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Business Parameter And Operational Parameter Performance Analysis Of Indian Banking Sector- "A Case Study On Merger Of Bank Of Baroda Using Banks Specific Ratios"

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ABSTRACT
This research paper aims to analyse the performance of the business and operations of Bank of Baroda before and after the merger. The study focuses on evaluating the impact of the merger on Bank of Baroda using business and operational parameters. The merger under consideration is between Bank of Baroda, Vijaya Bank, and Dena Bank, which took place in September 2018. The paper utilizes a quantitative research approach, employing financial data and performance metrics obtained from the annual reports. A comparative analysis is conducted to assess the pre-merger and post-merger performance of Bank of Baroda. The analysis encompasses a period of 4 years (2014-15 to 2017-18) before and 4 years (2018-19 to 2021-22) after the merger. The study contributes to the existing literature on mergers and acquisitions in the banking sector. The findings suggest that the merger has influenced the bank's financial performance, particularly in terms of net interest margin, which has experienced a significant improvement following the merger. Based on the paired sample t-test results and descriptive statistics, it appears that the merger had limited statistically significant impact on the assessed Business ratios and Operating ratios. Overall, this research contributes to a comprehensive understanding of the impact of mergers on the performance of Bank of Baroda and provides valuable insights for policymakers, practitioners, and academicians in the field of finance and banking.

Keywords:*Merger, Business parameters, Operational parameters, Ratio analysis, T-test, Bank of Baroda.*

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I. OVERVIEW

(Ibrahim, 2011)The merger of Bank of Baroda in 2018 was a significant event in the Indian banking sector. It involved the amalgamation of Bank of Baroda with two other public sector banks, Vijaya Bank and Dena Bank.(Khubalkar&Karmore, 2020) The merger was part of the Indian government's initiative to consolidate the banking sector, improve operational efficiency, and strengthen the financial stability of public sector banks.

(Umamaheshwari & Ashwini, 2020)The merger was announced in 17th September 2018 and officially took effect from April 1, 2019. (Ali & Roy, 2008)It resulted in Bank of Baroda becoming the third-largest bank in India, in terms of assets and branch network. (Shah & Jethva, 2023)The merged entity operates under the name Bank of Baroda and continues to be a public sector bank, majority-owned by the Indian government.(Patel & Gohil, 2023)The merger aimed to achieve various objectives, including synergies in operations, cost reduction, enhanced risk management capabilities, and improved customer service. It aimed to create a stronger and more competitive bank by leveraging the combined strengths, resources, and expertise of the three banks.

The merger of Bank of Baroda serves as a noteworthy case study for analysing the challenges, benefits, and outcomes of bank mergers in the context of the Indian banking sector. (Staikouras et al., 2007)It offers valuable insights into the strategic considerations, integration process, and impact on various stakeholders, including employees, customers, and shareholders.

II. REVIEW OF LITERATURE

(Banu M, 2019)examined acomparativestudy between public sector, private sector, and foreign sector banks.To analyse the Operating Efficiency of banks various liquidity, solvency and profitability ratios are used as representatives. Further descriptive and correlation among these banking sectors is presented pair wise, comprising of 10 years (2007-08 to 2016-17) of secondary data. To test the hypothesis paired sample T-test is performed. The results show that, there is a strong correlation between the profitability positions of public, private, and foreign sector banks in terms of return on equity, return on investments, return on assets, and return on advances. The findings indicate that the cash-deposit ratio and the credit-deposit ratio have a beneficial impact on banks' short-term liquidity. However, the net interest margin and investment ratios have little influence on the solvency of the three banking sectors.

(Bhartiya & Malhotra, 2014)studied the performance of Indian private sector and public sector banks.Data of three yearsbefore and afterthe acquisitionduring the post liberalisation period extracted from CMIE Prowess database of 16 banks.The pre-merger and post-merger average of Operating ratioswere computed for 3 years before and 3 years after the merger. Paired two sampleT-test were used to check if there is any significant difference between the post and pre- merger performance of the bank. the result shows that the most of banks have performed well post-merger. The profitability margins were very high in post-merger period. The ROI and ROCE were increased whichsignifies that after the acquisition the performance was appraised.Some public sector banks have shown decline but private sector banks have shown a rising trend in profit margin.

