interaction effects disclosed that employee efficiency and equity utilization together would increase profitability. The higher use of debt is still having a negative effect on the asset-based profitability. In sum, these findings revealed that the banks' profitability would be the joint outcome of employee efficiency and asset utilization.

The Moderation Effect models demonstrated that bank size significantly moderated the relationship between employee efficiency and profitability. PPE exercised a strong positive effect on ROA, ROE, and NPM, reaffirming employee productivity as a key driver of financial performance **(Berger & Mester, 1997)**. But, ECH did not significantly affect the overall profitability, suggesting limited returns from higher employee costs. Evidence of diminishing returns to productivity on net profit margins was observed. The interaction between employee efficiency and bank size was negative, indicating that productivity gains would weaken as bank size increased. Conversely, larger banks are better able to convert productivity into asset-based returns, reflecting economies of scale. Bank size would positively influence ROE and NPM while provisioning policies could constrain short-term asset profitability. In short, the findings confirmed that employee efficiency was crucial to bank profitability but its impact diminished as bank size increased.

10. Suggestions

Banks within the same sector, sharing many similar structural characteristics (like the same leverage ratio and provisioning requirements), differed in terms of employee performance, asset utilization, and profitability. The result of the research revealed that banks should continuously monitor and improve productivity of workers and efficiency of the whole operation as a way of increasing financial performance. Among the various things the study revealed, the main point is that the financial performance of a bank merger could be positive if there was perfect alignment of employee efficiency, asset utilization, and leverage management. Regarding the size of banks, while larger ones were more capable of converting worker productivity into profit, smaller ones could achieve higher asset efficiency per worker. The regulators and the managers should consider these points while dealing with human resources, planning operations, and merging departments to secure long-term profitability.

11. Conclusion

The research extensively examined the impact of the relationship between employee effectiveness and bank asset utilization on the profitability of banks in Saudi Arabia, especially considering the recent sectoral reforms and mergers initiated by Vision 2030. Based on the RBV and Efficiency Theory, the research demonstrated human capital and asset management capabilities to be important internal resources, necessary for the achievement of enhanced post-merger financial performance. The evidence revealed that employees' efficiency, especially PPE, increased profitability (in terms of ROA, ROE, and NPM). But, ECH alone cannot ensure positive financial performance unless accompanied by efficient use of assets. The profitability impact of labor productivity was substantiated by asset utilization ratios such as the ATR and ETR. The interaction terms indicated that the best synergistic improvement in labor efficiency and asset utilization together may bring enhanced profitability following a merger, consistent with the argument that internal synergies are essential to make the post-merger integration process successful. Finally, the outcome of the moderation test revealed that the size of a bank reported standalone influence on falling marginal returns to employee productivity. Larger banks were confronted with falling returns to employee production, possibly because of bureaucratic inefficiencies and increased structural complexity. But more efficient larger banks, can harvest productivity gains on a massive scale, leading to higher returns based on assets.

12. Limitations of the Study

The existing research was designed only for short-term results, which makes it difficult to know the long-term effects on performance. There is also little evidence on how employees, culture, and bank size could influence success after mergers. In addition, using mostly secondary financial data may miss the internal practices and strategies that shape real outcomes.

13. Scope for Further Study

Future studies should take a long-term view to better understand how mergers affect Saudi banks over time. More research is also needed on how employee productivity, use of assets, and digital banking contribute to performance. The role of bank size should be studied in greater depth, and comparisons with other GCC and emerging markets could give a clearer picture of how Saudi banks fit into global trends.

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Table-1: Definition and Measurement of Variables Used in the Analysis of Bank Performance in Saudi Listed Banks (2016–2024)

Type	Variable	Formulae
Dependent Variables	ROA	Net Income / Total Assets
	ROE	Net Income / Shareholders' Equity
	NPM	Net Income / Revenue
Independent Variables (Employee Efficiency & Asset Utilization)	ECH	Salaries / No. of Employees
	PPE	Net Income / No. of Employees
	EPR	Revenue / No. of Employees
	ATR	Revenue / Total Assets
	ETR	Revenue / Shareholders' Equity
Control Variables	Bank Size	Log of Total Assets
	Leverage	Total Liabilities / Total Assets
	Provisioning Policy	Provision-to-Revenue Ratio

Source: (Ross, et al., 2019).

Table-2: Descriptive Statistics of Study Variables for Saudi Banks (2016–2024)

Variable	N	Mean	Std. dev.	Min	Max
ROA	90	0.015	0.006	-0.015	0.027
ROE	90	0.106	0.044	-0.082	0.219
NPM	90	0.420	0.155	-0.465	0.616
ECH	90	0.326	0.084	0.159	0.555
PPE	90	0.727	0.380	-0.788	1.477
EPR	90	1.675	0.527	0.678	2.817
ATR	90	0.036	0.005	0.025	0.051
ETR	90	0.253	0.065	0.152	0.436
Bank Size	90	26.061	0.713	24.708	27.730
Leverage	90	0.851	0.024	0.789	0.897
Provision Policy	90	0.124	0.085	0.023	0.479

Source: Authors calculation using SPSS 20.00.

