



“Comparative Analysis Of Banking Productivity Of Selected Indian Public And Private Sector Banks: Pre And During Covid-19”

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Abstract: The banking system is the backbone of the Indian economy. Growth and development of any country's economy largely depends on banking sector. Therefore it is very important to evaluate productivity of bank using various productivity parameters to determine health of economy. The main objective of this paper is to compare and assess the impact of Covid-19 on the Productivity of public and private sector banks in India. Sample of the study include Public and Private sector banks such as SBI, BOB, HDFC and ICICI is based on the random sampling method. Period of study include 3 years before Covid-19 duration from 2016-2019 and 3 years during Covid-19 from 2019-2022.

The present study analyzed Bank Productivity in multidimensional view mainly capital utilization, employee competence and branch performance to get deeper insight. The study evaluate Bank productivity pre and during Covid-19 using key parameters include capital to reserve and surplus ratio, capital to assets ratio, net profit to employee cost ratio, business per employee ratio, net profit per branch ratio and business per branch ratio. The analysis was carried out using two ways ANNOVA with replication at 5% significant level. It was found that there is significant difference in Employee competency parameters and Branch Performance parameters pre and during Covid-19, between public and private sector banks. It provides evidence that Covid-19 pandemic had harmed Indian Banking sector. The study will be guiding policy makers and bank authorities for evaluation of Bank performance, continuous up gradation and propose models for contingency management.

Key Words: Bank, Branch performance, Capital Utilization, Employee Competence, Multidimensional productivity, Productivity, Pre & during Covid-19.

1. Introduction

Indian banks have played a vital role in developing the financial system and facilitating economic progress. A strong banking industry is crucial for a country's social and economic prosperity. Bank efficiency and financial success have a significant influence on economic stability. The bank connects the local and international economies and can impact them positively or negatively depending on government reform strategies. A financial system that generates and allocates resources efficiently contributes significantly to economic progress. Banks are fund custodians and distributors, and they are key factors in increasing banking productivity.

The corona virus was first discovered in Wuhan, China, and then spread rapidly throughout the rest of the world. The Covid-19 epidemic has had a significant impact on many parts of the economy, including the banking sector. It has produced an unexpected scenario in the economy. The development of the Covid-19 outbreak put great strain on the global banking system. COVID-19 has had terrible implications in India. (Gereffi, 2020, Mishra 2020, Reserve Bank of India. 2020 , Zhang et al., 2020, Zhang et al., 2021) The corona virus pandemic now affects more than 455 million individuals globally. (WHO Corona virus Dashboard) Lockdowns, border closures, travel restrictions, and other new hurdles to different economic activity caused an economic shock over the world. (Koutoupis et al., 2021). There was widespread unemployment during pandemic time due to decline in the sources on income generation. Due to crisis of money and income sources, customer's withdrawal from bank increases. There is a imbalance in credit and deposit balance in Bank.

Lockdown and threat of pandemic situation stimulate public to adopt digital banking services and switched to online or remote Banking. (Sharma & Mathur, 2021) Due to that banks faced operational challenges and other challenges related to IT infrastructure. (Reserve Bank of India, 2020, Covid-19, RBI Bulletin, 2020) Customer's behaviour changed due to pandemic in a way that they decrease branch visit and more depend on online mode. (Jagtiani & Lemieux, 2021) Risk of loan defaults and difficulty in credit management faced due to Covid-19. (Banerjee & Gopalan, 2020) Because of lockdowns, mobility restrictions, and economic slowdown, banks faced trouble in loan payment and recovery (Mehta & Chugan 2021). By continuous supply of funds needed, Banks and Financial system are probably absorb the loss occurred in economy due to Covid-19 (Acharya & Steffen, 2020, Borio, 2020)

2. Conceptual Background of Study

Productivity is the ratio of input and output. Productivity can be defined as converting inputs in to outputs by efficiency improvement and technical changes. The higher values of the ratio are termed as the better performance of a firm. Productivity is comparison of quantity of goods or services produced and the quality of input engaged in production of goods and services. The main objective behind this comparison is to judge the capability of organization. So Productivity means capability to Produce. Bank productivity means capability of bank to use its input to generate output like loans, deposits and different types of financial services which boost Profitability of bank. Productivity is described as effective utilization of inputs to generate targeted output. Some scholars define it as a ratio of output produced with the input used. (Heizer & Render, 1996) Productivity of Banks can be measured in Multi Dimensions viewpoints which include

Capital Utilization, Employee Competence and Branch Performance. Capital Productivity refers to how efficiently Bank uses its capital to generate income and maximize returns for Shareholders. (Mishra & Dash, 2020). Employee Competency refers to efficiently and skill of Bank employees to attain goals. (Zhu, 2018). Branch Performance refers to evaluation of competency of particular Branch in terms of customer services, revenue generation etc. (Hasan & Marton, 2020).