(Veena & Patti, 2016)evaluated the financial performance of the ICICI bank such as, profitability ratio, liquidity ratio, leverage ratio, growth ratio, net profit margin, ROE, ROA, D/E ratio, current ratio, quick ratio, cash ratio, debt ratio, interest coverage ratio. Data has been collected from secondary sources. To measure the reliability of data descriptive statistics and T-test has been applied. The study finds out that there isno relationship between profitability ratio, liquidity ratio, leverage ratio, growth ratio performance towards ICICI Bank Ltd. The study concludes that after the merger the financial performance has increased compared to the pre-merger.

(Goet, 2020)tries to find out thequestion whether the merger of banks influences the profitability.Mega Bank has been chosen as a sample for the purpose of the study.The study used a total of six year's data consisting three years pre and three year's post-merger. To test the objectives of the study, descriptive and correlational research design have been used.For evaluation ratios like Net Profit Margin, ROA, ROE, Cost to Income ratio, P/E ratio, have been used. Further paired T-test was used to check whether there is any difference between the performance.The study found a negative impact of merger on price-earnings ratio and CASA ratio. However, net profit margin, return on assets, earnings pershare, return on equity. Capital adequacy ratio, credit deposit ratio and cost to income ratio have shown positive trend and grown after the merger. The results indicate that the overall financial performance of Mega bank in the area of profitability, performance and efficiency has been reasonable but not significant. It indicates that merger and acquisition deals success to improve the overall financial performance of the bank.

III. OBJECTIVE

The objective of this study is to evaluate and analyse the Operational efficiency and Business performance of the bank pre- and post-merger. The following sub objective is drawn to attaintheaboveobjective.

1. To identifyPre-Merger and Post-Mergerperformance of the Bank of Barodaby evaluating the business and operational parameters.
2. To examine the Business performance of Bank of Baroda through bank specific ratios.
3. To examine the Operational performance of Bank of Baroda through bank specific ratios.

IV. HYPOTHESIS

On the basis of above objectives following hypothesis are framed:

1. H_{01} = There is no significant relation between the operational performance of Bank of Baroda Pre-Merger andPost-merger.
2. H_{02} = There is no significant relation between the business performance of Bank of Baroda Pre-Merger and Post-merger.

V. METHODOLOGY OF THE STUDY

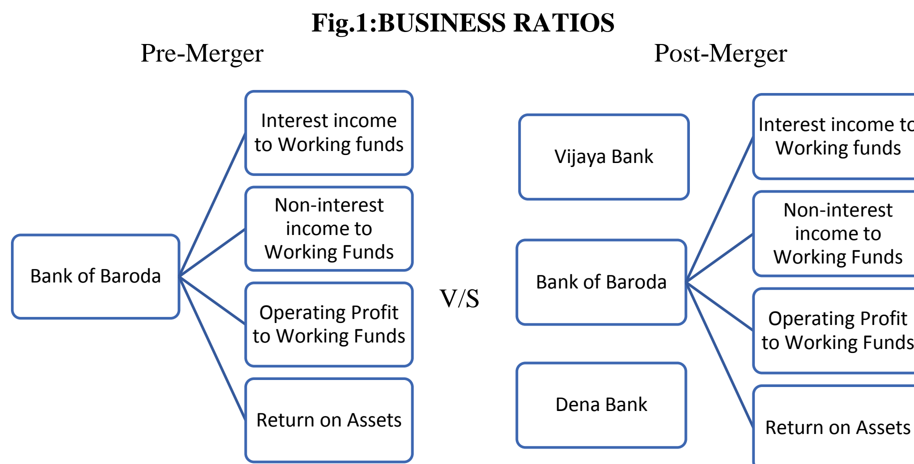
The study is based on the secondary data collected from theannual reports of Bank of Baroda, which got merged with the effect from April 2019. So, the study comprises the data offour years before (2015-16 to 2017-18) and four yearsafter the merger(2018-19 to 2021-22).A comparison between Bank of Baroda (standalone) before merger and Bank of Baroda after mergerwith Vijaya bank and Dena bank (a merged entity) isconducted to analyse the business and operational parameters. The business parameter contains interest income to working funds, non-interest income to working funds, operating profit to working funds andreturn on

assets. the business ratios are taken from Schedule-18 form Annual report.The operational parameters contain cost of deposits, net interest margin, int paid to total expense and cost-income ratio, which is selected by the judgement of the author.To analyse the data a comparison between pre-and post-merger using the selected ratios. Further, to test the hypothesis 'paired T-test' is done using JAMOVI statistical software.