Table-3: Baseline Panel Regression Results on Profitability of Saudi Banks (2016-2024)

	ROA		ROE		NPM	
	Coefficient	**P>|z|**	**Coefficient**	**P>|z|**	**Coefficient**	**P>|t|**
ECH	0.002	0.916	-0.056	0.352	-0.423	0.498
PPE	0.013	0.000***	0.038	0.000***	0.373	0.000***
EPR	-0.007	0.000***	-0.010	0.582	-0.135	0.135
ATR	0.259	0.048**	3.008	0.003***	0.254	0.965
ETR	0.059	0.000***	0.083	0.361	0.479	0.400
Bank Size	0.002	0.727	-0.040	0.294	-0.297	0.268
Leverage	-0.056	0.045**	0.093	0.735	-2.896	0.042**
Provision Policy	-0.011	0.002***	-0.061	0.246	-0.027	0.920
constant	0.041	0.071*	-0.112	0.603	2.126	0.052*
Wald chi2(8)	2,348.310		2,866.400			
Prob > chi2	0.000***		0.000***			
F (8,9)					441.440	
Prob > F					0.000***	

Source: Authors calculation using SPSS 20.00.

Note: ***, **, * indicate a significance level at a 1%, 5%, and 10% confidence interval, respectively.

Table-4: Interaction Effects of Asset Utilization and Personnel Productivity on Profitability of Saudi Banks (2016-2024)

	ROA		ROE		NPM	
	Coefficient	**P>|t|**	**Coefficient**	**P>|z|**	**Coefficient**	**P>|z|**
ECH	-0.175	0.032**	-0.432	0.718	-3.137	0.556
PPE	-0.003	0.557	0.073	0.190	0.442	0.077*
EPR	0.023	0.078*	-0.377	0.044**	-1.204	0.149
ATR	0.658	0.060*	1.142	0.817	12.823	0.560
ETR	0.015	0.339	-0.007	0.963	0.227	0.736
ECH*ATR	3.546	0.472	22.764	0.765	86.374	0.799
ECH*ETR	0.728	0.030**	2.127	0.661	13.165	0.542
PPE*ATR	-0.705	0.068*	3.442	0.530	-16.697	0.495
PPE*ETR	0.070	0.000***	-0.133	0.540	-1.174	0.226
EPR*ATR	0.834	0.218	0.927	0.931	43.235	0.368
EPR*ETR	-0.114	0.021**	1.508	0.033**	4.394	0.162
Bank Size	-0.006	0.209	-0.043	0.548	-0.243	0.448
Leverage	-0.101	0.002***	0.247	0.436	0.740	0.600
Provision Policy	-0.003	0.400	-0.065	0.240	-0.373	0.131
Constant	0.088	0.001***	-0.225	0.386	-0.718	0.535
F (14,56)	23.300					
Prob > F						
Wald chi2(14)			32.590		29.090	
Prob > chi2			0.003***		0.010***	

Source: Authors calculation using SPSS 20.00.

Note: ***, **, * indicate a significance level at a 1%, 5%, and 10% confidence interval, respectively.

Table-5: Regression Results for the Moderating Effect of Bank Size on Saudi Bank Performance (2016-2024)

	ROA		ROE		NPM	
	Coefficient	**P>|z|**	**Coefficient**	**P>|z|**	**Coefficient**	**P>|z|**
ECH	0.038	0.080*	-0.214	0.448	-0.852	0.486
PPE	0.017	0.000***	0.076	0.001***	0.407	0.000***
EPR	-0.005	0.200	-0.050	0.301	-0.368	0.076*
ATR	-0.035	0.865	3.468	0.193	2.398	0.835
ETR	0.058	0.000***	0.033	0.764	-0.121	0.798
ECH*Size	-0.493	0.041**	3.637	0.247	12.563	0.355
PPE*Size	-0.027	0.057*	-0.419	0.025**	-2.266	0.005***
EPR*Size	0.025	0.013**	0.002	0.986	0.585	0.296
Bank Size	0.010	0.400	0.288	0.055*	1.505	0.021**
Leverage	-0.038	0.105	0.148	0.625	0.687	0.600
Provision Policy	-0.009	0.030**	-0.044	0.410	-0.238	0.304
Constant	0.023	0.226	-0.175	0.475	-0.765	0.470
Wald chi2(11)	329.520		31.260		33.600	
Prob > chi2	0.000***		0.001***		0.000***	

Source: Authors calculation using SPSS 20.00.

Note: ***, **, * indicate a significance level at a 1%, 5%, and 10% confidence interval, respectively.