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THE INSTITUTE OF COST ACCOUNTANTS OF INDIA

Statutory Body under an Act of Parliament

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Vision Statement

The Institute of Cost Accountants of India would be the preferred source of resources and professionals for the financial leadership of enterprises globally.

Mission Statement

The CMA professionals would ethically drive enterprises globally by creating value to stakeholders in the socio-economic context through competencies drawn from the integration of strategy, management and accounting.

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CMA Bibhuti Bhusan Nayak
President
The Institute of Cost Accountants of India
12 Sudder Street, Kolkata - 700016

FOREWORD

In recent times, the concept of a circular economy is evolving beyond an environmental response to a strategic approach for creating value and addressing economic and political challenges. It emphasises on designing products and systems that minimize waste, maximize resource efficiency, and keep materials in circulation for as long as possible.

Evolving legislation and business strategy across the world are transforming the manufacturing industry. Governments increasingly enforce circular economy regulations that mandate product durability, recyclability and producer responsibility. This shift reflects a view among manufacturers that the circular economy offers better value, recurring revenue and resilience against raw material volatility.

Manufacturers worldwide are increasingly recognizing the need to integrate sustainable practices into their operations, driven by regulatory changes, consumer demand, and the long-term financial benefits of sustainability. By integrating circular economy principles, such as recycling, reusing, and designing for durability, with ESG goals that emphasize ethical governance and social responsibility, manufacturing firms can significantly contribute to the global shift toward sustainability.

It gives me an immense pleasure to present esteemed Research Bulletin of the Institute, Vol.50, Nos. III & IV issue of the Research Bulletin focusing on various issues like: Circular Economy, CSR, Financial Inclusion, Taxation, etc.

This issue features 13 articles and fervently believe this volume would be intriguing, thought-provoking and useful in reaching new milestones.

I would also like to express gratitude to all the contributors who have made this issue possible, as well as the authors, reviewers and editor for their professional contribution. Last but not least, the assistance of the editorial team is fully appreciated.

CMA Bibhuti Bhusan Nayak
President
The Institute of Cost Accountants of India

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CHAIRMAN'S COMMUNIQUÉ

Financial inclusion can be regarded as a new wave in global finance, having extensive implications on not just to whom finance is being delivered but also on the modes of its delivery. Through initiatives like the Pradhan Mantri Jan Dhan Yojana, Atal Pension Yojana, and others, the government of India is working to empower individuals, secure financial futures, and promote entrepreneurship. The motto, "From Jan Dhan to Jan Suraksha," encapsulates the vision of financial security and inclusive growth for all.

Financial inclusion is a pivotal aspect for socio-economic growth, enabling individuals and businesses to fully participate in the economy. For India, a nation on the cusp of exponential growth towards the Viksit Bharat mission, enhancing financial inclusion is not just important—it is essential.

Last year, India's Financial Inclusion Index surged to 64.2, up from 60.1 in the previous year, reflecting substantial progress in extending banking services across the nation. A cornerstone of this achievement is the Pradhan Mantri Jan Dhan Yojana (PMJDY), launched in 2014, which has facilitated the opening of over 54 crore bank accounts. This initiative has been instrumental in bringing previously unbanked populations into the formal financial system, marking a significant leap from 53% to nearly 80% of the population now having bank accounts.

Despite global uncertainties and downward revisions in growth forecasts for other large economies, India is set to maintain its leadership in global economic growth. Supported by strong fundamentals and strategic government initiatives, the country is well-positioned to navigate the challenges ahead. With reforms in infrastructure, innovation, and financial inclusion, India continues to enhance its role as a key driver of global economic activity.

I sincerely appreciate and thankfully acknowledge the efforts made for timely publication of this volume.

The readers are requested to put the valuable suggestion towards amelioration of Research Bulletin.

CMA Harshad Shamkant Deshpande
Chairman
Journal & Publications Committee
The Institute of Cost Accountants of India

EDITOR'S NOTE

Greetings!!!

The Institute started publication of the 'Research Bulletin' since 1982. It has been included in the International Serial Directories [ISSN 2230 9241]. It includes both theme based and non-theme-based articles on the blazing issues. Inputs are mainly received both from academicians and the corporate stalwarts. The objective of this bulletin is to highlight the dynamism in environmental, social, economic and market-related issues so that the researcher can analyze the surroundings, adapt the changes in a better manner and can take decisions strategically.

This Research Bulletin, Vol.50, Nos. III & IV issue includes conceptual and empirical articles and new insights on Circular Economy, Corporate Governance, Taxation, Financial Inclusion, Banking, etc. would surely improve the knowledge base of readers.

The first article- *An Empirical Study on Young Villagers' Awareness of Digital Payment Systems* tries to assess the factors which affect the usage of online payments through an empirical survey conducted on a representative population residing in select districts of West Bengal. The second article *on Circular Economy for Sustainable Development – An Analysis* examines the impact of circular economy practices on reducing carbon emissions in India, focusing on CO_2, CH_4, and N_2O emissions across various sectors. The empirical data show that there is a significant statistical bias among villagers on the basis of their gender, age and family income with regards to awareness of digital payments. The third research study- *Corporate Governance: A Response towards changing Scenario* reviews that India is developing at a faster pace in comparison to its peers. Liberalization, Privatization and Globalization (LPG) has opened plethora of opportunity before corporate India nay India to become one of the super powers in economic front, despite global turmoil and slowdown. Stricter governance norms and compliance will ensure transparency to prospective and present Investors (local or global). Next article- *Does Corporate Social Responsibility Drive Financial Success? Insights from Manufacturing Firms* aims to investigate the impact of CSR expenditures on firms' financial performance.

The objective of the paper- *Financial Inclusion in Emerging Economies: An In-Depth Study of India* is to develop a comprehensive Financial Inclusion Index for Asian countries, with a specific focus on India and its States, using these indices as a basis for ranking the countries and regions in terms of the direction, degree, and intensity of financial inclusion. *Financial Inclusion in India: The Journey So Far* seeks to examine the current status of financial inclusion in India, including the factors that are causing barriers to financial inclusion; it also assesses the various measures taken by the Indian government to promote financial inclusion. The study, *Predicting Indian Gold Prices Using Box Jenkins Methodology* employs Box and Jenkins' (1976) methodology to forecast gold prices using annual time series data from 1964 to February 2024.

Resilience Reckoning - Uncovering Capital Strengths and NPA Vulnerabilities in India's Top Banks embarks on a journey to unveil the intricate nexus between capital adequacy and NPAs within India's top ten banks. Spanning the tumultuous years from 2020-21 to 2023-24, it constructs a conceptual framework to illuminate their interplay. The empirical

analysis then delves deeper, dissecting the correlation and growth trends of these metrics, ultimately seeking to unearth actionable insights for the Indian banking sector. The paper- *Soundness of Domestic Systemically Important Banks (D-SIBs) in India: A Comparative Study* seeks to examine the financial performance and banking stability of the Indian D-SIBs (SBI, ICICI & HDFC) during the period 2017-18 to 2022-23.

The Role of GST in Simplifying the Indirect Tax Regime in India examined how GST talks about issues that surfaced during GST implementation and its contribution towards economic formalisation. The article on *The Influence of CSR And Green Tax in Enhancing Green Energy Efficiency, ESG Performance, And Sustainable Green Economy* looks at how CSR programs enhance the ESG performance, and green energy effectiveness, and sustainable green economy. The report also assesses how effective green tax laws are as a tool for encouraging companies to improve their ESG performance, and green energy effectiveness. The paper *Unravelling the Web: A Bibliometric Analysis of the Impact of social media on Investor Sentiment* employs bibliometric techniques to systematically analyse the existing body of literature, identifying key themes, trends, and gaps in research related to the impact of social media on investor sentiment.

The research study- *Value Creation through Merger & Acquisition "A Case Study of Punjab National Bank"* investigates the financial implications of the merger, assessing its effects on PNB's profitability, asset quality, and customer reach. Through an analysis of financial metrics and pre- and post-merger performance data, the study reveals that, despite initial integration challenges and asset quality issues, PNB has effectively leveraged economies of scale, reduced operational redundancies, and expanded its customer base, leading to enhanced financial performance. Additionally, it highlights post-merger integration challenges and risk management considerations, offering valuable insights into M&A as a value creation strategy in the Indian banking sector.

We are extremely happy to convey that our next issue of *Research Bulletin, Vol.51 No. I* would be a non-theme one. Moreover, we are immensely indebted to our Editorial Board for scholarly review of the articles.

We look forward to constructive feedback from our readers on the articles and overall development of the Research Bulletin. Please send your mails at *research.bulletin@icmai.in*.

We express our sincere gratitude to all the contributors and reviewers of this important issue and wish our readers get requisite insight from the articles.

CMA (Dr.) Debaprosanna Nandy
Secretary (Officiating)
Editor - Research Bulletin
The Institute of Cost Accountants of India
E: secy@icmai.in

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.....

Editorial Board

Our Contributors in this issue

Alaknanda Lonare
Assistant Professor, SVKM's NMIMS, Mukesh
Patel School of Technology Management and Engineering, Mumbai, Maharashtra
Alaknanda.lonare@nmims.edu

Arindam Banerjee
Associate Professor, School of Commerce and Management, Shiv Nadar University,
Kalavakkam, Chengalpet
arindambanerjee@snuchennai.edu.in

Anjanee Kumar Rai
Assistant Professor, School of Management Sciences, Varanasi
anjanirai1991@gmail.com

Asha Sharma
Assistant Professor, Department of Accountancy and Business Statistics, University College of
Commerce & Management Studies, Mohanlal Sukhadia University, Udaipur (Rajasthan)
drashasharma.sharma07@gmail.com

Christina N
Research Scholar, School of Commerce and Management, Shiv Nadar University, Kalavakkam,
Chengalpet
christina23610019@snuchennai.edu.in

Dileep Kumar S. D.
Assistant Professor and Coordinator, PG Department of Commerce, PES Institute of Advanced
Management Studies, Shivamogga
dileepsd87@gmail.com

Durga Singh Gour
Assistant Professor, Department of Accountancy and Business Statistics, Govt Girls College
Kherwara Udaipur, Singhdurga92@gmail.com

Goutam Bhowmik
Professor, Department of Commerce, University of Gour-Banga, Malda, West Bengal
ramagoutambhowmik@gmail.com

Himadri Halder
Research Scholar, Department of Commerce & Management, Seacom Skills University, Bolpur,
West Bengal
halderhimadri4@gmail.com

Jyotirmoy Koley
Assistant Professor of Commerce, Darjeeling Government College, Darjeeling, West Bengal
jyotirmoykoley@gmail.com

Our Contributors in this Issue

Khajabee M
Department of Commerce, Nalanda Independent PU College, Ballari, Karnataka
khajuvali2939@gmail.com

Kushal De
Assistant Professor, Department of Commerce, Dhruba Chand Halder College, West Bengal
dekushal@yahoo.co.in

Madhu Bhartia
Assistant Professor, Department of Commerce, Institute of Computer Science &Technology, SHEPA, Varanasi
madhubhartia11@gmail.com

Malay Kumar Paul
Researcher with Fortune Institute of International Business, Kolkata
mkpcalcutta@yahoo.co.in

Meghna Chotaliya
Associate Professor and Head of Department of Accountancy, R.D. National College, University of Mumbai, Maharashtra
meghnachotaliya26@gmail.com

Neelam Yadav
Visting Faculty, Department of Accountancy and Business Statistics, UCCMS, MLSU, Udaipur
drneelamyadav74@gmail.com

Priyanka Banik
State Aided College Teacher-I, Department of Commerce, Heramba Chandra College, Kolkata
priyankabanik13@gmail.com

Rajkumar Guchhait
Research Scholar, Department of Commerce, University of Calcutta, West Bengal
g08rajkumar@gmail.com

Rajendra Nath Datta
Assistant Professor, Department of Commerce, Maharaja Srischandra College, Kolkata
rajendraeco@gmail.com

Rohan Jha
Independent Researcher, Kolkata
vatsrohan2096@gmail.com

Wilson Peter Minz
Research Scholar, Department of Commerce, University of Gour-Banga, Malda, West Bengal
wilsonpeterminz11@gmail.com

Contents

AN EMPIRICAL STUDY ON YOUNG VILLAGERS' AWARENESS OF DIGITAL PAYMENT SYSTEMS

Rajkumar Guchhait
Kushal De

Abstract

India, the fifth-largest economy in the world with a GDP of 3.8 trillion-dollars, still has significant segment of the population who are not acquainted with digital payment systems. This is due to several factors like technological unawareness of the users, concern for security, lack of trust in digital payments, etc. The present study tries to assess the factors which affect the usage of online payments through an empirical survey conducted on a representative population residing in select districts of West Bengal. The empirical data show that there is a significant statistical bias among villagers on the basis of their gender, age and family income with regards to awareness of digital payments. The determinants like time saving and convenience have statistically significant impact on the level of awareness of using digital payment systems. By giving attention on improving convenience and through efficient management, it is feasible to enhance the awareness of digital payments among villagers.

Keywords

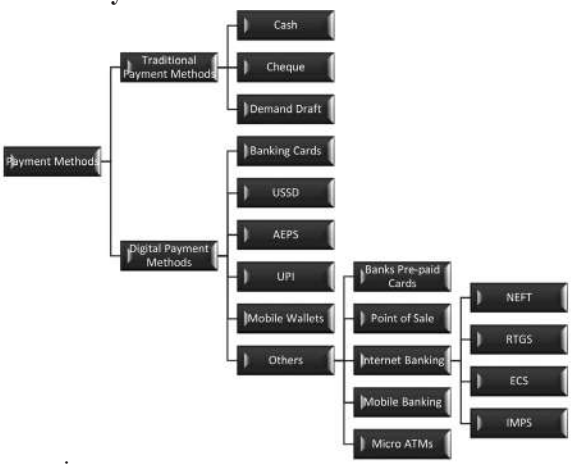
Awareness, Digital Payment, Cashless Transaction, Reliability, Village

Introduction

India, the fifth largest economy in the world and set to become fourth largest economy by 2026 (economictimes.indiatimes.com). India is the global leader in digital transactions, accounting for nearly 46% of all transactions in 2022 (according to the Press Information Bureau, pib.gov.in). The key factor behind this phenomenal growth can be attributed to the Unified Payment Interface (UPI), which was launched by the National Payments Corporation of India (NPCI) in 2016. Another important factor is announcement of demonetization by Indian government on 8th November, 2016 to curb the flow of black money in Indian economy. One of the most significant achievements of demonetization is the tremendous growth in digital penetration caused by the shortage of cash in the economy. The total volume of digital payment transactions went to 18,737 crores in FY 2023-24 from 2,071 crores in FY 2017-18 with a compound annual growth rate (CAGR) of 44% (pib.gov.in). ₹200 lakh crore UPI transactions in value were completed in India in FY2023-24, which was a gigantic shift from the ₹1 lakh crore UPI transactions in value that were completed in FY2017-18 at a 138% CAGR (pib.gov.in).

In today's environment, timely and cost-effective settlement of large sums of money is essential. Digital payment mechanisms outperform traditional ways of payment in the current scenario. It provides an easy and rapid payment process with a single click, removing the need for physical currency and waiting in lines. A variety of digital payment options are available today which includes the unified payment interface (UPI), debit cards, credit cards, internet banking, the Aadhaar-enabled payment system (AEPS), etc.

Figure 1: Classification of Payment Methods



Source: cashlessindia.gov.in

Majority of the population (63.64% in 2023; tradingeconomics.com), even today, resides in rural India and their financial literacy has a huge impact on the economic growth of the country. Interestingly, according to a report published by TransUnion CIBIL (2023), One-third of digital payment users in India are from rural areas. There is still a difference in digital payment usage between urban and rural India. Several factors are behind this dismal statistics which include low literacy rates, technological unawareness, slow internet speeds, limited digital payment options for feature phones, lack of trust in cashless transactions, etc. Users in rural areas face difficulty in operating e-payment websites, which are mostly in English, as they are unable to comprehend the language. The lack of access to computers and low usage of smartphones is a major issue in rural areas. Also, the rural people experience slower internet speeds compared to urban people, leading to e-payment transactions being cancelled or incomplete. As a result, people in rural areas believe in cash transactions and prefer them over cashless ones. Many people are still unaware of various e-payment methods.

To make digital payments popular in rural India, several initiatives were taken by the government, including 'Digital India', 'digital finance for rural India', 'Digidhan Mission', 'Internet Saathi', etc. Statistics from various researches have stated that digital payments are more popular in rural areas in recent times, but still, they lag far behind urban areas. This study aims to understand consumers' awareness of digital payment systems, which can be beneficial for governments, banks, financial institutions, and policymakers. Promoting digital transactions can lessen the flow of illicit transactions and black money. This will improve accountability, financial inclusion, and boost the country's economic condition. The research focuses on exploring consumers' awareness of digital transactions and identifying factors that trigger their awareness of digital payment systems.

Literature Review

Some studies have been considered to assess the impact of various factors on users' awareness of digital payment systems. Few select studies are discussed in this regard below.

The study of Shafeer (2019) investigated the use of digital financial services in campuses by college students. According to the study, most young people use mobile banking services at a moderate level, and there are no appreciable differences among young people's usage levels of digital banking services. Singh & Singh (2022) showed that most respondents believe digital payments are faster, simpler to use, and affordable, despite some issues with inter-operability and standardization of security and formats. According to Sujith et. al. (2019), most respondents are familiar with mobile wallets and use them to make payments. They find the services offered by m-wallet gateways adequate and opted for m-wallets for the ability to make instant payments. Sharma and Sharma (2019) observed that digital payment applications enable rural residents to conduct financial transactions at odd hours. It provides

financial empowerment and significantly impacts the success of digital payments in the region. Babulal (2019) observed that mobile banking is appreciated for its convenience and versatility. However, due to low digital literacy levels in India, many people lack the skills to use the various financial system options. As a result, the digital payment system is not fully developed and is not widespread across the country. Singh and Malik (2019) stated that rural areas in India are hesitant to adopt digital payment methods due to low literacy rates, lack of technological knowledge, and slow internet speeds. To resolve this issue, collaboration with NGOs and educational institutions can improve financial literacy and offer multilingual online payment methods, including local language mobile applications. Vally and Divya (2018) found that age of consumers significantly influences the adoption of digital payments. Use of digital payment is influenced by the education of respondents but not their income levels. Educated individuals are expected to have more favourable attitudes towards adoption of innovations. Kafley and Chandrasekaran (2019) indicated that rural residents are less inclined to adopt digital payment methods due to low literacy rates, lack of technological proficiency, slow internet speeds, and a lack of trust in cashless transactions.

From this review of literature, a pertinent research question emerges regarding the level of awareness of digital payments, the usage pattern of digital payment systems in rural India, and the factors that influence the use of digital payment systems. Considering the said issues, the researchers aim to address the awareness and the impact of various factors on the use of digital payments in rural parts of India.

Research Objectives

The study intends to unveil the awareness among villagers in select districts of West Bengal pertaining to their use of digital payments. The following objectives are taken up for study by the researchers:

1) To evaluate if gender, age and family income of villagers have any significant association with the awareness of using digital payment systems.
2) To find the significant factors and the impact of each factor on the awareness of using digital payment systems.

Research Methodology

This study is both empirical and exploratory in nature. The present study is an attempt to understand the impact of several factors on the adoption of digital payment systems in rural areas. Theoretical information is taken from published sources such as books, research papers, journals, newspapers, government web contents, etc. for the research work. Primary data is collected by using the survey method. A field study is conducted with a closed-ended questionnaire designed by the researchers among a sample residing in West Bengal. Several villages are covered for the data collection from the rural areas of the districts of Purba Medinipur, Pachim Medinipur, and Howrah. Each respondent is asked about their awareness of digital payment systems on a five-point Likert scale ranging from 1 (strongly dissatisfied) to 5 (strongly satisfied).

A total of 120 respondents are interviewed, among which there are 99 respondents who use digital payment systems. 84 responses are deemed fit after data cleaning and are selected for the purpose of data analysis. The sample is selected on convenience for survey in these areas. The data is tabulated in Excel and analyzed in SPSS 27.

To fulfill the first objective of the article, the phi-coefficient is selected to check if there is any association between awareness of using digital payments and the gender, age, or family income of the respondents or not. Gender, age, family income of the respondents, and awareness of using digital payment systems are dichotomous variables, meaning there are two categories for each variable. To measure the strength and direction of association between dichotomous variables, the phi-coefficient is deemed fitted and used in the study.

For the fulfillment of the second objective of the study, which is to find out the factors influencing the awareness of digital payments, the principal component method of factor analysis is applied. Kaiser-Meyer-Olkin Measure is used to check the suitability of the collected data for factor analysis by analysing the proportion of variance among variables. Bartlett's Test of Sphericity is conducted to check the adequacy of the sample collected and the correlation between selected variables. The test assesses whether the correlations between variables are strong enough to warrant using factor analysis, a technique that aims to reduce the number of variables by identifying underlying factors. A reliability test is conducted to check the internal consistency and reliability of the factors based on Cronbach's alpha value. Respondent's awareness of digital payment systems is captured in a binary code '0' or '1', where '0' is coded as unaware of using digital payment systems and '1' is coded as aware of DPS. To find out the impact of various factors on a dichotomous variable, logistic regression has been deemed fit and applied.

Data Analysis and Findings:

Table 1: Demographic and Income Profile of Respondents

Profile	Categorical Variable	Frequency	Percent (%)
Gender	Male	45	54
	Female	39	46
Age	Below 20	36	43
	20-30	48	57

Education Qualification	Higher Secondary or below	45	54
	Above Higher Secondary	39	46
Monthly income	Below Rs 25000	69	82
	Above Rs 25000	15	18

Source: Primary Survey

The responses about the use of digital payment systems are collected from young users in villages. The sample consists of 54% male respondents and 46% female respondents who use digital payments. About 43% of respondents are in the below-20 age group, and the remaining 57% are in the age group of 20 to 30 years. Respondents' income profiles show that the majority of the respondents have an income range below Rs. 25,000, and the majority respondents stated that they are aware of digital payment systems.

$H_0$1: There is no significant association between awareness of digital payment systems and gender of the respondent.

Table 2: Phi-coefficient between awareness of using digital payments & gender of the respondents

		Value	Approximate Significance
Nominal by Nominal	Phi	0.298	**0.006**
	Cramer's V	0.298	0.006
N of Valid Cases		84	

Source: Researchers' own computation

In table 2, the phi-coefficient is computed to check whether a significant association exists between awareness of using digital payments and gender of the respondents. P-value of the phi-coefficient is 0.006 at 5% level of significance. This means that null hypothesis ($H_0$1) is rejected and there is a statistically significant association between the awareness of using digital payments and gender of the respondents.

H02: There is no significant association between awareness of digital payment systems and age of the respondents.

Table 3: Phi-coefficient between awareness of using digital payments and age of the respondent

		Value	Approximate Significance
Nominal by Nominal	Phi	0.320	0.003
	Cramer's V	0.320	**0.003**
N of Valid Cases		84	

Source: Researchers' own computation

In table 3, phi-coefficient is computed to check for a for a significant association between age of the respondent and awareness of using digital payments. P-value of the phi-coefficient is 0.003, which is less than 0.05 at the 5% level of significance, thus it rejects the null hypothesis ($H_0$2). Which means that there is a statistically significant association between the awareness of using digital payments and the age of the respondent.

H03: There is no significant association between awareness of digital payment systems and family income of the respondents.

Table 4: Phi-coefficient between awareness of using digital payments and income of the respondent

		Value	Approximate Significance
Nominal by Nominal	Phi	0.696	0.001
	Cramer's V	0.696	**0.001**
N of Valid Cases		84	

Source: Researchers' own computation

In table 4, phi-coefficient is computed to check for a significant association between awareness of using digital payments and income of the respondent. P-value of the phi-coefficient is 0.001, which is less than 0.05 at the 5% level of significance. This means that null hypothesis ($H_0$3) is rejected and there is a statistically significant association between the awareness of using digital payments and the income of the respondent.

Table 5: KMO and Bartlett's Test		
Kaiser-Meyer-Olkin Measure of Sampling Adequacy.		**0.645**
Bartlett's Test of Sphericity	Approx. Chi-Square	594.083
	df	78
	Sig.	**0.001**

Source: Researchers' own computation

Table 5 shows the KMO measure of sampling adequacy, which is above 0.50, indicates that the sample is adequate enough for conducting factor analysis. The 'Bartlett's test of Sphericity' ensures that there is a statistically significant correlation among the selected variables under study. Since the p-value of Bartlett's test is <0.05, it can be concluded that there is a statistically significant correlation among the selected variables.

Table 6: Rotated Component Matrix				
	Component			
	1	2	3	4
Digital payment systems save time.	.853			
Digital payment systems accomplish the task more quickly.	.834			
Digital payments are faster than traditional transfers.	.808			
Users can do the e-payments anytime.	.681			
Digital payment systems protect the privacy of users.		.852		
Digital payment systems help to prevent transaction fraud.		.792		
Digital payment system is safer than the cash payment mode.		.701		
Participants involved in digital payment systems are reliable.		.554		
Users can easily do their various payments digitally.			.900	

Digital payment systems are available everywhere.			.672	
Digital payment is a valuable option due to its low cost.				.842
Digital payment system is hassle-free.				.691
Digital payment systems bring greater expediency.				.594
Eigen Values	4.588	2.588	1.176	1.102
Percentage of Total Variance Explained	35.290	19.907	9.045	8.476
Cumulative Variance Explained	35.290	55.197	64.241	72.717
Extraction Method: Principal Component Analysis. Rotation Method: Varimax with Kaiser Normalization.				

Source: Researchers' own computation

In table 6, the rotated component matrix has been used to estimate the correlations between each of the variables and the estimated components. It presents the components that affect the awareness of digital payment systems among the young villagers of West Bengal. The Kaiser normalization factor (Eigen value > 1) is used to extract the factors. Factor 1 consists of the questions relating to time consumption in making e-payments and is termed 'Time Saving', which explains 35.29% of variance; Factor 2 contains questions relating to reliability of using digital payment systems and trust issues relating to banks; hence, the factor is termed 'Reliability', which explains 19.91% of variance. Factor 3 consists of the questions relating to the convenience of using digital payment systems and is termed 'Convenience', which explains 9.05% of variance; Factor 4 consists of questions relating to the economic advantages of using digital payment systems, operating interface and performance of the system and is termed as 'Efficiency', which explains 8.48% of variance; and these four factors comprise 72.72% of the total variation.

Table 7: Reliability Test

Time Saving		**Reliability**		**Convenience**		**Efficiency**	
Cronbach's Alpha	N of Items	Cronbach's Alpha	N of Items	Cronbach's Alpha	N of Items	Cronbach's Alpha	N of Items
0.832	4	**0.808**	4	**0.795**	2	**0.678**	3

Source: Researchers' own computation

In table 7, reliability test is conducted to check the internal consistency of the four factors based on Cronbach's Alpha value. The value of Cronbach's Alpha of time saving (0.832), reliability (0.808), convenience (0.795) and Efficiency (0.678) is greater than 0.6. The reliability of the measurement is accepted.

Table 8: Logistic Regression coefficients

Factor	Model 1	Model 2	Model 3	Model 4
Time Saving	0.953 **			
Reliability		1		
Convenience			2.04 **	
Efficiency				0.008
Constant	2.95	2.92	3.81	2.57

**Significant at 5% level

Table 8 presents the coefficient of logistic regression analysis. Each model showing the relationship between the factor and awareness of using digital payment systems. '**' indicates that there is a statistically significant impact of the factor on the awareness of using digital payment systems at 5% level.