BUSINESS PARAMETERS

Size of business means the scale of organisation and operation of business enterprise. It means the scale and volume of operation turned out by a single firm. The study ofsize of business is important because it significantly affects the profitability and efficiency of the business.Business firm vary in size- small, medium and large. To measure size of business unit, the standard of measurement can be grouped into:

Fig.1:BUSINESS RATIOS



Source:Drawn by the author

1. Interest Income to Working Fund: Interest income to working fund ratio is a financial metric that measures the proportion of a company's interest income generated from its working fund or operating assets.

Interest Income to Working Fund = $\frac{\text{total interest income}}{\text{average working fund}} \times 100$

This ratio provides insights into how effectively the company is earning interest income from its working capital and indicates the profitability of its interest-related activities.

2. Non-Interest Income to Working Fund: Non-interest income to working fund ratio is a financial measure that represents the proportion of a company's non-interest income (income from sources other than interest) relative to its working fund or operating assets.

Non-Interest Income to Working Fund = $\frac{\text{non}-\text{interest income}}{\text{average working fund}} \times 100$

This ratio helps to assess the diversification of a company's revenue streams and the contribution of non-interest income to its overall earnings.

3. Operating Profit to Working Fund: Operating profit to working fund ratio is a financial ratio that shows the proportion of a company's operating profit (profit earned from core business operations) to its working fund or operating assets.

Operating Profit to Working Fund = $\frac{\text{operating profit}}{\text{average working fund}} \times 100$

This ratio indicates the efficiency of the company's core business activities in generating profits from its working capital.

4. Return on Asset: Return on Asset is a key financial ratio that measures a company's profitability in relation to its total assets.

Return on Asset = $\frac{\text{Net income (profit after taxes)}}{\text{average total asset}} \times 100$

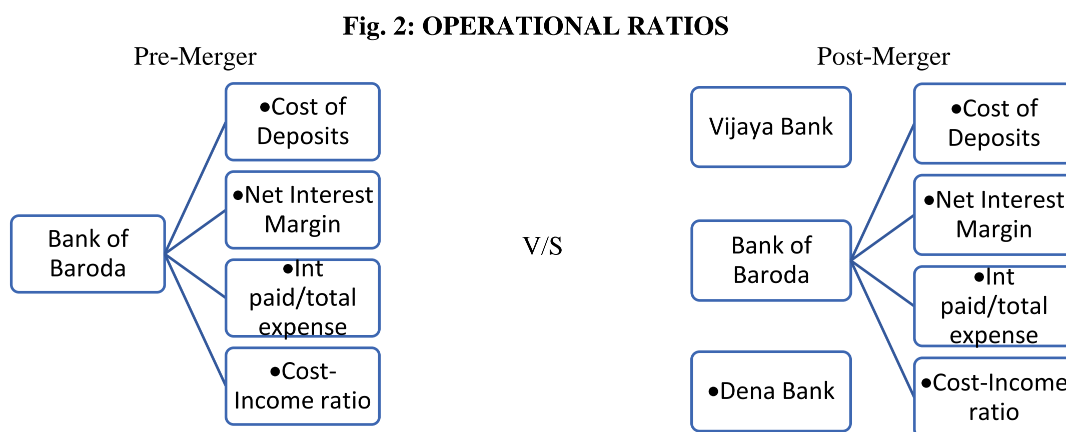
ROA indicates how effectively a company is utilizing its assets to generate profits and is used as a measure of overall efficiency and profitability.

