

**SMART ANALYTICS, ARTIFICIAL  
INTELLIGENCE AND  
SUSTAINABLE PERFORMANCE  
MANAGEMENT IN A GLOBAL  
DIGITALISED ECONOMY**

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**SMART ANALYTICS, ARTIFICIAL  
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A GLOBAL DIGITALISED ECONOMY**

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**Senthil Veerasamy** has been an educator for more than 15 years, and he also has an industry experience of 3 years. His areas of research include ICT applications in social sciences, eTourism, digital sentiment analysis, digital watermarking, wavelet transforms, and multimedia computing. He has participated in Summer Research Fellowships at IIT Delhi and at the Indian Statistical Institute, Kolkata. He has participated in numerous international conferences and workshops, in addition to national level workshops and conferences. He has published 30 research papers in reputed journals and international and national conferences.

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# FOREWORD



Numerous cutting-edge technologies and systems, including artificial intelligence and smart analytics, are changing not only the sustainable performance of the individual businesses that use them but also the global digitalised economy. The digital economy is becoming the primary focus of industrial change and a new driver of economic recovery in most economies across the globe. On the other hand, digital technologies provide solutions for the contemporary challenges in sustainability. For instance, the development of digital banking reduces the threat of spreading diseases through physical currencies in the long run. The academic literature has largely ignored how new technologies alter the setting in a sustainable manner in which they are being adopted. Therefore, this edited book intends to fill in some of these research gaps that exist in the literature.

In this edited book, emerging technologies and innovations such as artificial intelligence, cryptocurrencies, data mining, augmenting cybersecurity, and machine learning are discussed concerning the sustainable development of the global economy. For example, contemporary issues such as how artificial intelligence can be used as a new tool for disruption in educational performance assessment, and how artificial intelligence and machine learning are utilised in the insurance industry are discussed to provide a wide array of understanding in different contexts across the globe. Moreover, this book focusses on issues in e-governance, financial inclusion, money laundering, and digital banking to achieve a balance between business growth and sustainable benefits.

This book is a promising effort that can be recommended as a must-read for people interested in learning in-depth information on smart analytics, artificial intelligence,

and sustainable performance in a global digitalised economy. I hope the readers will learn a lot from this book and that it will be a turning point in their learning cycle.

Narayanage Jayantha Dewasiri

Professor

Sabaragamuwa University of Sri Lanka

Brand Ambassador – South Asia, Emerald Publishing

Founding Editor – *South Asian Journal of Marketing*

# CHAPTER 1

## COVID 19 AND FINANCIAL PERFORMANCE OF BANKS IN INDIA: IMPACT AND IMPLICATIONS

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### ABSTRACT

*Purpose: The purpose of the study is to determine the significant difference between the performance of the Indian banks in pre coronavirus disease (COVID 19) and post COVID 19 periods. Further, it explores the impact of COVID 19 on the profitability of the Indian banks by investigating variation between the non-performing assets (NPAs) and the net profit of the banks during pre and post COVID 19 periods.*

*Need of the study: The COVID 19 outbreak has affected various industries including Indian banks which reported an increase in NPAs, and demand for credit which in turn impacted profitability. This study was carried out to examine the impact of COVID 19 outbreak on Indian banking sector.*

*Methodology: This study uses different banks' NPA and net profits performance to examine the effect of COVID 19 on banks' overall performance. The data have been collected from secondary sources, commercial websites,*

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*and websites of Indian banks (private and public sectors). t-Test was used to analyse the data.*

*Findings: Among public sector banks, Canara Bank was found to have a significant difference in net profit in the pre and post COVID 19 periods. In private sector banks, HDFC Bank showed a significant difference in the net profit in pre and post COVID 19 periods. For NPAs, all private banks showed no significant difference in pre and post COVID 19 period results.*

*Implications: The study revealed that both private and public sector banks in India were mildly affected by pandemic and most of them are significantly reporting no difference in net profit and NPAs during pre and post COVID 19 periods.*

**Keywords:** COVID 19; non-performing assets; Indian banks; profitability; financial reports; financial performance

**JEL classification:** G2

## INTRODUCTION

Modern banking in India began in the mid-eighteenth century. The Bank of Hindustan was among the first banks founded in 1170 and liquidated in 1829–1832. General Bank of India was also founded in 1786 but failed in 1791. The State Bank of India (SBI) is still the most significant and oldest bank.