Time Saving Factor: Coefficient is 0.953, which means there is a positive relationship between time saving and awareness of using digital payment systems. Every one unit increase in time saving leads to increase in awareness of using digital payment systems by 0.953. The p-value says that there is a statistically significant relationship between the two.

Reliability Factor: Coefficient for the reliability factor is 1, indicating that there is a positive relationship between the two. One unit increase in reliability is associated with an increase in awareness of using digital payment systems by 1. P-value says that there is no statistically significant relationship between the two.

Convenience Factor: Coefficient for the convenience factor is 2.04, indicating that there is a positive relationship between the two. One unit increase in convenience is associated with an increase in awareness of using digital payment systems by 2.04. P-value says that there is a statistically significant relationship between the two.

Efficiency Factor: Coefficient is 0.008, which means there is a positive relationship between Efficiency and awareness of using digital payment systems. Every one unit increase in efficiency leads to increase in awareness of using digital payment systems by 0.008. The p-value says that there is no statistically significant relationship between the two.

Conclusion

The rural population in India comparatively lags behind the urban segments with regards to digital payment systems, despite

the fact that India is advancing towards the digital era. However, to ensure that the electronic payment system operates without any hiccups, there are a few factors that are needed to be addressed. The level of awareness and the impact of these factors on awareness of using digital payment systems were studied in this paper.

There is a bias among young digital payment users in villages on the basis of gender and age with regards to awareness of using digital payment systems. It is found in the study that there is a statistically significant correlation between the gender, age of the respondents, and awareness of using digital payment systems. The study aimed to find out the potential correlation between the family income of respondents and awareness of using digital payment systems. Based on result, it is found that there is a statistically significant association between awareness of using digital payment systems and family income of the respondents. This finding suggests that family income does have a significant impact on the decision of villagers on their awareness of using digital payments. From the logistic regression coefficient, it is revealed that 'Time Saving' and 'Convenience' have a statistically significant relationship with the awareness of using digital payments. So, awareness of using digital payments among villagers is significantly influenced by level of 'Convenience' and 'Time Saving'.

By giving attention on raising 'Convenience' and through efficient management, it is possible to enhance the awareness of using digital payments among villagers. If the aforementioned problems and hurdles are resolved, India will have a very bright future for establishing a cashless society. This research will help banks and digital payment service providers in policymaking to attract customers and the government in drafting digital payment policies.

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CIRCULAR ECONOMY FOR SUSTAINABLE DEVELOPMENT – AN ANALYSIS

Dileep Kumar S. D.

Abstract

The circular economy (CE) represents a transformative approach to sustainable development, offering a viable alternative to the traditional linear economic model. Current practices highlight the urgency of transitioning to a circular economy, as global material consumption and waste are surpassing the planet's regenerative capacity. In this background, this study examines the impact of circular economy practices on reducing carbon emissions in India, focusing on CO_2, CH_4, and N_2O emissions across various sectors. Data from EDGAR and other secondary sources covering a 20-year period were analyzed. Descriptive statistics and one-sample t-tests reveal significant differences in emissions across sectors such as fuel exploitation, power industry, and transport. The findings give emphasis to the critical role of the power industry in India's carbon footprint and highlight challenges in implementing circular economy initiatives. Further, the study offers strategies for overcoming barriers and emphasizes the importance of government policies in promoting sustainability.

Keywords

Circular Economy, Carbon Emissions, Climate Change, India, Sustainable Development.

Introduction

The circular economy has emerged as a pivotal concept, increasingly embraced by environmentalists, governments, and businesses worldwide. Once considered a niche idea, circularity is now recognized as one of the most promising approaches to addressing the planet's pressing sustainability challenges. At its core, the circular economy is a model of production and consumption that prioritizes the sharing, leasing, reusing, repairing, refurbishing, and recycling of existing materials and products for as long as possible. This approach extends the life cycle of products, ensuring that their value is preserved and utilized multiple times. In practical terms, the circular economy focuses on minimizing waste. When a product reaches the end of its life, its materials are recycled and reintegrated into the economy, creating new value in the process. This contrasts sharply with the traditional linear economic model, which follows a take-make-consume-throw away pattern, dependent on abundant, low-cost resources and energy. However, the current linear processes in the industries are presented in the (Figure – 1).

Source: https://www.rts.com/resources/guides/circular-economy/

The current industrial economy is largely characterized by linear processes, as depicted in the above chart. This linear model follows a straightforward path such as produce, sell, use, and then dispose of products through incineration or landfill. This approach, while efficient in the short term, is heavily reliant on a continuous supply of raw materials and results in significant waste. It contrasts sharply with the circular economy, which seeks to minimize waste by keeping materials in use for as long as possible through recycling and reusing, thereby reducing the environmental impact and promoting sustainability.

Existing Linear Economic Model – A Few Disadvantages

The linear economy, built on a take-make-dispose model, assumes a limitless supply of natural resources and has become deeply ingrained in modern business practices. However, this model faces mounting criticism due to its significant ecological and economic drawbacks. As resources become scarcer and environmental degradation worsens, the sustainability of this approach

is increasingly being questioned.

1) **Ecological Disadvantages:** The production of goods depletes natural resources and damages ecosystems, threatening essential services like water purification, air quality, and soil health. Environmental Impact, Collecting raw materials consumes large amounts of energy and water, emits toxic substances, and disrupts ecosystems like forests and lakes. This stage also uses a lot of energy and water and often results in the release of harmful emissions. Discarding products takes up land and releases toxic substances into the environment, further harming natural areas.
2) **Economic Disadvantages:** Fluctuating Raw Material Prices, since 2006, raw material prices have become more volatile and unpredictable. This instability creates risks for companies, discourages investment in material extraction, and makes it harder for businesses to predict costs, weakening their competitive position. Dependence on Critical Materials, Many industries rely on scarce, critical materials like indium and chromium, which are in limited supply. Key sectors such as metal, electronics, and automotive industries are particularly vulnerable due to their dependence on these materials. This is true, even in the case of geopolitical interdependence, global trade has made countries increasingly dependent on one another for essential resources. The scarcity of one key resource (like water or fuel) can drive up prices and reduce the availability of other interconnected goods. Rising Material Demand, Growing populations and increasing wealth are driving up the demand for materials. The number of middle-class consumers is expected to rise by three billion by 2030, leading to higher material consumption. The decreasing lifespan of products is fueling this demand, as consumers replace products more quickly, creating a cycle of faster consumption and reduced product quality.

Circular Economy and Current Models Leading in Nations – An Overview

Unlike the linear approach, which follows a direct path from production to disposal, the circular economy emphasizes a continuous cycle of production, use, and regeneration. This model integrates processes such as reuse, repair, refurbishing, and recycling, allowing materials and products to remain in the economy for as long as possible. By doing so, the circular economy minimizes waste and reduces the need for new resources, promoting a more sustainable and efficient system of production and consumption. The concept of a circular economy contrasts sharply with the traditional linear model, however, it is clear from the following (Figure – 2).

Source: https://www.rts.com/resources/guides/circular-economy/

Kosovo is actively fostering innovative solutions for start-ups and small to medium-sized enterprises (SMEs). This includes the development of a mobile application designed to detect environmental pollution and violations within urban settings. In Ghana, efforts are underway to enhance urban waste management by supporting entrepreneurs who are constructing homes from recycled plastic materials. Jordan is advancing the transition to a circular economy, which is generating new opportunities for women. This shift is enabling them to secure employment, acquire new skills, start their own businesses, and assume leadership roles within their communities. The Philippines has passed legislation mandating that large manufacturers reduce their use of plastic packaging and bear the costs associated with managing plastic waste. Mexico is increasingly integrating circular economy principles into its climate action strategies. The country is creating and implementing training programs for local authorities to identify and execute circular economy initiatives that align with the objectives of Mexico's updated Nationally Determined Contributions (NDC).

Moving forward, Vanuatu is leading globally in terms of circularity, with an estimated 59 percent of its domestic consumption being circular as of 2021. This puts it ahead of countries like the Netherlands, which has 24.5 percent, and Austria at 9.7 percent. However, global circularity has declined from 8.6 percent in 2020 to 7.2 percent in 2023.

Circular Economy and Sustainable Development Principles – A Synergy Benefits

Progress towards the 17 Sustainable Development Goals (SDGs) has significantly slowed down, largely due to the COVID-19 pandemic. Investments in SDGs are lacking, and both public and private sectors are still mainly focused on traditional linear economic models. While developed nations and stable regions are doing better, low and middle-income countries are struggling due to chronic underfunding. The circular economy, though not a complete solution on its own, shares many principles with sustainable development and is relevant to several SDGs. To achieve the SDGs, it's crucial to integrate all aspects of sustainability into a well-defined circular economy framework. There are positive signs of this integration, but a comprehensive theoretical foundation and practical application are still needed.

The circular economy (CE) and sustainable development (SD) principles share a common goal of minimizing environmental impact while promoting long-term economic and social well-being. Both frameworks emphasize the efficient use of resources, reduction of waste, and the importance of environmental stewardship. Through focusing on creating closed-loop systems and enhancing resource efficiency, CE directly supports the broader objectives of SD, such as climate action and responsible consumption.

To effectively integrate CE into SD practices, it is essential to embed circular principles into all levels of economic and social systems. This involves adopting circular models across industries, designing products for longevity and recyclability, and encouraging sustainable consumption patterns. The systemic approach ensures that circular economy strategies complement and reinforce sustainable development goals, fostering a more resilient and adaptive economic framework.

Despite their alignment, CE and SD require a comprehensive framework that addresses their unique challenges and overlaps. Achieving this requires a robust theoretical underpinning and practical application that incorporates social, environmental, and economic dimensions. Developing integrated policies and strategies that support both circular economy and sustainable development principles will be critical in overcoming barriers and ensuring a cohesive approach to sustainable development.

Circular Economy Matters for the Planet - Why?

Current estimates indicate that already exceeding the Earth's capacity to regenerate its natural resources. If trends continue, we would require three Earths by 2050. Over the past twenty years, global material consumption has surged by more than 65 percent, reaching 95.1 billion metric tons in 2019. That same year, around 13 percent of food intended for human consumption was lost post-harvest, and an additional 17 percent was wasted at various stages, including households and retail. Additionally, electronic waste hit 7.3 kilograms per person in 2019, with much of it poorly managed, which poses

environmental and health risks. To ensure the survival and well-being of both people and the planet, these figures highlight the urgent need to change how we use and manage our finite resources. Earlier studies suggest that to return to sustainable consumption levels, global material extraction and use must be reduced by one-third. Adopting a circular economy approach will be crucial to achieving this goal.

Literature Review

Rodriguez-Anton et al. (2019) examine the relationship between circular economy initiatives and Sustainable Development Goals (SDGs). Since the adoption of the Millennium Development Goals (2000) and the 2030 Agenda for Sustainable Development (2015), sustainability has been a global priority. The European Commission's 2015 EU Action Plan for the Circular Economy aimed to transition towards a sustainable, resource-efficient system. The EU has since emphasized the role of circular economy initiatives in achieving SDGs. This study employs exploratory factor analysis and correlation analysis to assess the statistical relationship between EU circular economy initiatives and SDG compliance. Additionally, cluster analysis identifies global country groups based on SDG performance and evaluates whether EU nations achieve similar SDG outcomes. By linking circular economy policies with sustainable development, the study highlights the EU's strategic efforts in fostering sustainability through economic transformation.

Banaite (2016) explores the evaluation of circular economy systems in the context of sustainable development. The study highlights that while circular economy evaluation systems exist at micro, meso, and macro levels, they often fail to incorporate social sustainability indicators. At the macro level, only two systems fully integrate both circular economy principles and sustainable development components, though data availability remains a concern. The study stresses the need for more comprehensive evaluation methodologies, particularly in the European Union, where such systems are still evolving. The findings offer valuable insights for policymakers to enhance decision-making and strategy development.

The circular economy (CE) has gained significant attention for its role in achieving sustainable development (SD) (Knable et al., 2022). Prior the study highlights the multidimensional impact of CE on economic, environmental, and social sustainability. Studies emphasize that CE practices such as renewable energy, reuse, repair, and recycling contribute differently to SD. While renewable energy and reuse reduce environmental harm, recycling shows limited effects, and repair paradoxically increases GHG emissions. However, repair is a key driver of economic growth, and multiple CE elements contribute to social benefits, such as reduced unemployment. Panel data analysis across 25 European countries (2010–2019) underscores the need for policymakers to tailor CE strategies based on national priorities to maximize SD outcomes.

Schroeder, Anggraeni, and Weber (2019)

explore the relationship between circular economy (CE) practices and Sustainable Development Goals (SDGs). Their literature review and matching exercise reveal that CE strongly aligns with SDG targets, particularly SDG 6 (Clean Water and Sanitation), SDG 7 (Affordable and Clean Energy), SDG 8 (Decent Work and Economic Growth), SDG 12 (Responsible Consumption and Production), and SDG 15 (Life on Land). While CE fosters synergies among SDGs, challenges such as trade-offs in decent work conditions and health risks from waste recycling remain. The study suggests CE as a "toolbox" for SDG implementation and calls for further empirical research to refine strategies and partnerships for effective CE integration into sustainable development.

Wang et al. (2023) examine the heterogeneous effects of the circular economy (CE), green energy, and globalization on CO_2 emissions, focusing on the top seven global emitters from 1990 to 2020. Using the Augmented Mean Group (AMG) method, they reveal that municipal waste, a crucial CE component, is positively linked to CO_2 emissions, emphasizing the need to repurpose waste as a resource. Economic growth and globalization further increase emissions, while renewable energy consumption enhances environmental integrity. Their findings, reinforced by robustness checks and causality tests, highlight CE's dual role in sustainability both as a solution and a challenge. The study underscores the necessity of policy interventions to align CE strategies with sustainable development goals (SDGs).

Yaduvanshi, Myana, and Krishnamurthy (2016) examine India's waste management (WM) practices and propose the circular economy (CE) as a solution to existing inadequacies. Using semi-structured interviews and secondary data analysis, they highlight WM challenges and present case studies, including the for-profit company VIVAM, showcasing innovative practices. The study compares India's WM with developed nations and explores green consumerism. Insights from China and the UK further strengthen the argument for CE adoption in India. The research underscores the need for industry-government-citizen alignment to enhance sustainability. It concludes that shifting from siloed WM practices to CE-driven approaches, coupled with public awareness and policy reforms, is crucial for India's sustainable development.

Vijai and Wisetsri (2024) explore the role of circular economy (CE) principles in driving sustainable development in India. As one of the fastest-growing economies, India faces challenges such as resource depletion, environmental degradation, and excessive waste generation. The study emphasizes CE as a solution to enhance resource efficiency, waste reduction, and sustainable consumption and production. It examines key sectors like manufacturing, agriculture, and waste management, highlighting economic benefits, job creation, and environmental improvements through a transition from a linear to a regenerative model. By integrating CE practices, India can mitigate environmental burdens and achieve sustainable development goals. The study underscores the necessity of

sector-specific CE strategies to maximize long-term sustainability.

Wang et al. (2024) examine the relationship between the circular economy (CE) and carbon emission reduction, addressing whether they synergize or counteract each other. Using bibliometric and big data analyses from the Web of Science and Chinese case studies, the study finds a predominantly synergistic interaction, with CE significantly enhancing carbon reduction. The study identifies four key collaborative areas like hot fields, potential fields, auxiliary fields, and common goals. By integrating theoretical and practical perspectives, the study develops a structured framework for future research. The findings support CE's role in achieving the UN's Sustainable Development Goals and highlight the need for diverse case studies and multi-dimensional analyses.

Hailemariam and Erdiaw-Kwasie (2023) analyze the role of the circular economy (CE) in achieving net-zero emissions and environmental sustainability. Using data from 29 European countries (2000–2020) and an instrumental variable approach to address endogeneity, the study finds that CE significantly reduces CO_2 emissions. The research highlights the transition from a linear to a circular model as essential for environmental quality. Business strategies emphasizing recycling and CE practices are identified as key drivers of emission reduction. The findings underscore CE's role in supporting sustainability goals and emphasize the need for targeted policies to enhance CE adoption for long-term environmental benefits.

Androniceanu, Kinnunen, and Georgescu (2021) explore the circular economy (CE) as a strategic approach to achieving sustainable economic growth and human development. Using data from Eurostat and the World Bank, they apply principal component analysis (PCA) to assess CE's evolution across 25 EU member states in 2018. Their study identifies 13 key indicators and constructs a CE index for comparative analysis. The findings indicate that CE contributes significantly to sustainability by integrating multiple economic sectors beyond traditional contributors. With three main factors explaining 70.06% of data variation, the study underscores CE's potential to drive competitive advantage and long-term sustainability. It highlights CE as a transformative model for economic and environmental resilience.

In the light of the above literature review, highlights the circular economy (CE) as a crucial driver of sustainability, addressing economic, environmental, and social dimensions. Studies establish strong linkages between circular economy initiatives and Sustainable Development Goals (SDGs), particularly in resource efficiency, waste reduction, and emissions control. While circular economy enhances environmental integrity, certain components, like municipal waste recycling, pose challenges by increasing CO_2 emissions. Comparative studies across EU nations, India, and China reveal diverse policy approaches and sectoral impacts, emphasizing the need for region-specific CE strategies. Empirical findings suggest that circular economy fosters economic growth, employment, and reduced ecological footprints, yet

gaps in evaluation metrics and social sustainability remain. The transition from a linear to a regenerative economic model necessitates coordinated policies, industry-government-citizen collaboration, and advanced assessment frameworks. Ultimately, circular economy emerges as a transformative solution for sustainable development, with targeted interventions required to optimize its benefits while mitigating associated challenges.

Objectives and Research Hypotheses

1. To analyze the impact of circular economy practices on reducing carbon emissions and mitigating climate change.
2. To explore the economic, social, and environmental benefits of adopting circular economy models in various industries.
3. To identify the challenges and barriers to implementing circular economy initiatives and propose strategies for overcoming them.
4. To evaluate the role of policy frameworks and government interventions in promoting circular economy for sustainable development.

Hypotheses

Keeping in mind the above objectives of the study, the following hypotheses are framed for the purpose of testing:

1) $H0_1$: The CO_2 emissions across different operations in India do not differ significantly.
2) $H0_1$: The CH_4 emissions across different operations in India do not differ significantly.
3) $H0_3$: The N_2O emissions across different operations in India are not significantly different from each other.

Other Aspects of Research Methodology

For the purpose of addressing the objectives and for testing the hypotheses, necessary data are collected from secondary sources including the reports of EDGAR (Emissions Database for Global Atmospheric Research), reference books, reports, research papers, websites, etc. And the study period is 20 years from 2004 to 2023.

Three sets of measures are, (a) CO_2 Emission in India, (b) CH_4 Emission in India, and (c) N_2O Emission in India, used for addressing the above objectives and for testing the hypotheses. And each set of measures comprise five variables/ parameters as identified below:

1) Fuel Exploitation
2) Industrial Combustion
3) Power Industry
4) Processes
5) Transport

For the purpose of analysis and interpretation of data, and for testing the hypotheses, the descriptive statistics of minimum, maximum, mean, standard deviation, skewness and kurtosis are used besides one sample t-test. It may be noted here that, one sample t-test, inferential statistics, are carried out to tests the hypotheses of the study.

Data Analysis and Discussion of Results

In the above backdrop, the present study examines the current state of carbon emissions from the points of view of each of the five sources of variables and also the trend in, and differences between of emissions are analysed.

Table-1: CO_2 Emission in India by Different Operations

Year	Sources (in Metric tons)				
	Fuel Exploitation	Industrial Combustion	Power Industry	Processes	Transport
2004	69.52928	208.2556	548.3214	87.4279	108.0512
2005	68.28128	232.619	561.4035	92.01945	115.4037
2006	74.61991	260.3072	596.7301	96.80484	120.6481
2007	63.92841	295.2585	658.4644	106.1579	142.9764
2008	57.12906	308.1789	684.6556	111.2529	163.2097
2009	52.02322	355.0909	758.4981	117.0561	178.7119
2010	56.19667	397.4904	785.4702	124.8538	192.9189
2011	64.1927	442.4592	818.9953	139.7669	209.2899
2012	75.0499	431.0654	946.1559	160.2269	221.5177
2013	76.31526	468.4188	962.5515	164.6345	226.2589
2014	80.86263	499.8833	1077.498	155.3459	235.7472
2015	83.06359	502.719	1055.398	162.8837	257.7479
2016	87.71634	523.6354	1044.048	175.1517	269.3869
2017	94.63522	555.0959	1098.782	184.9695	291.2317
2018	97.92298	564.6781	1197.158	190.7111	305.6906
2019	104.541	548.9013	1163.775	194.8255	308.4561
2020	94.64496	501.0288	1057.473	177.4733	268.6636
2021	94.84572	559.3889	1165.722	203.0373	295.0934
2022	125.268	568.7255	1265.695	218.7781	323.609
2023	133.5912	619.0166	1376.994	233.478	339.7606

Descriptive Statistics					
Min.	52.02	208.26	548.32	87.43	108.05
Max.	133.591	619.02	1376.99	233.48	339.76
Mean	82.72	442.11	941.19	154.84	228.72
SD	21.90	125.43	248.92	43.64	72.91
Skewness	0.74	-0.53	-0.14	-0.01	-0.23
Kurtosis	0.00	-1.01	-1.14	-1.08	-1.15

Source: Data compiled and retrieved from https://edgar.jrc.ec.europa.eu/report_2024#emissions_table

It is clear from the above table that CO_2 emission in India from various operations between 2004 and 2023 reveals significant trends and patterns. The power industry consistently stands out as the largest contributor to CO_2 emissions, with a mean emission of 941.19 metric tons and a maximum emission of 1,376.99 metric tons. The standard deviation (SD) of 248.92 indicates significant fluctuations in emissions over the years. Its skewness of -0.14 suggests a near-symmetrical distribution, while a kurtosis of -1.14 indicates a flatter distribution with fewer extreme values. Industrial combustion is the second-largest source of CO_2 emissions, with an average emission of 442.11 metric tons and a maximum of 619.02 metric tons. The skewness of -0.53 suggests that emissions tend to be concentrated toward the upper range, while a kurtosis of -1.01 indicates a relatively flat distribution with fewer peaks. The transport sector also plays a crucial role in emissions, with a mean of 228.72 metric tons and a maximum of 339.76 metric tons. This sector shows higher variability (SD = 72.91), suggesting fluctuations in emissions across the years. The skewness of -0.23 indicates a slight concentration toward higher values, while the kurtosis of -1.15 confirms a flatter-than-normal distribution. Processes and fuel exploitation contribute lower emissions, with mean values of 154.84 and 82.72 metric tons, respectively. Among these, fuel exploitation has the lowest variability (SD = 21.90) and exhibits a positive skewness (0.74), indicating a greater occurrence of lower emission values with some extreme high values. Processes, with an SD of 43.64, show moderate fluctuations in emissions over the years. The findings indicate that targeted policy interventions are essential, especially in the power and industrial combustion sectors, to curb India's CO_2 emissions. Promoting renewable energy, industrial efficiency, and sustainable transportation will be key to achieving significant carbon reductions and aligning with India's environmental goals.

Table – 2: CH_4 Emission in India by Different Operations

Year	Sources (in Metric tons)				
	Fuel Exploitation	Industrial Combustion	Power Industry	Processes	Transport
2004	69.44202	1.574083	0.243145	0.119636	1.24186
2005	71.53909	1.661731	0.258673	0.126998	1.36774
2006	73.66157	1.767297	0.305325	0.130258	1.263117
2007	77.78818	1.910761	0.352198	0.135733	1.199853
2008	83.01035	2.012557	0.344014	0.158416	1.265366
2009	89.69576	2.17196	0.423744	0.178103	1.421844
2010	90.27915	2.405078	0.484014	0.19689	1.544031
2011	93.27395	2.519755	0.511632	0.218699	1.547296
2012	96.18705	2.532499	0.538941	0.224906	1.50911
2013	64.97615	2.76734	0.552019	0.239835	1.478631
2014	69.0886	2.91281	0.61856	0.258119	1.502605
2015	71.90992	3.01388	0.604915	0.265166	1.539022
2016	73.09342	3.104141	0.754285	0.291532	1.724142
2017	73.10866	3.313459	0.91724	0.32041	1.771351
2018	78.86033	3.519034	0.910374	0.331295	1.778042
2019	75.92757	3.513109	0.913169	0.326332	1.855889
2020	71.98247	3.594742	0.941024	0.306326	1.668789
2021	81.32038	3.860504	0.976479	0.344446	1.960099
2022	92.44065	4.066353	1.062513	0.363292	2.122502
2023	100.4215	4.166299	1.099611	0.396275	2.240542
Descriptive Statistics					
Min.	64.98	1.57	0.24	0.12	1.20
Max.	100.42	4.17	1.10	0.40	2.24

Mean	79.90	2.82	0.64	0.25	1.60
SD	10.35	0.82	0.28	0.087	0.29
Skewness	0.54	0.05	0.18	-0.01	0.60
Kurtosis	-0.98	-1.36	-1.36	-1.24	-0.36

Source: Data compiled and retrieved from https://edgar.jrc.ec.europa.eu/report_2024#emissions_table

The table presents CH_4 (methane) emissions across various industrial operations in India from 2004 to 2023, revealing distinct sectoral trends and variations. Fuel exploitation remains the dominant source of methane emissions, with a mean emission of 79.90 metric tons and a maximum of 100.42 metric tons recorded in 2023. The standard deviation (SD) of 10.35 indicates moderate variability in emissions over the years. A positive skewness (0.54) suggests a tendency towards higher emission values, with an increasing trend over time. The negative kurtosis (-0.98) indicates a relatively flatter distribution with fewer extreme values. Industrial combustion follows as the second-largest contributor, with an average emission of 2.82 metric tons and a maximum of 4.17 metric tons. Compared to fuel exploitation, this sector shows lower variability (SD = 0.82), implying relatively stable emission patterns. The near-zero skewness (0.05) suggests a balanced distribution, while the kurtosis (-1.36) indicates a flatter-than-normal distribution. Power industry with a mean emission of 0.64 metric tons, this sector contributes relatively low methane emissions. Its skewness (0.18) suggests a slight concentration of values toward higher emissions, while its kurtosis (-1.36) indicates a flatter distribution. Emissions from processes remain the lowest, with a mean of 0.25 metric tons and minimal variability (SD = 0.087), signifying stable emissions over time. A near-zero skewness (-0.01) confirms a symmetrical distribution. Methane emissions in the transport sector show a moderate contribution, with a mean of 1.60 metric tons and an SD of 0.29, indicating some fluctuations over time. The positive skewness (0.60) suggests that emissions have a tendency toward higher values, while the negative kurtosis (-0.36) points to a distribution with fewer extreme peaks. The analysis clearly indicates that fuel exploitation is the primary driver of methane emissions in India, followed by industrial combustion. While emissions from the power industry, processes, and transport are relatively lower, their upward trends highlight the need for comprehensive methane reduction strategies. Policy efforts should prioritize reducing methane leaks, adopting cleaner technologies, and enhancing regulatory frameworks to curb emissions in key sectors.