OPERATIONAL PARAMETER

Operational parameters for banks refer to specific factors or variables that are crucial for evaluating and analysing the performance and efficiency of a bank's operations. These parameters help assess the bank's ability to generate profits, manage risks, and deliver satisfactory services to its customers. (Kesireddy Venu,

2021)Additionally, operating ratios are financial metrics that are commonly used to analyse and evaluate the operational efficiency and profitability of banks.

Fig. 2: OPERATIONAL RATIOS



Source: Drawn by the author

1. Cost of Deposit: Cost of deposit is a financial ratio that measures the expensesincurred by a bank or financial institution in attracting and maintaining deposits from customers.

Cost of deposit = $\frac{\text{interest paid on deposits}}{\text{average total deposits}} \times 100$

A lower cost of deposit indicates that the bank is managing its deposit-related expenses efficiently, which can lead to higher profitability.

2. Net Interest Margin:Net interest margin is a key profitability ratio for banks and financial institutions. It represents the difference between the interest income earned from loans and investments and the interest expenses paid on deposits and borrowings.

Net Interest Margin = $\frac{\text{Net Inter est Income}}{\text{Average Earning Assets}} \times 100$

A higher net interest margin indicates that the bank is generating more income from its interest-earning activities relative to its interest expenses, which is a positive indicator of profitability.

3. Interest Paid to Total Expenses:The interest paid to total expenses ratio shows the proportion of a bank's total expenses that are attributed to interest payments on borrowings and deposits.

Interest Paid to Total Expenses =$\frac{\text{total interest expenses}}{\text{total operating expenses}} \times 100$

A lower interest paid to total expenses ratio indicates that the bank's interest expenses are relatively lower compared to its overall operating expenses. This can be a positive sign of effective interest rate management.

4. Cost-Income Ratio: The cost-income ratio (also known as the operating expense ratio) measures the proportion of a bank's operating expenses to its operating income.

Cost-Income Ratio = $\frac{\text{total operating expenses}}{\text{total operating income}} \times 100$

A lower cost-income ratio indicates that the bank is controlling its operating expenses well in relation to its income. A lower ratio is associated with greater efficiency and profitability.

VI. DATA ANALYSIS AND INTERPRETATION

BUSINESS RATIOS

Table-1

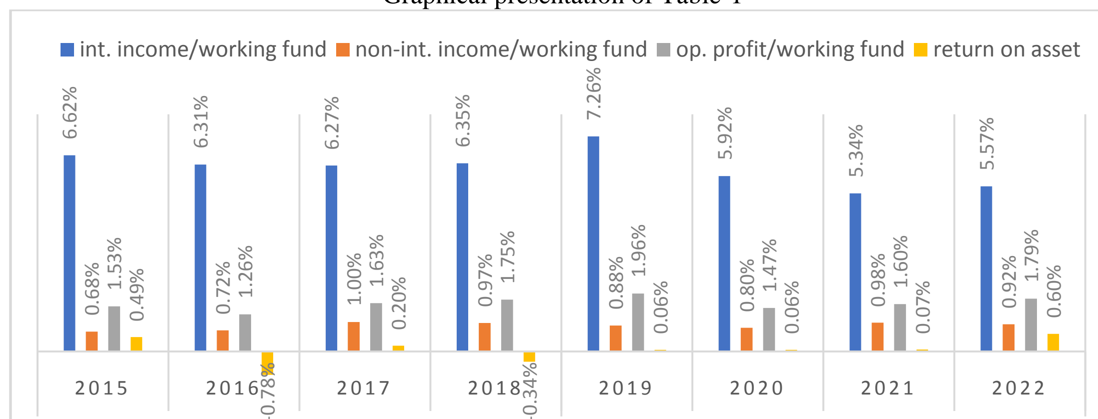
Business ratios pre- and post- merger

	Pre-merger				Post-merger			
Years	2015	2016	2017	2018	2019	2020	2021	2022
int. income/avg. working fund	6.62%	6.31%	6.27%	6.35%	7.26%	5.92%	5.34%	5.57%
non-int. income/avg. working fund	0.68%	0.72%	1.00%	0.97%	0.88%	0.80%	0.98%	0.92%

op. profit/avg. working fund	1.53%	1.26%	1.63%	1.75%	1.96%	1.47%	1.60%	1.79%
return on asset	0.49%	-0.78%	0.20%	-0.34%	0.06%	0.06%	0.07%	0.60%

