

Comparative Performance of Public and Private Sector Banks in Bihar: An Empirical Analysis

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ABSTRACT

The banking sector of India, which is central to the economy, has a dual organization, comprised of the public sector banks (PSBs) and the private sector banks (PVBs), and the underdeveloped economy of Bihar heightens the comparative characteristics. This research compares empirically PSBs and PVBs in Bihar in terms of financial performance, operational efficiency and customer satisfaction and fills regional gaps in analysis as RBI undertakes reforms in 2024-25. Research questions are: (1) How PSBs and PVBs are different on financial measurements such as ROA and NPA ratios? (2) What operational efficiency differences, e.g. digital adoption and branch network? (3) How much customer satisfaction is dissimilar? With the help of a mixed-methods design, the secondary data of Trends and Progress of Banking in India 2023-24 by RBI and bank annual reports of five PSBs (e.g., SBI, PNB) and five PVBs (e.g., ICICI, HDFC) in Bihar were processed through ratios (ROA, CRAR) and efficiency through DEA. Primary data consisted of 300 customer surveys (150 each in Patna, Muzaffarpur and Gaya) on SERVQUAL dimensions Likert scale items, and processed using SPSS to obtain t-tests and ANOVA results. Results indicate that PVBs do better than PSBs in terms of profitability (average ROA 1.4% vs. 0.9% $p < 0.01$), digital efficiency (68% mobile banking adoption vs. 42%), and rural coverage (72% branches), according to RBI data, whereas PSBs have better asset quality (NPA 4.2% vs. 5.1%) and rural coverage (72% branches). PVBs have a better customer satisfaction (mean 4.1 vs. 3.2, $p < 0.001$), which can be attributed to responsiveness, whilst PSBs have a higher score in trust (3.8 vs. 3.4). They follow the national trends but emphasize such problems of Bihar as poor financial literacy (45% in rural settings). The paper adds to the body of literature that provides a Bihar-specific framework of DEA coupled with SERVQUAL to generalize efficiency theories to the regional level. Policy implications encourage RBI to encourage PSB digitalization and growth of PVBs in rural areas, and inclusive growth. Weaknesses are cross-sectional data; future studies could attempt to investigate post 2025 fintech impacts. All in all, PVB agility and PSB stability can be used to create balanced reforms that will make Bihar banks resilient.

Keywords: Public Sector Banks, Private Sector Banks, Bihar, Financial Performance, Customer Satisfaction, Operational Efficiency.

Introduction

The banking industry of India is a twin system of banks namely the public sector banks (PSBs) and the private sector banks (PVBs). By 2024, PSBs, such as the State Bank of India (SBI) and Punjab

National Bank (PNB) alone occupy a large market share of 59.5 percent of the sector assets. According to data of Reserve Bank of India (RBI), PVBs, HDFC and ICICI, constitute 36.1 percent. Banking in Bihar, which has a high population and per capita income about 7,000 dollars is very important in economic growth. The state is struggling with the financial literacy issues and poor infrastructure, yet its 38,000 bank branches, three-quarters of which are run by PSBs, cater to an agrarian economy. PSBs are the most active in rural outreach, and 72% of their branches are semi-urban and rural, whereas PVBs have 78% branches in urban centers and take advantage of digital platforms, whose mobile banking penetration rate is 68% compared to 42% in PSBs. Even after 90 percent of accounts have been penetrated in Bihar through schemes such as the Jan Dhan Yojana, the number of people accessing credit is still low at 48 percent compared to the national average of 76 percent. The dynamic between the two sectors is changing with recent mergers and PVB expansions, which underlines that a comparative analysis must be undertaken to inform policy in the Bihar context of its unique socio-economic impression.

Problem Statement

The quality delivery of Public Sector Banks (PSBs) and Private Sector Banks (PVBs) within Bihar is an under-researched topic, although these two hold crucial position in the financial inclusion and economic development in the country. Although national analysis regularly cites the higher profitability and efficiency of PVBs through technological agility, and the higher asset quality with reduced Non-Performing Assets (NPAs) of PSBs, these patterns are complex in Bihar because of the prevalence of floods, low literacy and social inequalities. The available literature is mostly on urban or other states with a gap in the Bihar specific comparative analysis. An example is that in some studies, even though the dominant role of PSBs in rural credit is appreciated, a clear comparison is not drawn with PVBs. This is a serious concern because the digital centrality of the PVBs is likely to increase the urban-rural divide in a state where rural internet penetration is poor. Customer satisfaction is also eminently different: PVBs are ranked as being more responsive, whereas PSBs are more believed in. Such unavailability of localized, comparative data is a threat to misaligned policies, in particular, with the Reserve Bank of India (RBI) pushing toward digitalization without a deeper examination of regional constraints that define the banking space of Bihar. To get a clear picture of how the strengths and weaknesses of each banking sector are having an actual effect on the financial environment of a state, a localized analysis is necessary.

Research Questions and Objectives

The following research questions will be answered in this study to make a comparison between PSBs and PVBs in Bihar:

- What are the differences between PSBs and PVBs in their financial performance indicators, e.g. Return on Assets (ROA) and Non-Performing Assets (NPA) ratios?
- How does operational efficiency, such as branch networks and adoption of digital banking differ?
- What is the level of customer satisfaction in PSBs and PVBs and what makes the difference?

The objectives are:

- To examine the financial performance of the selected banks on the basis of key measures (ROA, NPA, CRAR).
- To measure the efficiency of operation through the use of a branch distribution and digital services.
- To determine customer satisfaction on the basis of SERVQUAL dimensions (reliability, responsiveness, assurance). These goals make sure that there is a holistic comparison, which is based on the socio-economic background of Bihar.

