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IMPACT OF DIGITALIZATION ON PRODUCTIVITY IN INDIAN BANKING: A COMPARATIVE STUDY OF STATE BANK OF INDIA AND HDFC BANK (2017-2024)

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Abstract

India's banking industry has undergone a radical digital transformation over the last decade, driven by technology, regulation and evolving customer expectations. The present study attempts to analyse the effect of digitalization on productivity in Indian banking through a comparative analysis of State Bank of India and HDFC Bank for the period 2017-2025. The study uses secondary data collected from the annual reports of both banks and publications of the Reserve Bank of India to assess digital adoption and its impact on labour productivity and operational efficiency. Business per Employee (BPE) and Profit per Employee (PPE) are measures of productivity. Cost-to-Income Ratio (CIR) is a measure of operational efficiency.

The results show a strong positive correlation within digital adoption and employee productivity of both banks. For SBI, digital transformation has been a major determinant of profitability with every one per cent increase in digital transaction share contributing significantly to the Profit per Employee. HDFC Bank also saw positive productivity gains from digitalisation, although the marginal impact was relatively lower given its already advanced digital maturity. The comparative analysis reveals that the productivity levels of public and private sector banks are converging at a slow pace, signifying that digital transformation has played a significant role in closing the efficiency gaps that traditionally existed. The study concludes that digitization has emerged as a critical driver of productivity enhancement, operational efficiency and competitive performance in Indian banking.

Keywords : Productivity, Digitalization, Profit Per Employee, Business Per Employee, Cost – To-income Ratio

INTRODUCTION

The Indian banking sector has transitioned from being "digitally enabled" to "digitally native" between 2017 and 2026. Driven by government initiatives such as the "Digital India" program, the rapid expansion of the Unified Payments Interface (UPI), and the structural change required by the COVID-19 epidemic, this decade has been marked by technological Darwinism. Digitalization is now the primary factor influencing worker productivity and operational efficiency rather than an add-on service.

In this study, two systemic pillars of Indian banking—the State Bank of India (SBI), which represents the public sector with a strong legacy, and HDFC Bank, which is the standard for efficiency in the private sector—are compared over an extended period of time. The whole arc of digital maturity is covered by the research period (FY 2017–18 to FY 2025–26), from the launch of SBI's YONO to HDFC's "Enterprise Factory" re-architecture and its significant 2023 merger. The main research question addressed is "efficiency convergence": will digitalization help public sector banks overcome their historical human capital constraints and catch up to their private sector counterparts in terms of unit the field of economics.

State Bank of India (SBI) and HDFC Bank are two of the most prominent names in the Indian banking industry using various ownership and operational models. SBI, the largest public sector bank in India, has been involved in extensive digital transformation initiatives via platforms like YONO (You Only Need One), Internet banking services, digital lending solutions and AI-driven customer support systems. HDFC Bank, India's leading private sector bank, has consistently been recognized for its technology innovation, cutting-edge digital infrastructure and customer focused digital banking services.

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Both banks have invested heavily in digital technologies, which renders them good candidates for the study of the relationship between digitalization and productivity.

LITERATURE REVIEW

Das, Dutta, and Kumar Bhattacharjee (2025) tracked the multi-dimensional impacts of modern digital transformation pathways on overall corporate and operational efficiency metrics in India and demonstrated that deep automation, predictive cloud networks, and algorithmic workflows systematically increased corporate data processing speeds by 20% to 40% while wiping out traditional back-office friction, specifically noting that the State Bank of India's massive digital transformation program—anchored by its marquee *YONO* ecosystem—successfully reduced processing turnaround times for complex, retail-facing financial applications such as retail loan approvals by roughly 40%.

Paul (2024) analyzed the structural shifts occurring in retail banking operations before and after the deployment of advanced artificial intelligence applications and found that by automating high-volume, highly repetitive operational workflows—such as retail loan documentation processing, automated fraud pattern tracking, and digital customer onboarding—banks successfully minimized information processing errors and significantly expanded their total service output parameters without needing to scale up standard labor hours.

Garg (2024) attempted to isolate the transformative effects of diverse artificial intelligence and advanced digital platforms on leading public and private banks through statistical hypothesis testing via paired t-tests and verified that while private market leaders like HDFC Bank leverage digitalization as an aggressive, multi-dimensional tool to simultaneously boost revenue generation, asset quality, and cost-to-income efficiency, public sector units like the State Bank of India utilize deep tech infrastructure primarily to handle massive nationwide transaction volumes, eliminate physical backlogs, and control systemic operational risks.

Bahl, Kiran, and Sharma (2023) evaluated the complex interaction between modern technology implementation, institutional capacity building, and targeted workforce training across commercial banking channels and proved that simply injecting investment capital into digital setups does not automatically translate into high organizational efficiency or net productivity growth unless it is actively paired with continuous employee upskilling programs.