Source: Compiled by author

Chart-1
Graphical presentation of Table-1



Pre-Merger Years (2015-2018):

1. Interest Income/Working Fund: The interest income as a percentage of the working fund remained relatively stable during the pre-merger period, ranging from 6.62% in 2015 to 6.27% in 2017. It increased slightly to 6.35% in 2018.
2. Non-Interest Income/Working Fund: The non-interest income as a percentage of the working fund showed a gradual increase from 0.68% in 2015 to 1.00% in 2017.
3. Operating Profit/Working Fund: The operating profit as a percentage of the working fund fluctuated, starting at 1.53% in 2015, peaking at 1.63% in 2017, and reaching 1.75% in 2018.
4. Return on Asset: The return on asset was positive in 2015 (0.49%) and 2017 (0.20%), but negative in 2016 (-0.78%) and 2018 (-0.34%).

Post-Merger Years (2019-2022):

1. Interest Income/Avg. Working Fund: The interest income as a percentage of the working fund increased significantly after the merger, from 7.26% in 2019 to 5.57% in 2022. There was a declining trend in interest income during the post-merger years.
2. Non-Interest Income/ Avg. Working Fund: The non-interest income as a percentage of the working fund fluctuated during the post-merger period, ranging from 0.80% in 2020 to 0.98% in 2021.
3. Operating Profit/ Avg. Working Fund: The operating profit as a percentage of the working fund showed some fluctuations after the merger, starting at 1.96% in 2019, reaching a low of 1.47% in 2020, and then increasing to 1.79% in 2022.
4. Return on Asset: The return on asset remained positive in the post-merger years, with a slight increase from 0.06% in 2019 to 0.60% in 2022. The company's profitability improved after the merger, as the return on assets increased.

Table-2
Outcomesof Business parameter through bank specific ratio

Parameters	*Merger*	*Mean*	*S.D.*	*d.f.= (n-1)*	*t-statics*	*p-value*	*Significance*
$\frac{Int.income}{Avg.\ Working\ Fund}$	Pre	6.38	0.158	3	1.032	0.378	Not Significant
	Post	6.02	0.858	3			
$\frac{Non.Int\ Income}{Avg.\ Working\ Fund}$	Pre	0.84	0.165	3	-0.93	0.421	Not Significant
	Post	0.89	0.075	3			

Operating Profit / Avg. Working Fund	Pre	1.54	0.208	3	-1.587	0.211	Not Significant
	Post	1.7	0.214	3			
Net income / Avg. Total Asset	Pre	-0.1	0.565	3	-0.887	0.44	Not Significant
	Post	0.197	0.268	3			

Source: Calculated by author

The paired sample t-test results provide insights into the changes in business ratios before and after the merger. The descriptive statistics offer further understanding of the mean and standard deviation for each business ratio in both the pre-merger and post-merger periods.

1. Interest Income/Working Fund: The t-test reveals a t-statistic of 1.032 with 3 degrees of freedom and a p-value of 0.378. This p-value indicates that there is no statistically significant difference between interest income as a proportion of working funds before and after the merger. Descriptively, the mean interest income/working fund ratio was slightly higher in the pre-merger period (6.38) compared to the post-merger period (6.02).
2. Non-Interest Income/Working Fund: The t-test shows a t-statistic of -0.930 with 3 degrees of freedom and a p-value of 0.421. The p-value suggests that there is no significant difference in non-interest income as a proportion of working funds before and after the merger. Descriptively, the mean non-interest income/working fund ratio was marginally higher post-merger (0.89) compared to pre-merger (0.84).
3. Operating Profit/Working Fund: The t-test yields a t-statistic of -1.587 with 3 degrees of freedom and a p-value of 0.211. This p-value indicates that the difference in operating profit as a proportion of working funds before and after the merger is not statistically significant. Descriptively, the mean operating profit/working fund ratio was higher post-merger (1.70) compared to pre-merger (1.54).
4. Return on Asset: The t-test gives a t-statistic of -0.887 with 3 degrees of freedom and a p-value of 0.440. This p-value suggests that there is no statistically significant difference in return on asset between the pre-merger and post-merger periods. Descriptively, there seems to be a slight increase in the mean return on asset post-merger (0.197) compared to pre-merger (-0.10).