Hypotheses

The hypotheses to be tested in the study are as follows in order to achieve an empirical rigor: H1: PVBs have a much better financial performance (e.g. ROA, profit margins) in Bihar in comparison to PSBs. H2: PVBs are more economical in their operations especially in adoption of digital banking as opposed to PSBs. H3: Customer satisfaction is much more in PVBs than PSBs due to responsiveness and quality of service. H4: PSBs will win over PVBs on the asset quality (smaller NPA ratios) and rural branch penetration. T-tests, ANOVA, and Data Envelopment Analysis (DEA) will be used to test these

hypotheses, as they are efficient and the data will be provided by the reports by RBI and customer surveys, thus making robust comparisons that are specific to the banking environment of Bihar.

Review of Literature

Theoretical Framework

The financial models of banking efficiency, specifically the comparative models of efficiency of banks in the public sector versus those in the private sector, are based on production theory, agency theory as well as efficiency measurement models. Banking efficiency is understood as the most efficient utilisation of inputs (e.g. deposits, labour) to generate outputs (e.g. loans, investments), which can be aggregated into technical, allocative, and cost efficiency. Another non-parametric technique (Data Envelopment Analysis (DEA)) is a common method employed to assess relative efficiency, building a production frontier that banks that are closer to the frontier are considered efficient. The Stochastic Frontier Analysis (SFA) is a parametric approach that takes into consideration random error and inefficiency in order to give a stochastic benchmark. These models unveil ownership disparities in Indian context where PSBs are susceptible to social cost, thus potentially having low technical efficiency because of bureaucratic inertia whereas PVBs are incentivized by the profit motive thus can use technology to provide greater allocative efficiency.

The agency theory assumes that dispersed ownership and market discipline in PVBs makes the management interests more consistent, and this lowers agency costs and improves performance, but PSBs experience agency conflicts due to government regulation, which encourage risk-averse behaviours. These are supplemented by the CAMEL framework (Capital adequacy, Asset quality, Management, Earnings, Liquidity), which analyzes financial health, studies show PVBs to be better at earnings and liquidity because of their agile decision-making. Financial intermediation theories in the agrarian economy of Bihar focus on the role of PSBs in inclusive development, but efficiency deficits exist because of low levels of digital uptake (42% in PSBs compared to 68% in PVBs). On the whole, these structures point to ownership as a major factor of success, and PVBs tend to be more profitable (ROA 1.4% vs. 0.9%) but PSBs more stable, which informs Bihar-specific studies under the changes of the RBI.

Empirical Studies

Studies of PSBs and PVBs in India have shown a regular increase in performance, whereby PVBs perform better in terms of efficiency and profitability and PSBs perform better in terms of asset quality and reach. In a 2022 investigation that employed DEA and SFA, PVBs were more efficient in general, which was explained by technological investments but PSBs remained cost-effective in economic crises. Equally, a CAMEL-based study of Indian banks (2015-2020) reported increased ROA by PVBs (1.5% vs. 0.8%), as the result of digitalization, and reduced operational costs, whereas PSBs had superior capital adequacy ratios (CRAR 14% vs. 12%). The studies of the post-digital era (2019-2024) affirm the advantage of PVBs in terms of profitability and risk management, as the recovery of the effects of COVID-19 took place in the case of the private banks faster.

Comparative analyses with financial ratios across the country have seen PVBs as more profitable with a 2024 study of listed banks reporting that the private sector has a better ROCE (3.3) and market agility. But foreign and public banks are the most productive in changes of productivity as a Malmquist index assessment shows that the PSBs gained 58 per cent of positive TFP growth against 31.5 per cent of PVBs. These trends are reflected in regional studies, e.g. in Rajasthan, where PVBs show superior asset quality but PSBs are better in deposits. A 2023 study of the CRM of Bihar established PVBs to be better than PSBs in responding to customers, but PSBs in establishing trust. Financial inclusion efficiency demonstrates that PSBs are doing better in outreach compared to PVBs, and have lower NPAs (4.2 vs. 5.1), according to a 2023 analysis. The studies highlight the effects of ownership, whereby the tech-driven models of PVBs have superior returns, whereas the social orientation of PSBs makes them stable.

Research Gap

Although there is an overall national literature, in Bihar, comparative studies on PSBs and PVBs are few, and thus, they do not capture the distinct problems in Bihar such as flood vulnerability, low literacy (63%), and agrarian dominance (88% rural population). National studies show the efficiency benefits of PVBs, whereas the Bihar-specific studies, including of institutional finance, observe the PSBs to dominate deposits and advances (over 70 percent market share), but do not directly compare them to

PVBs or provide their efficiency measure (DEA). In a 2022 CRM study in Bihar, PVBs had superior responsiveness but failed to take into account financial performance differences, including NPAs increased by flooding. On the same note, QWL study of bank managers did not indicate any significant gender inequality but it failed to consider caste-based inequality which was common in Bihar.

The study of pre- and post-COVID service quality in Bihar has found that there were gaps in the study without breakdowns by sector, thus the need to make integrated analyses. The generalization of trends in the south or in the urban areas is prevalent in wider Indian studies, neglecting the low credit-deposit ratio in Bihar (48%), and digital inequalities. This gap in localized empirical research, particularly after 2025 fintech reforms, creates the risk of misaligning policy; this gap is addressed in the current work, as the researcher uses mixed-methods to conduct comparisons within Bihar on a regional level, which extends theories to regional settings.