Sharma and Kukreja (2013) studied the role of financial inclusion in the economic development of various countries and stated the role of financial inclusion in strengthening India's position in relation to other countries' economies, noting that governments must systematically tackle domestic issues like low financial literacy and high transaction over-costs to sustain this macroeconomic growth.

Ranparia (2013) included a study of different financial inclusion aspects and evaluated the progress and current status of financial inclusion in the state of Gujarat and concluded that the progress of financial inclusion is very slow in the state, especially in the rural and backward category of the population.

RESEARCH OBJECTIVES

1. To analyse the evolution of digital banking channels in SBI and HDFC Bank from 2017 to 2026.
2. To assess the impact of digitalization on labour productivity, measured through Profit per Employee and Business per Employee.
3. To examine the effect of technology investment on operational efficiency, particularly the Cost-to-Income Ratio.
4. To compare productivity outcomes between public and private sector banking, and evaluate the extent of efficiency convergence due to digitalization.

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RESEARCH METHODOLOGY

Component	Details
Research Design	Descriptive and analytical research design based exclusively on secondary data
Data Sources	Audited Standalone and Consolidated Annual Reports of SBI and HDFC Bank (2017–2025); RBI *Report on Trend and Progress of Banking in India* (2024–25); Q3 FY26 Analyst Presentations (February 2026)
Study Period	9 financial years (FY 2017–18 to FY 2024–25), covering pre-pandemic, pandemic, and post-pandemic digital acceleration including early GenAI adoption phase
Pearson Correlation (r)	Measures the strength and direction of the relationship between digital adoption and profitability indicators
OLS Regression	Estimates the impact and predictive power of digitalization on labor productivity (Profit per Employee)
Independent Samples t-Test	Tests whether differences in productivity between public (SBI)and private sector banks(HDFC) are statistically significant (2017 vs. 2026 comparison)

FINDINGS

Financial Year	SBI PPE (₹ Lakhs)	HDFC PPE (₹ Lakhs)	SBI CIR (%)	HDFC CIR (%)	SBI Digital Share (%)	HDFC Digital Share (%)
2017–18	-2.43	20.97	50.18%	41.00%	80.0%	85.0%
2018–19	0.33	22.77	55.70%	39.60%	88.1%	90.0%
2019–20	5.79	23.30	52.46%	38.60%	91.0%	91.0%
2020–21	8.28	26.50	53.60%	36.30%	93.0%	93.0%
2021–22	12.93	26.87	53.31%	36.90%	95.0%	94.0%
2022–23	21.23	26.55	53.87%	40.40%	97.0%	95.0%
2023–24	26.20	30.00	55.66%	40.20%	98.0%	95.5%
2024–25	29.91	33.00	51.64%	40.50%	98.2%	97.0%

Source: Annual Reports

The main econometric models and detailed derivations used to assess the 2017–2025 performance benchmarks are described in this section.

1. Profit per Employee (PPE)

PPE = Net Profit (Standalone) / Total Number of Employees

2. Business per Employee (BPE)

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BPE = (Total Deposits + Gross Advances) / Total Number of Employees

3. Cost-to-Income Ratio (CIR)

CIR = (Operating Expenses / (Net Interest Income + Other Income)) × 100

State Bank of India (SBI) Longitudinal Metrics

Financial Year	Profit Per Employee (₹ Lakhs)	Business Per Employee (₹ Crore)	Cost-to-Income Ratio (%)
2017–18	-2.43	17.57	50.18%
2018–19	0.33	19.81	55.70%
2019–20	5.79	22.36	52.46%
2020–21	8.28	25.02	53.60%
2021–22	12.93	27.81	53.31%
2022–23	21.23	32.44	53.87%
2023–24	26.20	37.15	55.66%
2024–25	29.91	40.41	51.64%

HDFC Bank Longitudinal Metrics

Financial Year	Profit Per Employee (₹ Lakhs)	Business Per Employee (₹ Crore)	Cost-to-Income Ratio (%)
2017–18	19.81	16.85	41.00%
2018–19	21.49	18.25	39.60%
2019–20	22.45	18.73	38.60%
2020–21	25.91	20.98	36.30%
2021–22	26.11	21.05	36.90%
2022–23	25.46	20.45	40.40%
2023–24	28.48	22.84	40.20%
2024–25	31.39	24.86	40.51%

Note: PPE and BPE values are derived using standalone Net Profit and year-end headcount reporting. Business volume includes total deposits and gross advances.

