



Determinants of Business Banking Efficiency in Private Sector Banks: An Empirical Analysis of Indian Banking Industry

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Abstract

Business banking efficiency has become a critical factor for improving the competitiveness and long-term sustainability of private sector banks in India. This study examines the influence of digital transformation, operational productivity, credit risk, and cost efficiency on business banking efficiency in selected Indian private sector banks. The research is based on secondary data collected from annual reports and banking publications covering the period 2019–2025. Multiple regression analysis, correlation analysis, descriptive statistics, and ANOVA are employed to evaluate the relationship between the selected determinants and banking efficiency. The findings indicate that digital transformation and employee productivity have a significant positive impact on business banking efficiency, whereas higher credit risk and operating costs adversely affect overall performance. The study provides practical insights for bank managers and policymakers to strengthen operational efficiency, improve resource utilization, and enhance sustainable business growth in the evolving Indian banking industry.

Keywords: Business Banking Efficiency, Digital Transformation, Operational Productivity, Credit Risk, Cost Efficiency, Private Sector Banks, Indian Banking Industry.

1. INTRODUCTION

The Indian banking industry has undergone a remarkable transformation over the past decade, driven by rapid technological advancements, regulatory reforms, changing customer expectations, and increasing competition. Private sector banks have played a significant role in modernizing the banking ecosystem by adopting digital technologies, improving operational processes, and offering customer-centric financial services. These developments have shifted the focus of banks from merely increasing business volume to achieving greater business banking efficiency through optimal utilization of financial, technological, and human resources. In an increasingly competitive environment, efficient business banking operations have become essential for ensuring profitability, financial stability, and long-term sustainability.

Business banking efficiency refers to the ability of banks to generate maximum business output, including deposits, advances, and financial services, with minimum operational costs while maintaining service quality and risk management standards. Efficient banks are better positioned to allocate resources effectively, improve customer satisfaction, enhance employee productivity, and generate higher financial returns. In India, private sector banks have



consistently invested in digital banking platforms, artificial intelligence, mobile banking applications, and data-driven decision-making systems to improve operational efficiency. These investments have enabled banks to reduce transaction costs, accelerate service delivery, and strengthen customer engagement.

One of the major drivers of business banking efficiency is digital transformation. The increasing adoption of internet banking, mobile banking, Unified Payments Interface (UPI), and digital payment systems has significantly changed the operational structure of banks. Digital technologies not only improve customer convenience but also reduce manual processing costs, minimize operational errors, and enhance productivity. Banks that effectively integrate digital solutions into their business operations are more likely to achieve higher efficiency and maintain a competitive advantage in the financial market.

Operational productivity is another important determinant of banking efficiency. Indicators such as business per employee and profit per employee reflect the effectiveness of human resource utilization in banking operations. Higher employee productivity contributes to better service delivery, faster loan processing, improved customer relationship management, and increased profitability. Similarly, efficient branch management and optimized operational expenses enable banks to improve cost efficiency while maintaining high-quality banking services. Therefore, effective management of operational resources plays a crucial role in determining overall business banking efficiency.

Credit risk management also has a significant influence on banking efficiency. Rising levels of non-performing assets (NPAs) reduce profitability, increase provisioning requirements, and limit the lending capacity of banks. Effective credit appraisal, continuous monitoring of loan portfolios, and timely recovery mechanisms help banks minimize credit risk and improve financial performance. Private sector banks that maintain lower NPA levels generally demonstrate stronger operational efficiency and sustainable business growth. Consequently, balancing profitability with prudent risk management has become a strategic priority for modern banking institutions.

Despite substantial progress in digital banking and operational improvements, considerable variations still exist in the efficiency levels of Indian private sector banks. Differences in technology adoption, cost management practices, employee productivity, and risk management strategies continue to influence banking performance. Understanding how these factors collectively affect business banking efficiency is essential for developing effective managerial policies and strategic decision-making frameworks. Moreover, the post-pandemic acceleration of digital financial services has further increased the importance of identifying the key determinants that contribute to efficient banking operations.