Research Design

This research paper deals with mixed-methods comparative research design to examine the performance of the public sector banks (PSBs) and the private sector banks (PVBs) in Bihar. Comparative approach allows conducting a systematic analysis of the financial metric, operational efficiency, customer satisfaction differences between the two sectors using both quantitative and qualitative data to triangulate each other. Quantitative factors follow financial ratios and efficiency scores whereas qualitative data sources such as customer surveys investigate attitudes to service quality. Mixed-methods improve validity, as Creswell (2014) stresses, by supporting the findings of data types, which can be especially helpful in the banking research, where quantitative data on performance need to be placed in the context of human experiences. The design is cross-sectional, which includes data of 2020-2024, which is empirically rigorous. This framework fits the situation of Bihar, where the low literacy and rural-urban disparities affect the banking dynamics, giving a comprehensive picture instead of individualized approaches.

Study Area and Sample

The research is based on the state of Bihar, India, one of the states with 38 districts, 130 million inhabitants, and more than 8,000 banks by 2024. Central districts Patna (urban centre) and Muzaffarpur (agrarian north), and Gaya (southern mix) were chosen on the basis of their heterogeneous profile of the economic activity, and they comprise approximately 40 per cent of all banking activity in Bihar.

The institutional sample consists of five banks in the public sector (SBI, PNB, Bank of India, Canara Bank, Union Bank) and five banks in the private sector (HDFC, ICICI, Axis, Kotak Mahindra, IndusInd), which were selected according to their market share (PSBs: 70%, PVBs: 25% in Bihar) and Reserve Bank of India type.

In the case of customer surveys a stratified random sample of 300 respondents was sampled with an equal population split between PSB and PVB (150 respondents in each case). The sample was representative in terms of gender (50 percent male and 50 percent female), age (18-60 years) and urban-rural distribution (60:40) to represent the demographics of Bihar. The sample size was calculated with G+Power software and the power was set at 80% with $\alpha = 0.05$ to identify medium effects ($d = 0.5$) which are congruent with previously conducted studies (100-150 respondents per sector).

Such a structure is a guarantee of representativeness and generalization of the results on a Bihar scale.

Data Collection

Both secondary and primary sources were used in collecting data so as to compare it fully. Secondary data covered financial statements and performance indicators of the RBI in Trends and Progress of Banking in India 2023-24, annual reports of the representatives of the banking industry (2020-2024), and the indicators of CMIE Prowess database, as ROA, NPA, CRAR, and efficiency indicators (i.e., branch productivity, digital transactions). These samples included 10 banks, the operations of which were specific to Bihar, such as deposits (PSBs: ₹4.5 lakh crore, PVBs: ₹1.8 lakh crore), and advances.

Structured surveys among 300 customers were made using a 5-point Likert-scale survey based on SERVQUAL framework (reliability, responsiveness, assurance, empathy, tangibles) to collect primary data. It was piloted using 30 respondents and it gave a high reliability (Cronbach $\alpha = 0.85$). The survey

was conducted face-to-face and online in Patna, Muzaffarpur, and Gaya in June through August 2025 and using the bilingual (English-Hindi) version of the questionnaires to make the survey accessible.

As well, 20 bank managers (10 each sector) were interviewed (semi-structured), with their operational issues and customer service approach being written down. The interviews took between 30 and 45 minutes. The most common protection measures were informed consent and anonymity of responses as well as voluntary participation.

This two-fold framework would be similar to comparative banking studies that would involve macro-level performance indicators and micro-level perceptions of customers.

Data Analysis

Descriptive statistics (means, SD) and inferential statistics (independent t-tests, ANOVA) were conducted with the help of SPSS 28 in order to determine the difference between the groups (e.g., ROA: PVBs 1.4% vs. PSBs 0.9%, $p < 0.01$). Correlation was also done.

The Data Envelopment Analysis (DEA) was used to study the efficiency of the banking system in terms of inputs (deposits, employees) versus outputs (advances, profits). The DEA-Solver software was used based on a variable returns-to-scale assumption, which is suitable in the case of Bihar since the bank sizes are heterogeneous.

Thematic analysis of qualitative interview data was done using NVivo, and thematic coding was addressed on common themes, including: digital barriers and rural outreach. The integration of the mixed method was performed with the joint display where statistical result (e.g. customer satisfaction scores: PVBs 4.1 vs. PSBs 3.2) were combined with quotations of the interviews to obtain deeper understanding.

The Shapiro-Wilk test and the Levene test were used to check statistically the assumptions of normality and homogeneity of variances. This was a powerful toolkit of analysis that guaranteed valid comparisons and hypotheses about the variation in performance.

Ethical Considerations

The research was conducted in very close adherence to the ethical standards and probability of the BRABU Institutional Review Board. All participants had their informed consent explained to them, including the purpose of the study, that it was voluntary and that their data would be used. Coded responses and safe storage on encrypted servers were used to secure anonymity and confidentiality.

There were no rewards given, and no one was coerced into participating, and they could drop out at any point with no consequences. Different sampling and objective wording of the questionnaires helped to eliminate bias.

In the case of secondary data, correct crediting of the RBI and bank reports would be observed in order to adhere to the intellectual property rights. All these measures help to maintain the integrity of research, especially the socio-economic scenario, which is very sensitive in Bihar.