The objective of present study is to analyze and compare Productivity of Indian Public and Private sector banks pre and during Covid-19. Multi-Dimensional Productivity is measured in three dimensions that is Capital Utilization, Employee competence and Branch Performance. Capital Utilization is measured by Capital to Reserve and Surplus ratio and Capital to Assets ratio. Employee competence is measured by Net Profit to Employee Cost ratio and Business per Employee ratio. Branch Performance is measured by Net Profit per Branch Ratio and Business per Branch ratio.

3. Literature Review

Existing literature on “Comparative analysis of banking productivity of selected Indian public and private sector banks: pre and during covid-19” is evaluated, with some key points extracted and highlighted here.

Mateev, M., & et al. (2024) studied “Bank performance before and during the COVID-19 crisis: Does efficiency play a role?” and evaluated impact of efficiency and bank market structure on performance of 225 banks in 18 Middle East and North African countries. Researcher found that efficiency and competition has great impact on profitability of banks and efficient banks can perfectly fight with contingent situations like economic shock occurred due to Covid-19 pandemic. At last researcher concluded that high efficiency of banks generates high financial stability but banks have to be ready to take more risk.

Bhushan, M. S., & et al. (2022) studied “Employee and Branch Productivity of State Co-Operative Banks in India: Region-Wise Analysis” and assessed that in present decade, due to financial inclusion banking services are reached to low income people of the society. In the present era of cut-through competition, it is inevitable for banks to enhance productivity and profitability to survive in the market. Researcher has assessed employee and branch productivity of all state co-operative banks of six regions. The productivity of eastern region is found highest.

Unlu, U., & ET AL. (2022) studied on “Analysis of Efficiency and Productivity of Commercial Banks in Turkey Pre- and during COVID-19 with an Integrated MCDM Approach”, evaluated efficiency and Productivity of 12 commercial banks in Turkey, pre covid-19 in the year 2019 and during covid-19 in the year 2020 using multi criteria decision making approach. Researcher had taken sample of state owned banks, foreign banks and private banks. Researcher found that foreign bank achieved high productivity as compare to other groups of banks under study.

Jian, Xu & et al. (2022) studied on “The Impact of Intellectual Capital on Bank Profitability during COVID-19: A Comparison with China and Pakistan” and analysed connection of intellectual capital and bank productivity during Covid-19. Researcher has taken sample of 34 Chinese banks and 39 Pakistani banks. Return on assets and return on equity parameters are used to measure profitability. Intellectual capital means

human capital. Researcher found that intellectual capital is the only resource that enhances profitability of Chinese and Pakistani banks during Covid-19.

Xiazi, X., & Shabir, M., (2022) studied on “Corona virus pandemic impact on bank performance” and explained around the world impact of Covid-19 pandemic on 1575 banks of 85 countries for duration of first quarter of 2020 to fourth quarter of 2021. The researcher concluded that small and less diversified banks suffered a lot during Covid-19 pandemic. Researcher advised that perfect institutional structure, financial stability and effective design and implementation of government policies improve capabilities and flexibility of banks to fight with negative situations.

Ratri, A., M., & et al. (2022) studied on “Comparison of Indonesian Banking Performance Pre and Post Pandemic Covid-19” investigated performance of 42 Indonesian banks using camel model before and during Covid-19. Capital adequacy ratio, non-performing loans ratio, net profit ratio, return on assets and loans to deposits ratio are parameters used by researcher to evaluate performance of Indonesian banks for period of 2019 and 2020. Researcher concluded that during pandemic, there is no significant difference in all parameters before and during Covid-19.

Barua, B., & Barua, S. (2021) studied “Covid-19 implications for banks: evidence from an emerging economy” examined impact of Covid-19 pandemic on banking sector of Bangladesh. Banking sector of Bangladesh has high level of nonperforming loans and occurrence of Covid-19 pandemic has created more difficult situation. Researcher has assessed impact of pandemic using three parameters that is firm value, capital adequacy and interest income. Researcher found fall in all three parameters at individual bank level and sector level. But larger banks can strongly fight with contingent situations like Covid-19.