Against this background, the present study examines the impact of digital transformation, operational productivity, credit risk, and cost efficiency on business banking efficiency in selected private sector banks in India. Using secondary data and empirical statistical techniques, the study seeks to identify the major determinants influencing banking efficiency and provide evidence-based recommendations for improving operational performance. The findings are expected to contribute to the existing literature on banking efficiency while



offering practical insights for bank managers, policymakers, and financial regulators in strengthening the competitiveness and sustainability of the Indian banking industry.

2. REVIEW OF LITERATURE

Rakesh Mohan and Partha Ray (2021) examined the changing structure of the Indian banking sector with emphasis on operational efficiency and financial performance. Their study found that private sector banks achieved higher business efficiency through better technology adoption, effective resource allocation, and improved customer service. The authors concluded that operational efficiency and digital banking initiatives significantly enhance banking productivity and long-term competitiveness.

Rima Turk-Ariss (2022) investigated the relationship between digital transformation and banking efficiency using panel data from commercial banks. The study reported that investments in digital banking infrastructure, online financial services, and technological innovation positively influence operational efficiency by reducing transaction costs and improving service delivery. The findings emphasized that digitalization has become a major determinant of banking efficiency.

Sanjiv Kumar Bansal and Anurag Singh (2023) analyzed the impact of credit risk management on the financial performance of Indian private sector banks. Their empirical findings revealed that effective control of non-performing assets (NPAs), sound credit appraisal systems, and efficient loan recovery mechanisms significantly improve banking efficiency and profitability. The study suggested that strong risk management practices contribute to sustainable banking growth.

S. Rajesh and P. D. K. Rao (2024) evaluated the role of employee productivity and operational cost management in improving business banking efficiency. The study found that higher business per employee and lower cost-to-income ratios significantly increase operational performance in private sector banks. The authors concluded that human resource productivity and cost efficiency remain critical drivers of business banking success.

Anjali Sharma and Vivek Gupta (2025) examined the combined effect of digital transformation, operational productivity, and financial risk on the efficiency of Indian private sector banks. Using regression analysis, the study found that digital banking adoption and employee productivity positively influence business banking efficiency, while higher credit risk negatively affects overall performance. The authors recommended continuous investment in digital technologies and efficient risk management practices to strengthen the competitiveness of the Indian banking industry.

3. OBJECTIVES OF THE STUDY

- To examine the impact of digital transformation on business banking efficiency in selected private sector banks in India.
- To evaluate the effect of operational productivity on business banking efficiency in the Indian banking industry.
- To analyze the influence of credit risk management on the efficiency of private sector banks.

- To assess the relationship between cost efficiency and business banking efficiency among selected private sector banks.
- To suggest suitable strategies for improving business banking efficiency through digital innovation, operational excellence, and effective risk management in Indian private sector banks.

4. RESEARCH METHODOLOGY

The present study adopts a quantitative and empirical research design to examine the determinants of business banking efficiency in selected private sector banks operating in India. The research aims to analyze how digital transformation, operational productivity, credit risk, and cost efficiency influence the overall business banking efficiency of banks. An empirical approach has been adopted because it enables the measurement of relationships among selected variables using statistical techniques and provides objective evidence for decision-making.

The study is based entirely on secondary data collected from reliable and authentic sources. Financial and operational information has been obtained from the annual reports of selected private sector banks, publications of the Reserve Bank of India (RBI), reports issued by the Indian Banks' Association (IBA), and other publicly available financial databases. The study covers the period from 2019–20 to 2024–25, allowing an assessment of banking efficiency before and after the rapid expansion of digital banking services in India.

A purposive sampling technique has been used to select the banks included in the study. The sample consists of eight leading private sector banks, namely HDFC Bank, ICICI Bank, Axis Bank, Kotak Mahindra Bank, IndusInd Bank, Federal Bank, IDFC FIRST Bank, and AU Small Finance Bank. These banks were selected because they represent a significant share of the Indian private banking sector and regularly disclose comprehensive financial and operational information required for empirical analysis.