Table -3: N_2O Emission in India by Different Operations

Year	Sources (in Metric tons)				
	Fuel Exploitation	Industrial Combustion	Power Industry	Processes	Transport
2004	0.184306	2.030126	4.390755	10.03013	2.723543
2005	0.182697	2.158405	4.824341	10.21826	2.886168
2006	0.177998	2.346572	5.82748	10.60708	2.979745
2007	0.183914	2.51965	7.316242	11.25789	3.687954
2008	0.185026	2.615527	7.783856	11.81333	4.273826
2009	0.186941	2.787894	9.116541	12.50182	4.650658
2010	0.193531	3.092064	10.39852	11.7807	5.183753
2011	0.202934	3.235805	12.60019	12.05012	5.473919
2012	0.212248	3.238421	16.0094	12.57276	5.611407
2013	0.206366	3.573083	17.10943	12.83673	5.614174
2014	0.205561	3.775652	18.46892	13.51967	5.860389
2015	0.202844	3.923563	18.20783	13.61908	6.160243
2016	0.199993	4.029003	17.99564	13.61431	6.114273
2017	0.195695	4.320239	17.78963	14.22494	6.510883
2018	0.19303	4.605179	18.88243	14.97433	6.831697
2019	0.193513	4.529074	18.80058	14.67312	6.816258
2020	0.190009	4.613836	16.96822	13.84071	5.554767
2021	0.187322	4.972567	19.1325	14.89025	6.600055
2022	0.186268	5.23345	21.23686	15.68313	6.894048
2023	0.187528	5.371644	23.0012	16.49866	7.273551
Descriptive Statistics					
Min.	0.178	2.03	4.39	10.03	2.72
Max.	0.212	5.37	23.00	16.50	7.27

Mean	0.193	3.65	14.29	13.06	5.39
SD	0.0094	1.05	5.90	1.81	1.41
Skewness	0.47	0.05	-0.44	0.02	-0.66
Kurtosis	-0.82	-1.21	-1.24	-0.83	-0.74

Source: Data compiled and retrieved from https://edgar.jrc.ec.europa.eu/report_2024#emissions_table

The N_2O (nitrous oxide) emissions data for India reveals distinct patterns across different operational sectors. Fuel exploitation remains the smallest source of N_2O emissions, with a mean value of 0.193 metric tons and minimal variability (SD = 0.0094) over the years. Its positive skewness (0.47) suggests a slight tendency toward higher values, though emissions remain consistently low. The negative kurtosis (-0.82) indicates a flatter distribution, meaning fewer extreme variations. Industrial combustion is a notable contributor, with an average emission of 3.65 metric tons and moderate variability (SD = 1.05). The nearly zero skewness (0.05) suggests a balanced distribution, while the negative kurtosis (-1.21) indicates a flatter-than-normal distribution, meaning emissions have shown steady but limited fluctuations. The power industry shows substantial N_2O emissions, with a mean of 14.29 metric tons and high variability (SD = 5.90), reflecting fluctuating trends over time. Its negative skewness (-0.44) suggests a slight tendency toward lower emissions, while the negative kurtosis (-1.24) indicates a broad distribution with fewer extreme values. The processes sector is the biggest contributor to N_2O emissions, with a mean of 13.06 metric tons and moderate variability (SD = 1.81). The near-zero skewness (0.02) suggests a symmetrical distribution, while negative kurtosis (-0.83) points to a flatter curve, meaning fewer extreme highs or lows in emissions over the years. The transport sector contributes significantly, with a mean emission of 5.39 metric tons and moderate variability (SD = 1.41). Its negative skewness (-0.66) indicates a tendency toward lower emissions in recent years, and negative kurtosis (-0.74) reflects a flatter distribution, showing fewer extreme variations. The findings emphasize the dominance of the processes sector in India's N_2O emissions, followed by the power industry and transport sector. Given the environmental impact of N_2O, mitigation efforts should prioritize emissions reduction in industrial processes, power generation, and transport. Strategies such as cleaner production technologies, improved fuel efficiency, and emission capture systems could play a key role in reducing overall emissions.

Results of Hypotheses Testing

Although the descriptive statistics analysis made hitherto throws light on the trend, relationship and difference, it is an appropriate to apply a few inferential

statistical tests for the purpose of testing the hypotheses are presented below.

(1) $H0_1$: The CO_2 emissions across different operations in India do not differ significantly.

Based on the detailed calculations made (using the data presented in Table -1, the summary results of one-sample 't' test are shown below (Table – 4) and followed by the discussion of results.

Table – 4: One-Sample 't' Test for CO_2 Emission in India by Different Operations

Sources	t	df	Sig. (2-tailed)	Mean Difference	95% Confidence Interval of the Difference	
					Lower	Upper
Fuel Exploitation	16.894	19	.000	82.718	72.470	92.966
Industrial Combustion	15.763	19	.000	442.111	383.409	500.813
Power Industry	16.909	19	.000	941.189	824.690	1057.689
Processes	15.868	19	.000	154.843	134.418	175.267
Transport	14.028	19	.000	228.719	194.594	262.844

Source: Table-1, SPSS Output

The one-sample t-test results indicate that CO_2 emissions for all operational categories are significantly different from the assumed population mean (zero emissions). Since all p-values are less than 0.05, we reject the null hypothesis (H_0), confirming that emissions from Fuel Exploitation, Industrial Combustion, Power Industry, Processes, and Transport significantly contribute to India's CO_2 emissions. Among them, the Power Industry shows the highest mean CO_2 emissions (941.19 metric tons), followed by Industrial Combustion (442.11 metric tons), while Fuel Exploitation has the lowest mean emissions (82.72 metric tons). These results highlight sectoral variations and the need for targeted mitigation strategies.

(2) $H0_2$: The CH_4 emissions across different operations in India do not differ significantly.

Based on the detailed calculations made (using the data presented in Table -2, the summary results of one-sample 't' test are shown below (Table – 5) and followed by the discussion of results.

Table – 5: One-Sample 't' Test for CH_4 Emission in India by Different Operations

Sources	t	df	Sig. (2-tailed)	Mean Difference	95% Confidence Interval of the Difference	
					Lower	Upper
Fuel Exploitation	38.512	19	.000	89.732	84.511	94.953
Industrial Combustion	16.204	19	.000	2.781	2.412	3.150
Power Industry	10.615	19	.000	0.612	0.485	0.739
Processes	13.142	19	.000	0.268	0.225	0.311
Transport	33.007	19	.000	1.583	1.480	1.686

Source: Table-2, SPSS Output

The one-sample t-test results reveal that CH_4 emissions for all operational categories in India differ significantly from the assumed population mean (zero emissions). With p-values less than 0.05 for all sectors, we reject the null hypothesis (H_0), confirming substantial differences in CH_4 emissions across these categories. Among them, Fuel Exploitation has the highest mean CH_4 emissions (89.732 metric tons), indicating a major contribution from this sector. The Industrial Combustion and Transport sectors also show notable emissions (2.781 and 1.583 metric tons, respectively), while Power Industry and Processes contribute relatively lower CH_4 emissions (0.612 and 0.268 metric tons, respectively). These results highlight the critical role of fuel exploitation and industrial activities in methane emissions, suggesting a need for targeted regulatory and mitigation measures to curb CH_4 emissions effectively.

(3) $H0_3$: The N_2O emissions across different operations in India are not significantly different from each other.

Based on the detailed calculations made (using the data presented in Table -3, the summary results of one-sample 't' test are shown below (Table – 6) and followed by the discussion of results.

Table – 6: One-Sample 't' Test for N_2O Emission in India by Different Operations

Sources	t	df	Sig. (2-tailed)	Mean Difference	95% Confidence Interval of the Difference	
					Lower	Upper
Fuel Exploitation	94.217	19	.000	0.195	0.190	0.200
Industrial Combustion	16.742	19	.000	3.562	3.082	4.042
Power Industry	14.009	19	.000	5.784	4.892	6.676
Processes	33.104	19	.000	13.241	12.382	14.100
Transport	17.512	19	.000	5.210	4.543	5.877

Source: Table-3, SPSS Output

The one-sample t-test results indicate that N_2O emissions across all operational categories in India are significantly different from the assumed population mean. With p-values less than 0.05, we reject the null hypothesis (H_0), confirming that N_2O emissions vary significantly across different operations. Among the sources, Processes contribute the highest mean N_2O emissions (13.241 metric tons), highlighting their substantial role in total emissions. Power Industry and Transport also show considerable emissions (5.784 and 5.210 metric tons, respectively), while Industrial Combustion follows closely (3.562 metric tons). Fuel Exploitation has the lowest emissions (0.195 metric tons), though still statistically significant. These findings suggest that industrial and transportation activities are key contributors to N_2O emissions, requiring sector-specific mitigation strategies for reducing environmental impact.

Circular Economy Contributes to Combating Climate Change - How?

A circular economy plays a crucial role in combating climate change. Currently, material extraction and use account for about 70% of global greenhouse gas emissions. To make substantial reductions in emissions, it's vital to address key areas of unsustainable consumption and production, particularly in high-impact sectors like industry, construction, and agriculture. However, the study indicates

that by adopting circular economy practices in just four major industrial materials like cement, steel, plastics, and aluminum, it's possible to cut global greenhouse gas emissions by up to 40% by 2050. Additionally, incorporating circular methods within the food sector could potentially achieve an overall reduction of 49% in global GHG emissions. Similarly, under the Paris Agreement, countries are setting climate goals known as Nationally Determined Contributions (NDCs) to cut greenhouse gas emissions and enhance resilience to extreme weather events. Integrating circular economy strategies into these commitments can speed up the transition to a low-carbon economy, safeguard the environment, and generate green, equitable job opportunities. Further, the International Labour Organization (ILO) estimates that adopting circular economy practices such as recycling, repair, rental, and remanufacturing could lead to the creation of 6 million jobs worldwide by 2030.

Shift to a Circular Economy – Issues/ Reactions

A shift towards a more circular economy presents a range of challenges. The initial hurdle is a lack of widespread awareness. Many countries are not yet familiar with the circular economy's potential or lack a concrete strategy for its implementation. There is a need for enhanced understanding of the benefits and effects of circular economy practices, particularly concerning climate and biodiversity. Another significant challenge is the difficulty that businesses, especially small and medium-sized enterprises (SMEs), face in securing the necessary financing to move from linear to circular models. For instance, transitioning from conventional to organic cotton farming can take around three years, and similarly, adopting circular, regenerative methods may require an equally lengthy period. This transition demands not only financial investment but also knowledge sharing, community support, and ongoing training. Even, if adopting circular economy practices were simpler, evaluating their effectiveness could still be problematic. Monitoring and reporting progress often involves complexities, such as tracking emissions, those indirect emissions associated with an organization's entire value chain. This process is complicated by factors like supply chain opacity, limited direct interactions with various suppliers, and intricate accounting procedures.

Conclusion and Implications

From the factual data analysis aimed to assess the impact of circular economy practices on reducing carbon emissions and to examine the economic, social, and environmental benefits of circular economy models across various industries. The findings, based on the analysis of CO_2, CH_4, and N_2O emissions across different operations in India, offer valuable insights. The study's hypotheses testing clearly shows that emissions across various operational sectors (fuel exploitation, industrial combustion, power industry, processes, and transport) are significantly different from hypothesized population means. The power industry was identified

as the most significant contributor to CO_2 emissions, followed by industrial combustion. Similarly, fuel exploitation dominated CH_4 emissions, and processes were the largest source of N_2O emissions.

Implications for Circular Economy and Climate Change Mitigation

1) **Targeting High-Emission Sectors:** The findings indicate that the power industry, fuel exploitation, and industrial processes are key contributors to greenhouse gas emissions. Implementing circular economy practices, such as improving energy efficiency, increasing the use of renewable energy, and adopting waste reduction measures, could significantly lower emissions in these high-impact sectors.
2) **Policy and Regulatory Interventions:** The analysis emphasizes the need for policy frameworks that incentivize industries to adopt circular economy models. Policies could include carbon pricing, subsidies for renewable energy, or mandates for waste recycling and reuse, which would accelerate the shift toward more sustainable production and consumption practices.
3) **Industry Transformation:** Circular economy practices such as closed-loop production, resource optimization, and product lifecycle management can transform industries by reducing dependency on finite resources and minimizing waste. For instance, the power industry could benefit from transitioning to cleaner energy sources and more efficient technologies, while fuel exploitation could explore alternative, less-polluting materials.
4) **Environmental and Social Benefits:** Beyond reducing emissions, adopting circular economy principles offers additional environmental benefits such as conserving natural resources and reducing environmental degradation. Socially, it creates new job opportunities in recycling, remanufacturing, and sustainable design industries, contributing to a just transition towards a low-carbon economy.
5) **Overcoming Barriers to Implementation:** Despite the benefits, barriers such as lack of awareness, initial capital costs, and resistance to change must be addressed. Strategic interventions including education, investment in innovation, and public-private partnerships could help overcome these challenges and promote widespread adoption of circular economy practices.

On the lines of the above, adopting circular economy models offers a pathway to significantly reducing carbon emissions and mitigating climate change. It is essential to focus on transforming high-emission sectors through innovative, sustainable practices, supported by appropriate policy measures and industry commitment. The successful transition to a circular economy will not only mitigate climate impacts but also foster economic resilience and environmental sustainability.

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CORPORATE GOVERNANCE : A RESPONSE TOWARDS CHANGING SCENARIO

Malay Kumar Paul

Abstract

The key elements of good corporate governance principles include honesty, trust and integrity, openness, performance orientation, responsibility and accountability, mutual respect, and commitment to the organization. Rights and equitable treatment of shareholders, interests of other stakeholders, roles and responsibilities of the board, disclosure and transparency are the main principles to be followed in adopting effective corporate governance strategies for the companies." Such effectiveness of strategies can be measured through a 'Governance Index'. The purpose of the instant study is to prepare a scoring model against the most impactful Governance parameters, which will indicate the relative strength of the entity against the peers in the area of Governance. The score will be derived from the corporate disclosures in the Annual Report.

Keywords

Corporate Governance, Corporate Governance Index (CGI), Key Pillars and Indicators (KPI), Boards of Directors, Shareholders

Set the tone

The art of Corporate Governance is a parallel consign of 'Dharma (nature)' in human existence. Logically, 'Fire' has a 'Dharma' to burn; 'Air' has 'Dharma' to blow; signifying the quintessence of 'Code of Conduct (COC)'. Rapid transformation in stakeholder expectation', stipulate corporations universally to pursue self-ordained COC. **As per the OECD (Organization for Economic Cooperation and Development) documents published in 1999, Corporate Governance is the system by which organizations are directed and controlled.** Corporate governance is scripted to entail integration of value creation for shareholders in a translucent comportment truly reflective of the position of corporate apparition. Milton Friedman (1962) visualized that corporate governance is to conduct the operation of an entity in accordance with owners (promoters) vision and shareholders' mission (capitalism) , leading to maximization of wealth ,in compliance with the fundamental rules of the economy it operates ; which are necessarily embodied in the legal framework of the land. The moral Compass of Corporate Governance need to be looked in light of pronouncement by Mahatma Gandhi ***"Businessmen are Trustees".*** Good Corporate Governance is a philosophical issue and matter of attitude, which gets more significance in this VUCA (Volatile, Uncertain, Complex, and Ambiguous) scenario.

In the context of ancient Indian philosophy, epics and legal texts , "dharma" encompasses not only religious duty but also social and moral order. Mahabharata, Ramayana, Bhagavad Gita, Manu Smriti , Yajnavalkya Smiriti, Vishnu Smriti etc. upholds the importance of 'dharma' as the source of governance. "Dharma is the foundation of governance, for it ensures the protection of all beings." (Mahabharata, Shanti Parva, Chapter 109, Verse 12). Ramayana emphasized on governance as King's primary duty, "The king's duty is to uphold dharma, for it ensures the prosperity of all." (Ayodhya Kanda, Chapter 100, Verse 15). "Dharma is the foundation of governance, for it ensures the well-being of all." (Bhagavad Gita Chapter 4, Verse 7). Kautilya's Arthashastra emphasizes the importance of "dharma" in governance, highlighting its role in maintaining social harmony and promoting the common good. "Dharma is the ultimate governance, for it ensures the well-being and harmony of all members of society." (The Kautilya Arthashastra translated by R P Kangle, 2010).

"The key elements of good corporate governance principles include honesty, trust and integrity, openness, performance orientation, responsibility and accountability, mutual respect, and commitment to the organization. Rights and equitable treatment of shareholders, interests of other stakeholders, roles and responsibilities of the board, disclosure and transparency are the main principles to be followed in adopting effective corporate governance strategies for the companies." Such effectiveness of strategies can be measured through a 'Governance Index' . A company's ''Corporate Governance Index'' expresses the opinion about the extent to

which a company adopts and conforms to codes and guidelines of good corporate governance practices that clearly serve the interests of its financial stakeholders. (Corporate Governance Ratings, Reha Cirak,2007)

During the 1990s, a number of corporate scandals in the USA (viz., Lehman Brothers, AIG Insurance, Xerox, Arthur Anderson, Enron, WorldCom, Tyco, etc.), and also elsewhere in the world, triggered the gun towards 'governance lapses' in respective entities. To protect stockholder and stakeholder interests, SOx (Sarbanes- Oxley) legislation was promulgated in 2002. Prior to that in 1992, Cadbury Report on financial governance was published. The Cadbury Committee advocated "a mechanism for accountability, emphasizing the need to raise reporting standards". Voluntary and mandatory disclosures can help in understanding corporate performance. (Bhasin and Junaid 2013). OECD (Organization for Economic Cooperation and Development) prescribed (2006) for a clear, concise, precise reporting governed by the substance over form principle. Moreover, good governance requires the board to constantly monitor the firm to ensure consistent growth in the firm value to add value to the shareholders wealth (Shleifer & Vishny,1997).

The Cadbury Committee (1992) defined Corporate Governance, as a system of structuring, operating and controlling a company with the following specific aims:

- Fulfilling long-term strategic goals of owners
- aking care of the interests of employees
- A consideration for the environment and local community
- Maintaining excellent relations with customers and suppliers; and
- Proper compliance with all the applicable legal and regulatory requirements

Corporate governance refers to the "the whole set of legal, cultural, and institutional arrangements that determine what public corporations can do, who controls them, how that control is exercised, and how risks and return from the activities they undertake are allocated." (Blair, 1995).

In summary, corporate governance talks about ……..

- ► The **Boards of directors** and their responsibility for the governance of companies
- ► S**hareholders**' role in governance is to appoint the **directors** and the **auditors** and to satisfy themselves that an appropriate governance structure is in place
- ► R**esponsibilities of the board** include setting the company's strategic aims, providing the leadership to put them into effect, supervising the management of the business and reporting to shareholders on their **stewardship**
- ► Board's actions are subject to **laws, regulations and the shareholders** in general meeting

Objective of the study

Corporate Governance is one of the most relevant area of concern in today's

world. Literature reviews indicate, most of the studies are made to establish a relationship between (1) 'corporate governance' and 'Firm performance' , (2) 'Corporate Governance' and 'Stock Market Performance', (3) Corporate Risk and Corporate Governance' etc. For the purpose, researchers identified corporate risk (Dependent variable) against parameters (independent variable) to explore the relationships. **The purpose of the instant study is to prepare a scoring model against the most impactful Governance parameters, which will indicate the relative strength of the entity against the peers in the area of Governance**. The score will be derived from the corporate disclosures in the Annual Report.

Corporate Governance Theories

The Governance theories that have been applied in the literature (in chronology of propagation time) to study 'Corporate Governance Indexing mechanism' includes:

a. Signalling Theory -Michael Spence (1973) indicates disclosure is a signal that conveys the company's intentions to external parties. A company with strong risk management practices may disclose more risks to signal its transparency and credibility to investors and stakeholders. Both present and future investors can peruse such signals for making timely and appropriate investment decision. **The author thinks , signal to and from society is the two-way for addressing governance issues**.

b. Legitimacy Theory - Richard Dowling & Frank Pfeffer (1975) suggests that companies disclose information to maintain their legitimacy in the eyes of society. **Legitimacy Theory proposes that organizations seek to maintain or enhance their legitimacy by engaging in activities that align with societal expectations and values**. Perceived right of the organization to exist and operate within a society. There exists an implicit agreement between an organization and society, where the organization provides benefits in exchange for societal approval and support. Provision relating to CSR (Corporate Social Responsibility) as introduced in Companies Act 2013 is fallout of such legitimacy approach. Organizations engage in activities that demonstrate their commitment to societal values and expectations.

c. Agency Theory -Michael Jensen & William Meckling (1976), which focuses on the relationship between principals (shareholders) and agents (managers), highlighting the **potential conflicts of interest due to information asymmetry and the need for disclosure to align these interests**. A company may disclose more risks to reduce the perception of management opportunism, thus aligning the interests of managers with those of shareholders.

d. Institutional Theory-John Meyer & Brian Rowan (1977), DiMaggio & Powell (1983) examined how **organizations respond to and are shaped by their institutional**

environment, including social, cultural, and political norms, values, and expectations. Disclosure requirement and information reported to conform to institutional norms and expectations. The risk and mitigation strategy and practices followed by the entity requires to be in line with industry requirement to gain legitimacy.

e. Resource Dependence Theory -Jeffrey Pfeffer & Gerald Salancik (1978) theory suggests that organizations are dependent on their environment for resources, and disclosure is a way to manage these dependencies and reduce uncertainty. By appropriate disclosure on risk and managing therefor the entity can assure the stakeholders of its resilience and reliability. **Resource Dependence Theory can be interpreted as a precursor for ESG**. The theory's emphasis on external resources, environmental sustainability as organizations seek to reduce their dependency on natural resources and minimize their environmental impact. The theory's focus on interdependence with stakeholders and the environment ; aligns with the social aspect of ESG, which considers the impact of organizational activities on society and stakeholders.

f. Stakeholder Theory - Edward Freeman (1984) posits that companies should consider the interests of all stakeholders, not just shareholders, when making disclosure decisions. Unlike agency theory, **stakeholder theory argues that managers in the organization are not only responsible for the interests of the shareholders, but also serve the network of relationships to include suppliers, employees and business partners**. Stakeholder theory goes beyond the orientation of the shareholders, which means that decisions are made regarding the different companies beyond the shareholders of the company. A company may disclose risks that are of particular concern to employees, such as health and safety risks, to demonstrate its commitment to these stakeholders.

g. Management Entrenchment Theory- Michael Jensen (1986) explains how managers may prioritize their own interests over those of shareholders, leading to agency problems. This is contrary to good governance practices. **This theory highlights the conflict between managers (agents) and shareholders (principals), where managers may prioritize their own interests over shareholder value**. This may impact the Organisation heavily because business decisions like production decision, Project selection and investments etc. are in the interest of managers only. They may resort to window dressing to hide reality and stakeholders will suffer their value of investment. It can be mentioned here that such personal motivations are reined by Companies Act 2013, which placed restriction on executive compensation with a

role to be played by 'remuneration committees' as a prescription for good governance.

Literature Review on CGI

Disclosure information in entirety provide knowledge about the way organizations functioning, however, in the absence of scoring index i.e CGI (Corporate Governance Index) methodology, it is not possible to make comparison among entities based on a set parameter how each one is handling the governance issues.

The CGI concept and its application grown heterogeneously across the globe. The article "Corporate Governance Scorecards" written by Ralitza Germanova, Corporate Governance Officer, IFC Laos Securities Commission, outlines the development and implementation of Corporate Governance (CG) Scorecards, a tool designed to assess and promote the adoption of CG codes. Originating from Germany and adapted by the OECD/World Bank/IFC, these scorecards have been applied in various countries, including Palestine, Jordan, Thailand, Malaysia, the Philippines, Indonesia, Vietnam, ASEAN, Mongolia, Kenya, Rwanda, and the Balkans.

The Corporate Governance Scorecard for Palestine employs a scoring methodology that weighs mandatory provisions at 75% and voluntary ones at 25%. The scorecard is ratified by the board of directors or relevant committees.

In Nigeria, the CG Scorecard was developed with IFC assistance to assess compliance with the CG Code and to identify strengths and weaknesses in CG practices. It is a mandated, web-based tool requiring sign-off by board members and senior management.

The document also discusses the Rwanda ESG Scorecard (2020) and other scorecard issues, such as the platform for completion, review periods, evidence-sourcing, data management, privacy, and reporting. The ratings were composed of 43 items (under four sub-index with weightage as 53%, 18%, 16% and 13% respectively), with a maximum value of 100 and were obtained by summing the below referred four sub-indices.(Lefort & Gonzalez, 2008

a. Composition and performance of the Board,
b. Shareholders rights,
c. Ethics and conflicts of interest and
d. Other information related to CG.

Each of the above sub-index comprised of a series of factors with the same weights. The composition and performance of the board sub-index captured board independence, mission, voting process, management structure, shareholders' agreements and resolutions proposed for its adoption. The sub-index related to ethics and conflicts of interest attempts to measure conflicts of interests and related party transactions, company operations with its directors and managers, significant transactions between the company and significant shareholders, and ownership composition. The final sub-index deals with other related information with CG. It attempts to measure a company's public commitment to good corporate practices. An Empirical Examination of the Relationship between Corporate Governance Ratings and

Listed Companies' performance by by Georgeta Vintilă1 & Ştefan Cristian Gherghina indicates 63 variables, divided in four categories: Audit, Board Structure, Compensation, and Shareholder Rights. Also, each category is divided in more subsections, including variables expressed as questions. For the U.S. companies, the Audit area comprise Audit Fees (21.25%), Controversies (57.5%), and Other Issues (21.25%). The Board Structure comprise Board Composition (25%), Committee Composition (15% spread evenly among Nomination, Compensation, and Audit Committees independence questions), and Board Practices (60%). The Shareholder Rights comprise One Share One Vote (10%), Takeover Defences (50%), Voting Issues (17%), and Voting Formalities (23%). The Compensation category comprise Remuneration-Executive Short Term (3%, which focuses on whether a company discloses performance measures, hurdle rates and pay-out thresholds for short-term cash incentive plans), Remuneration-Executive Long Term/ Equity (32%), and Remuneration-Other (65%). The relevant questions in each Sub-Index is as follows, the questionnaire being factored in the governance scoring model:

Shareholders Rights -Sub-Index

- How independent is the Board?
- What is the Board's mission?
- How is the Board's functions structured?
- Is the Board effective?
- How does the Company establish Board autonomy?

Composition and Performance of the Board Sub-Index

- How does the Company describe its shareholding voting Process?
- How does the Company encourage alignment between Board and Manager interest with Shareholder interests?
- How does Company address pyramidal structures that reduce the concentration of control?
- How does the Company provide information on its agenda and Shareholders' agreements?
- What resolutions does the Company propose for adoption?

Ethics and Conflicts of Interest Sub-Index

- How are conflicts of interests and related party transactions measured?
- How are Company operations with its Directors and Managers scrutinized?
- Does the Company have significant transactions with shareholders or a certain concentration of ownership?
- What is the Company's ownership composition?

Other Information related to CG Sub-Index

- What is the Company's public commitment to good corporate practices and transparency?
- Does the Company use international accounting principles?
- What is the Company's policy in relation to breaches of CG practices?
- How does the Company disclose its financial performance?

- What practices of good governance does the Company have in place?

Journey in India

Governance reforms have become the corner stone of corporate sector development in India in recent years. As Indian companies begin to access international capital and as foreign investors begin to acquire stakes in Indian companies, the design of a well laid out governance structure has become increasingly important for growth of corporate sector. India's journey towards good governance practices was initiated long back. Despite couple of hiccups in the form of lapses of governances observed e.g consecutive Security scam by Harshad Mehta (1992) and Ketan Parekh (2001) , Satyam (2009), Speak Asia (2011), Sharda Group (2013) etc. ; which are black spots in history of governance in India.