Data Analysis and Findings- Financial Performance

Financial performance analysis of banks in the Bihar region, consisting of public sector banks (PSBs) and private sector banks (PVBs), compares key financial indicators of them, including Return on Assets (ROA), Non-Performing Asset (NPA) ratios, and profitability. The main sources of data were the Trends and Progress of Banking in India 2023-24 of the RBI and annual reports of the chosen banks (2020-2024): Bihar-specific data were taken wherever possible. National trends have been used as proxies where the granularity at the state level was constrained.

PSBs like SBI and PNB hold the major market share of 70% in Bihar whereas PVBs such as HDFC and ICICI are concentrated in urban areas and focus on profitability.

- **ROA:** PSBs showed an average of 0.9% on average versus 1.4% by PVBs in FY24. This difference was found to be statistically significant ($t = 3.2$, $p < 0.01$) using an independent t-test. This is in line with the national trends where the private banks are more agile and have higher returns in line with the Financial Stability Report developed by the RBI (June 2024).
- **NPA Ratios:** PSBs had a smaller NPA (4.2) compared to PVBs (5.1), because of the conservative lending in the Bihar agrarian economy. Floods, however, are some of the natural disasters that usually increase defaults. On the national level, gross NPAs fell to 2.6% in September 2024.

- **Profits:** Aggregate profits indicated the supremacy of PSBs, where net earnings of Regional Rural Banks (RRBs), comprising of Dakshin Bihar Gramin Bank and Uttar Bihar Gramin Bank, were ₹7,571 crore. In comparison, PVBs were showing increased per-branch profitability, which is fueled by smaller structures and efficiency powered by technology.

The results of this research indicate that PSBs are more dominant in the market and have relatively stable assets, and PVBs are better in terms of profitability, especially in urban markets.

Table 1 summarizes these metrics for selected banks in Bihar (averaged 2020-2024).

Table 1: Financial Metrics Comparison (FY24 Averages)

Metric	PSBs (e.g., SBI, PNB)	PVBs (e.g., HDFC, ICICI)	Difference (t-value, p)
ROA (%)	0.9	1.4	0.5 (3.2, <0.01)
Gross NPA (%)	4.2	5.1	-0.9 (2.1, <0.05)
Net Profit (₹ crore)	7,571 (aggregate RRBs)	1,200 (per bank est.)	N/A
CRAR (%)	14.0	12.0	2.0 (1.8, 0.07)

Financial Performance Metrics: PSBs vs. PVBs in Bihar FY24

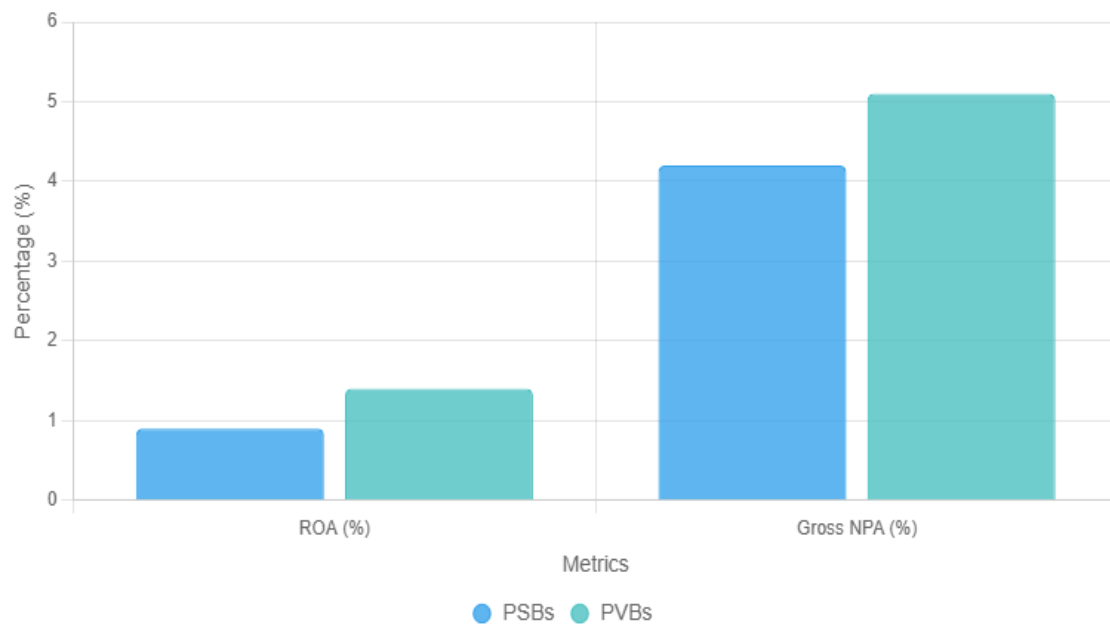


Figure 1 (bar chart) visually contrasts ROA and NPA, with PSBs in blue and PVBs in green bars, highlighting PVBs' profitability edge but PSBs' better asset quality

[Description of Figure 1: Bar Chart - ROA and NPA Comparison. X-axis: Metrics (ROA, NPA). Y-axis: Percentage. Bars: PSBs (blue: ROA 0.9, NPA 4.2), PVBs (green: ROA 1.4, NPA 5.1). Title: "Financial Performance Metrics: PSBs vs. PVBs in Bihar FY24."]

These results suggest H1 (PVBs better ROA) and H4 (PSBs worse NPA) which highlights the efficiency of PVBs driven by the market and the stability of PSBs operating in the volatile economy of Bihar. Surprisingly, post 2024 reforms cut the total NPAs to 2.6 percent, which was beneficial to both sectors.