OPERATING RATIO

Table-3

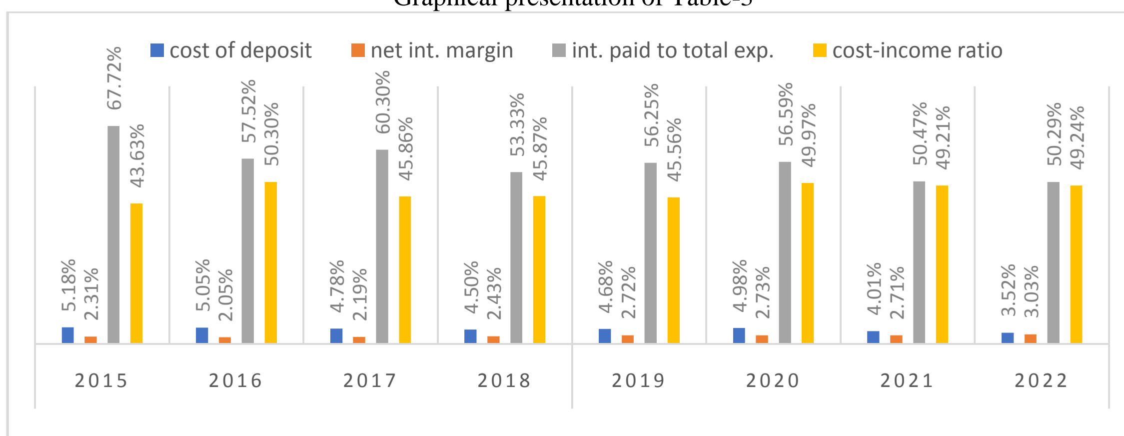
Operating ratios pre- and post- merger

	Pre-merger				Post-merger			
Years	2015	2016	2017	2018	2019	2020	2021	2022
cost of deposit	5.18%	5.05%	4.78%	4.50%	4.68%	4.98%	4.01%	3.52%
net int. margin	2.31%	2.05%	2.19%	2.43%	2.72%	2.73%	2.71%	3.03%
int. paid to total exp.	67.72%	57.52%	60.30%	53.33%	56.25%	56.59%	50.47%	50.29%
cost-income ratio	43.63%	50.30%	45.86%	45.87%	45.56%	49.97%	49.21%	49.24%

Source: Compiled by author

Chart-2

Graphical presentation of Table-3



Pre-Merger Years (2015-2018):

1. Cost of Deposit: The cost of deposit as a percentage of the total deposit decreased steadily during the pre-merger years, from 5.18% in 2015 to 4.50% in 2018. This indicates that the bank was able to manage its deposit costs efficiently before the merger.
2. Net Interest Margin: The net interest margin, which represents the difference between interest income and interest expenses, fluctuated during the pre-merger period. It ranged from 2.05% in 2016 to 2.43% in 2018.
3. Interest Paid to Total Expenses: The proportion of interest paid to total expenses decreased from 67.72% in 2015 to 53.33% in 2018. This suggests that the bank was able to reduce its interest expenses relative to its total expenses before the merger.
4. Cost-Income Ratio: The cost-income ratio, which shows the proportion of expenses to operating income, fluctuated during the pre-merger years. It ranged from 43.63% in 2015 to 45.87% in 2018.