1999 – Kumar Mangalam Birla Committee on Corporate Governance

2000- Narayan Murthy Committee and Introduction of Clause 49

2002 – Naresh Chandra Committee formed

2004 – CEO /CFO Certification

2009 – Issue of voluntary guidance on Corporate Governance

2012 – Issue of guiding principles in Corporate Governance

2013 – Companies Act 2013

2014 – Revised Clause 49

2016 – Adoption of IND AS in line of global accounting standard

2017 – Kotak Committee , set-up by SEBI recommended measures to improve Corporate Governance , including enhancements to board composition , Audit Committee and Shareholder rights

2019- National Guidelines on Responsible Business Conduct and encourage Companies to adopt sustainable and ethical practices

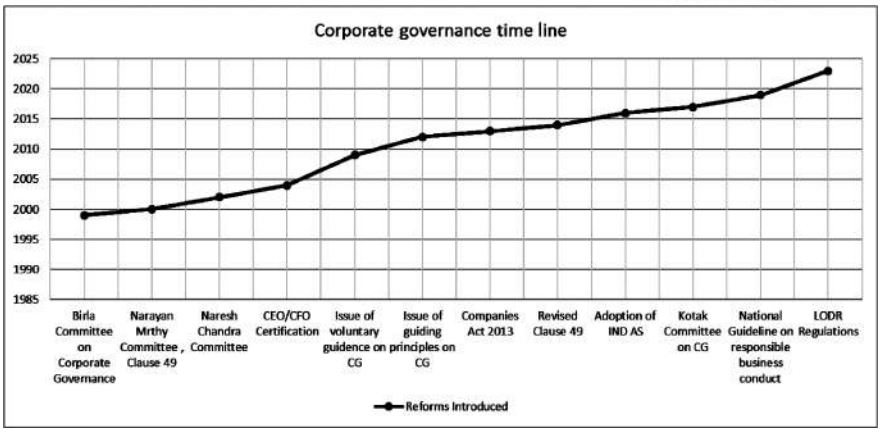
2023 - LODR Regulations, SEBI has introduced qualitative thresholds for determining materiality of events / information

In India, Agencies like ICRA, CRISIL, BSE etc. tried to develop purposive CG Index. The latest CGI was reported by CRISIL (2019), IIAS - Institutional Investor Advisory Services (2020), Bombay Stock Exchange (2020), ICRA (2020), S & P (2020) reproduced hereunder. The salient features of those studies include categorization under broad governance issues (1 to 7 as referred) detailed hereunder.

Agency	Score Indicator						
	1	2	3	4	5	6	7
ICRA			Y	Y	Y	Y	Y
S & P	Y		Y			Y	Y
CRISIL		Y	Y	Y	Y		Y
IIAS	Y		Y			Y	Y
BSE			Y	Y	Y	Y	Y

1 = Accounts Quality
2 = Transparency
3 = Board Composition
4 = Audit Committee
5 = Executive Compensation
6 = Disclosure
7 = Shareholder Rights

Y indicates reported Parameters



Corporate Governance Index (CGI)

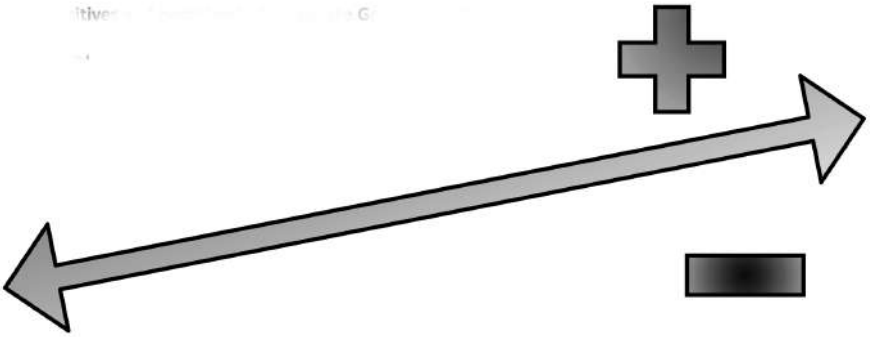
Corporate governance covers a numbers of internal and external mechanisms that reduce agency cost within a corporation and thereby lead to an increase in enterprise value, confidence level of Investors/ prospective Investors and Stakeholders. Six important governance mechanisms are considered hereunder to capture the overall state of corporate governance of a company. Viz. (1) Shareholding pattern, (2) Board structure, (3) Business Model –transactions (4) Governance structure and management processes (5) Financial discipline and (6) Ethics. These pillars are again sub-divided to strengthen the base further. The corporate governance practices prevalent in an organisation reflect the distribution of rights and responsibilities among its different participants—such as the Board, management, shareholders and other financial stakeholders—and the rules and procedures laid down and followed for making decisions on corporate affairs. The 'K**ey Pillars and Indicators (KPI) '**of CGI is indicated hereunder. Total 21 Sub-Index parameters used for Scoring with maximum indicated score as 3. Total Score allotted 55 and based on actual status as per disclosure of the entity can be computed to ascertain CGI of the entity. The same can be replicated across business sectors.

1. Shareholding pattern
   a. Promoter and Non-promoter holding
   b. Institutional holding
   c. Retail /Minority holding
   d. Cross holding, which may affect minority interest
2. Board Structure
   a. Competency level of members
   b. Independency of Directors
   c. Orientation of new directors about company's governance processes
   d. Relative standing of existing governance practices as a form of self-assessment
3. Business Model –transactions
   a. Transactions with Group entities / related parties
   b. Dependency of revenue within group entities
   c. Inter group movement of funds
   d. Board's authority to handle such transactions
4. Governance structure and management processes
   a. Policy monitoring / governance Board
   b. Woking Board – hands on major areas e.g Financial decision, Acquisition etc.
   c. Empowerment through Committee roles e.g Remuneration / Nomination Committee
   d. Two way communication with Board
5. Financial discipline
   a. Adherence to Accounting Standards and adequacy of disclosure (incl. BRSR)
   b. Changes in accounting policies
   c. Disclosure of transactions between associates, related parties etc.
   d. Quality of controls and review by Auditor

6. Ethics
   a. Code of ethics
   b. Cascading of ethics throughout the Organization
   c. Monitoring of compliance
   d. Whistle blower policy and protection for whistle blower

Impact (positives and negatives) of Corporate Governance Rating

- visible entity performance
- increases company valuations
- increases reputation and goodwill
- greater access to financing
- lower cost of capital
- more favourable treatment of all stakeholders



- poor visibility of performance
- risky financing patterns
- reputational risk
- susceptible to macroeconomic crisis
- Exodus of talent

Based on the actual status reported, one can compute the CGI. The same can be put in a band of score to identify the Company's grade as indicated hereunder.

Score Band	Grade
40 - 55	A
30 - 39	B
20 - 29	C
Upto 19	D

Conclusion

India is developing at a faster pace in comparison to its peers. Liberalization, Privatization and Globalization (LPG) has opened plethora of opportunity before corporate India nay India to become one of the super power in economic front, despite global turmoil and slowdown. Stricter governance norms and compliance will ensure transparency to prospective and present Investors (local or global). Companies with poor corporate governance practices came into limelight, with many such companies experienced an exodus of even independent directors from their Boards. As we extended the Rating mechanism for important corporate

governance issues like related party transactions, accounting and reporting quality, stock exchange communication on significant deals etc. , it would be interesting to see that corporate governance rating as a tool for identifying the good and poorly governed companies which in turn should provide a test for the acceptability of the corporate among regulators, investors and society at large.

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Annexure

Sl.No.	BRSR Ref.	Criterion	Linkage	Rating Score	Score	Max.
1	1,4	Shareholder Composition	Shareholder pattern	More than 50% by Public	1	
				More than 70 % by Public	2	2
2	4	COO Compensation	Financial Discipline	More than 25% of Average Company Pay-out	1	
				Less than 10% of Average Company Pay-out	2	2
3	1	Board Composition	Board Structure	Maximum number of Independent Directors	2	2
				Less than 50% Independent Directors	1	
4	4,7	Legal and Compliance Spent and adherance	Ethics	Major non-compliance disclosure	1	
				Minor Legal violation & contesting , results pending	2	

				Legal Expenses less than 1% of Turnover	3	3
5	3,4,7	Audit Committee composition	Board Structure	More than 75% Independent Directors	3	3
				Between 60 % to 75%	2	
				Less than 60%	1	
6	1,4	Investor activism	Business Model -transactions	Minority Participation in decision making - voting by less than 50%	1	
				Minority Participation in decision making - voting by more than 50%	2	2
7	4,7	Institutional holding	Shareholder pattern	Less than 10%	1	
				More than 20%	2	2
8	1,7	Secretarial shortcomings in disclosure	Business Model -transactions	Rectification of discosures	1	
				Ensuring accuracy in disclosure required	2	2
9	4	Minority Shareholding vs. Independent Directors	Board Structure	Per 10 p.c of Minority Interest representation by at least one Director	2	2
				Less than one Director per 10% of Minority Interest	1	
10	3,4,8,9	p.c of Entity Turnover against transactions with Related Parties	Business Model -transactions	Maximum upto 25% of Turnover	2	2
				Over 25% turnover from related parties - dependency risk	0	

11	1,4	Board Engagement Level (Attendance)	Governance Structure & Management process	More than 75% of the BOD Meetings	2	2
				Less than 60% of the BOD Meetings	1	
12	3,8,9	Disclosure of Performance parameters and Executive compensation	Governance Structure & Management process	Role of Remuneration Committee in specifying performance parameter setting and disclosure	2	
				Evaluation of performance against the set parameters and disclosures	3	3
				Linking of performance with remuneration and disclosure	4	
13	1,4	Separation of CEO and Chairperson Role (Kotak Committee)	Governance Structure & Management process	Non separation	0	
				Separated	2	2
14	4,8,9	MSME Payment compliance	Governance Structure & Management process	Disclosure on MSME payments disclosure within stipulated days of payment	3	3
				Provision for interest made in Accounts due to delayed payment	1	
15	8,9	CSR Spent	Governance Structure & Management process	Actual Spent in approved activities over the stipulated limit	3	3
				Actual Spent in approved activities upto the stipulated limit	1	

				Actual Spent in approved activities less than 50% of the stipulated limit	0	
16	1,4,7	Retirement, Re-election and Continuity period criterion for Directors with Age bracket	Board Structure	Provisions under Companies Act and own set of guidelines for adherence	2	2
				More than 10 years tenure and age beyond 70 years	0	
				Re-election for more than 3 times in a row or more than 10 years continuous	0	
17	5,7	Resignation by Director/s before serving the stipulated period	Ethics	Resignation citing any reason other than health ground	0	
				Serving the full tenure	2	2
18	1,4	Management Shareholding information disclosure	Governance Structure & Management process	Annual Sign-off procedure with disclosure of holding	2	2
				Holding more than 5% in total by the top executives	0	
19	4,7	Whistle Blower Policy	Governance Structure & Management process	Period gap over 2 years for implementation post stipulation> 2 years	0	
				Period gap over 2 years for implementation post stipulation < 1 year	3	3
				Period gap over 2 years for implementation post stipulation> 1 but <2 years	2	

20	1,4,7	Promoter's pledging and disclosure of reason (result in increased governance & liquidity risk)	Governance Structure & Management process	No pledging disclosure with assumption for non-happening	3	3
				Disclosure of pledge with reason therefor	2	
				Release of pledge and disclosure	1	
21	1,4	Entity disclosed Policy on selection of Statutory Auditor	Governance Structure & Management process	Board's disclosed Policy for selecting Statutory Auditor	3	3
				No disclosed Policy but referred by any Board Member or Promoter	0	
22	2,5, 6,7,8	Business Responsibility and Sustainability (BRSR)	Governance Structure & Management process	Appropriate Disclosure of Business Risk in BRSR and RM under Corporate Governance Reporting	5	5
				Incompleteness	2	
				Non or inadequate Reporting	0	
						55
				Score Band	Grade	
				40 - 55	A	
				30 - 39	B	
				20 - 29	C	
				Upto 19	D	

DOES CORPORATE SOCIAL RESPONSIBILITY DRIVE FINANCIAL SUCCESS? INSIGHTS FROM MANUFACTURING FIRMS

Durga Singh Gour
Neelam Yadav

Abstract

In recent years, the concept of corporate social responsibility (CSR) has gained significant traction across various industries, particularly in the manufacturing sector. The present paper aims to investigate the impact of CSR expenditures on firms' financial performance. For the study, a sample of 359 companies from 6 manufacturing sectors has been selected. The study covers a period of 9 years, from FY 2015-16 to 2022-23. For the analysis, canonical correlation analysis applied, i.e., used When there are several dependent and independent variables utilized to investigate the relationship between the two sets of variables. The dependent variables are ROA, ROE, EPS, P/E ratio, P/B ratio, and market capitalization, while the independent variable include Corporate Social Responsibility (CSR). Results found that CSR investments are positively correlated with better financial outcomes in sectors like construction materials, food and agro-based products, metal and metal products, and machinery manufacturing. Spending more on CSR improves the financial success of businesses in certain industries. Financial performance metrics for the textile and chemical industries are not significantly impacted by CSR spending. This implies that the financial results in these industries are not significantly impacted by CSR initiatives.

Keywords

Corporate Social Responsibility, Financial Performance, Profitability Measures, Manufacturing Sector, Market Capitalization, Canonical Correlation

Introduction

Corporate Social Responsibility (CSR) is crucial for modern businesses as it fosters a positive relationship between companies and their stakeholders, including customers, employees, and the community. By prioritizing ethical practices, environmental sustainability, and social welfare, organizations not only enhance their brand reputation but also build customer loyalty and trust. Furthermore, businesses that actively engage in CSR are better positioned to navigate regulatory challenges and mitigate risks, ultimately leading to long-term profitability and resilience in an increasingly competitive market.

Although good corporate entities have long prioritized corporate social responsibility (CSR), it wasn't until the Companies Act of 2013 that it gained significant attention in India. This is because the Act required corporate entities that met the prescribed threshold to spend at least 2% of their average profit over the previous three years **(MCA, 2013).** In accordance with the "National Voluntary Guidelines on Social, Environmental, and Economic Responsibilities of Business," the Act further specifies the kinds of activities that could be the focus of CSR spending and mandates that all pertinent information be disclosed **(MCA, 2011)**. Over the past forty years, research on the social responsibility of businesses has focused on corporate social responsibility (CSR) and its connection to firm performance. Over time, the region has seen both major advancements and changes.

CSR & Manufacturing Sector

In recent years, the concept of Corporate Social Responsibility (CSR) has gained significant traction across various industries, particularly in the manufacturing sector. As companies increasingly recognize the importance of integrating social and environmental concerns into their business strategies, the relationship between CSR initiatives and financial performance has emerged as a critical area of investigation. This paper aims to explore the dynamic interplay between CSR and multiple financial performance indicators, specifically Return on Assets (ROA), Return on Equity (ROE), Earnings Per Share (EPS), Price-to-Earnings (P/E) ratio, Price-to-Book (P/B) ratio, and market capitalization within India's manufacturing sector.

The manufacturing sector plays a pivotal role in India's economic growth, contributing substantially to GDP and employment. However, it also faces challenges related to sustainability and ethical practices. As stakeholders increasingly demand accountability and transparency, understanding the financial implications of CSR becomes essential for companies seeking to enhance their competitive advantage. This research seeks to provide empirical evidence on whether robust CSR practices correlate with improved financial metrics, thereby offering insights for manufacturers aiming to align their operational strategies with broader societal goals.

Literature Review

(Singhal et. al., 2024) examined the impact

of corporate social responsibility (CSR) on corporate financial performance (CFP) using return on equity (ROE), a metric used to quantify shareholder value. The National Stock Exchange (NSE)-Nifty-100 indexed companies of the Emerging Economy (India) provided the study's 2009–2023 data. The empirical model was created for analysis using panel data regression, with ROE as the dependent variable and earning per share (EPS), log total income (LTI), CSR investment/profit after tax (CSRIPAT), and CSR applicability/profit after tax (CRSAPPPAT) as the independent variables. The findings showed that the CSR/ESG projects' investment and application had no discernible effect on the enterprises' return on equity. Companies that effectively communicate with stakeholders could reduce the CSR/ESG promise–performance gap and improve performance. **Paliwal, (2023)** examined Gujarati pharmaceutical firms' CSR reporting procedures and ranked them according to their disclosure and reporting methods. Mann-Whitney According to the results of the U test, the price-earnings ratio (PER) is the only variable that significantly differs from the CSR disclosures of the sample companies. Furthermore, even though pharmaceutical companies are spending more money on CSR initiatives as required by the Companies Act of 2013. **Coelho, R., et. al. (2023)** gave insight into the connection between CSR initiatives and businesses' financial performance via bibliometric data. In order to map this topic, 53 articles from 1984 to 2021 that examined the relationship between CSR and financial performance were systematically reviewed and their content analyzed. According to the findings, corporate social responsibility (CSR) has a direct effect on a business's financial performance, and this effect grows stronger as the business's environmental, social, and governance (ESG) ratings rise. **Kesari B. & Rawat N. (2023)** shows the effect of corporate social responsibility (CSR) on the top 15 Indian companies that spend money on CSR. utilized correlation analysis and linear regression techniques for analysis. Taking business size into account, the results show a strong and very weak positive correlation between CSR and important financial metrics, such as return on equity (ROE), return on assets (ROA), and profit before taxes (PBT). Consequently, it can be said that there is a rather strong positive correlation between CSR and financial performance. **Kaur N. and Singh V. (2021)** analyzed how the Indian steel industry's financial performance (FP) is affected by corporate social responsibility (CSR) in terms of market (MM), growth metrics (GM), profitability (PM), and value-added (VAM). empirical analysis utilizing 14 years' worth of secondary data from 40 corporations gathered from the Prowess database, annual reports, CSR, and company websites. The effect of CSR on FP has been investigated using panel regression analysis, MANOVA, and univariate ANOVA. The outcome shows that CSR has a favorable effect on FP in terms of VAM, PM, and GM, suggesting that further CSR investments will increase sales, profitability, and wealth for shareholders. Furthermore, there is no discernible link between CSR and MM in this study.

Yoona B., & Chung Y. (2018) compares how corporate social responsibility (CSR) affects a restaurant company's financial performance from the perspectives of internal and external stakeholders. The market's assessment of a company's future profitability as well as its short-term profitability were measured using two financial metrics: return on asset and Tobin's q. According to the study, external CSR raises a company's market value but has a detrimental impact on operational performance. Internal corporate social responsibility (CSR) boosts a company's operational profitability but has little impact on its market value. In order to give a more thorough understanding of CSR, this study looks at the stakeholder perspective of CSR while taking into account a number of performance measures.

Research Gap

While there are many studies done on CSR and financial performance globally, specific research focusing on the Indian manufacturing sector is often limited. A research gap identified in the existing literature is the limited focus on how Corporate Social Responsibility (CSR) impacts financial performance specifically within the Indian manufacturing sector. Current studies often overlook distinctions across various manufacturing sub-sectors, leaving a gap in understanding how CSR initiatives might uniquely influence financial indicators, such as ROA, ROE, EPS, P/E ratio, P/B ratio, and market capitalization, across these sub-segments. This study addresses this gap by examining the long-term effects of CSR on firm performance in selected Indian manufacturing sectors, providing insights that can inform policymakers, industry leaders, and scholars.

Objective

To investigate the relationship between Corporate Social Responsibility (CSR) and multiple financial performance indicators (ROA, ROE, EPS, P/E ratio, P/B ratio, and market capitalization) in the manufacturing sector in India

Hypothesis

HO: There is no significant relationship between CSR expenditure and the financial performance indicators (ROA, ROE, EPS, P/E ratio, P/B ratio, and market capitalization) in the manufacturing sector in India.

H1: There is a significant relationship between CSR expenditure and the financial performance indicators (ROA, ROE, EPS, P/E ratio, P/B ratio, and market capitalization) in the manufacturing sector in India.

Research Methodology

- **Sample Design –**

  To examine the relationship between Corporate Social Responsibility (CSR) and multiple financial performance indicators—namely ROA, ROE, EPS, P/E ratio, P/B ratio, and market capitalization, the manufacturing sector was selected for study. A total of 359 companies from six industries were included in the final sample: Construction Materials (42), Food and Agro-Based Products (62), Metal and

Metal Products (60), Chemicals and Chemical Products (82), Textiles (29), and Machinery (84). Companies that were found to be outliers, had missing data, did not record CSR expenditures, or lacked continuous operations were not included in the sample.

- **Study Period and Data collection-**
  The study covers a period of 9 years, from FY 2015-16 to 2022-23. Data related to financial performance indicators, including CSR, ROA, ROE, EPS, P/E ratio, P/B ratio, and market capitalization were collected from secondary sources, specifically the annual reports of companies available in the ProwessIQ database.
- **Research Variables -**
  The study utilizes both dependent and independent variables. The dependent variables are ROA, ROE, EPS, P/E ratio, P/B ratio, and market capitalization, while the independent variable include Corporate Social Responsibility (CSR).
  1. **The CSR expenditure** is measured by the total amount spent on CSR activities during the year.
  2. **Return on Assets (ROA)** is a profitability ratio that reflects management's ability to generate profit. ROA is calculated using the formula: Profit Before Tax divided by Total Assets.
  3. **Return of Equity (ROE)** is a financial ratio that measures a company's ability to generate profits from its shareholders' equity. ROE is calculated using the formula: Profit after Tax divided by shareholder's fund.
  4. **Earnings per share (EPS)** is measured by the Profits available of Equity shareholders divided by No. of share outstanding
  5. **The Price-to-earnings (P/E) ratio** is a financial metric used to assess the valuation of a company by comparing its current share price to its earnings per share (EPS). The P/E ratio is calculated using the formula: Market value per share (MPS) divided by EPS.
  6. **The Price-to-book (P/B) ratio** is a financial metric used to compare a company's market value to its book value, giving investors an idea of how the market values the company's assets. The P/B ratio is calculated using the formula: Market value per share (MPS) divided by Book value per share.
  7. **Market Capitalization (Market Cap)** is the total value of a company's outstanding shares of stock. Market Cap is calculated with this formula: market value per share multiplied by total numbers of outstanding share.

- **Statistical tools and Techniques-**
  To achieve the objective, Canonical correlation analysis and normality test either **Shapiro – wilk** (sample size equal or below 50) or **Kolmogorov-Smirnov test** (sample size > 50) have been administered using SPSS program.

When there are several dependent and independent variables, **canonical**

correlation analysis is utilized to investigate the relationship between the two sets of variables. Market capitalization, ROA, ROE, EPS, P/E ratio, P/B ratio, and other dependent variables are all included in this study, along with one independent variable, CSR spending. Consequently, this statistical method is appropriate for the analysis.

Canonical correlation analysis is applied when the dependent data follows a normal distribution. The Shapiro-Wilk and Kolmogorov-Smirnov tests were conducted separately for each industry to assess this condition, and the results were interpreted accordingly

Analysis and Discussion- The below analysis shows an industry-wise relationship between CSR expenditure and the financial performance indicators (ROA, ROE, EPS, P/E ratio, P/B ratio, and market capitalization) of selected industries of Indian corporate sector.

1. **Construction materials industry-**

Normality test

The **Shapiro-Wilk** tests was used to assess the normality of the dependent variable data.

Table 1 Tests of Normality

Dependent Variables	Shapiro-Wilk		
	Statistic	Df	Sig.
ROA	0.961	42	0.166
EPS	0.975	42	0.465
ROE	0.985	42	0.855
P/E ratio	0.955	42	0.101
P/B ratio	0.937	42	0.056
Market Cap	0.981	42	0.699

Source: Author's Own Compilation

Table 1 shows p-values for the Shapiro-Wilk test of market capitalization (0.69), ROA (0.16), EPS (0.46), ROE (0.85), P/E ratio (0.10), and P/B ratio (0.056). Since all of the p-values are higher than the threshold limit of 0.05, the sample data are found to be normally distributed.

Table 2 Results of Canonical Correlations

	Correlation	Eigenvalue	Wilks Statistic	F	Num D.F	Denom D.F.	Sig.
1	0.738	0.954	0.456	6.961	6.000	35.000	0.000

Source: Author's Own Compilation

The Canonical Correlation Analysis, which is shown in Table 2, provides information about the relationship between CSR spending and financial performance metrics (ROA, ROE, EPS, P/E ratio, P/B ratio, and market capitalization) in the construction materials sector:

1. **Canonical Correlation (0.738):** A moderate to strong positive relationship is shown by a canonical correlation of 0.738, which implies that higher CSR spending is linked to improved financial performance.
2. **Eigenvalue (0.954):** The substantial influence of CSR on various financial indicators is demonstrated by the eigenvalue of 0.954, which suggests that CSR spending accounts for around 95% of the variance in financial performance.
3. **Wilks' Lambda (0.456):** A Wilks' Lambda value of 0.456, which is near to zero, validates model significance and also interpret that the 54.4%, (1-0.456) of variance in financial performance indicators is explained by CSR expenditure.
4. **P-value (0.000):** The relationship is statistically significant with a p-value of 0.000, which is well below the threshold limit 0.05. The null hypothesis (H0), according to which there is no significant correlation between CSR spending and financial performance indicators (ROA, ROE, EPS, P/E ratio, P/B ratio, and market capitalization) in the construction materials sector, is to be rejected. Therefore, it can be concluded that there is a strong correlation between CSR and financial performance.

2. Food and Agro-based product

Normality Test

The **Kolmogorov-Smirnov** tests was used to assess the normality of the dependent variable data.

Table 3 Tests of Normality

Dependent Variables	Kolmogorov-Smirnov[a]		
	Statistic	Df	Sig.
ROA	0.125	62	0.17
EPS	0.116	62	0.058
ROE	0.082	62	.200
P/E ratio	0.074	62	.200
P/B ratio	0.107	62	0.073
Market Cap	0.088	62	.200

Source: Author's Own Compilation

Table 3 shows the p-values for the Kolmogorov-Smirnov test of ROA (0.17), EPS (0.058), ROE (0.200), P/E ratio (0.200), P/B ratio (0.073) and Market capitalization (0.200). Since all the p-values are higher than the threshold limit of **(0.05)**, the sample data are found to be normally distributed.

Table 4 Results of Canonical Correlations

	Correlation	Eigenvalue	Wilks Statistic	F	Num D. F	Denom D.F.	Sig.
1	0.818	0.912	0.331	18.560	6.000	55.000	0.000

Source: Author's Own Compilation

The Canonical Correlation Analysis, which is shown in Table 4, provides information about the relationship between CSR spending and financial performance indicators (ROA, ROE, EPS, P/E ratio, P/B ratio, and market capitalization) in the food and agro-based product industry:

1. **Canonical Correlation (0.818):** A strong positive relationship is shown by a canonical correlation of 0.0818, which implies that higher CSR spending is linked to improved financial performance.
2. **Eigenvalue (0.912):** The substantial influence of CSR on various financial indicators is demonstrated by the eigenvalue of 0.912, which suggests that CSR spending accounts for around 91.2% of the variance in financial performance.