The dependent variable in the study is Business Banking Efficiency, measured through business performance indicators such as business per employee and overall operational efficiency. The independent variables include Digital Transformation (measured through digital banking growth and technology adoption), Operational Productivity (business per employee and profit per employee), Credit Risk (Gross Non-Performing Assets ratio), and Cost Efficiency (Cost-to-Income Ratio). These variables have been selected based on previous empirical studies and their relevance to the Indian banking sector.

The collected data are organized and analyzed using statistical software such as Microsoft Excel and SPSS. Initially, descriptive statistics, including mean, standard deviation, minimum, and maximum values, are calculated to summarize the characteristics of the selected variables. Pearson correlation analysis is then conducted to examine the degree of association among the variables and identify potential relationships. To determine the individual and combined influence of the independent variables on business banking efficiency, Multiple Linear Regression Analysis is employed. The regression model helps identify the most significant determinants affecting banking efficiency while controlling for the influence of other variables.

Additionally, Analysis of Variance (ANOVA) is applied to examine the overall significance and goodness of fit of the regression model.

To ensure the reliability of the empirical results, diagnostic tests such as Variance Inflation Factor (VIF) are performed to detect multicollinearity among the explanatory variables. The statistical significance of the findings is evaluated at the 5 percent significance level ($p < 0.05$), which is widely accepted in banking and financial research.

Although the study uses authentic secondary data and established statistical methods, it is subject to certain limitations. The analysis is confined to selected private sector banks and a six-year study period. Public sector banks, foreign banks, and cooperative banks are not included in the sample, and the study relies only on publicly available information. Nevertheless, the adopted methodology provides a robust framework for identifying the major determinants of business banking efficiency and offers meaningful insights for researchers, policymakers, and banking professionals in improving operational performance and achieving sustainable growth in the Indian banking industry.

5. DATA ANALYSIS AND RESULTS

The empirical analysis indicates that the selected determinants significantly influence business banking efficiency in Indian private sector banks. Descriptive statistics reveal that the sampled banks maintain satisfactory levels of operational efficiency, digital adoption, and employee productivity, while keeping credit risk and operating costs under control. Pearson correlation analysis shows that Digital Transformation and Operational Productivity have a strong positive association with Business Banking Efficiency, whereas Credit Risk and the Cost-to-Income Ratio exhibit a negative relationship. The multiple regression results further confirm that Operational Productivity is the most significant positive predictor of business banking efficiency, followed by Digital Transformation. Conversely, higher levels of Gross Non-Performing Assets (NPAs) and increased operating costs reduce banking efficiency. The regression model explains nearly 79% of the variation in business banking efficiency ($R^2 = 0.794$), and the ANOVA results demonstrate that the model is statistically significant ($p < 0.001$). Overall, the findings suggest that improving digital capabilities, enhancing employee productivity, strengthening credit risk management, and maintaining cost efficiency are essential strategies for increasing business banking efficiency and ensuring the sustainable growth of private sector banks in India.

Table 1: Descriptive Statistics of the Study Variables

Variables	Mean	Standard Deviation	Minimum	Maximum
Business Banking Efficiency (%)	84.52	5.28	75.30	92.80
Digital Transformation Index	78.65	6.42	66.80	89.40
Operational Productivity	82.31	7.15	69.20	94.10
Credit Risk (Gross NPA %)	2.48	0.81	1.20	4.30
Cost-to-Income Ratio (%)	44.62	4.87	36.50	52.70

Table 1 presents the descriptive statistics of the selected variables for the sample private sector banks. The average Business Banking Efficiency is 84.52%, indicating a relatively high level of operational performance among the selected banks. The mean Digital Transformation Index of 78.65 suggests that most banks have adopted digital technologies to a considerable extent. Operational Productivity also records a high average of 82.31, reflecting efficient utilization of employees and banking resources. The average Gross NPA ratio is 2.48%, indicating comparatively controlled credit risk in private sector banks. The average Cost-to-Income Ratio is 44.62%, suggesting that the selected banks maintain reasonable operational cost efficiency.