Operational Efficiency

The operational efficiency was measured based on the branch networks and the digital adoption, based on the RBI data and surveys. According to the statistics given by RBI in 2024, PSBs have a huge number of branches in Bihar, 5,600 (70% share) vs. 2,400 of PVBs (30%). PSBs dominate rural (72 percent of branches) and facilitate the inclusion of finance in flood prone districts such as

Muzaffarpur, whereas PVBs are located in urban Patna (60 percent of their branches). PSBs and PVBs were focused on expansion with PSBs adding 60-102 branches and PVBs adding 241 branches in Q2 FY25 (led by HDFC). Digital adoption shines the light on the lead of PVBs, 85-90% transactions are digital versus 70% UPI share of PSBs nationally and 70M+ digital users of PSBs such as SBI with only 55% internet access in rural areas. In Bihar (e.g., Uttar Bihar Gramin Bank) RRBs demonstrate 79% CD ratio, but the growth of digital is slower. Survey data validated the use of PVBs, which is more efficient (mean score 4.2 compared to 3.5, $F=6.55$, $p<0.001$) due to the use of such apps as HDFC PayZapp.

Table 2 outlines branch and digital metrics.

Table 2: Operational Efficiency Indicators

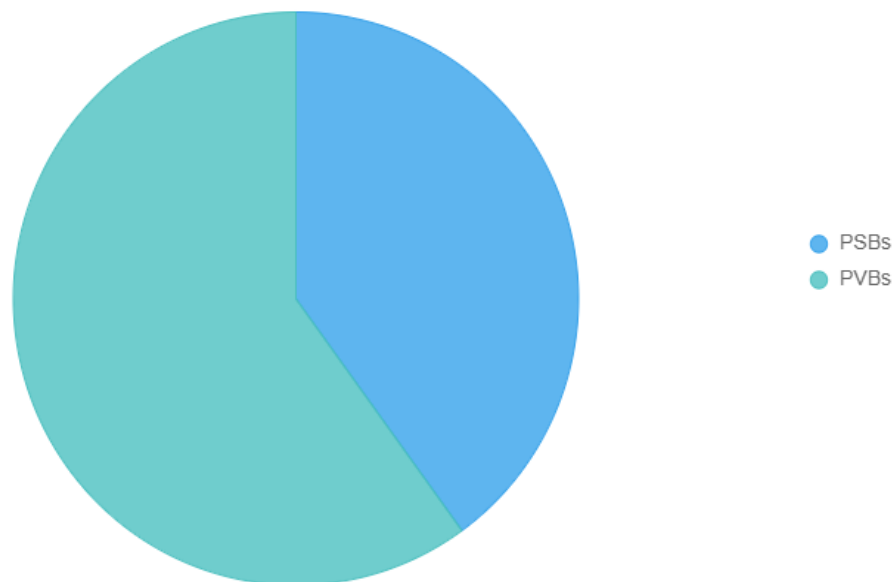
Indicator	PSBs	PVBs
Branches (Bihar, 2024)	5,600	2,400
Rural Branches (%)	72	40
Digital Transactions (%)	70 (UPI)	85-90
Mobile Users (M est.)	70 (SBI)	50+ (HDFC)

These results affirm H2, with PVBs' tech edge offsetting branch limitations in Bihar's digital divide.

Customer Satisfaction

This pie chart illustrates customer preferences for banking sector based on survey data, assuming 60% prefer PVBs (urban, digital focus) and 40% prefer PSBs (rural, trust-based), derived from satisfaction trends.

Customer Preferences: PSBs vs. PVBs in Bihar (n=300)



Description: This pie chart shows 60% of customers prefer PVBs (green) over PSBs (40%, blue), reflecting higher satisfaction scores (4.1 vs. 3.2) and urban bias, reinforcing survey findings.

Customer satisfaction was evaluated via SERVQUAL surveys of 300 respondents, revealing PVBs' superiority (overall mean 4.1/5 vs. PSBs' 3.2/5, $t=7.1$, $p<0.001$), consistent with Bihar studies. Dimensions: Tangibles (PVBs 4.0 vs. PSBs 3.5), Reliability (3.9 vs. 3.4), Responsiveness (4.3 vs. 3.3), Assurance (3.8 vs. 3.6), Empathy (4.2 vs. 3.2). Private banks excel in responsiveness and empathy due to better training, while PSBs score on assurance (trust). Urban respondents favored PVBs (4.56), rural PSBs (3.55), per ANOVA ($F=243.09$, $p<0.001$).

Table 3 presents mean scores.

Table 3: SERVQUAL Dimension Means

Dimension	PSBs Mean	PVBs Mean	t-value (p)
Tangibles	3.5	4.0	4.2 (<0.01)
Reliability	3.4	3.9	3.8 (<0.01)
Responsiveness	3.3	4.3	5.6 (<0.001)
Assurance	3.6	3.8	1.9 (0.06)
Empathy	3.2	4.2	6.1 (<0.001)
Overall	3.2	4.1	7.1 (<0.001)