3. **Wilks' Lambda (0.331):** A Wilks' Lambda value of 0.331, close to zero, confirms the model's significance and also interpret that the 66.9%, (1-0.331) of variance in financial performance indicators is explained by CSR expenditure.
4. **P-value (0.000):** The relationship is statistically significant with a p-value of 0.000, which is well below the threshold limit 0.05 . The null hypothesis (H0), according to which there is no significant correlation between CSR spending and financial performance indicators (ROA, ROE, EPS, P/E ratio, P/B ratio, and market capitalization) in the food and agro-based product industry, is to be rejected. Therefore, it can be concluded that there is a strong correlation between CSR and financial performance.

3. Metal and Metal Product: -

Normality Test

The **Kolmogorov-Smirnov** tests was used to assess the normality of the dependent variable data.

Table 5 Tests of Normality

Dependent Variables	Kolmogorov-Smirnov[a]		
	Statistic	Df	Sig.
ROA	0.068	60	.200
EPS	0.102	60	0.190
ROE	0.054	60	.200
P/E ratio	0.144	60	0.061
P/B ratio	0.072	60	.200
Market Cap	0.117	60	0.051

Source: Author's Own Compilation

Table 5 shows the p-values for the Kolmogorov-Smirnov test of ROA (0.200), EPS (0.190), ROE (0.200), P/E ratio (0.061), P/B ratio (0.200) and Market capitalization (0.051). Since all the p-values higher than the threshold limit of **(0.05)**, the sample data are found to be normally distributed.

Table 6 Results Canonical Correlations

	Correlation	Eigenvalue	Wilks Statistic	F	Num D.F	Denom D.F.	Sig.
1	0.681	0.867	0.536	7.654	6.000	53.000	0.000

Source: Author's Own Compilation

The Canonical Correlation Analysis, which is shown in Table 6, provides information about the relationship between CSR spending and financial performance indicators (ROA, ROE, EPS, P/E ratio, P/B ratio, and market capitalization) in the metal and metal product industry:

1. **Canonical Correlation (0.681):** A moderate to strong positive relationship is shown by a canonical correlation of 0.681, which implies that higher CSR spending is linked to improved financial performance.
2. **Eigenvalue (0.867):** The substantial influence of CSR on various financial indicators is demonstrated by the eigenvalue of 0.867, which suggests that CSR spending accounts for around 86.7% of the variance in financial performance.
3. **Wilks' Lambda (0.536):** A Wilks' Lambda value of 0.536, closer to zero, supports the model's significance and also interpret that the 46.4%, (1-0.536) of variance in financial performance indicators is explained by CSR expenditure.
4. **P-value (0.000):** The relationship is statistically significant with a p-value of 0.000, which is well below the threshold limit 0.05 . The null hypothesis (H0), according to which there is no significant correlation between CSR spending and financial performance indicators (ROA, ROE, EPS, P/E ratio, P/B ratio, and market capitalization) in the metal and metal product industry, is to be rejected. Therefore, it can be concluded that there is a strong correlation between CSR and financial performance.

4. Chemical and Chemical Products

Normality Test

The **Kolmogorov-Smirnov** tests was used to assess the normality of the dependent variable data.

Table 7 Tests of Normality

Dependent Variables	Kolmogorov-Smirnov[a]		
	Statistic	Df	Sig.
ROA	0.096	82	0.060

EPS	0.094	82	0.072
ROE	0.066	82	.200
P/E ratio	0.082	82	.200
P/B ratio	0.082	82	.200
Market Cap	0.068	82	.200

Source: Author's Own Compilation

Table 7 shows the p-values for the Kolmogorov-Smirnov test of ROA (0.060), EPS (0.072), ROE (0.200), P/E ratio (0.200), P/B ratio (0.200) and Market capitalization (0.200). Since all the p-values higher than the threshold limit of **(0.05)**, the sample data are found to be normally distributed.

Table 8 Results Canonical Correlations

	Correlation	Eigenvalue	Wilks Statistic	F	Num D.F	Denom D.F.	Sig.
1	0.220	0.051	0.952	0.635	6.000	75.000	0.702

Source: Author's Own Compilation

The Canonical Correlation Analysis, which is shown in Table 8, provides information about the relationship between CSR spending and financial performance indicators (ROA, ROE, EPS, P/E ratio, P/B ratio, and market capitalization) in the chemical and chemical product manufacturing industry:

1. **Canonical Correlation (0.220):** A weak positive relationship is shown by a canonical correlation of 0.220, which implies that CSR investment may not strongly impact financial metrics.
2. **Eigenvalue (0.051):** An eigenvalue of 0.051 indicates that CSR expenditure explains just 5.1% of the variance in financial performance, demonstrating minimal influence on these indicators.
3. **Wilks' Lambda (0.952):** The high Wilks' Lambda value of 0.952 suggests that the model is not statistically significant also interpret that the only 4.8%, (1-0.952) of variance in financial performance indicators is explained by CSR expenditure.

1. **P-value (0.702):** A p-value of 0.702, well above the threshold of 0.05, confirms that the relationship between CSR and financial performance is not statistically significant. This result suggests that the null hypothesis (H0), stating that there is no significant relationship between CSR expenditure

and financial performance indicators (ROA, ROE, EPS, P/E ratio, P/B ratio, and market capitalization) in the chemical and chemical product manufacturing industry, is accepted. Thus, it can be concluded that a no significant relationship exists between CSR spending and financial performance.

5. Textiles Industry: -

Normality Test

The **Shapiro-Wilk** tests was used to assess the normality of the dependent variable data.

Table 9 Tests of Normality

Dependent Variables	Shapiro-Wilk		
	Statistic	Df	Sig.
ROA	0.960	29	0.323
EPS	0.913	29	0.051
ROE	0.979	29	0.816
P/E ratio	0.917	29	0.052
P/B ratio	0.957	29	0.281
Market Cap	0.965	29	0.433

Source: Author's Own Compilation

Table 9 shows the p-values for the Shapiro-Wilk test of ROA (0.32), EPS (0.051), ROE (0.81), P/E ratio (0.052), P/B ratio (0.281) and Market capitalization (0.433). Since all the p-values higher than the threshold limit of **(0.05)**, the sample data are found to be normally distributed.

Table 10 Results of Canonical Correlations

	Correlation	Eigenvalue	Wilks Statistic	F	Num D.F	Denom D.F.	Sig.
1	0.431	0.229	0.814	0.838	6.000	22.000	0.554

Source: Author's Own Compilation

The Canonical Correlation Analysis, which is shown in Table 10, provides information about the relationship between CSR spending and financial performance indicators (ROA, ROE, EPS, P/E ratio, P/B ratio, and market capitalization) in the textiles industry:

1. **Canonical Correlation (0.431):** A weak to moderate positive relationship between CSR expenditure and financial performance indicators, is shown by a canonical correlation of 0.431, which implies that CSR investment may not strongly impact financial metrics.
2. **Eigenvalue (0.229):** An eigenvalue of 0.229 indicates that CSR expenditure explains just 22.9% of the variance in financial performance, demonstrating minimal influence on these indicators.
3. **Wilks' Lambda (0.814):** A high Wilks' Lambda value of 0.814 implies that the model is not statistically significant and also interpret that the only 18.6%, (1-0.814) of variance in financial performance indicators is explained by CSR expenditure, suggesting a weak relationship between the variables.
4. **P-value (0.554):** A p-value of 0.702, well above the threshold of 0.05, confirms that the relationship between CSR and financial performance is not statistically significant. This result suggests that the null hypothesis (H0), stating that there is no significant relationship between CSR expenditure and financial performance indicators (ROA, ROE, EPS, P/E ratio, P/B ratio, and market capitalization) in textiles industry, is accepted. Thus, it can be concluded that a no significant relationship exists between CSR spending and financial performance.

6. Machinery: -

Normality Test

The **Kolmogorov-Smirnov** tests was used to assess the normality of the dependent variable data.

Table 11 Tests of Normality

Dependent Variables	Kolmogorov-Smirnov[a]		
	Statistic	Df	Sig.
ROA	0.094	84	0.065
EPS	0.136	84	0.053
ROE	0.052	84	.200
P/E ratio	0.054	84	.200
P/B ratio	0.068	84	.200
Market Cap	0.067	84	.200

Source: Author's Own Compilation

Table 11 shows the p-values for the Kolmogorov-Smirnov test of ROA (0.06), EPS (0.053), ROE (0.200), P/E ratio (0.200), P/B ratio (0.200) and Market capitalization (0.200). Since all the p-values higher than the threshold limit of **(0.05)**, the sample data are found to be normally distributed

Table 12 Results Canonical Correlations

	Correlation	Eigenvalue	Wilks Statistic	F	Num D.F	Denom D.F.	Sig.
1	0.780	0.934	0.392	19.912	6.000	77.000	0.000

Source: Author's Own Compilation

The Canonical Correlation Analysis, which is shown in Table 12, provides information about the relationship between CSR spending and financial performance indicators (ROA, ROE, EPS, P/E ratio, P/B ratio, and market capitalization) in the machinery manufacturing industry:

1. **Canonical Correlation (0.780):** A moderate to strong positive relationship is shown by a canonical correlation of 0.780, which implies that higher CSR spending is linked to improved financial performance.
2. **Eigenvalue (0.934):** The substantial influence of CSR on various financial indicators is demonstrated by the eigenvalue of 0.934, which suggests that CSR expenditure accounts for around 93% of the variance in financial performance.
3. **Wilks' Lambda (0.392):** A Wilks' Lambda value of 0.392, which is relatively low, confirms the model's significance also interpret that the only 60.8%, (1-0.392) of variance in financial performance indicators is explained by CSR expenditure, suggesting a weak relationship between the variables.
4. **P-value (0.000):** The relationship is statistically significant with a p-value of 0.000, which is well below the threshold limit 0.05 . The null hypothesis (H0), according to which there is no significant correlation between CSR spending and financial performance indicators (ROA, ROE, EPS, P/E ratio, P/B ratio, and market capitalization) in the metal and metal product industry, is to be rejected. Therefore, it can be concluded that there is a strong correlation between CSR and financial performance.

Overall Findings and Conclusion:

The study examines the relationship between Corporate Social Responsibility (CSR) expenditure and financial performance indicators (ROA, ROE, EPS, P/E ratio, P/B ratio, and market capitalization) in various manufacturing sectors. The key findings include:

- **Significant Positive Relationships**: CSR investments are positively correlated with better financial

outcomes in sectors like construction materials, food and agro-based products, metal and metal products, and machinery manufacturing. Spending more on CSR improves the financial success of businesses in certain industries.

- **No Significant Relationships**: Financial performance metrics for the textile and chemical industries are not significantly impacted by CSR spending. This implies that the financial results in these industries are not significantly impacted by CSR initiatives.

Implications for Stakeholders

- **Organizations**: Businesses should modify their CSR plans to take advantage of established advantages in industries where financial performance is greatly improved by CSR spending. CSR strategies may need to be reevaluated and modified in industries where no discernible relationship is found.
- **Investors**: The study provides valuable insights for investors seeking higher returns through CSR-focused investments. By targeting industries like construction materials, food and agro-based products, metal and metal products, and machinery manufacturing, investors can identify opportunities for enhanced financial performance.
- **Governments:** To promote CSR activities in sectors where notable advantages are seen, policymakers can create focused financial incentives, grants, or tax exemptions. This can encourage investment and innovation, especially in the fields of food and agro-based products and construction materials.

Overall, the findings emphasize the need for industry-specific CSR strategies to effectively enhance financial performance and guide investment decisions.

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FINANCIAL INCLUSION IN EMERGING ECONOMIES: AN IN-DEPTH STUDY OF INDIA

Meghna Chotaliya
Alaknanda Lonare

Abstract

Financial inclusion is a key driver of economic growth, serving as a bridge to ensure the participation of marginalized groups in the economic process. This paper presents a year-wise ranking of Indian States/Union Territories over a selected study period, as well as of selected Asian countries, based on their degree of financial inclusion. The study constructs two separate indices: the Financial Inclusion Index, which incorporates both demand-side and supply-side indicators. The objective of this paper is to develop a comprehensive Financial Inclusion Index for Asian countries, with a specific focus on India and its States, using these indices as a basis for ranking the countries and regions in terms of the direction, degree, and intensity of financial inclusion.

Keywords

Financial Inclusion, Index, Bank Branches, Demand, Supply

Introduction

Financial Inclusion encompasses access to various financial services like banking, credit, insurance, and digital payments that important for economic development, poverty reduction and financial stability of a country, therefore, financial inclusion and economic growth are intricately connected, with financial inclusion serving as a vital tool for bridging gaps and fostering equitable participation from the marginalized sections of society. Financial inclusion fosters economic resilience and reduces income inequality for the underprivileged sections of the society that are priority for the institutions like IMF and World Bank.

By the late 2000s, policymakers and governments worldwide began to emphasize the importance of an inclusive financial system (Sarma, 2010). However, measuring financial inclusion remains a complex challenge, requiring a nuanced approach to capture regional disparities across both demand and supply dimensions. While various indicators have been proposed to assess individual aspects of financial inclusion, a comprehensive measure to rank the financial inclusion levels of States/ Union Territories within India or across countries globally is still lacking.

Past studies have observed that even well-developed financial systems have not been fully inclusive, leaving certain segments of the population excluded from the formal financial system. This underscores the need for a comprehensive index to capture the multiple dimensions of financial inclusion. This paper aims to address this gap by constructing a Financial Inclusion Index (FII) that incorporates both demand-side and supply-side indicators, enabling a year-on-year ranking of Indian States/ Union Territories, as well as selected Asian countries, in terms of their financial inclusion status hence following gaps have been identified in the existing research.

1. Financial inclusion indices depend on supply side or demand side indicators that lack a comprehensive multidimensional framework for actionable assessment.
2. Limited research has been conducted that compares India and other Asian economies.
3. Most of the studies conducted on Financial Inclusions does not offer static assessments that neglect to progress over the years.

Therefore, this index can used as a tool to assess the efficacy of financial inclusion policies across various regions. To construct this index, the study focuses on supply-side data, specifically examining the accessibility of financial services. This includes the availability of physical service points from commercial banks, credit unions, savings and credit cooperatives, microfinance institutions, and other deposit-taking entities (e.g., savings banks, rural banks, post office savings). These data are sourced from the International Monetary Fund's Financial Access Survey (FAS). The index developed in this study aims to rank countries and Indian States based on their financial inclusion status, providing insights into the direction, degree, and intensity of financial inclusion efforts.

Literature Review

Several attempts have been made to construct a Financial Inclusion Index (FII) to assess the extent of financial inclusion across various States, regions, and districts within a country. However, very few studies have integrated both the demand and supply-side dimensions of financial inclusion.

Goel and Sharma (2017) developed an Index of Financial Inclusion for India using a methodology like that employed by the United Nations Development Programme (UNDP) in the computation of renowned development indexes, such as the Gender Development Index (GDI), the Human Poverty Index (HPI), and the Human Development Index (HDI). Their approach is based on three dimensions of banking penetration. Similarly, N.S. Deepti and S. Vaidhyasubramaniam (2018) constructed a Financial Inclusion Index (IFI) based on three key variables: penetration (the number of adults with a bank account), availability of banking services (measured by the number of bank branches per 1,000 people), and usage (measured by outstanding credit and deposits). Their study covers the period from 2011–12 to 2015–16, with all three dimensions found to have a significant impact on financial inclusion.

Gursharan Singh Kainth (2011) examined the extent of financial inclusion in Punjab, using data on all three dimensions (penetration, availability, and usage) for the 20 districts of the state, as well as for rural areas, during 2008-09. He computed the coefficient of complementarity between these dimensions and found considerable variation across different districts. Mandira Sarrna (2017) analysed the inclusiveness of financial systems across multiple countries using a multidimensional approach while constructing an index like the UNDP's methodology. She found that Austria had the highest IFI value of 0.953, while Madagascar ranked the lowest with an IFI value of 0.009.

Iqbal and Sami (2017) studied the impact of financial inclusion on economic growth over a seven-year period using a multiple regression model. Their findings indicated a positive and significant impact of the number of bank branches and credit-deposit ratios on India's GDP, while the growth of ATMs showed an insignificant effect on GDP.

Sarma (2010) also followed a multidimensional approach to construct the Financial Inclusion Index (IFI), using a methodology akin to the UNDP's development index models. In this model, weights of 1, 0.5, and 0.5 were assigned to the banking penetration index, the availability index, and the usage index, respectively. This framework allows a country to be represented as a point in a three-dimensional Cartesian space, where the dimensions range between 0 and 1 for penetration, and between 0 and 0.5 for availability and usage. The point (0, 0, 0) represents complete financial exclusion, while (1, 0.5, 0.5) represents the ideal state of financial inclusion.

Despite these efforts, the literature still lacks a comprehensive measure capable of fully capturing the extent of financial inclusion in an economy. Therefore, this paper aims to fill this gap by developing

a Financial Inclusion Index (FII) that include both Demand-side and Supply-side indicators.

Methodology

The methodology is the systematic approach used by the researcher to define problems, analyze data and achieve their objectives using appropriate research design. For the present study, following research objectives are being specified.

1. To develop Financial Inclusion Index (FII) that incorporates both supply-side and demand-side indicators.
2. To evaluate and compare financial inclusion levels across Indian States.
3. To offer policy suggestions that aimed at financial inclusions with an emphasis on addressing disparities in marginalized population.

For the above objectives, a Financial Inclusion Index (FII) is created that includes three key areas such as (a) Financial Institutions and Regions: Identifying the financial institutions and the countries/ regions included in the analysis. (b) Study Period: Defining the period over which the analysis will be conducted. (c) Dimensions of Financial Inclusion: Selecting the relevant dimensions to describe the phenomenon of financial inclusion.

The methodology in this study is focused on developing a statistically sound method to compute the FII, using a proper weighting technique. The index is designed to develop the financial inclusion index of India over the period of ten years i.e. 2011 to 2020, for this following hypothesis is developed:

1. H_1: The Financial Inclusion Index (FII) is reliable measurement of Financial Inclusion in India based on demand-side indicators.
2. H_2: The Financial Inclusion Index (FII) is reliable measurement of Financial Inclusion in India based on supply-side indicators.
3. H_3: The Financial Inclusion Index (FII) reflects significant year-on-year change in Financial Inclusion in India.

It is recognized that the methodology for assigning weights is sensitive to data variations. The proposed index will range from 0 to 1, where a value of 0 indicates complete financial exclusion, and a value of 1 indicates complete financial inclusion. The relationship is expressed as: $0 \leq d1 \leq 1$, meaning that a higher value of d1 corresponds to a higher state of financial inclusion.

This study considers four dimensions for both the demand and supply sides, which can be represented by points (d1, d2, d3, d4) for demand-side indicators, and (S1, S2, S3, S4) for supply-side indicators. The point (0, 0, 0, 0) represents the worst situation (complete financial exclusion), and the point (1, 1, 1, 1) represents the best situation (complete financial inclusion).

Data Sources and Indicators

This study requires both demand-side and supply side data which is primarily sourced from secondary databases such as The Economic Survey of India, IMF, and World Bank. For the calculation of indicators, the study uses various demand-side indicators, such as banking penetration, the availability of banking services, and the usage of banking systems in India and for supply-

side indicators, Number of branches and ATMs are used.

The study covers the period from 2011 to 2020. Data on demand-side indicators and supply-side indicators are sourced from the IMF's Financial Access Survey and Reserve Bank of India publications. The calculation of the Financial Inclusion Index (FII) incorporates multidimensional variables for Asian countries, with specific reference to India, using the latest available data from 2010 to 2020. The FII is computed by considering two groups of indicators:

Demand-Side Indicators:

- Number of deposit accounts with commercial banks per 1,000 adults
- Outstanding deposits with commercial banks as a percentage of GDP
- Number of loan accounts with commercial banks per 1,000 adults

Algebraically, FII can be computed as follows:

Formula 1

$$D1 = \frac{w\,I\,*(A\,i-m\,i)}{(M\,i-m\,i)}$$

Where,
Wi = Weight attached to the dimension *i,*
Ai = Actual value of dimension *i,*
Mi = Minimum value of dimension i*;*
Mi = Maximum value of dimension i;
Di = Dimensions of financial inclusion

Formula 2

$$X1 = \sqrt{\frac{(1-D1)\,2\,+(1-D2\,)2\,\,+\,(1-D3)\,3\,\,+(1-\,D4)\,2)}{n}}$$

Formula 3:

$$X\,2\,\,=1-\frac{\sqrt{(W1-D1)+\,(W2-D2)+\,(W3-D3)+\,\ldots.+((Wn-Dn)}}{\sqrt{w1^{2}+w2^{2}+w3^{2}\,\ldots.w\,n^{\,2}}}$$

Formula 4:

$$FII(d)/(s)\;=\;½\,(X1\;-\;X2)$$

Where,
FII (d) indicates Financial Inclusion Index of Demand side and FII (s) indicates the Index of Supply Side The three dimensions of financial inclusion are considered for computation of FII namely:
d1, d2, d3 = index for the dimension's penetration, availability, and usage respectively
w1, w2, w3 = weight attached to dimensions penetration, availability and usage respectively
A1, A2, A3 = actual value of the dimension's penetration, availability, and usage respectively
m1, m2, m3 = lower limit on value of penetration, availability, usage dimensions respectively
M1, M2, M3 = upper limit on value of penetration, availability, usage dimensions respectively

Data Analysis

Table 1: Descriptive Statistics: Demand Side Indicators of Financial Inclusion

Demand Side Indicators	Observations	Mean	Std Dev	Minimum	Maximum
D1: Number of deposit accounts with commercial banks per 1000 adults	10	1320.70	433.33	791.78	1946.42
D2: Outstanding deposits with commercial banks as a percent of GDP	10	62.04	1.56	59.74	64.79
D3: Number of loan accounts with commercial banks per 1000 adults	10	155.46	21.49	131.57	200.58
D4: Outstanding loans from commercial banks as a percent of GDP	10	47.43	2.24	43.82	50.39

Where:

- D1 = Number of deposit accounts with commercial banks per 1000 adults
- D2 = Outstanding deposits with commercial banks as a percent of GDP
- D3 = Number of loan accounts with commercial banks per 1000 adults
- D4 = Outstanding loans from commercial banks as a percent of GDP

Table 2: Descriptive Statistics: Supply Side Indicators of Financial Inclusion

Supply Side Indicators	Observations	Mean	Std Dev	Minimum	Maximum
S1: Number of Commercial Bank Branches per 1000 km	10	37.89	7.90	26.94	48.11
S2: Number of Commercial Bank Branches per 100000 adults	10	12.59	1.77	9.58	14.56
S3: Number of ATMs per 1000 km	10	53.21	18.36	14.90	71.80
S4: Number of ATMs per 100000 adults	10	18.04	4.47	5.30	22.07

Sources: WDI (2019), World Bank; IFS (2019), IMF.

Where:

- S1 = Number of Commercial Bank Branches per 1000 km
- S2 = Number of Commercial Bank Branches per 100000 adults
- S3 = Number of ATMs per 1000 km
- S4 = Number of ATMs per 100000 adults

Table 1 and Table 2 present descriptive statistics of the demand side and supply side indicators respectively, for computing the financial inclusion index for the years 2009-2018. Statistics pertaining to each dimension and indicator of the index are presented. Descriptive statistics, such as mean, standard deviation, minimum (Min), maximum (Max) are computed and presented above.

Table 3: Index of Financial Inclusion – Using Data on 4 Dimensions (Demand Side Indicators) of Financial Inclusion in India from 2004 to 2012

Year	NDA (D1)	ODG (D2)	NLA (D3)	OLG (D4)
2011	791.78	61.60	131.57	44.73
2012	861.52	59.74	139.10	43.82
2013	932.18	61.69	138.91	46.65
2014	1020.04	61.12	147.81	48.30
2015	1158.65	62.43	142.22	49.19
2016	1335.61	63.81	151.07	50.39
2017	1540.50	64.79	154.32	49.95
2018	1730.83	62.49	170.73	48.97
2019	1889.49	62.77	178.31	46.32
2020	1946.42	60.01	200.58	46.01

Source: Authors' Calculation

Where:

- D1 = Number of deposit accounts with commercial banks per 1000 adults
- D2 = Outstanding deposits with commercial banks as a percent of GDP
- D3 = Number of loan accounts with commercial banks per 1000 adults
- D4 = Outstanding loans from commercial banks as a percent of GDP

Table 4: Index for Financial Inclusion on Demand Side Indicators of Financial Services (FIID) in India

Year	X1	X2	FII D
2011	0.84	0.71	0.78
2012	0.97	0.95	0.96
2013	0.73	0.54	0.64
2014	0.68	0.47	0.58
2015	0.65	0.43	0.54
2016	0.58	0.34	0.46
2017	0.61	0.37	0.49
2018	0.65	0.42	0.53
2019	0.73	0.53	0.63
2020	0.88	0.78	0.83

Table 5: Yearly Extent of Financial Inclusion of India: Demand Side Indicators of Financial Inclusion

Year	FII D	Extent of Financial Inclusion
2011	0.71	High
2012	0.95	High
2013	0.54	Medium
2014	0.47	Medium
2015	0.43	Medium
2016	0.34	Low
2017	0.37	Low
2018	0.42	Medium
2019	0.53	High
2020	0.78	High

Table 6: Index of Financial Inclusion – Using Data on 4 Dimensions (Supply Side Indicators) of Financial Inclusion in India from 2000-2019

Year	CBBK (S1)	ACBK (S2)	NATM (S3)	AATM (S4)
2011	26.94	9.58	14.90	5.30
2012	28.72	10.01	20.80	7.25
2013	30.65	10.49	25.81	8.83
2014	33.24	11.16	32.67	10.97
2015	35.89	11.83	38.96	12.84
2016	39.69	12.85	54.90	17.77
2017	42.62	13.56	61.88	19.68
2018	45.63	14.26	67.91	21.23
2019	47.37	14.57	71.77	22.07
2020	48.11	14.56	71.80	21.74

Table 7: Index for Financial Inclusion: Supply side indicators of Financial Inclusion in India (FII s)

Year	X1	X2	FII s
2011	0	3.00	1.00
2012	0	0.50	0.83
2013	0.38	0.12	0.71
2014	0.64	0.67	0.56
2015	0.87	1.00	0.45
2016	0.33	0.88	0.29
2017	0.61	0.83	0.28
2018	0.86	0.89	0.30
2019	1.98	0.97	0.32
2020	0.99	1.00	0.33

Table 8: Yearly classification of India: FII Supply side

Year	FII_D	Extent of Financial Inclusion
2011	1	High
2012	0.83	High
2013	0.71	High
2014	0.56	Medium
2015	0.45	Medium
2016	0.29	Low
2017	0.28	Low
2018	0.30	Low
2019	0.32	Low
2020	0.33	Low

Table 9: Table showing ranking of Asian Countries based on Financial Inclusion Index (2020) (Demand side)

Country	FII_D	Rank
Afghanistan	0.71	5
Bangladesh	0.61	8
Bhutan	0.45	10
China	0.65	6
India	0.73	4
Indonesia	1.00	1
Iraq	0.63	7
Japan	0.27	12
Malaysia	0.86	2
Pakistan	0.78	3
Philippines	0.60	9
Saudi Arabia	0.43	11

FII D measures the level of financial inclusion in each country. A higher score (closer to 1) indicates better financial inclusion and a lower score (closer to 0) suggests poorer financial access. The rank column shows the position of each country based on their FII D score, with Rank 1 being the highest level of financial inclusion. Indonesia (1.00) ranks the highest, meaning it has the most developed financial inclusion among the listed countries. Malaysia (0.86) and Pakistan (0.78) follow closely, indicating strong financial systems. India (0.73) is ranked 4th, showing significant financial inclusion but still behind some other countries in the region. Japan (0.27) and Saudi Arabia (0.43) have the lowest FII D scores, indicating lower levels of financial inclusion. Afghanistan (0.71) ranks better than China (0.65), Iraq (0.63), and Bangladesh (0.61), which might be surprising given its economic challenges. Countries with higher FII D scores likely have better banking access, digital payment adoption, and financial literacy. Lower scores (e.g., Japan, Bhutan, Saudi Arabia) might indicate barriers like traditional banking systems, regulatory constraints, or lower adoption of financial services. Indonesia's top position suggests strong government policies, digital banking growth, and widespread financial access. China ranking lower than India (0.65 vs. 0.73) might suggest gaps in rural financial inclusion or reliance on alternative financial systems.