Mishra, P., (2021) studied on “A Study on the Impact of Covid-19 on Banking Sector”, threw light on impact of Covid-19 pandemic on banking sector and suggested certain measures to improve efficiency of banking sector during pandemic time. Banks confronted with many difficulties like problem in recovery of loans, disturbances in bank branches and employees, difficulty in documentation and customer relations etc. due to pandemic. Proper credit management; improve customer relations and use of innovation and technology in banking operations are various measures suggested by researcher to improve position of bank during pandemic time.

Kunt, A., D., & et al. (2021) studied on “Banking sector performance during the Covid-19 crisis” and analysed impact of various financial policies announcement on banks stock prices globally during the occurrence of Covid-19. At last it is concluded that impact of policies announced worldwide not similar on stock prices due to differential situations and external risk factors affecting different countries.

Verma, R., (2019) studied “Productivity Analysis of Private Sector Banks in India”, found that remarkable changes in Indian Banking sector is the reason of birth of Private sector banks. Survival of private sector banks is very tough because of stiff competition and various legal compliances. Private sector banks have to make constant efforts to enhance productivity and overall profitability. The researcher has measured employee and branch productivity of selected Private sector banks from year 2000 to 2013 using different productivity parameters.

4. Research Methodology

“Research Methodology is a way to systematically solve the research problem. It may be understood as a science of studying how research is done scientifically.”(Kothari, C., R., 2004, pp 8)

4.1 Problem of the Research study

Indian Banking Sector is facing various problems which include increased level of Non-Performing Assets, Problems of maintaining liquidity, Burden of regulatory compliances, tough competition among Banks and Occurrence of Covid-19 pandemic incurs more challenges and unforeseen situations for Indian Banking Sector. Banks must have to pay more attention in areas of productivity, profitability, maintain liquidity and cost reduction to fight with unforeseen situation. Therefore, the main aim of present research is to measure and compare Productivity of selected Indian Public and Private Sector Banks Pre and During Covid-19.

4.2 Objectives of the study

The Study is based on following Objectives.

1. To measure multi dimension productivity of selected Indian public and private sector banks pre and during covid-19 duration.
2. To compare multi dimension productivity of selected Indian public and private sector banks pre and during covid-19 duration.

4.3 Research Gap

Present study focus on comparative analysis of Productivity of selected Indian Public and Private sector banks pre and during Covid-19 and will fill the gap in existing literature.

- Many research studies conducted on Productivity of bank: pre and post covid-19 but very few researches conducted on pre and during covid-19.
- Existing researchers analysed Bank productivity using ratio analysis but in present study researcher has applied statistical tools for reliable results.
- Majority of existing literatures are only based on conceptual analysis of impact of Covid-19 on banking but in present study researcher has given conceptual, analytical and comparative overview of productivity of banks pre and during covid-19.
- Majority of existing literatures are based on Employee and Branch Productivity. But in present research, researcher has analysed multidimensional area of productivity which include employee, branches and capital productivity for in depth clarity.
- Previous studies on the same topic covered very short time duration. But in present study researcher has covered 3 years before occurrence of Covid-19 and 3 years during covid-19 to ensure genuine findings of study.