The Indian banking sector is divided into two categories: scheduled banks and non-scheduled banks. The scheduled banks are those listed in the second schedule of the Reserve Bank of India Act, 1934. Nationalised banks, SBI and its associates, Regional Rural Banks (RRBs), foreign banks, and Indian private sector banks are among the scheduled banks. On 1 April 2017, the SBI merged its associate banks to form the largest bank in India. Commercial banking includes scheduled and non-scheduled commercial banks governed by the Banking Regulation Act of 1949.

Reserve Bank of India (RBI) was established on 1 April 1935. Its office was initially located in Kolkata but was permanently relocated to Mumbai in 1937. Though originally privately owned, the RBI has been wholly owned by the government since its nationalisation in 1949. The Governor sits in the Central Office and develops policies for the banks. Banking is categorised into four types of banks:

- Commercial banks.
- Small finance banks.
- Payments banks.
- Co-operative banks.

Commercial banks are governed by the Banking Regulation Act of 1949, and the business model of such banks is profit oriented. Their primary function is

to accept deposits and make loans to individuals, businesses, and governments. Commercial banks are classified as follows:

- Public sector banks.
- Private sector banks.
- Foreign banks.
- RRBs.

#### *Public Sector Banks*

Public sector banks are nationalised and contribute over 75% of the country's total banking business. The government owns the vast majority of these banks. In terms of volume, SBI is the largest public sector bank in India, and following its merger with its five associate banks (as of 1 April 2017), it is now ranked among the top 50 banks in the world.

#### *Private Sector Banks*

These include banks in which private shareholders own a majority stake or equity. The RBI's banking rules and regulations will also apply to private sector banks.

#### *Foreign Banks*

A foreign bank has its headquarters in another country but operates as a private entity in India. These banks are mandated to follow the regulations of their home country and the country where they function.

#### *Regional Rural Banks*

These are also scheduled commercial banks, but their primary goal is to provide credit to underserved segments of society such as agricultural labourers, marginal farmers, and small businesses. They typically operate at the regional level in various Indian states and may have branches in select urban areas. RRBs also perform the following essential functions:

- Banking services and financial services in rural areas and semi-urban areas.
- Government operations including paying Mahatma Gandhi national rural employment guarantee act (MGNREGA) workers' wages and the distribution of pensions.
- Debit cards, credit cards, and locker facilities are examples of non-banking services.

#### *Small Finance Banks*

This is a niche banking segment in the country to provide financial inclusion to segments of society that other banks underserve. Primary customers of small

finance banks include small and marginal farmers, unorganised sectors, microindustries, and other small business units.

#### *Payments Banks*

In the Indian banking industry, this is a relatively new bank model designed by the RBI and is permitted to accept restricted deposits. They also provide net banking, mobile banking, ATM, and debit cards. Currently, the amount is limited to ₹ 1 lakh per customer.

#### *Co-Operative Banks*

Co-operative banks are governed by an elected managing committee and are registered under the Cooperative Societies Act of 1912. These operate on a no-profit, no-loss basis and primarily serve urban entrepreneurs, small businesses, industries, and self-employment. In rural areas, they primarily fund agricultural activities such as farming, livestock, and hatcheries.

#### *Schedule Banks*

The Reserve Bank of India Act, 1934 includes a list of scheduled banks in its second schedule. To be eligible as a scheduled bank, the bank must meet the following criteria:

- A bank with a paid-up capital of ₹ 5 lakhs or more is classified as a scheduled bank.
- A bank must demonstrate to the central bank that its operations do not jeopardise depositors' interests.
- A bank must be incorporated rather than run as a sole proprietorship or partnership.

#### *Non-scheduled Banks*

Non-scheduled banks are local area banks not listed in the RBI's second schedule.