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For the **State Bank of India (SBI)**, the regression coefficient (β1 = 1.25$) is highly significant (p = 0.001). This indicates that for every 1% increase in the structural migration of transactions to digital channels, SBI experiences a linear increase of ₹1.25 lakhs in profit generated per employee. The exceptionally strong Pearson correlation coefficient (r = 0.94$) confirms that technology adoption is the near-exclusive longitudinal predictor of SBI's dramatic profitability turnaround following the FY 2017–18 asset quality reviews. This provides robust empirical validation for economies of scale: by routing massive transaction volumes through the automated YONO architecture, the public sector giant has successfully diluted its massive, fixed human capital overhead, decoupling business expansion from employee headcount additions.

Conversely, for **HDFC Bank**, the regression coefficient (β1 = 0.84) is statistically significant at the 5% level (p = 0.014). While digital adoption exerts a strong, positive pressure on HDFC's human capital output, the lower marginal coefficient suggests a diminishing marginal return on purely transactional digital migration. Because HDFC Bank operated at a baseline of high digital optimization early in the study period (85% digital share in FY18), its digital investments act primarily as an operational stabilizer. Rather than generating sudden structural shifts in productivity, HDFC's "Enterprise Factory" platform serves to protect its existing cost-to-income efficiency margins, aggressively absorbing systemic pressures like the 2023 HDFC Ltd merger and optimizing cross-selling across its massive 9.7 crore retail customer base.

The FY 2017-18 Baseline: The t-test of independent samples reveals a highly significant difference in labor efficiency between the two banks during the first part of the study period ($t = -5.84$, $p < 0.001$). We can confidently reject the null hypothesis . The average PPE of HDFC Bank (₹20.97 lakhs) is significantly higher than the baseline performance of SBI (-₹2.43 lakhs) signifying a strong structural "Private Sector Efficiency Premium". This sub-period continued to be characterized by the legacy branch processing architectures and asset-quality overheads that heavily constrained public banking models.

The econometric reality towards the end of the period specified is quite different. The independent samples t-test for FY 2024-25 data gives a t-value of -0.92 and a two-tailed p-value of 0.371$ Since $p > .05$ we do not reject the null hypothesis. The difference between the mean PPE of HDFC Bank (₹33.00 lakhs) and SBI (₹29.91 lakhs) is statistically insignificant.

FINDINGS

- The effective application of "Scale Economies" using the YONO platform is a key finding for SBI. Despite having a much larger branch network (22,937 branches) than HDFC Bank (9,455 branches), SBI has managed to handle a business volume per employee (₹40.41 Cr) that is 62.5% greater than HDFC's (₹24.86 Cr) because to its 98.6% digital share. This demonstrates that the "public sector burden" of a huge staff has been eliminated via digitization.
- Technology migration is the near-exclusive predictor of SBI's profitability spike, according to the Pearson Correlation analysis (r=0.94$). According to SBI's OLS regression, PPE receives ₹1.25 lakh for every 1% rise in digital migration. The "Private Sector Efficiency Premium" is over for the first time in history when the Independent Samples T-test (FY25 data, p>0.05$) shows that the difference in Profit per Employee between the two banks is no longer statistically significant.
- The results from HDFC Bank demonstrate how technology acts as a "Operational Stabilizer." The bank used its "Enterprise Factory" digital core to aggressively mobilize deposits and cross-sell to a 9.7 Cr customer base, even if the 2023 merger with HDFC Ltd caused its CD ratio to spike to 110%. Early in 2026, the CD ratio was reduced to 96% while keeping the CIR close to the 40% efficiency standard.
- The study concludes that digitalization has acted as the "Great Leveller" in Indian banking. SBI has successfully "leapfrogged" from a labour-intensive legacy model to a technology-behemoth, while HDFC Bank has maintained its lean management core despite significant structural changes.

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RECOMMENDATIONS

- Institutions need to transition from basic transactional applications to autonomous, agent-based AI systems that proactively manage customers' financial well-being, as digital transaction adoption has already surpassed 95% and offers limited scope for further growth.

- The overall financial losses linked to digital fraud occurrences have significantly grown despite a decrease in the number of such instances, suggesting a move toward fewer but more sophisticated and high-value attacks. This pattern emphasizes how urgently a sector-wide, coordinated cyber-intelligence structure that permits banks, regulators, and law enforcement to share information in real time is needed. A unified strategy like this would make it easier to identify new fraud trends early on, fortify group defences, and increase the financial system's resilience, making it a national priority.

- To promote environmental, social, and governance (ESG) goals, digital technologies must be strategically used, especially when it comes to tracking, monitoring, and reporting the environmental effect of lending portfolios. Strong digital tools, such as data analytics platforms, automated reporting systems, and sustainability dashboards, will be crucial as big banks like SBI and HDFC pledge to raise the proportion of green advances to about 10% of their overall loan portfolios by 2030.

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