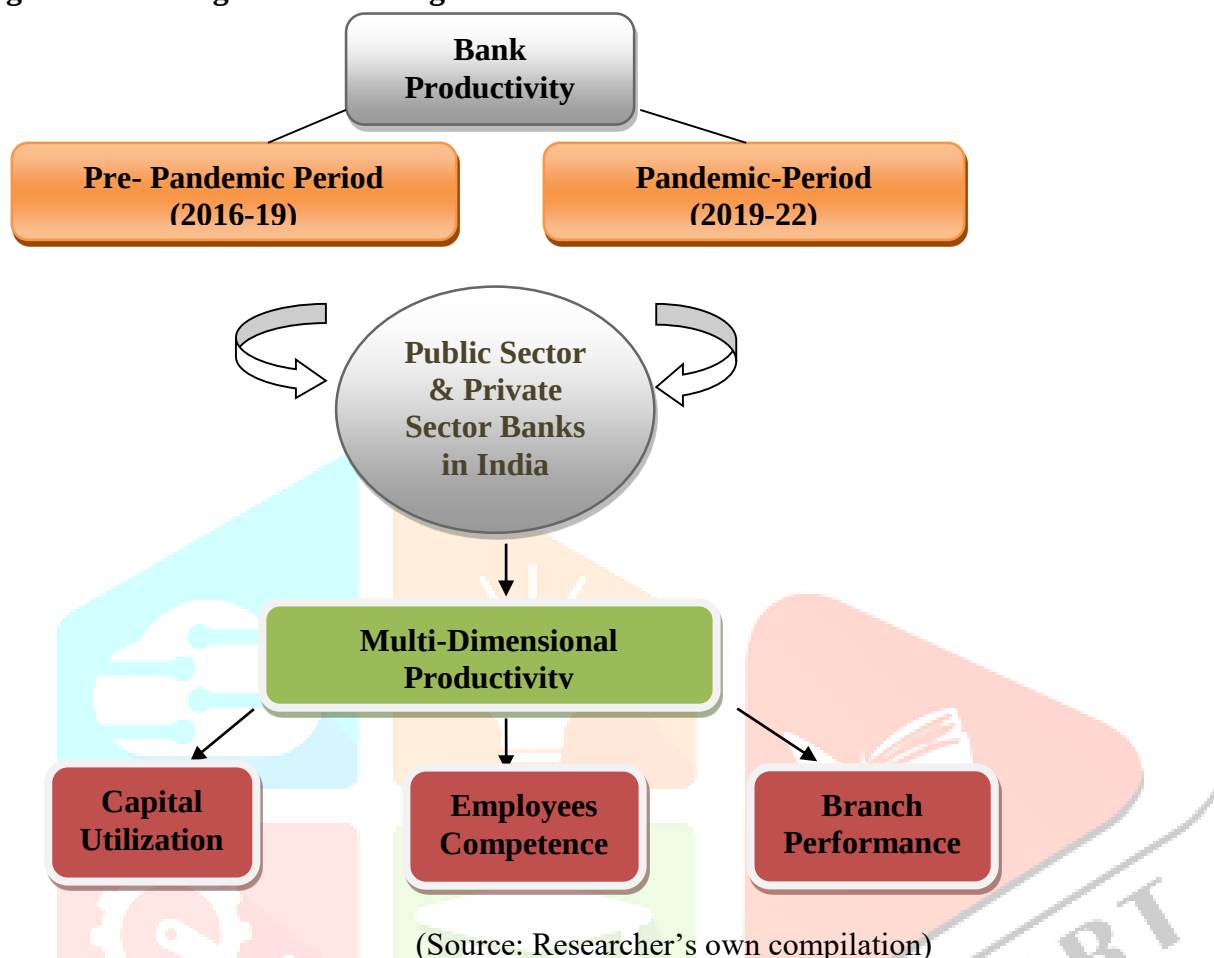
4.4 Period of the Study

The Present research covers 6 years duration, including 3 years pre Covid-19 from 2016-2019 and 3 years during Covid-19 from 2019-2022. Time duration before occurrence of covid-19 provides a base to Compare Productivity of selected Banks during Covid-19 Duration.

4.5 Research Design

The present Study is based on Descriptive Research Design. The Present Study is quantitative research that Compare Productivity of selected Indian Public and Private Sector Banks pre and during Covid-19.

Figure: 1 Showing Research Design



4.6 Sampling Design and Sample Size

In Present study, sample is taken on the bases of simple random sampling technique. Present Study is based on comparative analysis of Productivity of selected Indian Public and Private Sector Banks pre and during Covid-19. Out of 12 Public sector banks researcher has selected 2 leading public sector banks i.e. SBI and BOB and out of 21 Private sector banks researcher has selected 2 known private banks i.e. HDFC and ICICI. Sample banks are the leading banks as per the parameters like Market Cap (on 20st Sep, 2023 4.00 PM), Net Sales, Total Assets and Net Profit.

4.7 Data Collection Method

The present Study is based on reliable and authentic secondary sources of data. The data collected from Published Annual Reports of Public & Private Sector Banks, IBA Bulletin, Magazines, Books, Journals and Websites etc.

4.8 Tools and Techniques for Data Analysis

Researcher has used Statistical Tools and Software for analysis and interpretation of data. Ratio Analysis is used to analyze data collected from various sources and Statistical Tool i.e. ANNOVA two factors with

replication is used at 5% significance level for interpretation of data. MS Excel is used for ANNOVA two-way analysis.