Table 10: Table showing ranking of Asian Countries based on Financial Inclusion Index (2020) (Supply side)

Country	FII_s	Rank
Afghanistan	0.57	7
Bangladesh	0.41	12
Bhutan	0.46	10
China	0.47	9
India	0.57	6
Indonesia	1.05	2
Iraq	0.46	11
Japan	2.70	1
Malaysia	0.83	3
Pakistan	0.78	4
Philippines	0.47	8
Saudi Arabia	0.71	5

The FIIs score reflects the level of financial services availability and accessibility in each country. A higher score means better financial infrastructure and service availability. A lower score indicates weaker financial inclusion in terms of supply (e.g., fewer bank branches, ATMs, digital financial services). Japan (2.70) ranks the highest—suggesting an advanced financial system with high banking penetration and digital services. Indonesia (1.05) comes second, showing strong financial service availability. Malaysia (0.83) and Pakistan (0.78) are ranked 3rd and 4th, indicating relatively strong financial inclusion. Saudi Arabia (0.71) ranks 5th, highlighting a fairly developed financial infrastructure. India and Afghanistan (both 0.57) are tied at 6th and 7th place, meaning their financial systems are moderate but still developing. China (0.47) and Philippines (0.47) rank lower (9th and 8th, respectively) which is low given China's economic strength. Bhutan (0.46), Iraq (0.46), and Bangladesh (0.41) occupy the bottom positions, indicating major financial inclusion challenges. Japan's exceptionally high score (2.70) suggests a well-developed and highly accessible financial system with widespread banking and fintech adoption. Indonesia (1.05) performs well, likely due to government initiatives, digital banking, and mobile financial services. China's lower score (0.47) compared to India (0.57) is unexpected and may indicate supply-side barriers such as uneven banking penetration in rural areas or alternative informal financial systems. Pakistan (0.78) ranking higher than India (0.57) suggests better financial service availability, possibly due to digital banking expansion. Bangladesh (0.41) ranks the lowest, highlighting limited access to formal financial services. Comparing this with the previous table (Demand Side FII D), Indonesia ranked 1st, while here it is 2nd, meaning financial services are both accessible and widely used. Japan was ranked low (12th) in demand-side FII D but ranks 1st here—indicating that while financial services are widely available, actual adoption and usage may be lower. India ranks 4th in demand-side FII D but 6th here—suggesting that while financial services are available, accessibility and reach might still be issues. Pakistan ranks 3rd in demand-side FII D but 4th here—showing strong supply-side infrastructure, supporting its financial inclusion progress. Japan leads in financial service availability but may have lower demand-side adoption. Indonesia performs strongly in both supply and demand—indicating effective financial inclusion policies. China surprisingly ranks lower in supply-side FIIs, suggesting gaps in financial infrastructure, despite its economic size. Bangladesh, Iraq, and Bhutan need significant improvements in financial service availability.

Conclusion

This study examined the finance-growth nexus in India through the lens of financial inclusion from 2011 to 2020, with a specific focus on demand-side indicators. The analysis revealed distinct phases: higher financial inclusion from 2011 to 2013, a moderate level in 2014 and 2015, and a decline to lower inclusion levels from 2016 to 2020. These trends suggest a

need for sustained policy and infrastructure development to reverse recent declines and support broader financial accessibility.

On a regional scale, the Financial Inclusion Index (FII) for 2020 highlighted varying levels of financial inclusion across Asian nations. Japan led the region in demand-side financial inclusion, followed by Indonesia and Malaysia, with Saudi Arabia and India ranking fifth and sixth, respectively. Afghanistan and the Philippines occupied middle positions, followed by China, Bhutan, and Iraq. Bangladesh ranked lowest in financial inclusion, indicating substantial room for improvement. These findings underscore the importance of continuously strengthening financial inclusion frameworks to foster economic growth. For India, addressing fluctuations in financial inclusion and closing gaps in the financial inclusion is a significant step in economic development. Expanding access to digital financial services can bridge gaps, particularly in regions with limited physical banking infrastructure. Leveraging mobile banking, digital wallets, and payment platforms can increase accessibility and encourage inclusion for underserved populations. Enhanced financial literacy programs tailored to different demographic groups, including women, rural populations, and youth, can empower individuals to understand and effectively use financial services. Financial literacy campaigns can address misconceptions and build trust in formal financial systems. The variation in financial inclusion levels across regions indicates a need for customized policies. Government and regulatory bodies could target states and districts with low inclusion by incentivizing banks and financial institutions to establish branches or deploy ATMs and microfinance units in these underserved areas.

Collaborating with microfinance institutions and local community organizations can enhance financial outreach. These institutions can act as intermediaries, promoting basic banking services in remote areas where traditional banks may not have a strong presence. Limited access to credit for small and micro-enterprises can restrict economic growth and financial inclusion. Creating simplified processes for loan applications, particularly through government-supported schemes, can promote entrepreneurship and economic self-sufficiency. Establishing frameworks for regularly monitoring and evaluating financial inclusion progress is essential. Real-time data analysis and tracking of financial inclusion metrics can provide insights into the effectiveness of implemented policies and guide future initiatives. The government and private sector can work to increase the density of ATMs, point-of-sale (POS) terminals, and other financial access points in areas with low inclusion rates. This will enhance the supply-side capacity to serve a wider population base. Financial institutions can design and offer products tailored to the unique needs of marginalized groups, such as no-frills savings accounts, microloans, and micro-insurance. These products can address specific barriers and appeal to individuals hesitant to engage with formal banking services. Using AI and data analytics, institutions can identify patterns

in underserved regions and create targeted financial products. Data-driven approaches will allow for better risk management and a more tailored approach to include the unbanked. Policymakers could offer incentives, such as tax breaks or subsidies, to banks and financial institutions that actively work to improve financial inclusion metrics, particularly in areas with historically low access.

By implementing these suggestions, India can move toward higher financial inclusion rates, enabling greater economic participation and support for sustainable growth across all regions.

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FINANCIAL INCLUSION IN INDIA: THE JOURNEY SO FAR

Rajendra Nath Datta
Priyanka Banik

Abstract

Financial inclusion is the key to economic empowerment. Financial inclusion ensures delivery of financial services at an affordable cost for all the people of the nation. By taking appropriate steps for financial inclusion, the country can usher the unbanked population under the scope of the formal banking system. At present, a substantial portion of India's rural population has limited access to the basic financial services. So if they could be brought under the formal financial system, the detrimental effects of the shadow economy will be minimized. The concept of financial inclusion is a burning issue in recent years as it can stimulate economic development and alleviate poverty. The present paper seeks to examine the current status of financial inclusion in India, including the factors that are causing barriers to financial inclusion; it also assesses the various measures taken by the Indian government to promote financial inclusion. The present study is descriptive in nature, and the data have been collected from different government websites, journals, and other sources. Although India has made notable progress to ensure financial inclusion, it still has a long way to go before achieving complete financial inclusion.

Keywords

Financial Inclusion, Financial Inclusion Index, Organized Banking System, Shadow Economy

1. Introduction

Financial inclusion ensures that individuals and businesses have access to affordable financial services that cater to their needs and are delivered responsibly and sustainably. Financial access improves the financial condition and living standards of poor and the disadvantaged. Financial inclusion is recognized globally as the key driver for economic growth, reduction of poverty and prosperity. Financial inclusion is crucial for inclusive and sustainable growth in a diverse country like India. Financial inclusion aims to broaden the reach of financial services by bringing people, particularly from lower socioeconomic groups and women, under the umbrella of an organized financial system to safeguard their assets and other resources in trying times. People, especially those from lower income groups, are unable to obtain basic financial services including bank accounts, credit, remittances, payments, insurance, etc. Financial inclusion takes into consideration the participation of vulnerable groups of society in the formal financial system by providing financial access in the form of account openings, payments, credit, insurance, etc. People from low income categories are often seen to fall victim to usurious money lenders, causing their exploitation. Financial inclusion mitigates exploitation of the marginalized groups by providing easy access to formal credit. Financial inclusion is required to uplift the poor by providing them with accessible and affordable financial products and services.

Financial inclusion is inevitable for a multitude of reasons to policy makers and academic researchers. First and foremost, financial inclusion ensures that financial resources are mobilized effectively. Additionally, having simple access to financial resources will enhance the day-to-day management of finances. Moreover, all-inclusive financial inclusion can prevent the operation of the parallel (shadow) economy from functioning posing a severe threat to the stability and growth of the formal economy. Financial inclusion ensures financial services are provided to the poorest in society.

The three pillars of an integral strategy are financial education, financial inclusion and financial stability. Financial inclusion performs on the supply side of providing financial services whereas, financial education supports the demand side by promoting awareness among people regarding the importance of using financial services provided by banks and other financial institutions. Financial inclusion as a research topic is very engrossing as it has universal application. Against the backdrop of the study, the paper discusses the progress of financial inclusion in India to date.

2. Literature Review

Bagli & Dutta (2012) have constructed a composite index to measure financial inclusion for each state using various parameters. The authors are of the opinion that progress of financial inclusion in each state is not promising. Thus, the authors have suggested that the government to take more prompt actions to expedite financial inclusion. The financial institutions are unable to bring the marginalized group under the umbrella of the formal financial system. Therefore, banks and other financial institutions need to arrange

mass financial literacy programme for marginalized sections of the population. Furthermore, the banks and other financial institutions need to be approachable to achieve financial inclusion.

Kunt et al. (2017) emphasized in their report that financial products must meet the diverse needs of people for the benefits of financial inclusion to be realized; it will create a significant difference in financial lives. They also advocated for giving proper education to the people in order to boost their confidence in the nation's organized financial system. Financial inclusion can be achieved by providing adequate financial infrastructure and financial regulators so that even small financial transactions are viable thereby ensuring a stable and reliable financial system for the country.

Iqbal & Sami (2017) document that financial services will boost the financial conditions and standard of living of the country's marginalized population. Reserve Bank of India along with the government of India has done a commendable job in promoting financial inclusion by ensuring growth in banking penetration, installing of new ATMs and by implementing various schemes. The authors in their study found a significant positive impact of the numbers of bank branches and credit deposit ratios of banks on GDP of the country. However, ATMs' growth rate has turned out to have a statistically insignificant impact on the Indian GDP. They state that there is a strong association between financial inclusion and the progress and development of a country and India has a long way to go before financial inclusion becomes a reality.

Ozili (2020) opines that levels of financial innovation, poverty level, stability of the financial sector, the state of economy, financial literacy and regulatory frameworks influence the financial inclusion of any country. These factors vary from country to country. The author suggested the policymakers to study carefully the interaction between financial inclusion and all the aforesaid variables as well as to find innovative ways to deliver financial services to users through non-banking channels.

Satyasai & Kumar (2020) have constructed the NAFINDEX (NABARD All India Financial Index) based on state-wise household access to financial services. The index was constructed from the field data collected by NABARD during 2016-17. NAFINDEX considers three dimensions, viz., traditional banking products, modern banking services, and payment systems. The index's average value across India was 0.337. There were variations across the states and in the above-mentioned three dimensions. In terms of the NAFINDEX during 2016–17, Goa was ranked first with an index of 0.6, followed by Punjab (0.486) and Karnataka (0.483). The least rank comes to 0.094 for Chhattisgarh. The finding shows that modern banking services and payment systems rank high in states with low traditional banking system penetration. In order to enhance financial inclusion, the authors propose that households be trained through improved outreach by microfinance institutions.

Sahoo & Dwibedi (2021) discussed the necessity of digital integration of financial services which will foster financial growth. The authors stated that financial inclusion is not a one-time activity rather a continuous process. It is a time-consuming process to connect all the people under the organized banking system, but digital or electronic

way will make it easier to reach people who can afford financial services at affordable prices that cater to their requirements. The authors advocate for use of digital financial system as it will prove catalyst to liberate the society from cash related robbery, corruption and shadow economy. The authors concluded that digital financial inclusion is the need of the hour to achieve the goal of financial inclusion.

Mondal (2022) highlighted that a financial exclusion exists in India, and a sizeable portion of the Indian population still has no access to the basic formal banking system (one of the primary causes of social exclusion in India). This study observes that social-economic factors as well as physical infrastructure play a crucial role in promoting financial inclusion. Additionally, the author suggests that providing internet access to the remote areas can fulfill the gap of difficult access to physical bank branches.

Mehak & Dharni (2023) highlight that financial inclusion offers the unbanked population a non-discriminatory and transparent access to the formal financial system at an affordable cost. Moreover, this study notes that there is no significant relationship between educational level and account ownership from the Indian perspective. Furthermore, they document that there is a lot of variation in account ownership, educational level, and income among G20 countries. Additionally, Indian borrowing and saving habits are also considerably poor as compared to other G20 countries.

3. Objectives of the Study

The objectives of the paper are outlined below:

i. To study the current scenario of financial inclusion through FI-Index.
ii. To find out the factors causing barriers to financial inclusion in India.
iii. To discuss the government's policies to expedite financial inclusion.

4. Research Methodology

The present study is descriptive and exploratory in nature. The study is undertaken to study the progress of financial inclusion in India. The study is based on secondary data that has been collated from journals, books, magazines, and websites. The various schemes for financial inclusion initiated by Indian Government have been examined from their inception up to 2023-24. Various graphs and charts were used to explain the data.

5. Findings and Discussion

According to the National Family Health Surveys report, about 96% of the households had access to the formal banking system by 2021. As per the survey by think tank *People Research on India's Consumer Economy,* it was found that banking services covered 99% of households in India. However, in comparison to the 2011 census, access to the formal banking system was limited to only 58.70% of households at that time. The expansion of banking services, particularly in rural areas, along with the government's Direct Benefit Transfer (DBT) scheme are among the key reasons for the significant rise in access to the formal banking sector. With financial inclusion as a top priority for the government, the government has taken numerous steps to ensure financial inclusion for all households. Some of these steps are building a robust branch network of commercial banks, zero balance accounts, Jan Dhan accounts etc.

Table 1: No. of Branches of Scheduled Commercial Banks in Rural & Semi-urban areas, 2019-2024

Year	Nos. of Rural Branches	Nos. of new Rural Branches Open
2019	51587	745
2020	52,346	759
2021	52,618	272
2022	53,179	561
2023	54,219	1,040
2024	55,236	1,017

Source: RBI Website

It is very apparent from Table 1 that there has been a significant increase in the number of rural branches of scheduled commercial banks between 2019 and 2024 (except 2021, where only 272 new rural branches were opened due to the presence of the COVID-19 pandemic). In the recent years, the numbers of rural branches have penetrated the rural market significantly, exhibiting that the rural people are relying on the formal financial system.

5.1 Financial Inclusion (FI) Index: The FI index provides a snapshot of India's current financial inclusion situations. The extent of financial inclusion across the country can be judged through FI index. FI-index calculation is based on multiple parameters to reflect the deep reach of financial inclusion in India. The FI Index gives a clear picture and a quantifiable measurement of financial inclusion in India. The FI index helps the policy makers to judge the existing policies of the Government to promote financial inclusion in India as it provides a standard to assess the performance over the years.

The index incorporates information based on various aspects of financial inclusion on a scale of 0 – 100. On the scale of 0 – 100, '0' represent complete financial exclusion, and '100' represent complete financial inclusion. FI-Index constructed by the Reserve Bank of India is based on three dimensions of FI, which are 'Access,' 'Usage' and 'Quality.' The weights attached to access, usage, and qualities are 35%, 45%, and 20% respectively. Usage and access are given more weight as these are important aspects of FI. These three sub-indices are further divided into non-overlapping set of indicators which are discussed as follows:

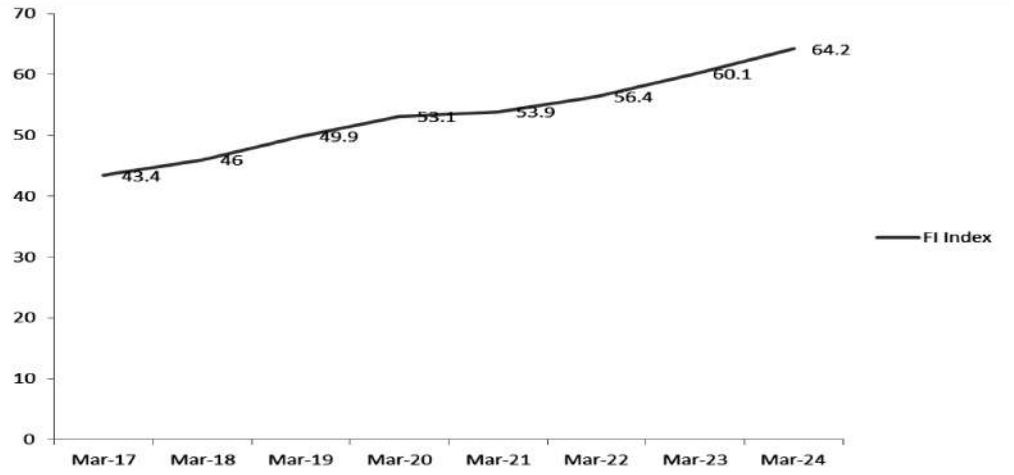
Access- Access is defined by four dimensions, i.e., access to 'Banking,' 'Digital,' 'Pension', and 'Insurance'. These represent the reach and the availability of financial services such as the availability of proper banking facilitates, ATMs, digital banking infrastructure etc. Based on the four previously mentioned dimensions, a total of 26 indicators were selected for

measurement of this sub-index.

Usage- Usage is defined by five dimensions, i.e., 'savings & investment,' 'credit,' 'digital,' 'insurance,' and 'pension.' These represent the demand side of financial inclusion, referring to the application of financial infrastructure through savings and investment habits, credit facilities, and contributions to different pension schemes. Usage takes into account 52 indicators for the measurement of this sub-index.

Quality- Quality has three dimensions which are 'Financial literacy', Consumer Protection, and 'Inequality'. Quality has 19 indicators. These indicators take into consideration the efforts taken by stakeholders to educate the citizen regarding various financial service available, prudent ways of using the financial services, etc.; it also measures the performance of grievance redress mechanism.

Thus, a total of 97 indicators are employed for measuring the FI index. Out of these 97 indicators, 90 are primary indicators and rests are inequality measure of seven primary indicators such as distribution of bank branches, ATMs, savings account, savings amount etc. The indicators are adjusted for inflation based on Consumer Price Index. The FI index has no base year. All the indicators are normalized to make them unit free and converting them to a consistent base for measurement. The FI index is calculated without taking any base year into consideration; thereby, it reflects the cumulative efforts of stakeholders for financial inclusion over the years. RBI publishes the index every year in July. The growth of the FI index from March 2017 to March 2024 is depicted in Figure 1.



wwFigure 1: FI Index (March 2017 – 2024) (Source: RBI Website)

Figure 1 depicts that the FI index of India from 2016-17 to 2023-24 is increasing over the years with growth witnessed in all the sub-indices. The FI-Index of India is promising as it is showing a rising trend. At present the FI index stands at 64.2, which signifies that close to two-thirds are under the ambit of the formal financial system. However, a considerable portion of the populace still lacks access to basic financial infrastructure and may be exploited by greedy money lenders. So still a lot of effort is called from all stakeholders to ensure 100% financial inclusion in India. As per the existing study the usage dimension has contributed significantly for improvement of FI index in March-2024. The usage dimension reflects the deep penetration of financial inclusion.

5.2 Factors causing barriers to Financial Inclusion (FI) in India: Access to financial services is one of the important steps to ensure 100% financial inclusion in India. Low-income households that lack basic education and knowledge, find it challenging to comprehend the need for financial services being so, they continue to be outside the ambit of these services. Financially inexperienced users may not get the full benefit of having a bank account if they are not aware of various financial services that are available. In many rural areas, there is lack of financial access, hindering it difficult for rural people to access financial services. Although access to a formal banking system is increasing, there is still a lot of work to be done to ensure financial access in every corner of India. The factors that are obstructing financial services from reaching to every household are discussed as follows:

a) **Lack of legal identification**: Minorities, refugees, and political migrants occasionally find it difficult to access financial services as they do not have proper identity proof such as birth certificate, voter card etc.
b) **Place of living**: The Population of rural areas finds it difficult to locate a bank or financial institution where they obtain the financial services. The penetration of commercial banks in the form of rural branches is not very significant. As a result, people in rural areas sometimes are required to travel a long distance to reach a bank. So, people in rural areas sometimes become reluctant to visit rural branches of commercial banks.
c) **Gender Biasness**: It was observed that female users sometimes do not get proper credit facilities from banks if they do not possess properties or assets. Banks may require a male guarantee in order to issue a loan. As a result, gender bias is pervasive, particularly in rural areas.
d) **Restricted knowledge of financial services**: The main barriers to receiving financial services are lack of basic education. Individuals who are unaware of the benefits of a formalized banking system or for whom financial services are not easily accessible or reasonably priced will not prioritize access to financial services in their daily lives. Many people are unaware of how to use ATMs, debit cards, online banking, and other financial services.
e) **Type of business**: It has been observed that banks and other financial

institutions are reluctant to provide funding to startups or unstructured businesses.

f) **Structural procedural formalities**: Due to lack of education and understanding, many people find it difficult to understand the extensive terms and conditions (required by financial institutions) to fill out the different forms.

g) **Psychological and cultural barriers**: Many people find it reluctant to visit bank branches due to psychological barriers. When bank employees are not bilingual in the local tongue, many individuals find it difficult to communicate.

h) **Social security payment**: In India, the social security payment is not linked to the banking system, which leads to higher banking exclusion.

i) **Service charges**: It is also one of the significant barriers to financial inclusion in developing countries like India. Banks sometimes charge many hidden charges that were not disclosed in the beginning. Thus, it results in low confidence in the use of banking services as it raises trust issues.

j) **Repayment of loan**: Small enterprises sometimes face difficulty due to cutthroat competition, which will restrict them from sustaining themselves in the competitive marketplace. Therefore, the chance of the number of defaulters is high.

The above-mentioned barriers are creating bottlenecks for promoting financial inclusion. These barriers are primarily responsible for the persistence of the parallel economy, which signifies that a part of the population is still outside the ambit of the formal financial system.

5.3 Government policies for Financial Inclusion: Financial inclusion serves as a stimulus to narrow the socioeconomic gap and ensure robust and sustainable economic development. Financial inclusion is acknowledged globally as being key to inclusive growth and development. The Indian government has left no stone unturned in terms of implementing financial inclusion over the last decade. Some of the key initiatives that the Indian government has taken are Pradhan Mantri Jan Dhan Yojana (PMJDY), Direct Benefit Transfer (DBT) and the issue of RuPay cards, among others. Financial inclusion has been introduced by the current Indian government in three phases. To start, Indian Government has expanded public access to financial institutions by introducing the concept of 'no frills' accounts (zero balance account). The Indian government has also started to take several initiatives to promote digital payment and the use of RuPay cards. These initiatives ensure that people are attracted into and remain in the formalized banking channel. Furthermore, the government of India has built the required infrastructure to ensure financial services penetrate all corners of the country. Thus, the nation offers a new wave of financial services that can be accessed online and through smart phones. Additionally, the private players reached out to help the Indian government promote financial inclusion. Private players have boosted rural entrepreneurship as well as raised financial literacy by leveraging their presence and providing banking and

ATM services through technology driven platforms. Following is a discussion of a few of the government of India's financial inclusion initiatives.

a) **PMJDY**: Prime Minister Jan Dhan Yojana is the revolutionary financial inclusion programme unveiled in 2014. The programme has penetrated banking all over India thereby expanding the market for financial services. The programme is targeted at making bank accounts accessible to all. The main benefit of opening a bank account through PMJDY is that it offers a Rs. 10,000 overdraft facility for accounts linked with an Aadhar card and a RuPay card, as well as accident insurance of Rs. 1 lakh (Rs. 2 lakhs for accounts opened after August 28, 2018).

The notable features about PMJDY are that over the years it has brought a sizeable portion of the unbanked population into the formal financial system, as the zero-balance account facilities and other products like RuPay cards are accessible to a significant part of the unbanked population, especially in rural areas. This programme directly contributed to the penetration of the banking system, enabling Direct Benefit Transfer to the eligible beneficiaries and reducing leakages in the system. The growth of PMJDY accounts in terms of accounts opened and deposit balances are depicted through the Figure 2 & 3.

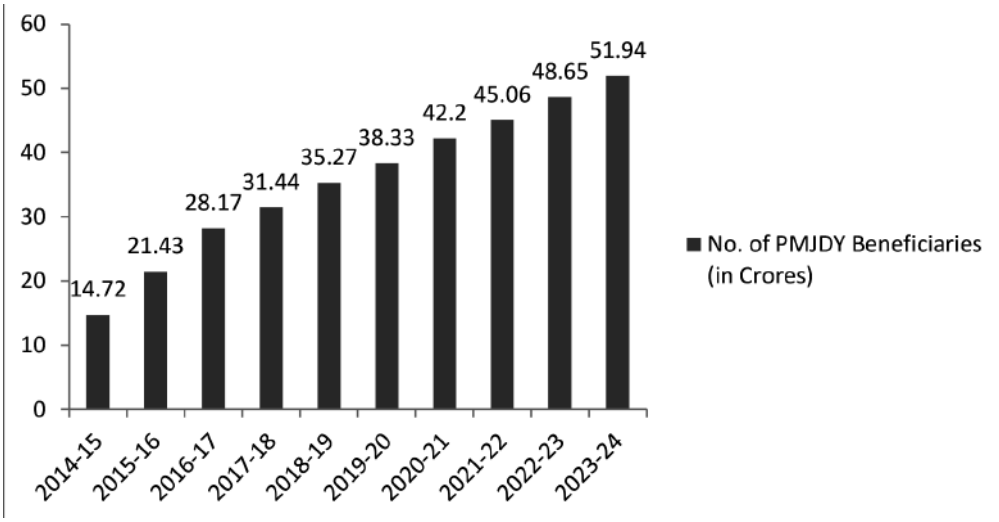


Figure 2: No. of PMJDY Beneficiaries (in Crores) (2014-15 to 2023-24) (Source: PMJDY website)

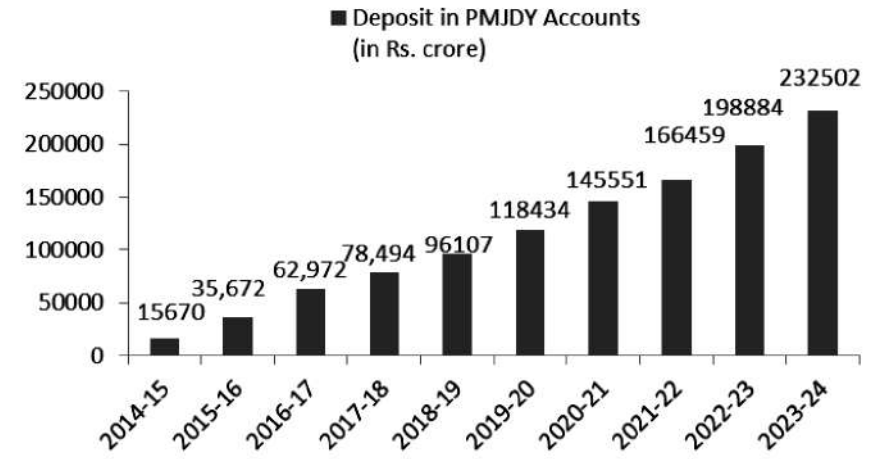


Figure 3: Deposit in PMJDY accounts (in Rs. Crore) (2014-15 to 2023-24) (Source: PMJDY website)

Based on these figures, it can be observed that the total number of PMJDY beneficiaries and deposits in PMJDY accounts from 2014-15 to date reflect substantial growth. The rising trends demonstrate that individuals are confident in making a deposit under PMJDY, which explains why it becomes more and more well-liked. This PMJDY is instrumental in building the confidence of the masses to rely on the formal financial system. In the post-pandemic period, i.e., from 2021-22 to the date, it can be observed that various government initiatives and awareness programms have promoted the money-saving practice, and hence a surge in deposits has been noticed in the post-pandemic era. As a result, PMJDY has made substantial efforts to integrate the populace into a well-functioning financial system. Moreover, through providing RuPay debit cards, PMJDY further encouraged the cashless economy.