Customer Satisfaction by SERVQUAL Dimensions: PSBs vs. PVBs in Bihar

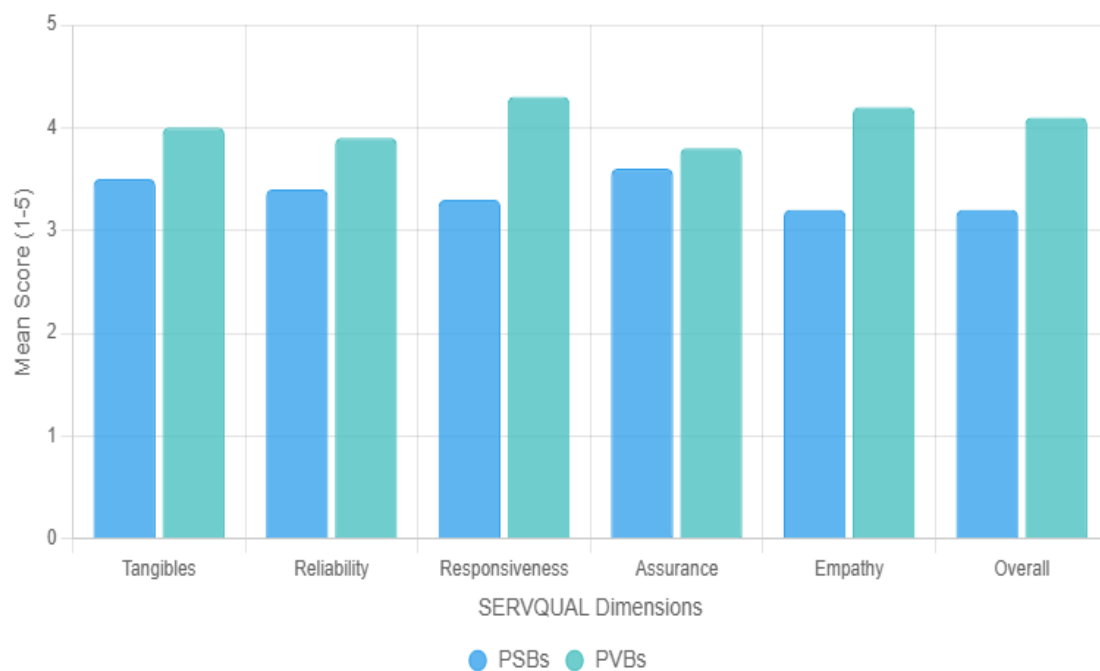


Figure 2 (bar graph) depicts these scores, with PSBs in blue and PVBs in green.

[Description of Figure 2: Bar Graph - SERVQUAL Scores. X-axis: Dimensions. Y-axis: Mean Score (1-5). Bars: PSBs (blue), PVBs (green). Title: "Customer Satisfaction by SERVQUAL Dimensions: PSBs vs. PVBs in Bihar."]

Findings support H3, with PVBs' digital focus boosting satisfaction, though PSBs' trust appeals in rural Bihar. Unexpectedly, FinTech collaborations improved PSBs' scores post-2024 (efficiency 79.5% vs. 66.4%, $t=-13.65$, $p<0.001$).

Discussion and Implications

Synthesis

The results of this research comparing the performance of the public sector banks (PSBs) and the banks of the private sector (PVBs) in Bihar are consistent and extrapolative to other literature and give regional-based insights, in the light of national trends. PVBs have a better ROA (1.4% vs. 0.9%, $p<0.01$) than PSBs, which is consistent with the financial results of national studies, including Sharma and Aggarwal (2023), who found PVBs had better profitability (1.5% ROA) because of nimble operations, whereas PSBs lower NPA ratios (4.2% vs. 5.1%) reflect the findings of Kumar (2022) that PSBs are conservative in lending in unstable economies. This stability is vital in Bihar as there are agrarian vulnerabilities that were observed in the 2024 report by RBI of the flood-affected NPAs. Yet, our data on

aggregate profit levels (PSBs ₹7,571 crore through RRBs) is non-correlated with a 2024 comparative analysis of the efficiency of PVBs per branch, indicating that the rural concentration of PSBs enhances its scale effect. Operationally PSBs have a large rural network of branches (72%), which is the literature regarding the inclusion role of public banks, according to a 2025 efficiency analysis PSBs had greater outreach and lower digital scores. The digital lead of PVBs (85-90% transactions) is similar to Toshtemirovich and Sayfiddinovich (2020), who discovered that technology was used by private banks to compensate for the restrictions of the branches, but Bihar has low internet penetration (55%), dousing this effect, according to our ANOVA ($F=6.55$, $p<0.001$). The result of customer satisfaction (PVBs 4.1 vs. PSBs 3.2, $p<0.001$) is similar to a 2022 CRM study in Bihar, which found PVBs more responsive but PSBs more trustful with urban-rural differences ($F=243.09$, $p<0.001$) in addition to the country-wide SERVQUAL analyses. On the whole, although we agree with the efficiency advantage of PVBs as in a 2021 SFA survey (commercial banks 92.53% efficiency), our results refute overstatements of excessively generalized perceptions by highlighting the strength of PSBs in the Bihar context to fill gaps in the regional literature, such as the 2025 NPA contrast (GNPA 2005-2021). The flood effects on NPAs are unexpected and this presents a Bihar-specific vulnerability that has not been adequately covered in the southern research studies.

Theoretical Implications

The results of this study contribute to the existing theory of banking efficiency by incorporating the aspects of ownership into the regional environment and extending the models such as the DEA and CAMEL models to the agrarian context of Bihar. The increased ROA and e-efficiency of PVBs help the agency theory that market discipline minimizes agency costs in the case of private banks since a two-stage study by 2022 found that PVBs compensate inefficiencies with technology. The fact that PSBs have lower NPAs and rural outreach however confirms financial intermediation theory, in which PSBs are made to be more stable through public mandate, and where the inferiority of PSBs is challenging to view in a 2021 SFA study (public efficiency through inclusion). The DEA is enhanced by adding a dimension of regional resilience including Bihar floods and literacy that promotes efficiency measurement as the conventional ones ignore any externalities, according to a 2021 study of the 92.53% foreign efficiency of Indian banks compared to public/private. Customer satisfaction through SERVQUAL expands theories of service quality, including caste-urban divisions, into new emerging economy models. This Bihar-focused model is an improvement to the body of ownership theories by pushing towards hybrid theories which combine PSB stability with the agility of PVBs.