Post-Merger Years (2019-2022):
1. Cost of Deposit: The cost of deposit continued to decline after the merger, from 4.68% in 2019 to 3.52% in 2021, and further decreased to 3.52% in 2022. This indicates that the bank was able to maintain efficient management of its deposit costs in the post-merger period.
2. Net Interest Margin: The net interest margin showed a positive trend after the merger, increasing from 2.72% in 2019 to 3.03% in 2022. This suggests that the bank's profitability from interest-related activities improved in the post-merger years.
3. Interest Paid to Total Expenses: The proportion of interest paid to total expenses remained relatively stable after the merger, ranging from 50.29% in 2019 to 56.59% in 2020. This indicates that the bank maintained a consistent approach to managing its interest expenses relative to total expenses in the post-merger period.
4. Cost-Income Ratio: The cost-income ratio remained relatively stable after the merger, ranging from 45.56% in 2019 to 49.24% in 2022. This suggests that the bank maintained a similar level of expenses relative to its operating income in the post-merger years.

Table-3

Outcomes of Operational parameter through bank specific ratio

Parameters	*Merger*	*Mean*	*S.D.*	*d.f.= (n-1)*	*t-statics*	*p-value*	*Significance*
$\frac{\text{Int. paid on deposit}}{\text{Avg. total deposit}}$	Pre	4.88	0.302	3	2.95	0.6	Not Significant
	Post	4.3	0.658	3			
$\frac{\text{Net int. Income}}{\text{Av. earning assets}}$	Pre	2.25	0.163	3	-9.58	0.002	Significant
	Post	2.8	0.155	3			
$\frac{\text{Total int. expenses}}{\text{Total op. expenses}}$	Pre	59.7	6.06	3	2.47	0.09	Not Significant
	Post	53.4	3.49	3			
$\frac{\text{Total op. exp.}}{\text{Total op. income}}$	Pre	46.4	2.8	3	-2.39	0.097	Not Significant
	Post	48.5	1.99	3			

Source: Calculated by author

The paired sample t-tests were conducted to analyse the differences in financial indicators between the pre-merger and post-merger periods. The results are as follows:
1. Cost of Deposit:The mean cost of deposit before the merger was 4.88, while after the merger, it decreased to 4.30. The paired sample t-test yielded a test statistic of 2.95 with 3 degrees of freedom and a p-value of 0.60. Since the p-value is greater than the significance level of 0.05 (commonly used for hypothesis testing), there is no statistically significant difference in the cost of deposit before and after the merger.
2. Net Interest Margin: The mean net interest margin before the merger was 2.25, while after the merger, it increased to 2.80. The paired sample t-test yielded a test statistic of -9.58 with 3 degrees of freedom and an extremely low p-value of 0.002. The p-value being less than the significance level indicates that there is a statistically significant difference in the net interest margin before and after the merger, suggesting that the merger has had a significant impact on the bank's net interest margin.
3. Interest Paid to Total Expense:The mean interest paid to total expense before the merger was 59.7, and after the merger, it decreased to 53.4. The paired sample t-test yielded a test statistic of 2.47 with 3 degrees of freedom and a p-value of 0.090. Although the p-value is slightly above the significance level of 0.05, the difference in interest paid to total expense between the two periods shows a notable change.
4. Cost to Income Ratio:The mean cost to income ratio before the merger was 46.4, and after the merger, it increased to 48.5. The paired sample t-test yielded a test statistic of -2.39 with 3 degrees of freedom and a

p-value of 0.097. Similar to the interest paid to total expense, the p-value is slightly above the significance level, but there is a noticeable change in the cost to income ratio between the two periods.

VII. CONCLUSION

In conclusion, based on the paired sample t-test results and descriptive statistics, it appears that the merger had limited statistically significant impact on the assessed Business ratios. The p-values for all ratios exceed common significance levels (e.g., 0.05), indicating that the observed differences between pre-merger and post-merger ratios are likely due to chance. However, some ratios did exhibit slight changes in means, suggesting potential shifts in performance, though not statistically significant at the chosen level of significance.

The paired sample t-tests for Operational ratios indicate that the merger has had a significant impact on the bank's net interest margin, with a substantial increase observed post-merger. Although the cost of deposit, interest paid to total expense, and cost to income ratio did not show statistically significant differences, but there were noticeable changes in these indicators between the pre- and post-merger periods.

These findings suggest that the merger has influenced the bank's financial performance, particularly in terms of net interest margin, which has experienced a significant improvement following the merger. Further analysis and consideration of broader contextual factors are recommended to better understand the merger's implications on the bank's business performance.

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