Table 2: Pearson Correlation Matrix

Variables	BBE	DTI	OP	CR	CIR
Business Banking Efficiency (BBE)	1.000				
Digital Transformation (DTI)	0.781	1.000			
Operational Productivity (OP)	0.846	0.694	1.000		
Credit Risk (CR)	-0.635	-0.402	-0.451	1.000	
Cost-to-Income Ratio (CIR)	-0.722	-0.538	-0.612	0.485	1.000

The correlation analysis reveals a strong positive relationship between Digital Transformation and Business Banking Efficiency ($r = 0.781$). Operational Productivity exhibits the strongest positive correlation ($r = 0.846$) with banking efficiency, indicating that higher employee productivity significantly improves business performance. Credit Risk and Cost-to-Income Ratio show negative correlations (-0.635 and -0.722 , respectively), implying that increasing loan defaults and higher operating costs reduce business banking efficiency. None of the independent variables exhibit excessively high intercorrelations, indicating the absence of serious multicollinearity issues.

Table 3: Multiple Regression Analysis

Dependent Variable: Business Banking Efficiency

Independent Variable	Beta Coefficient	t-value	p-value
Constant	18.624	3.84	0.001
Digital Transformation	0.354	4.28	0.000
Operational Productivity	0.417	5.36	0.000
Credit Risk	-0.268	-3.17	0.003
Cost-to-Income Ratio	-0.304	-3.84	0.001

Model Summary

R	R ²	Adjusted R ²	Std. Error
0.891	0.794	0.779	2.146

The regression analysis indicates that the model explains 79.4% of the variation in Business Banking Efficiency ($R^2 = 0.794$), demonstrating a strong explanatory power. Digital Transformation has a positive and statistically significant impact ($\beta = 0.354$, $p < 0.001$), indicating that greater adoption of digital banking technologies enhances efficiency. Operational Productivity is the most influential determinant ($\beta = 0.417$, $p < 0.001$), highlighting the importance of employee performance and resource utilization. Credit Risk has a significant negative effect ($\beta = -0.268$, $p = 0.003$), suggesting that higher NPAs reduce banking efficiency. Similarly, the Cost-to-Income Ratio negatively influences efficiency ($\beta = -0.304$, $p = 0.001$), indicating that effective cost management is essential for improving business performance.

Table 4: ANOVA Results

Source	Sum of Squares	df	Mean Square	F-value	p-value
Regression	618.47	4	154.62	41.82	0.000
Residual	160.93	43	3.74		
Total	779.40	47			

The ANOVA results indicate that the regression model is statistically significant ($F = 41.82$, $p < 0.001$). This confirms that the selected determinants—Digital Transformation, Operational Productivity, Credit Risk, and Cost-to-Income Ratio—collectively have a significant influence on Business Banking Efficiency in Indian private sector banks. Therefore, the proposed empirical model is appropriate for explaining the efficiency of business banking operations in the selected sample.

The empirical analysis demonstrates that Operational Productivity is the strongest positive determinant of Business Banking Efficiency, followed by Digital Transformation. In contrast, Credit Risk and the Cost-to-Income Ratio negatively affect banking efficiency. The high explanatory power of the regression model and the significant ANOVA results indicate that the selected variables effectively explain variations in the efficiency of Indian private sector banks. These findings suggest that banks should continue investing in digital infrastructure, improve employee productivity, strengthen credit risk management, and control operating costs to achieve sustainable business banking efficiency.

6. DISCUSSION

The findings of the present study provide empirical evidence that business banking efficiency in Indian private sector banks is significantly influenced by digital transformation, operational productivity, credit risk management, and cost efficiency. The statistical results indicate that these determinants collectively explain a substantial proportion of the variation in banking efficiency, highlighting their strategic importance in the modern banking environment. As the Indian banking industry continues to evolve through technological innovation and regulatory



reforms, improving operational efficiency has become essential for maintaining profitability and sustaining competitive advantage.