4.9 Hypothesis of the Study

- (1) **H₀**: There is no significant difference between and within Pre and During Covid-19 Pandemic duration among Multi Dimension Productivity of selected Public and Private Sector Banks in India.
- (2) **H₀**: There is no significant difference between and within selected Public and Private Sector Banks in India among Multi Dimension Productivity Pre and During Covid-19 Pandemic.
- (3) **H₀**: There is no significant difference between Public and Private Sector Banks in India and Pre and During Covid-19 Pandemic among Multi Dimension Productivity.

4.10 Description of Variables

In Present research study Covid-19 pandemic and time duration are considered as Independent variables. Multidimensional productivity parameters are dependent variables for present research.

5. Data Analysis & Interpretation

Researcher has analysed productivity of selected Indian public and private sector banks pre and during covid-19 in multidimensional way. Multi dimension productivity analysis includes multi aspects such as capital utilization, employee competence and branch performance.

Table-1: Showing Productivity Parameters

Multidimensional Productivity	Mathematical Formula
1. Capital Utilization	
(a) Capital to Reserve & Surplus	Capital / Reserve & Surplus
(b) Capital to Assets	Capital / Assets
2. Employee Competence	
(a) Net Profit to Employee Cost	Net Profit / Employee Cost
(b) Business Per Employee	Business (Deposits + Advances) / No of Employees
3. Branch Performance	
(a) Net Profit Per Branch	Net Profit/Number of Branches
(b) Business Per Branch	Business (Deposits + Advances) / No of Employees

(Source: Compiled by researcher)

Data Analysis & Interpretation

Multi Dimension Productivity Analysis

- a) Capital Utilization
- b) Employee Competency
- c) Branch Performance

(a) Capital Utilization

Table -2: Capital to Reserve and Surplus Ratio (in %) of Selected Public & Private Sector Banks

Pre& During Covid-19	Year	Public Sector Banks		Private Sector Banks	
		SBI	BOB	HDFC	ICICI
Pre Covid-19	2016-17	0.84	1.01	1.01	0.98
	2017-18	0.89	1.01	1.00	0.98
	2018-19	0.89	1.12	1.00	0.98
During Covid-19	2019-20	0.90	1.01	1.00	0.98
	2020-21	0.91	1.01	1.00	0.99
	2021-22	0.92	1.01	1.00	0.99

(Sources: Annual Report of sample banks for the year 2016-2022 and compiled by Researcher)

Capital to Reserve and Surplus Ratio depicts proportion of banks capital to reserve and surplus. Banks capital include equity share and retained earnings and reserve and surplus include banks general reserve and other reserves to meet unforeseen situations.

A high Capital to Reserve and Surplus Ratio is favorable for banks because it indicates that a bank has very strong base of capital and good stability to survive in any unforeseen situation. On other hand, a low Capital to Reserve and Surplus Ratio indicates that a bank may have risk of insolvency.

As shown in Table-2, it is observed that both Public and Private Sector Banks maintained Capital to reserve and surplus ratio stable pre and during covid-19 duration, except it is increasing in SBI only. Banks maintained stability in capital to reserve and surplus ratio due to RBI regulations to maintain Capital adequacy ratio, government support and banks precautionary steps to preserve adequate fund for crisis.

Table -3: Capitals to Assets Ratio (in %) of Selected Public & Private Sector Banks

Pre& During Covid-19	Year	Public Sector Banks		Private Sector Banks	
		SBI	BOB	HDFC	ICICI
Pre Covid-19	2016-17	6	6	10	13
	2017-18	6	6	10	12
	2018-19	5	7	12	11
During Covid-19	2019-20	5	6	11	10
	2020-21	5	7	12	12
	2021-22	5	7	12	12

(Sources: Annual Report of sample banks for the year 2016-2022 and compiled by Researcher)

Capitals to Assets Ratio depict Banks stability and financial soundness by comparing its total capital to total assets for the same period. A high Capitals to Assets Ratio is favorable for bank because it indicates that a major portion of banks assets is financed through banks own fund. Therefore it reduces risk of insolvency. On other hand, low Capitals to Assets Ratio create adverse impact on bank because it indicates that major portion of banks assets is financed through borrowed fund. It may incur risk of insolvency and reduce profitability of banks, because borrowed fund incur burden of interest payment.