#### *Non-performing Assets*

1. An NPA is a term used for the loans or advances which are delinquent or in default. When principal or interest is late or missed on loan, it is said to be in arrears.
2. A loan is considered in default when the lender believes the loan agreement has been violated and the debtor cannot meet his obligations.
3. NPAs are recorded on a bank's balance sheet after a borrower fails to pay for an extended period.
4. Depending on the length of time overdue and the likelihood of repayment, NPAs can be classified as substandard, doubtful, or a lost asset.

### COVID 19

COVID 19 is a contagious infection. Most people have been infected with this virus since 2019, have experienced minor to moderate lung illness, and have recovered without special treatment in the hospitals and doctors' help. Some, however, have become critically ill and require medical attention in the hospital from doctors.

The best way to prevent COVID 19, even to slow down transmission, was to be well informed about the disease and how the virus spreads. Further, precautionary measures like maintaining distance, that is, at least one metre apart from others, wearing a mask, and frequently washing hands using an alcohol-based rub also helped to protect from infection.

### COVID 19 and Indian Banking

- COVID 19 has impacted banking in various ways. Initially, a short-term disruption was likely to cause accessibility issues and a reduction in small and medium sized enterprises (SME)/corporate customers, but a more prolonged crisis was likely to increase customer preference for digital channels and products.
- A full-fledged pandemic has resulted in a significant decrease in demand from SMEs and corporate, structural shifts in customer behaviour, and transformation of employee roles and the overall operating model.
- Financial institutions have started to respond to some of the immediate needs to ensure business profitability and continuity. A focussed approach involving a combination of tactical initiatives and strategic interventions was critical to address immediate concerns and drive long-term profitable growth.

## LITERATURE REVIEW

Much research has been done to identify the influence of COVID 19 on the Indian banks or the banking sector of India. Nilam Panchal (2021) investigated the relationship between the NPA and the net profits of some selected Indian banks. The author selected four Indian banks, two from the public sector and the other from the private sector. The study concluded that the COVID 19 outbreak had affected the overall performance of the banks, and RBI must take all the possible initiatives for sufficient liquidity in the financial system. Bobade and Alex (2020) concluded that COVID 19 pandemic had a severe impact on banks' financial performance. RBI framed many policies for ensuring business continuity and engaging in a partnership to customise the process and enhance the experience.

The government encouraged people to find innovative business models for the new industry environment and focussed on building a robust digital ecosystem with the latest technology. Marcu (2021), undertook a study to identify the challenges in managerial practices of the banking industry and to find out the banks' strategies during the pandemic period. This descriptive study concluded that the big banks have prepared better for the pandemic with the help of the

central bank and have stood up well to the economic shock of the pandemic. This pandemic time has challenged the resilience and adaptability of the banks in India with the digitalisation process of the banking industry. Bhatia and Gupta (2020) investigated the volatility of Indian banking sectorial indices for the pre and post COVID 19 periods.

They considered various hypotheses and used the volatility models to compare the events for the stock prices of the Indian banks. The study showed that, according to the symmetric model, the volatility of the volatility persistence is highest in the Nifty banks (NBI) and lowest in Private sector banks (PSBI); in asymmetric effects, it has been lowest in PSBI. Perwej (2020) has studied the impact of COVID 19 on banking and financial systems. The study went through an intensive literature review of the research papers, and the conclusions were that the banking sector had seen many challenges during the pandemic period. The deficiency and the lack of ability in the Indian banking system were highlighted in the pandemic period. The banking sector realised the need for the immediate digitisation of the operations such as cash deposits and withdrawals. The banks already have their operations in the digital mode and could focus on the complete transactions by digitalising all the functions, processes, and systems. Ramasamy (2020), in his study, 'Impact Analysis in Banking, Insurance and Financial Services industry due to COVID 19 Pandemic', identified the various factors which impacted the banking, financial services, and insurance sector. The study concluded that the banking, financial services and insurance (BFSI) sector contributes to the country's economy by serving the people through its services, but after the pandemic, this sector was hit with much uncertainty. Korzeb and Niedziółka (2020) have identified the resistance of commercial banks to the crisis caused by the COVID 19 pandemic: the case of Poland.