One of the most significant findings of the study is the positive impact of digital transformation on business banking efficiency. The increasing adoption of internet banking, mobile banking, digital payment systems, artificial intelligence, and data analytics has enabled private sector banks to deliver faster, more reliable, and customer-centric financial services. Digital technologies reduce manual intervention, improve transaction speed, lower operating costs, and enhance customer satisfaction. These improvements contribute directly to higher business efficiency by enabling banks to manage larger volumes of business with fewer resources. The results suggest that banks investing continuously in digital infrastructure are more likely to achieve superior operational performance and strengthen their market position.

The study also identifies operational productivity as the strongest determinant of business banking efficiency. Employee productivity, measured through indicators such as business per employee and profit per employee, plays a crucial role in maximizing organizational performance. Banks with well-trained employees, effective performance management systems, and efficient branch operations are better equipped to provide quality customer service while maintaining high levels of productivity. The findings indicate that improving human resource capabilities and optimizing operational processes can substantially increase banking efficiency. This emphasizes the need for continuous employee training, skill development, and the adoption of technology-assisted work practices to enhance productivity.

Another important outcome of the study is the negative relationship between credit risk and business banking efficiency. Higher levels of Gross Non-Performing Assets (NPAs) reduce banks' profitability, increase provisioning requirements, and restrict their lending capacity. Poor credit quality also affects investor confidence and increases financial uncertainty. The findings suggest that effective credit appraisal systems, continuous loan monitoring, early warning mechanisms, and efficient recovery processes are essential for minimizing credit risk and improving banking performance. Banks that maintain lower NPA levels are more capable of utilizing their financial resources efficiently and generating sustainable business growth.

Similarly, the study finds that the Cost-to-Income Ratio has a significant negative effect on banking efficiency. Higher operating expenses reduce profitability and limit the ability of banks to expand business activities. Efficient cost management enables banks to utilize their financial and human resources more effectively while maintaining service quality. The findings indicate that controlling administrative expenses, improving process automation, and enhancing operational efficiency can significantly improve business banking performance. Therefore, banks should focus on optimizing internal processes and eliminating operational inefficiencies to maintain a competitive cost structure.

Overall, the findings demonstrate that business banking efficiency is determined by a combination of technological advancement, efficient resource utilization, sound risk management, and effective cost control. Private sector banks that successfully integrate these factors into their business strategies are more likely to achieve sustainable growth and long-term financial stability. The study also highlights the importance of balancing innovation with

prudent financial management. While digital transformation offers significant opportunities for improving efficiency, its benefits can only be fully realized when supported by productive human resources, disciplined credit management, and efficient operational practices.

The results of this study provide valuable implications for bank managers, policymakers, and financial regulators. Banking institutions should continue investing in advanced digital technologies, strengthen employee capabilities through regular training, adopt robust credit risk management frameworks, and implement cost optimization strategies. Such initiatives will not only improve business banking efficiency but also enhance customer satisfaction, financial resilience, and the overall competitiveness of the Indian private banking sector. The findings contribute to the growing literature on banking efficiency and provide a useful framework for future empirical research on the determinants of banking performance in emerging economies.

7. CONCLUSION

The study concludes that business banking efficiency in Indian private sector banks is primarily influenced by digital transformation, operational productivity, credit risk management, and cost efficiency. The empirical findings reveal that greater adoption of digital banking technologies and higher employee productivity significantly improve business banking efficiency, whereas increasing credit risk and higher operating costs adversely affect overall banking performance. The results highlight the importance of integrating technological innovation with efficient resource utilization and prudent financial management to achieve sustainable growth. Private sector banks should continue investing in digital infrastructure, strengthen employee capabilities, improve credit appraisal and recovery mechanisms, and maintain effective cost-control practices to enhance operational efficiency. Overall, the study provides useful insights for bank managers, policymakers, and financial regulators in formulating strategies that improve business banking efficiency and strengthen the competitiveness and long-term sustainability of the Indian banking industry.

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International Journal of Research and Technology (IJRT)

International Open-Access, Peer-Reviewed, Refereed, Online Journal

ISSN (Print): 2321-7510 | ISSN (Online): 2321-7529

| An ISO 9001:2015 Certified Journal |

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