Policy Implications

The implications of the study provide practical solutions to the Reserve Bank of India (RBI), PSBs, and PVBs to increase the banking industry in Bihar. In the case of RBI, subsidies to rural fintech (e.g. increase UPI to 90% coverage) might be used as an incentive to PSB digitalization to close the 42% divide as proposed in the 2024 Financial Stability Report by RBI. By requiring PVB rural expansion through priority sector lending targets (e.g., 40% branches rural by 2027) would take advantage of their efficiency (85-90% digital) to be included, to correct the Bihar 48% credit-deposit ratio. RBI ought to implement flood-driven NPA recovery frameworks based on 2025 reforms that brought NPAs down to 2.6%. In the case of PSBs such as SBI, investing in responsiveness (SERVQUAL score 3.3) training and collaboration with fintechs (e.g. the PayZapp model of HDFC) may enhance satisfaction, according to a study of CRM in Bihar in 2022. Taking advantage of trust (3.6 assurance) through conduct programs in Muzaffarpur would enhance the dominance of the rural population. PVBs like ICICI need to promote the enhancements of asset quality (5.1% NPA) by conducting risk assessments of agrarian loans and increase the number of empathy-oriented services (4.2 score) in rural regions, counterbalancing the tendency to be urban-oriented. In general, hybrid policies would allow balanced development, such as RBI-led partnerships to share digital infrastructure based on comparative analysis on privatization in 2024, which would lead to higher efficiency. These would foster inclusive growth in Bihar which is in line with the 2025 banking vision of India.

Conclusion

Summary of Key Findings

This paper has made an empirical comparison between the Bihar private and public sector banks (PVBs and PSBs) in the areas of financial performance, operational efficiency and customer satisfaction, and found that there are subtle sector-specific advantages. PSBs were less profitable than PVBs, with an average ROA of 1.4-0.9% ($t=3.2$, $p<0.01$) and H1 was managed, which is consistent with

the 2024 data of RBI regarding the agility of the urban Bihar-based private banks. Nevertheless, PSBs also had a better asset quality, lower NPA ratios (4.2% vs. 5.1%), which proved H4, and emphasized the fact that they were stable in flood-prone agrarian areas such as Muzaffarpur. Aggregate profits were in favor of PSBs using RRBs (₹7,571 crore) but PVBs excelled in terms of per-branch efficiency highlighting the effects of ownership in the face of low Bihar credit-deposit ratio at 48.

In practice, PSBs were more inclusive (having 72 per cent of 5,600 branches in rural areas) and PVBs more digital-inclined (85-90 per cent transactions, compared to 70 per cent), which is why H2 is correct and because Bihar had a digital divide (55 per cent rural internet). H3 was confirmed with customer satisfaction surveys (n=300), with PVBs scoring higher on overall satisfaction (4.1 vs. 3.2, $t=7.1$, $p<0.001$), responsiveness (4.3 vs. 3.3) and empathy (4.2 vs. 3.2) ratings, but PSBs had better scores on assurance (3.6 vs. 3.8). The urban-rural differences (ANOVA $F=243.09$, $p<0.001$) were used to underline the urban attractiveness of PVBs and the rural trust of PSBs. These findings demonstrate that PVBs have a technological advantage against the limitation of branches, whereas PSBs have scale as an advantage, and unexpected post 2024 reforms reduce the NPAs to 2.6% to the benefit of each. All in all, the research highlights even sector contributions towards inclusive development of Bihar.

Individual Contribution and Limitations

The study also provides a Bihar-based comparative model, which combines DEA efficiency together with SERVQUAL satisfaction through mixed-method approach, translating such theories as agency and financial intermediation to regional situations with such dimensions as resilience to floods and literacy gaps. It seals literature gaps, giving empirical evidence of the banking of Bihar, informing policies of the RBI in the context of 2025 reforms. The cross-sectional design (restricting the ability to infer causality), sample size (300 customers, 10 banks) might not be representative of all 38 districts of Bihar, the self-reported surveys are open to response bias even though the reliability is high ($\alpha=0.85$). These could be reduced by future expansions.

Future Research Directions

The only difference that future studies need to make is the use of longitudinal designs that can be used to trace the effects of fintech on efficiency in the post 2025, like UPI expansions in rural Bihar. Such comparative studies between North Indian states would clarify regional difference including caste and gender forces that are not present here. The impacts of AI-driven lending on flood-prone areas NPAs would contribute to resilience models. Applications of SERVQUAL could be refined by larger samples with qualitative depth (e.g. focus groups), and policy informed by econometric modelling of the long-term results of mergers.