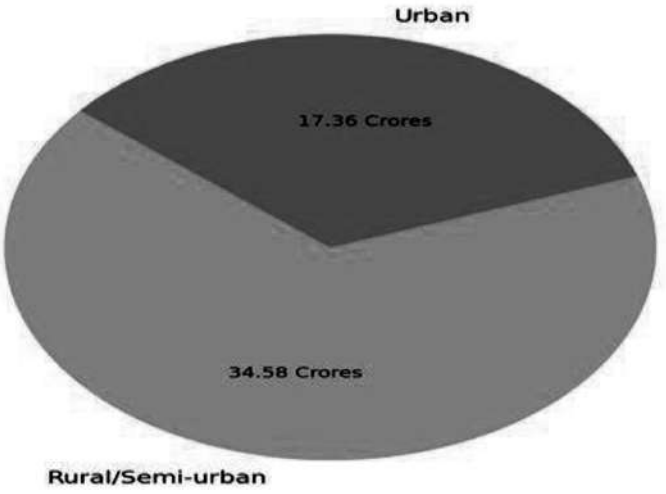


Figure 4: No. of Beneficiaries under PMJDY in Rural & Urban areas as on 31.3.24

Out of 51.95 crores of beneficiaries under PMJDY, about two-third of the beneficiaries are from rural / semi-urban areas; it indicates that the penetration of PMJDY is more prominent in rural/semi-urban areas.

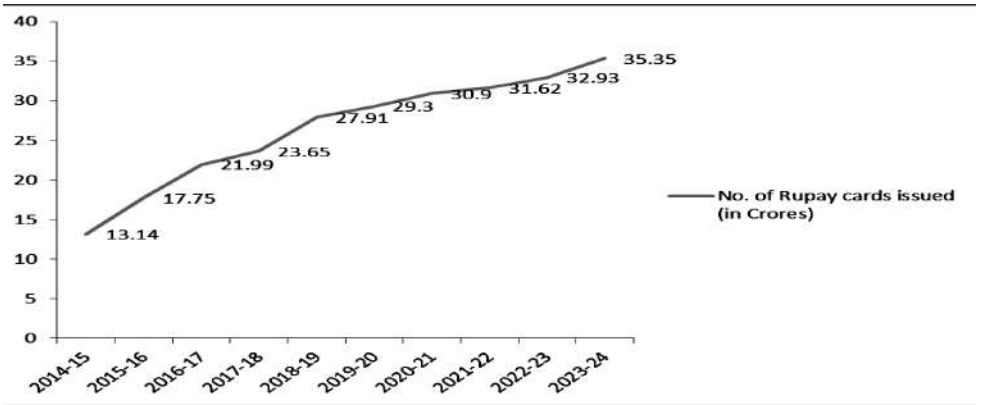


Figure 5: No. of Rupay cards issued from 2014-15 to 2023-24 (Source: PMJDY website)

Figure 5 depicts the increasing trend for usage of the RuPay card among PMJDY account holders. Thus, the RuPay card is significantly contributing to boosting the cashless economy; it will help to restrict the growth of the shadow economy. Following demonization, the use of the RuPay card accelerates, thereby advancing the movement towards a cashless economy.

b) **Aadhaar**: It was created to provide a unique identification (UID) number to all citizens of India. It has contributed to the financial inclusion plan of the government by providing documentation benefits that are required for opening bank accounts or getting mobile connections. Aadhaar assists in the elimination of fake identities and can be easily verified and authenticated in a cost-effective manner. The loan application process has now become hassle free with updated Aadhaar. The beneficiaries can take rations from anywhere in the country under the "one nation, one ration" programme. Students who have updated their Aadhar cards have greater access to various scholarship programmes.

The notable features of Aadhaar are its facilitated identity verification for the citizens, making them eligible for access of financial services. The biometric database of Aadhaar's number is unique and robust in nature. The integration of Aadhaar numbers with bank accounts has facilitated the smooth transfer of various DBT schemes to eligible beneficiaries, making the entire process more transparent and thereby boosting financial inclusion across the nation.

Since the introduction of aadhaar in September 2010, aadhaar enrollment has grown exponentially. The Figure 6 shows the progression of Aadhaar with year-by-year enrollment.

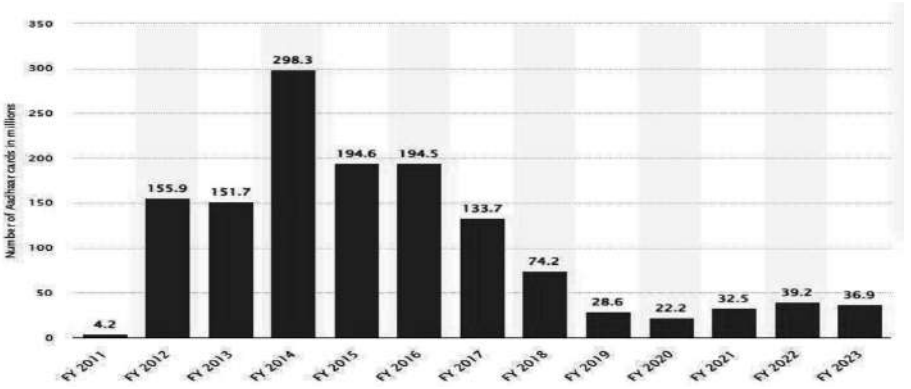


Figure 6: Year wise aadhar generation across India from FY 2010-11 to 2022-23 (Source: *www.statista.com***)**

From Figure 6, it can be observed that initially there is a surge for the issue of aadhar card. But now it is showing decreasing trend as most of the people have received their aadhar card.

c) **DBT Scheme**: Direct Benefit Transfer (DBT) launched by the Government of India to transfer the benefits and subsidies of various schemes directly to the bank account of the beneficiary. As a result, it ensures the fund's transparency to the beneficiaries. Additionally, the DBT scheme has made the beneficiaries to realize that bank account is a pre-requisite, to receive the subsidies. By linking various subsidies with the beneficiaries' bank accounts, the government has been able to reduce the leakages of the subsidiaries and thereby ensured that the subsidies reach to the eligible beneficiary. So, the unbanked population felt the importance for a bank account and DBT scheme contributes to promote financial inclusion initiative of Government of India by increasing the banking activities among previously excluded sections of the society.

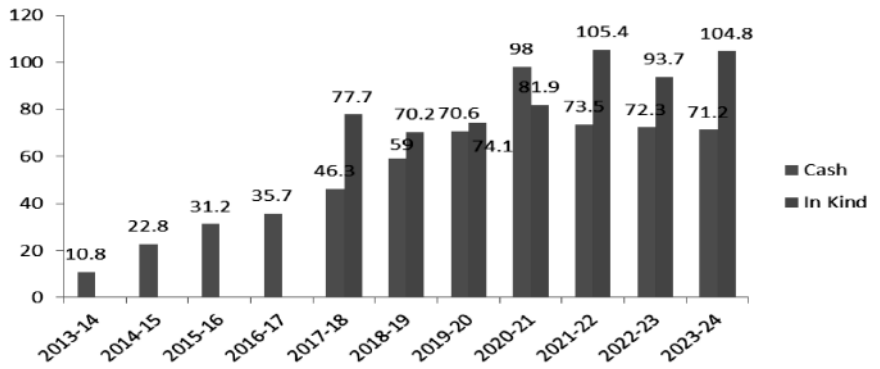


Figure 7: Year Wise DBT Beneficiaries from 2013-14 to 2023-24 (Source:DBT website)

Figure 7 provides a summary of the DBT recipients by year. It is observed that the number of DBT recipients has grown over time, ensuring that most of the population is covered by the formal banking system. The DBT scheme in kind includes PAHAL Scheme (subsidy for LPG scheme), MGNREGS, NSAP, Scholarship Scheme, PMAYG, PDS, Fertilizer and others.

d) **Pradhan Mantri MUDRA Yojana (PMMY):**

Prime Minister Mudra Yojana was launched in 2015; it aims to provide financial assistance in the form of a bank loan of up to Rs. 10 lakhs to the non-corporate, small, and microenterprises (SMEs) that promote financial inclusion for those who are not getting the benefit of the formal financial

system. The scheme is primarily design for the SMEs which contribute significantly to job creation and overall economic development. The key focus of this scheme is to provide financial aid, especially to the marginalized section of our society, and empower them. Under PMMY, various training programs are organized for skill and capacity development, particularly for rural populations, to raise awareness about the different types of financial aid available to support their businesses. These programs aim to inculcate entrepreneurial values among the youth. Another notable feature of PMMY is that the nominal lending rate, in conjunction with targeted outreach initiatives, has promoted gender equality that increases women's workforce participation (Saini *et al.*, 2024; Alves *et al.*, 2019; Fayolle & Gailly, 2013). The schemes are designed to promote small-scale industries which form the background of India's economy. This will contribute to creation of job and economic empowerment for many, particularly for women entrepreneurs.

Table 2 contains data related to the loan amount outstanding, sanction and disbursed since the inception of PMMY i.e., from 2015-16 till 2023-24

Table 2: Loan Details under PMMY, 2015-16 to 2023-24

[Amount Rs. in Crore]

F.Y	2015-16	2016-17	2017-18	2018-19	2019-20	2020-21	2021-22	2022-23	2023-24
Outstanding Amt	109,292.87	138,209.31	202,113.28	260,128.10	267,318.18	284,546.63	311,706.46	382,674.02	443,951.83
Disbursed Amt	132,954.73	175,312.13	246,437.40	311,811.38	329,684.63	311,754.40	331,402.20	450,423.66	532,358.35
Sanctioned Amt	137,449.27	180,528.54	253,677.10	321,722.79	337,465.13	321,759.25	339,110.35	456,537.98	541,012.86
Disbursement Rate	0.97	0.97	0.97	0.97	0.98	0.97	0.98	0.99	0.98

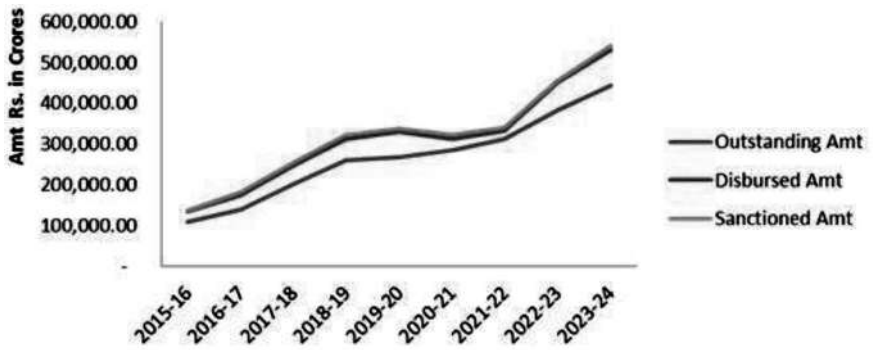


Figure 8: Loan Details under PMMY (2015-16 to 2023-24)[Source: PMMY website]

From Figure 8, it can be observed that the gap between the sanctioned loan amount and the disbursed loan amount is negligible, which implies a high disbursement rate. It is gratifying to note that in Table 2 that the disbursement rate is substantial (0.97 and above). In operational terms, it implies that the sanctioned loan amounts are actually being disbursed smoothly.

The sanctioned loan amount is showing mostly an increasing trend over the years, which highlights the demand for loans from formal financial institutions is increasing, and the loans are becoming accessible for the eligible borrowers. As the number of people borrowing money from formal financial institutions increases over the years, the functioning of the shadow economy will shrink. Additionally, as the people are relying on the formal financial system for taking loans, the chances of them being exploited by greedy moneylenders will be less.

6. Concluding Observations & Suggestions

6.1 Concluding Observations

Various government schemes such as PMJDY, Aadhar, UPI, PMMY etc., have contributed positively to driving financial inclusion and ensuring financial services can be accessed by every individual in the country. The Jan Dhan scheme, Mudra Scheme, Aadhaar, and Mobile (JAM) etc. have brought a paradigm shift in the field of financial inclusion. On the other hand, financial inclusion constrained the scope within which the parallel or shadow economy could operate. When a completely cashless economy is achieved, the parallel economy can be completely restricted. However, an increase in digital transactions calls for prompt redressal of grievances that may occur due to failed transactions or service gaps. The government is required to aware the users of financial services regarding various kinds of fraud, cyber security, and data security. Despite significant progress in financial inclusion initiatives, India still has a long way to go before becoming a fully financially inclusive and cashless economy.

6.2 Suggestions for better growth/quality of Financial Inclusion in India

- The number of bank branches and ATMs should be increased, particularly in unbanked rural areas enabling the people to access the financial services through formal financial system at an affordable cost rather than being relying on informal financial system and falling victim to usurious money lenders.
- Banks should improve and promote their digital infrastructure to encourage the use of mobile banking systems enabling easier access to financial services, especially in rural areas where banks branches are limited, thereby enhancing financial inclusion.
- Financial literacy campaigns are required to be organized regularly, particularly in rural and marginalized communities, to raise awareness about different financial concepts, enabling people to make better financial decisions and accessing financial services only through formal financial institutions.
- The basic concepts of financial education should be integrated in

the school curriculum to familiarize students with the financial knowledge from an early stage which will empower them to make informed financial decisions through formal financial channel and protect them from falling prey to financial exploitation.

- The use of local language and vernacular media should be prioritized, mainly in rural areas, to improve outreach and help people to understand the benefits of the formal financial system, thereby driving financial inclusion.
- To ensure active usage of Jan Dhan accounts, they should be linked with the credit card and insurance schemes, providing account holders with a basket of financial products, and ensuring greater participation in the formal financial system.
- The bank's grievance redress mechanism must function promptly, especially in cases related to Direct Benefit Transfers (DBT), to prevent leakages and fraud, thereby ensuring that the benefits reach the target beneficiaries and boosting confidence in the banking system.
- Pension schemes and insurance products, particularly designed for the informal sector groups should be introduced to bring them under the ambit of formal financial system.
- Self-help groups (SHG) should be effectively monitored to drive the financial inclusion in rural areas, empowering communities to make use of financial services through formal financial institutions.
- The formal financial institutions should play a vital role in promoting financial inclusion by providing loan at nominal rates to the women entrepreneurs and the MSMEs, ensuring that the underserved groups have access to affordable credit, which will help them to run their business and contribute to economic development.

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PREDICTING INDIAN GOLD PRICES USING BOX JENKINS METHODOLOGY

Khajabee M

Abstract

Gold has gained popularity as a valuable commodity for investment purposes and has served as a national reserve for many years, making it essential in the economics of any country. Analyzing gold price movements aids investors in focusing their investments, while governments rely on it to make informed economic decisions, given its significance as a significant element in the world economy. This study employs Box and Jenkins' (1976) methodology to forecast gold prices using annual time series data from 1964 to February 2024. After conducting a unit root test, ARIMA (2, 2, 3) is identified as the optimal model. Predictions indicate an upward trend in gold prices over the next three years.

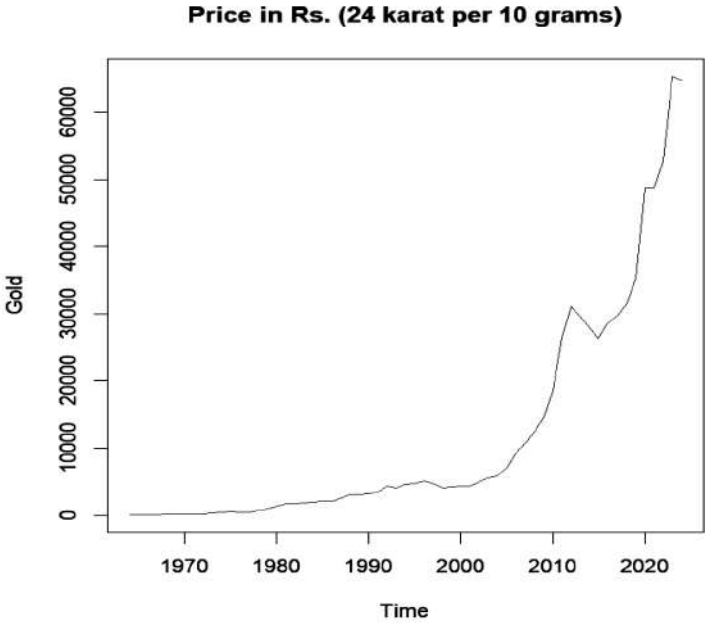
Keywords

Gold Price, Box and Jenkins' Methodology, Volatility, Autoregressive Integrated Moving Average (ARIMA) Model

Introduction

Gold holds a supreme position among the world's minerals, not only for its intrinsic value but also as a vital reserve asset for nations. These reserves serve as a guarantee, ensuring the ability to meet international payment obligations or engage in global trade, thereby boosting the economic standing of the country. In addition to its reserve function, gold is renowned as the premier choice for investment among all minerals worldwide. Investors gather to gold due to its enduring allure and perceived stability, making it a cornerstone of diversified investment portfolios. Half of the world's gold consumption is attributed to jewelry, with investments accounting around 40%, and the remaining 10% used in various industrial applications (Naz et al., 2017). In India, where culture, religion and economy come together to highlight the importance of gold, predicting price movements benefits investors, businessmen etc. As a precious metal, gold holds a unique status as a commodity market, often regarded similar to stocks. Notably, during the global economic crisis of 2008 various financial products performed weakly, but the gold market had exceptional performance. This emphasizes the complexity of factors influencing gold price fluctuations, ranging from the exchange rate of the dollar to inflation rates and monetary policy decisions. The significance of the gold market within the global financial system and the accurate determination of its value for the future is paramount (Sharma et al., 2015). The process has been done with econometric modeling of gold prices. The price of gold is subject to fluctuations determined by a multitude of factors, rendering its movement inherently volatile. Among these influential factors are inflation rates, demand and supply dynamics, and political considerations, among others. Moreover, geopolitical uncertainties and concerns about the stability of the global reserve currency, the US dollar, can spark increased demand for gold. Hence, the price of gold exhibits erratic fluctuations, rendering it highly unpredictable. Figure 1 illustrates the price movement of gold spanning 60 years, from 1964 to February 2024. Despite this volatility, forecasting future gold prices is indeed feasible since the fluctuations in gold prices have a significant impact on the Indian economy.

Figure 1: Showing the price movement from 1964 to 2024



The movement of gold prices follows a time-series pattern, characterized by changes over time. Forecasting such data has traditionally posed a challenge until the advent of machine learning and deep learning techniques in economics and statistics. This study applied the Autoregressive Integrated Moving Average (ARIMA) model, to forecast the future price of gold. The model is widely used in time series analysis for forecasting and understanding the underlying patterns and dynamics in data. Initially, the gold prediction was done using regression analysis by different researchers such as Deepika, Nambiar, & Rajkumar, (2012); Ismail, Yahaya, & Shabri, (2009); Khashei, Hejazi, & Bijari, (2008); and Zhang, Ma, & Wang, (2011). George E. P. Box and Gwilym M. Jenkins introduced the ARIMA model in the 1970s. The model includes three crucial components: autoregression (AR), differencing (I), and moving average (MA). ARIMA models are a commonly used class of models in many practical applications, particularly in time series analysis. Abdullah (2012), employed the ARIMA model to forecast the upward trends in gold bullion coin prices, suggesting them as worthy investment options. Chujai et al. (2013), used ARMA and ARIMA models to predict future household electricity consumption across various timeframes, including daily,

weekly, monthly, and quarterly periods. They evaluated the effectiveness of these models by comparing their Root Mean Square Error (RMSE) values. Davis et al. (2014), focused on modelling and forecasting gold prices in financial markets using ARIMA models, achieving a correct forecasting rate of 66.67%. G. Peter Zhang (2003), conducted a comparative analysis of forecasting performance using ARIMA and Artificial Neural Network (ANN) models on sunspot and exchange rate data spanning one month, six months, and twelve months. The evaluation, based on Mean Squared Error (MSE), revealed that the ANN model outperformed ARIMA in terms of accuracy. Guha et al. (2016), employed an ARIMA (1, 1, 1) model to forecast gold prices, providing valuable insights for predicting future gold values. Javier et al. (2003), applied the ARIMA model to forecast electricity prices, achieving highly accurate estimations for future prices. Jha et al. (2016), explored time series applications for traffic forecasting in India, comparing ARIMA and GARCH models. Their findings demonstrated superior performance of the time series model over GARCH. Uma et al. (2013), conducted time series analysis on the Midcap-50 stock trend using the ARIMA model, predicting future trends with minimal error percentages. Due to the limited number of studies conducted on forecasting gold prices specifically in the Indian context after the COVID-19 pandemic. Further investigation in forecasting the gold price prediction is significant. Hence, an attempt has been made to predict the future value of gold prices in India using the ARIMA model based on Box Jenkins methodology.

Research Methodology

The purpose of this study is to forecast Indian gold prices using Box and Jenkins' (1976) methodology, relying on secondary data. Annual time series data spanning 61 years, from 1964 to February 2024, is taken for this study. Box and Jenkins (1976) mentioned that the ARIMA model is widely applied in forecasting gold prices. This model aims to establish a practical relationship between future, current, and historical values of the time series data. The growth of the ARIMA model comprises mainly three stages: preprocessing of time series data, identification, estimation, diagnostic checking, and forecasting. The Augmented Dickey-Fuller (ADF) test is employed to determine whether gold prices exhibit stationarity or non-stationarity. To identify the appropriate orders for p and q, the autocorrelation function (ACF) and partial autocorrelation function (PACF) of the sample is used.

Data Analysis

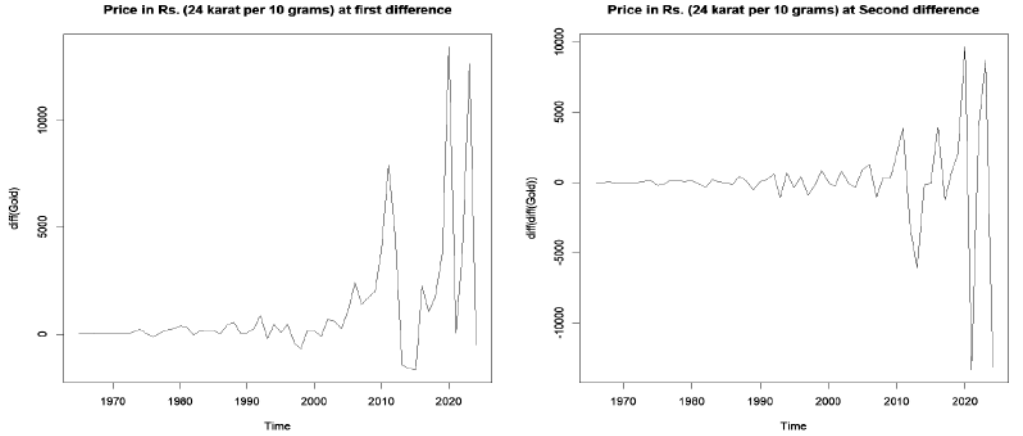
a) Unit Root Test –

Table 1: Augmented Dickey-Fuller test

	Significance Level	t-stat.	P-value
ADF test statistic at level:		3.974	*1.000*
	1% level	-3.544	
	5% level	-2.911	
	10% level	-2.593	
ADF test statistic at first difference:		0.710	*0.991*
	1% level	-3.571	
	5% level	-2.922	
	10% level	-2.599	
ADF test statistic at second difference:		-4.691	*0.000*
	1% level	-3.571	
	5% level	-2.922	
	10% level	-2.599	

Source: *Authors' calculation.*

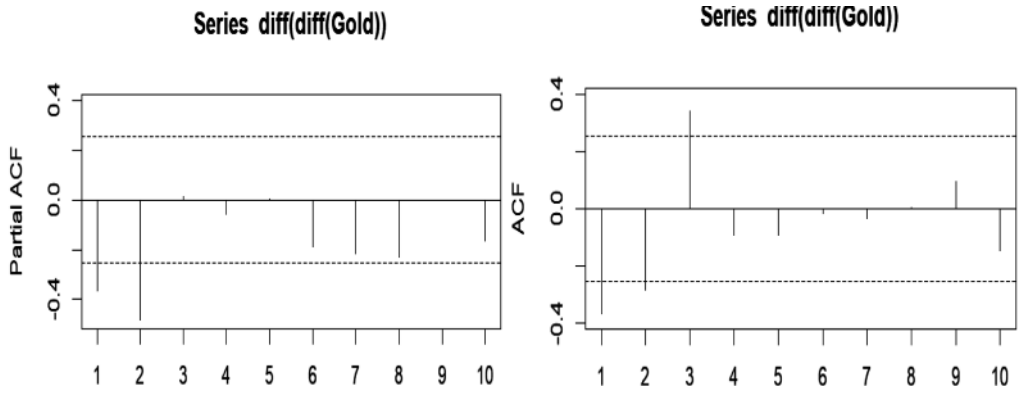
Figure 2: Showing the Gold price movement at different levels



It can be observed from Table 1, that the t-statistics are positive, and the p-values exceed the level of significance both at the level and after the first difference. Therefore, the null hypothesis cannot be rejected. However, after taking the first difference, the ADF test statistic decreases to 0.710, although the p-value remains high, indicating non-stationarity. Moreover, upon further differencing to the second order, the ADF test statistic substantially decreases to -4.691 with a p-value less than alpha. Hence, the series at second difference is stationary.

b) Identification of AR (p), MA (q), and ARIMA (p, d, q) orders –

Figure 3: PACF and ACF



After passing the stationarity test, the d-value in the ARIMA (p, d, q) model is 2. Since the stationarity is achieved after the second-order differencing. The values of p and q in the ARIMA (p, 2, q) model need to be identified. The identification of p and q values can be achieved through the observation of the ACF and PACF of the sample data. The PACF plot from Figure 3 exhibits significant lines at lag 1 and lag 2, suggesting the presence of previous two autoregressive terms AR (1) and AR (2), while the ACF plot indicates significant values for previous three error terms MA (1), MA (2), and MA (3).

c) Estimation of ARIMA model –

Table 2: Results of ARIMA model

Variable	Coefficients of ARIMA					
	(1,2,1)	**(1,2,2)**	**(1,2,3)**	**(2,2,1)**	**(2,2,2)**	**(2,2,3)**
Intercept	69.509	69.621	73.425	81.319	76.532	66.678
AR (1)	0.023	-0.688	-0.557	-0.805	-0.751	-1.030
AR (2)	-	-	-	-0.696	-0.274	-0.925
MA (1)	-0.847	0.030	-0.154	0.188	0.012	0.501
MA (2)	-	-0.768	-0.711	-	-0.590	-0.399
MA (3)	-	-	0.141	-	-	-1.102
Sigma	**2424.869**	**2331.326**	**2178.086**	**2428.658**	**2359.42**	**1947.778**
Log likelihood	**-545.51**	**-543.30**	**-543.17**	**-544.30**	**-542.92**	**-540.35**
AIC	**1097.015**	**1096.595**	**1098.329**	**1098.608**	**1097.829**	**1094.702**
BIC	**1103.248**	**1106.983**	**1110.795**	**1108.996**	**1110.295**	**1109.244**

Source: *Authors' calculation.*

Table 2 presents the results of the ARIMA model with different p, d, q orders selected based on Figure 3. The mean values of the time series from all the models are greater than 65 when all the predictors are zero. The standard deviation of the residuals for ARIMA (2,2,3) is lower, hence the model is good fit. With a higher log likelihood and a lower Akaike Information Criterion (AIC), ARIMA (2,2,3) is found to be superior among the models listed in Table 2.

d) Diagnostic test –

Table 3: Portmanteau test for white noise

Model	Portmanteau (Q) statistic	P-value
ARIMA (1,2,1)	14.4899	0.9760
ARIMA (1,2,2)	11.0587	0.9971
ARIMA (1,2,3)	11.4310	0.9962
ARIMA (2,2,1)	8.7683	0.9996
ARIMA (2,2,2)	11.4784	0.9960
ARIMA (2,2,3)	13.3040	0.9872

Source: *Authors' calculation.*

The results of the Portmanteau test suggest that the ARIMA models adequately capture the temporal dependencies in the data, as indicated by the relatively high p-values associated with the Portmanteau statistic for all models. Most of these p-values exceed 0.95, indicating that there is no significant autocorrelation remaining in the residuals after fitting the ARIMA models.