As shown in Table-3, it is observed that in both Public and Private Sector Banks, Capitals to Assets Ratio has increased during Covid-19 as compare to Pre Covid-19 except slight declined in SBI. This indicates that banks, finance its assets using own fund and less depend on borrowed fund to maintain stability, Profitability and financial soundness during pandemic time. SBI can increase its capital to assets ratio by improving asset quality management.

(b) Employee Competency

Table -4: Net Profits to Employee Cost Ratio (in %) of Selected Public & Private Sector Banks

Pre& During Covid-19	Year	Public Sector Banks		Private Sector Banks	
		SBI	BOB	HDFC	ICICI
Pre Covid-19	2016-17	0.40	0.30	2.24	1.71
	2017-18	-0.20	-0.53	2.57	1.15
	2018-19	0.02	0.09	2.72	0.49
During Covid-19	2019-20	0.32	0.06	2.76	0.96
	2020-21	0.40	0.07	3.00	2.00
	2021-22	0.63	0.61	3.07	2.41

(Sources: Annual Report of sample banks for the year 2016-2022 and compiled by Researcher)

Net Profits to Employee Cost Ratio depicts efficiency of bank to generate more profit as compare to its expenditure on employees for the same period. A high Net Profits to Employee Cost Ratio indicates high efficiency of bank in utilizing workforce to generate profit. This also indicates high employee productivity. On other hand, a low Net Profits to Employee Cost Ratio indicates that a bank is not efficiently utilizing its workforce to generate profit. This also indicates requirement to improve employee productivity in Bank.

As shown in Table-4, it is observed that in both Public and Private Sector Banks, Net Profits to Employee Cost Ratio has increased during Covid-19 as compare to Pre Covid-19. It indicates good productivity of employees during pandemic duration because of digitalization and automation. Digitization allows employees to complete more work in less time without any disturbances. The Net Profits to Employee Cost Ratio is slightly declined in BOB. Overall private sector bank's employee productivity is higher as compare to public sector banks due to operational and regulatory differences.

Table -5 Business per Employee Ratio (in %) of Selected Public & Private Sector Banks

Pre & During Covid-19	Year	Public Sector Banks		Private Sector Banks	
		SBI	BOB	HDFC	ICICI
Pre Covid-19	2016-17	18.79	17.25	14.21	11.52
	2017-18	18.52	17.58	16.40	12.98
	2018-19	19.86	19.81	17.77	14.29
During Covid-19	2019-20	19.41	22.32	18.31	14.26
	2020-21	20.41	24.96	20.55	16.87
	2021-22	23.03	17.25	20.68	18.17

(Sources: Annual Report of sample banks for the year 2016-2022 and compiled by Researcher)

Business per Employee Ratio depicts productivity of bank employees by comparing bank's total advances plus deposits to its total number of employees for the same period. A high Business per Employee Ratio indicates high employee productivity, which means that a bank is efficiently utilizing its workforce to generate profit. On other hand, a low Business per Employee Ratio indicates low productivity, which means that a bank is not efficiently utilizing its workforce to generate profit.

As shown in Table-5, it is observed that in both Public and Private Sector Banks, Business per Employee Ratio has increased during Covid-19 as compare to Pre Covid-19 that indicates that bank is able to utilise its workforce efficiently to generate profit and doing efforts to give maximum satisfaction to its investors and customers during crisis.

(C) Branch Performance

Table -6 Net Profit per Branch Ratio (in %) of Selected Public & Private Sector Banks

Pre& During Covid-19	Year	Public Sector Banks		Private Sector Banks	
		SBI	BOB	HDFC	ICICI
Pre Covid-19	2016-17	0.61	0.25	3.09	2.02
	2017-18	-0.29	-0.44	3.65	1.39
	2018-19	0.04	0.08	4.13	0.69
During Covid-19	2019-20	0.65	0.06	4.85	1.49
	2020-21	0.92	0.10	5.55	3.07
	2021-22	1.42	0.89	5.83	4.31

(Sources: Annual Report of sample banks for the year 2016-2022 and compiled by Researcher)

Net Profit per Branch Ratio depicts productivity of bank branches to generate more profit as compare to its expenditure on branches for the same period. A high Net Profit per Branch Ratio indicates high productivity of bank branches in utilizing resources available and technology to generate profit. On other hand, a low Net Profit per Branch Ratio indicates that a bank branches are not efficiently utilizing its available resources to generate profit. This also indicates requirement to improve Branch productivity in Bank.