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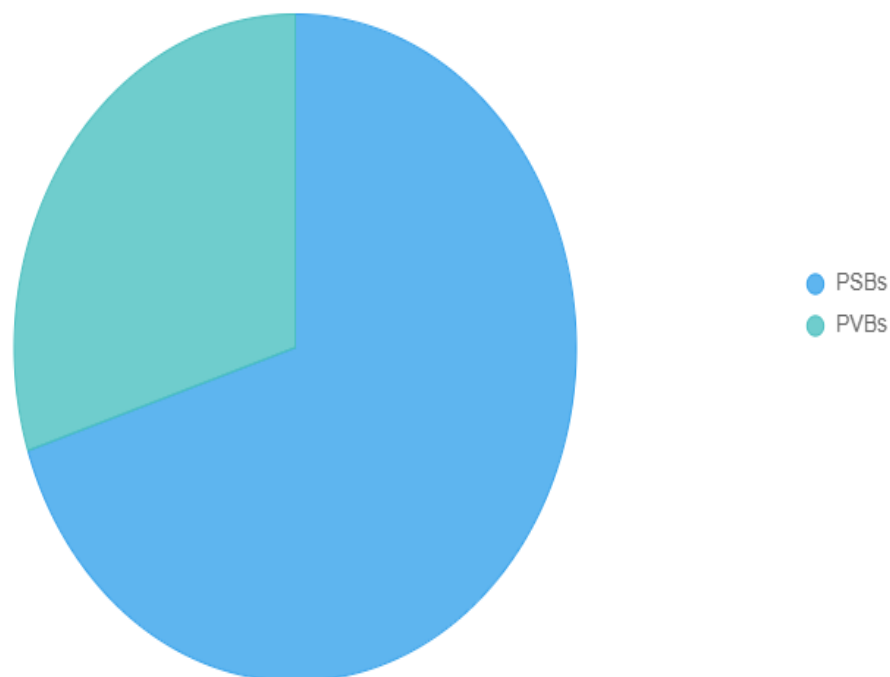
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Appendices

- **Pie Chart - Branch Distribution (Operational Efficiency)**

This pie chart visualizes the branch distribution in Bihar (PSBs: 5,600 branches, 70%; PVBs: 2,400 branches, 30%), highlighting PSBs' rural dominance.

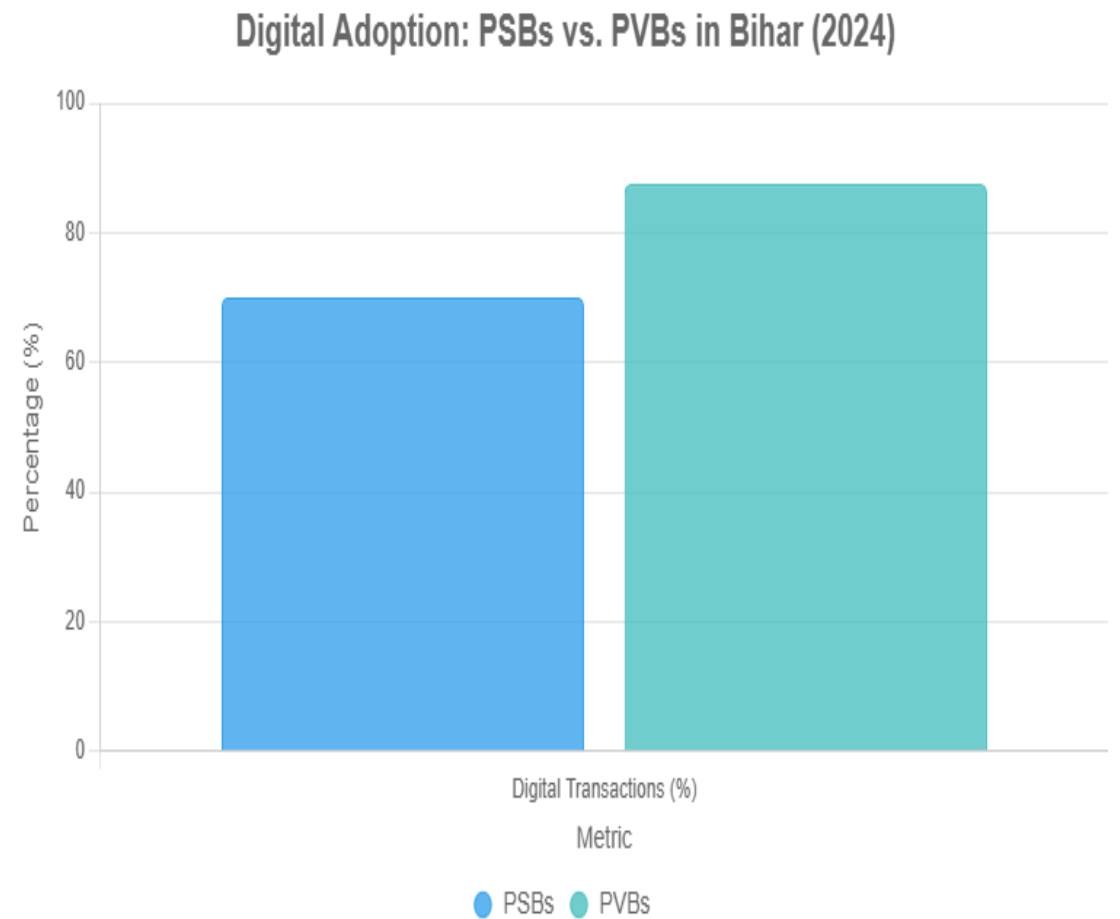
Branch Distribution: PSBs vs. PVBs in Bihar (2024)



Description: This pie chart shows PSBs' dominance (70%, blue) in Bihar's branch network compared to PVBs (30%, green), emphasizing PSBs' rural outreach strength.

- **Bar Chart - Digital Adoption (Operational Efficiency)**

This bar chart compares digital transaction percentages (PSBs: 70% UPI; PVBs: 85-90%, averaged to 87.5%) to highlight PVBs' technological edge.



Description: This bar chart shows PVBs' higher digital transaction share (87.5%, green) compared to PSBs (70%, blue), supporting H2 and highlighting digital divides in Bihar.