Similarly, Padhan and Prabheesh (2021) have concluded that the Indian banking sector has been badly affected by the COVID 19 pandemic. Kharade (2021), in his research paper, shows the impact of COVID 19 on the banking and financial sector of the Indian economy. The study was based on secondary data and concluded that the financial institutions are using the customer-centric approach through digital channels to make it easier for the customers and have a healthy relationship with them. Also, RBI has formulated many policies to enhance the experience. Saldanha and Nitin (2021) investigated the impact of COVID 19 and the pandemic on the Indian retail banking sector. This research paper looked at how the pandemic has affected retail banking and sees if there is any change in the preference or perspective of the individuals. This study found that the individuals who used to visit banks or interact with them were affected the most. The introduction of the unified payments interface (UPI) has gained much importance and is preferred over cash on delivery in India which is considered a massive step in the digitalisation of India's payment system. Berger and Demirgüç-Kunt (2021) did the banking research during COVID 19. The authors analysed two things: the shortest US recession on record and the avoidance of any banking crises. The financial surprise was also seen in the resilient banking sector to prudential

policies. This paper identified that the crises had urged the generation of new government policies for the betterment of the banking industry.

## RESEARCH OBJECTIVES

The objectives of the study are:

- To determine the significant difference between the performances of Indian banks in the pre and post COVID 19 periods using the *t*-test.
- To identify how the profitability of the Indian banks was affected by COVID 19.
- To determine the variation between the NPAs and the net profit of the banks by comparing the pre and post COVID 19 periods using the descriptive tools.
- To understand the steps taken by the RBI for the same.

## RESEARCH METHODOLOGY

### *Sample Frame*

- The study includes eight Indian banks from two sectors, four from the private and four from the public sector, to find the impact of the COVID 19.
- The study's sample size would be eight Indian banks such as Canara Bank, Indian Bank, Union Bank, Bank of Baroda, ICICI Bank, HDFC Bank, Federal Bank, and Yes Bank.
- The rationale for selecting these banks for the research work for collecting secondary data is that these are big commercial banks of India as per RBI Report, 2011. The NPA level of these banks has a significant impact on the Indian economy. It was essential to find out the reasons for these banks' increasing NPA and their profitability post COVID 19 period.
- Each sector, such as private and public banks, will have four banks.
- The span of pre and post COVID 19 periods is two years which is 2018–2019 and 2019–2020 (for pre COVID 19 period) and 2020–2021 and 2021–2022 (for post COVID 19 period).

### *Data Collection*

- The data for the study were collected from a secondary source.
- The study includes the research of the financial statements of selected Indian banks.
- The data have been collected using annual reports, websites of sample banks, and a few private websites like moneycontrol.com.

### *Research Methodology*

- In this study, the analysis is done using the *t*-test to determine the significant difference between the net profit and NPA of Indian banks for the pre and post COVID 19 periods.
- Variation was found between the NPA and net profit of the selected banks by comparing the pre and post COVID 19 data using the descriptive tools.

### *Limitation of the Study*

- This study has analysed only eight selected Indian banks.
- The comparison of the data for the pre and post COVID 19 periods of the study is made only for the two years.

## **DATA ANALYSIS**

In this report, the analysis of the financial statements of the banks has been done to meet the objectives of the research paper, and the study was done to find out the impact of COVID 19 on the Indian banks. The data are taken from the financial statements of the Indian banks. Although there are various types of Indian banks, for this study, only two types of Indian banks were taken, which are as follows:

- **PUBLIC SECTOR BANKS**
  1. Canara Bank
  2. Union Bank
  3. Indian Bank
  4. Bank of Baroda
- **PRIVATE BANKS**
  1. ICICI Bank
  2. Federal Bank
  3. HDFC Bank
  4. Yes Bank

**Table 1.** Table of NPA and Net Profit of Canara Bank.

Canara Bank	(In Crores)	
Years	NPA	Net Profit (₹)
2018–2019	28,542	–4,087.00
2019–2020	22,955	547.00
2020–2021	18,287	–2,023.00
2021–2022	24,455	2,702.00

*Source:* Authors' compilation.