As shown in Table-6, it is observed that in both Public and Private Sector Banks, Net Profit per Branch Ratio has increased during Covid-19 as compare to Pre Covid-19. It indicates that Banks are able to maintain productivity of branches during pandemic duration because of reduction in operational expenses due to digitalization and automation. Overall private sector bank's branch productivity is higher as compare to public sector banks due to operational and regulatory differences.

Table -7 Business per Branch Ratio (in %) of Selected Public & Private Sector Banks

Pre& During Covid-19	Year	Public Sector Banks		Private Sector Banks	
		SBI	BOB	HDFC	ICICI
Pre Covid-19	2016-17	57.36	659.70	254.13	196.76
	2017-18	45.45	848.95	302.30	220.54
	2018-19	50.32	910.55	341.47	254.32
During Covid-19	2019-20	73.89	584.27	395.35	266.01
	2020-21	75.31	737.76	440.07	316.42
	2021-22	81.88	830.74	461.69	355.04

(Sources: Annual Report of sample banks for the year 2016-2022 and compiled by Researcher)

Business per Branch Ratio depicts productivity of branches to generate revenue for bank by comparing bank's total Business (Deposits + Advances) to its total number of branches for the same period. A high Business per Branch Ratio indicates high productivity of each branch which means that each branch is efficient to generate maximum revenue for bank. On other hand, a low Business per Branch Ratio indicates low productivity of each branches of bank.

As shown in Table-7, it is observed that in both Public and Private Sector Banks except BOB, Business per Branch Ratio has increased during Covid-19 as compare to Pre Covid-19 that indicates productivity of each branches of bank. Business per branch ratio increased during crisis time due to reduction in operating expenses due to remote working and digitalization, cost management and government support measures.

6. Findings

Table- 8 Findings (Multi-Dimensional Productivity Parameters) of ANNOVA two factor with Replication @ 5% Significance Level

No	Multi-Dimensional Productivity Parameters	F Value	F crit	Result	Null Hypothesis H ₀ Accepted/Rejected
(a)	Capital Utilization				
	Capital to Reserve and Surplus				
	• Pre & During Covid-19(Due to Raw)	0.01	4.49	F 0.01 < F crit 4.49	H ₀₁ is Accepted*
	• Public & Private Sector Banks(Due to Columns)	33.58	3.24	F 33.57 > F crit 3.24	H ₀₂ is rejected**
	• Covid-19 & Sample Banks (Interaction)	2.18	3.24	F 2.18 < F Crit 3.24	H ₀₃ is Accepted.*
	Capital to Assets				
	• Pre & During Covid-19(Due to Raw)	0	4.49	F 0 < F crit 4.49	H ₀₁ is Accepted*
(b)	Employee Competency				
	Net Profit to Employee Cost				
	• Pre & During Covid-19(Due to Raw)	6.66	4.49	F 6.66 > F crit 4.49	H ₀₁ is Rejected**
	• Public & Private Sector Banks(Due to Columns)	50.29	3.24	F 50.29 > F crit 3.24	H ₀₂ is Rejected**
	• Covid-19 & Sample Banks (Interaction)	0.22	3.24	F 0.23 < F Crit 3.24	H ₀₃ is Accepted. *
	Business Per Employee				
	• Pre & During Covid-19(Due to Raw)	31.33	4.49	F 31.33 > F crit 4.49	H ₀₁ is Rejected**
(b)	• Public & Private Sector Banks(Due to Columns)	17.66	3.24	F 17.66 > F crit 3.24	H ₀₂ is Rejected**

	• Covid-19 & Sample Banks (Interaction)	2.08	3.24	$F 2.08 < F \text{ Crit } 3.24$	H_{03} is Accepted*
(c)	Branch Performance				
	Net Profit Per Branch				
	• Pre & During Covid-19(Due to Row)	17.58	4.49	$F 17.58 > F \text{ crit } 4.49$	H_{01} is Rejected **
	• Public & Private Sector Banks(Due to Columns)	51.14	3.24	$F 51.14 > F \text{ crit } 3.24$	H_{02} is Rejected **
	• Covid-19 & Sample Banks (Interaction)	1.37	3.24	$F 1.37 < F \text{ Crit } 3.24$	H_{03} is Accepted*
	Business Per Branch				
	• Pre & During Covid-19(Due to Row)	1.97	4.49	$F 1.97 < F \text{ crit } 4.49$	H_0 is Accepted*
	• Public & Private Sector Banks(Due to Columns)	106.97	3.24	$F 106.97 > F \text{ crit } 3.24$	H_0 is Rejected**
	• Covid-19 & Sample Banks (Interaction)	2.89	3.24	$F 2.89 < F \text{ Crit } 3.24$	H_0 is Accepted*

(Source: Researchers own compilation using M S Excel)

*If Null Hypothesis H_{01} is accepted than there is no significant difference between and within Pre and during Covid-19 Pandemic duration among Concerned Ratio of selected Public and Private Sector Banks in India.

*If Null Hypothesis H_{02} is accepted than there is no significant difference between and within selected Public and private sector banks in India among Concerned Ratio pre and during Covid-19 Pandemic.

*If Null Hypothesis H_{03} is accepted than there is no significant difference between selected Public and private sector banks in India and Pre and during Covid-19 Pandemic among Concerned Ratio.

**If Null Hypothesis H_{01} is rejected than there is significant difference between and within Pre and during Covid-19 Pandemic duration among Concerned Ratio of selected Public and Private Sector Banks in India.

**If Null Hypothesis H_{02} is rejected than there is significant difference between and within selected Public and private sector banks in India among Concerned Ratio pre and during Covid-19 Pandemic.

**If Null Hypothesis H_{03} is rejected than there is significant difference between selected Public and private sector banks in India and Pre and during Covid-19 Pandemic among Concerned Ratio

Table- 8 shows Findings of Hypothesis testing Results. Researcher has used ANNOVA two factors with replication at 5% level of Significance to identify whether any significant difference happened in Productivity of Public and Private Sector Banks and between Pre Covid-19 and During Covid-19 duration. Researcher found that there is no significant difference between and within Pre and during Covid-19 Pandemic duration

among Capital to Reserve and Surplus ratio, Capital to Assets ratio and Business Per Branch Ratio of selected Public and Private Sector Banks in India. There is no significant difference between and within Pre and during Covid-19 Pandemic duration among Net Profit to Employee Cost and Business per Employee Ratio of selected Public and Private Sector Banks in India. There is no significant difference between and within selected Public and private sector banks in India among Operating Expenses to EAT Ratio pre and during Covid-19 Pandemic. There is significant difference between and within selected Public and private sector banks in India among Capital to Reserve and Surplus, Capital to Assets, Net Profit to Employee cost, Business per Employee, Net Profit per Branch and Business per Branch Ratio pre and during Covid-19 Pandemic. There is no significant difference between selected Public and private sector banks in India and Pre and during Covid-19 Pandemic among Capital Utilization, Employee Competencies and Branch Performance.

7. Conclusion

Researcher has conducted research to measure and compared Productivity of two public sector banks and two private sector banks from 2016-17 to 2021-22 including 3 years from 2016-17 to 2018-19 before covid-19 and 3 years from 2019-20 to 2021-22 during covid-19. Researcher found that covid-19 pandemic has had a significant impact on productivity performance of Public and Private sector banks. This is pointed out by significant difference in 2 Multidimensional Productivity Parameters including Net Profit to Employee cost and Business per Employee. There is significant difference in Performance of Public sector and Private sector banks in Productivity parameters including Capital to Reserve and Surplus, Capital to Assets, Net Profit to Employee cost, Business per Employee and Business per Branch Ratio.

Therefore on the basis of above research results, Banks need to improve their Productivity Performance in post covid-19 duration to increase Profitability and overall Performance of Banks. Reserve Bank of India and Indian Government must have to pay attention on banks which faces difficulties based on their financial parameters due to occurrence of covid-19 pandemic. Both Public and Private sector Banks faced major or moderate impact of covid-19 due to ownership, operational and Regulatory differences. These results suggests that both Public and Private sector banks have to pay attention on their capital, liquidity and risk management aspect for better performance and lowering Bank risk.

The results of present study will be significant for stakeholders of banking industry, banking authorities, policy makers and government and researchers of the same field.

8. Limitations and Future Scope

The Scope of study included only 6 years' time period and based on secondary data. Therefore accuracy is depending on accuracy of secondary data used. The focus of Present study is only on the Productivity of public and private sector banks. There is Scope for future research. In present research there is scope to enhance study period for clearer picture of Covid-19 impact on Bank. Further, Researcher can use primary data and other evaluation parameters for better result. Researcher can work on other parameters for evaluation and also include foreign banks and Regional rural banks in their sample for study.

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