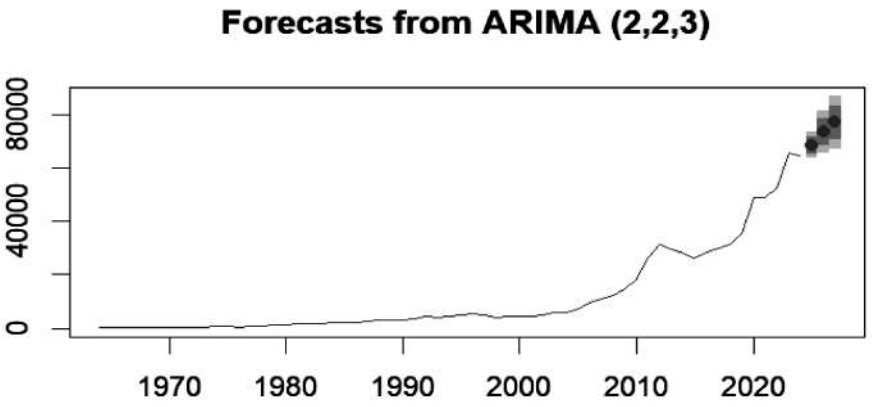
e) Forecasting –

Table 4: Forecasted Annual Gold Price

Year	Predicted Gold Price	Confidence Level			
		Lower class @ 80%	Upper class @ 80%	Lower class @ 95%	Upper class @ 95%
2025	68402.74	65286.15	71519.34	63636.32	73169.17
2026	73269.79	68185.72	78353.85	65494.39	81045.18
2027	76887.94	70457.85	83318.02	67053.96	86721.91

Source: *Authors' calculation.*

Figure 4: Forecasted Graph of ARIMA (2,2,3)



The lower and upper bounds of the forecasted gold prices provide a range of probable values within which the actual gold price is expected to lie with a certain level of confidence. The results from Table 4 and Figure 4 show an upward trend in gold prices over the next three years.

f) Model Validation and Robustness Testing –

Table 5: Results of model validation and robustness testing

Measures	ARIMA (2,2,3)
Mean Error (ME)	-0.0000
Root Mean Squared Error (RMSE)	0.2212
Mean Absolute Error (MAE)	0.0682
Mean Absolute Scaled Error (MASE)	0.5127
Auto-Correlation Function at Lag 1 (ACF 1)	-0.0001

Different accuracy metrics have been used to examine the ARIMA (2,2,3) model's prediction accuracy and resilience as shown in Table 5. The model does not consistently overestimate or underestimate market prices, as indicated by its ME of -0.0000, which suggests that it is not significantly biased. The model's predictions appear to be fairly accurate, with only minor departures from actual values, as indicated by the RMSE of 0.2212 and MAE of 0.0682. Furthermore, the MASE is much lower than 1, indicating that the ARIMA model outperforms a basic benchmark

model. Additionally, the ACF 1 of -0.0001 shows that the residuals do not significantly correlate, that the model has successfully captured time-dependent patterns, and that autocorrelation is not a problem.

Conclusion

This study employed Box and Jenkins' (1976) methodology to predict the future prices of gold, a crucial commodity often perceived as a barometer of economic stability, particularly during periods of economic crisis. The study used annual time series data spanning 61 years from 1964 to February 2024. Initially, a unit root test was conducted on the annual gold price data. Subsequently, among various ARIMA models, ARIMA (2, 2, 3) emerged as the most suitable model through the Box-Jenkins approach, encompassing model identification, parameter estimation, diagnostic checking, and future price forecasting. Finally, the predictions of gold prices indicate an upward trend over the next three years. This study focuses exclusively on employing the mean (ARIMA) model for short-term forecasting of gold prices in the Indian context. However, for future research endeavors, it is recommended to explore alternative volatility models such as EGARCH, TGARCH, IGARCH, GJR-GARCH, and NGARCH. It is important to acknowledge that while these models provide valuable insights, they may not always be perfectly accurate due to the influence of external factors like economic and geopolitical events on financial asset prices and returns. Therefore, investors are advised to use these models as supplements to their own analysis rather than relying solely on them for making investment decisions.

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RESILIENCE RECKONING - UNCOVERING CAPITAL STRENGTHS AND NPA VULNERABILITIES IN INDIA'S TOP BANKS

Rohan Jha

Abstract

As a cornerstone of India's economic framework, the banking sector has witnessed a symbiotic relationship between private and public sector banks, their concurrent growth and development fostering a dynamic financial ecosystem that underpins the country's prosperity.The Indian banking industry has undergone a metamorphosis, transforming into a vibrant and comparative marketplace, where capital regulations serve as the anchor, and the prudent management of asset quality and quantity has become the compass that navigates the financial trajectory of banking businesses.

This research embarks on a journey to unveil the intricate nexus between capital adequacy and NPAs within India's top ten banks. Spanning the tumultuous years from 2020-21 to 2023-24, it constructs a conceptual framework to illuminate their interplay. The empirical analysis then delves deeper, dissecting the correlation and growth trends of these metrics, ultimately seeking to unearth actionable insights for the Indian banking sector.

Keywords

Capital Adequacy, Non Performing Assets, Banking Sector, Levene Test & ANOVA

Introduction:

The banking sector is the bedrock of India's economic foundation, providing stability and fueling the country's transformation into a vibrant economy.A country's economic ecosystem is nourished by the financial roots of a healthy banking sector, with focus on growth, resilience, and prosperity. By harnessing the power of monetary flows and industrial strengths, banks create and execute bold growth plans that propel economic development and prosperity."As the economy embarks on its journey of growth and discovery, the banking sector has become the trusted compass, guiding its transformation in response to the reforms in India's financial sector with unwavering precision and direction.

Within the global banking framework's strict regulations, India has masterfully crafted a thriving financial landscape, where public, private, and foreign banks coalesce, driving innovation and growth through a balance of cooperation and competition.By efficiently mobilizing and allocating savings, India's banks create a vital link between depositors and investors, fueling economic growth and development. With a diverse array of lending options, they address the unique needs of various customers, foster financial inclusivity, and contribute to the country's economic progress.

This paper conceptual framework provides a comprehensive understanding of the interplay between capital adequacy and NPAs, a vital concern in India's banking sector, where the bad loan conundrum continues to pose significant risks. By defining capital adequacy as the regulatory-prescribed capital cushion, we emphasize its pivotal role in fostering banks' financial robustness and sustainable performance. This study tackles the pressing issues of capital adequacy and Non-Performing Assets (NPAs), recognizing the perilous impact of NPAs on economic expansion. Our empirical analysis probes the correlation between capital adequacy and NPAs in select Indian banks from 2019-2024, providing crucial insights into their symbiotic relationship and guiding risk mitigation strategies.

Review of the literature:

In their **2009** study, **Uppal** notes that Indian banks' priority sector lending has increased, yet they still fall short of RBI's targets, primarily due to challenges like diminished profitability, rising non-performing assets, and excessive transaction costs.

In their **2014** study, **Joseph and Prakash** examined the trends and underlying causes of Non-Performing Assets (NPA) in private and public sector banks, providing actionable strategies for banks to address the growing concern of NPA.

Nag's 2015 study, presented a comprehensive investigation into the Net NPA ratio of Indian banks, revealing the intricacies of NPA growth and its impact on the stability of the banking system.

Bhasin's 2017 study sheds light on the evolving landscape of Non-Performing Assets (NPAs) in India's banking sector, revealing a concerning trend. Through a thorough examination of secondary data, the research highlights a notable disparity: Public Sector Banks carry a significantly higher burden of NPAs compared to their Private and Foreign counterparts. However, the study also offers constructive

insights and practical recommendations, enabling banks to address this challenge and enhance their resilience in a rapidly changing financial environment.

Mittal and **Suneja's 2017** study, delves into the pressing issue of NPAs, casting a spotlight on the Indian banking landscape. With a dual objective, the study meticulously examines the NPA levels in both Public and Private Sector Banks, while also unraveling the underlying causes of this upward trend. The findings reveal a stark contrast: Public Sector Banks are grappling with a disproportionately higher NPA burden, underscoring the need for targeted strategies to mitigate this challenge and foster a more resilient banking ecosystem.

Bawa et. al. (2018) states that NPAs and ROA have an inverse relationship. As NPAs increase, the ROA of banks tends to fall. This is because NPAs not only reduce the bank's interest income but also increase the provisioning requirements, which can further diminish profitability. Therefore, a rise in NPAs can have a cascading effect on a bank's financial performance, leading to a decline in ROA.

Mehta and **Jha's 2020** in their study aims to provide a balanced perspective on the role of Non-Performing Assets in compromising bank financial stability. By examining existing research, the authors investigate NPA levels, causes, and management approaches, as well as trends in private and public sector banks. This study offers a thorough understanding of the complex dynamics surrounding NPAs and their impact on the banking sector.

Carter (2024) conducted a study on two prominent public sector banks, the State Bank of India (SBI) and Indian Bank, analyzing their performance over a five-year period from 2017-18 to 2021-22. Utilizing the CAMELS framework, the researcher compared essential metrics, including capital adequacy, asset quality, management efficiency, earnings quality, liquidity, and sensitivity to market risks. The findings revealed that both SBI and Indian Bank exhibited robust financial health, with Indian Bank slightly surpassing SBI in overall performance. Additionally, the research underscored the critical role of well-governed financial institutions in fostering economic growth and stability. It emphasized that ongoing enhancements in governance and operational efficiency are vital for ensuring the long-term sustainability of these banks.

Bansal & Singh (2024) undertook a CAMEL-based assessment of four major Indian banks: YES Bank, State Bank of India (SBI), Lakshmi Vilas Bank (LVB), and DBS Bank India Ltd. The study spanned from 2009 to 2020, a period marked by considerable challenges for many of these institutions. YES Bank, once regarded as a high achiever, faced a significant downturn by 2020, grappling with elevated non-performing assets (NPAs) and declining interest income, which ultimately resulted in negative profitability. Likewise, LVB struggled due to ineffective loan management and insufficient capital, underscoring the critical importance of robust financial practices and effective risk management strategies for ensuring the long-term viability of banks in a competitive landscape.

Research Gap:

This study identifies a significant research gap in the existing literature, which has

overlooked the relationship between Non-Performing Assets (NPAs) and Capital Adequacy, as well as recent NPA trends (2019-2024). Our research seeks to address this gap by examining the trend of NPAs and assessing their association with Capital Adequacy.

Objectives:

1). Venturing into the intricate landscape of NPAs, we dissect the multifaceted classifications and root causes that contribute to their emergence, providing a candid understanding of this vital aspect of financial ecosystems.

2). Through a thorough analysis of capital adequacy and NPAs, we establish a comprehensive framework that underpins the banking sector's stability and promotes a healthy financial landscape.

3). This study conducts an in-depth exploration of the interrelationship between Capital to Risk-Weighted Assets Ratio (CRAR) and Non-Performing Assets (NPAs) across a diverse range of Indian banks, spanning public and private institutions, to uncover insightful patterns and correlations that can shape banking strategy and regulation.

Research Methodology and Database:

This study navigates the intricate landscape of Non-Performing Assets (NPAs) and capital adequacy in the Indian banking sector. By examining the performance of top ten banks (on the basis of market capitalisation)- **SBI, PNB, BOB, IOB, CB, HDFC, ICICI, AXIS Bank, KOTAK MAHINDRA Bank and IndusInd Bank-** over a **four-year** period (**2020-21** to **2023-24**), we apply a balanced approach of statistical analysis and hypothesis testing to uncover the nuanced relationships between NPAs and capital adequacy. Utilizing a rich and diverse dataset from annual reports, journals, and banking websites, this research aims to provide a in depth understanding of the NPAs-capital adequacy nexus, offering valuable perspectives for stakeholders to promote sustainable growth and development in the banking sector.

Discussions:

Capital to Risk Weighted Assets -An overview:

CRAR serves as a foundational element in banking regulation, providing a comprehensive framework for evaluating a bank's ability to withstand potential losses by ensuring sufficient capital is maintained in proportion to its risk exposure.**Formula: CAR** = (Total Capital / Risk-Weighted Assets) **x 100.**

Components: The components of CRAR are as follows: 1.Total Capital: Total Capital represents the bank's capital coalition, uniting Tier 1 capital (equity and reserves) and Tier 2 capital (subordinated debt and hybrid instruments) to form a robust financial foundation.

2.Risk Weighted Assets: RWA reflects the bank's risk profile by assigning risk weights to assets according to their credit, market, and operational risk characteristics, providing a nuanced measure of risk exposure.

By combining Total Capital and Risk-Weighted Assets, the CAR delivers a nuanced assessment of a bank's capacity to absorb potential losses and manage

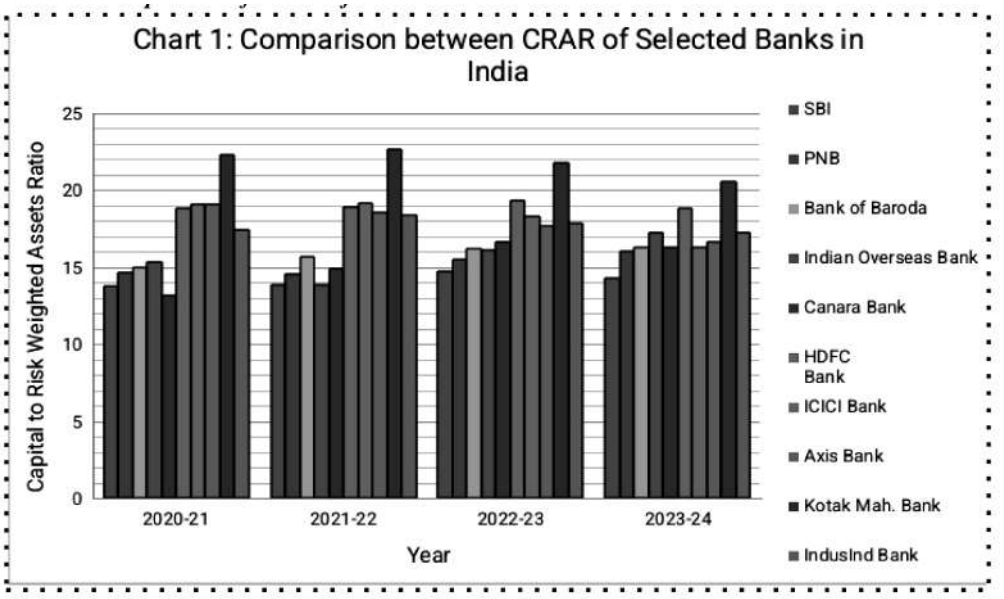
risk effectively. A higher CAR signals a bank's robust financial position, enabling it to navigate challenges with confidence, while a lower CAR indicates a need for caution and potential risk management improvements.

Table 1: Capital to Risk Weighted Assets Ratio of selected Public & Private Sector Banks in India (2021-24)

Year	Public Sector Banks					Private Sector Banks				
	SBI	PNB	Bank of Baroda	Indian Overseas Bank	Canara Bank	HDFC Bank	ICICI Bank	Axis Bank	Kotak Mah. Bank	IndusInd Bank
2020-21	13.74	14.64	14.99	15.32	13.18	18.8	19.1	19.12	22.26	17.38
2021-22	13.83	14.57	15.68	13.83	14.90	18.9	19.2	18.54	22.69	18.42
2022-23	14.68	15.54	16.24	16.10	16.68	19.3	18.3	17.64	21.80	17.86
2023-24	14.28	16.00	16.31	17.28	16.28	18.8	16.3	16.63	20.55	17.23

Source: Annual reports of Banking Companies

Chart 1: Comparison of CRAR of selected Banks:



The analysis of CRAR values presents a balanced picture of India's banking sector, where public sector banks have made notable progress in strengthening their capital positions, while private sector banks have consistently demonstrated a stronger capital adequacy. The gradual improvement in CRAR values across both sectors reflects a shared commitment to enhanced capital adequacy and risk management, but the variability in CRAR values among banks underscores the importance of continued vigilance and effective capital management strategies to maintain the stability and resilience of the banking system.

An overview of Non Performing Assets:
A Non-Performing Asset (NPA) is a loan or advance that has stalled, failing to produce income for the bank due to:

- Prolonged overdue payments (over 90 days) for term loans,
- Inactive Overdraft/Cash Credit accounts for over 90 days,
- Overdue discounted bills exceeding 90 days,
- Agricultural advances with delayed payments spanning two harvest seasons, but not exceeding one year.

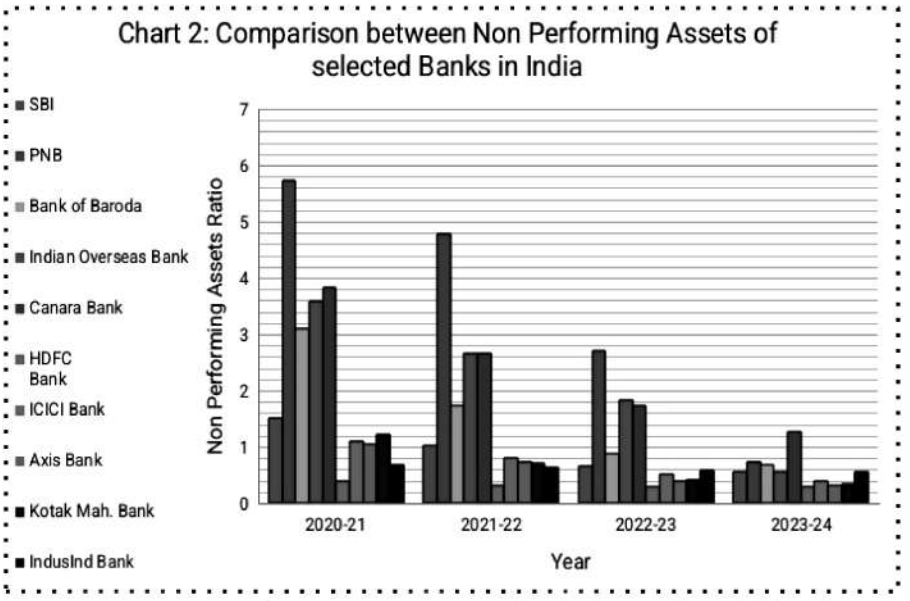
Types of NPA:
Substandard Assets: Assets that have remained NPA for less than 12 months.
Doubtful Assets: Assets that have remained NPA for 12 months or more.
Loss Assets: Assets considered uncollectible.
The Net NPA to Net Advances Ratio is a crucial benchmark, offering a snapshot of a bank's asset quality by comparing the net amount of non-performing assets to the total net advances, calculated as: (Net NPA / Net Advances) x 100.
Where, **Net NPA** = Gross NPA - Provision for NPA **&**
Net Advances = Gross Advances - *(Provisions + Write-offs).*

Table 2: Non Performing Assets of selected Public Sector & Private Sector Banks in India (2021-24)

Year	Public Sector Banks					Private Sector Banks				
	SBI	PNB	Bank of Baroda	Indian Overseas Bank	Canara Bank	HDFC Bank	ICICI Bank	Axis Bank	Kotak Mah. Bank	IndusInd Bank
2020-21	1.50	5.72	3.09	3.58	3.82	0.40	1.10	1.05	1.23	0.69
2021-22	1.03	4.79	1.72	2.65	2.65	0.32	0.81	0.73	0.71	0.64
2022-23	0.67	2.71	0.89	1.83	1.73	0.30	0.50	0.39	0.41	0.59
2023-24	0.57	0.73	0.68	0.57	1.27	0.30	0.40	0.31	0.34	0.57

Source: Annual reports of Banking Companies

Chart 2: Comparison of NPAs of selected Banks:



The provided table offers a detailed examination of the Non-Performing Assets (NPAs) of selected public and private sector banks in India from 2020-21 to 2023-24. Notably, there has been a general decline in NPA levels across most banks during this four-year period. For example, public sector banks have seen their NPA levels drop from 1.50% in 2020-21 to 0.57% in 2023-24. Private sector banks, including HDFC Bank, ICICI Bank, and Axis Bank, have also experienced a similar downward trajectory in their NPA figures.

In summary, the analysis of NPA levels among selected public and private sector banks in India from 2020-21 to 2023-24 indicates a positive trend, with most banks successfully reducing their NPAs. However, there are notable differences in NPA levels among various banks, highlighting that some institutions have been more adept at managing their non-performing assets than others. Overall, these findings suggest that the Indian banking sector is progressing towards a more sustainable and stable landscape, as banks actively work to minimize non-performing assets and enhance their credit quality.

Analysis and Interpretation:

Correlation Test For Public Sector Banks:

H0: $\rho = 0$ (there is no correlation between CRAR and NPA of selected public sector banks in India).

H1: $\rho \neq 0$ (there is a correlation between CRAR and NPA of selected public sector banks in India).

Table 3: Correlation matrix for Public Sector Banks :

		CRAR	NPA
CRAR.	Pearson correlation	1	-0.392
	Sig. (2 tailed)		0.493
	N	5	5
NPA.	Pearson correlation	-0.392	1
	Sig (2 tailed)	0.493	
	N	5	5

Source: Author's Calculation

The analysis indicates that there is no significant relationship between the Capital to Risk-Weighted Assets Ratio (CRAR) and Non-Performing Assets (NPA) in public sector banks. In simpler terms, this means that the amount of capital a bank holds to cover its risk-weighted assets does not directly influence the level of non-performing loans it experiences.

From a practical standpoint, this finding suggests that banks with higher CRAR levels do not automatically have lower NPAs, and conversely, banks with lower CRAR levels may not necessarily face higher NPAs. This points to the importance of other factors, such as lending practices, credit evaluation processes, and broader economic conditions, which may significantly impact the level of non-performing assets. For example, a bank with a robust CRAR might still report high NPAs if it has substantial exposure to high-risk sectors or lacks effective credit risk management strategies. Conversely, a bank with a lower CRAR could maintain a healthier NPA level if it adopts a more cautious lending approach and implements strong credit monitoring systems.

Correlation Test For Private Sector Banks:

H0: $\rho = 0$ (there is no correlation between CRAR and NPA of selected private sector banks in India).

H1: $\rho \neq 0$ (there is a correlation between CRAR and NPA of selected private sector banks in India).

Table 4: Correlation matrix for Private Sector Banks:

		CRAR	NPA
CRAR.	Pearson correlation	1	0.451
	Sig. (2 tailed)		0.426
	N	5	5
NPA.	Pearson correlation	0.451	1
	Sig (2 tailed)	0.426	
	N	5	5

Source: Author's Calculation

A moderate positive linear relationship (r = 0.451) exists between CRAR and NPA, indicating that while the variables tend to move together, other factors also influence their behavior.The significance level (0.426) is greater than the typical alpha level of 0.05.Since the significance level (0.426) is greater than 0.05 therefore, the significance value (p-value) when t is 0.8753 and n=5 is approximately 0.426. This indicates that the observed t-statistic is not statistically significant at the 0.05 level, and we fail to reject the null hypothesis.

- **Homogeneity of Variances Test:**

H0: ρ = 0: (Variances of Average growth of CRAR among the selected public and private sector banks in India are equal).
H1: ρ ≠ 0: (Variances of Average growth of CRAR among the selected public and private sector banks in India are not equal).

Table 5: Test of Homogeneity of Variances- Average growth of CRAR

Levene statistics	df1	df2	Significance
1.3035	9	30	**0.2894**

The significance level of 0.2894 indicates that we cannot reject the null hypothesis regarding the equality of variances. In simpler terms, this suggests that the variability in the average growth of the Capital to Risk-Weighted Assets Ratio (CRAR) is comparable across different groups, indicating a level of consistency and homogeneity in the data.

This finding implies that the factors influencing CRAR growth are likely to be uniform across various groups. Consequently, any observed differences in CRAR growth are not attributable to variations in variance. This insight encourages policymakers and regulators to concentrate on identifying the common drivers of CRAR growth, rather than being preoccupied with potential differences in variance among groups.

H0: ρ = 0: (Variances of Average growth of NPA among the selected public and private sector banks in India are equal).
H1: ρ ≠ 0: (Variances of Average growth of NPA among the selected public and private sector banks in India are not equal).

Table 6: Test of Homogeneity of Variances- Average growth of NPA

Levene statistics	df1	df2	Significance
2.4186	9	30	**0.0389**

Table 6 presents the results of the Levene's test for homogeneity of variances concerning the average growth of Non-Performing Assets (NPA). The Levene statistic is reported as 2.4186, with degrees of freedom (df1) equal to 9 and degrees of freedom (df2) equal to 30. The significance level associated with this test is 0.0389.

The Levene statistic indicates the extent to which the variances across different groups differ from one another. A significance level of 0.0389 suggests that we can reject

the null hypothesis of equal variances at a conventional alpha level of 0.05. This implies that there are statistically significant differences in the variances of average NPA growth across the groups analyzed.

- **Equality of Means Test:**

H0: ρ = 0: (There is no significant difference in the growth of CRAR of selected public & private sector banks in India).
H1: ρ ≠ 0: (There is significant difference in the growth of CRAR of selected public & private sector banks in India).

Table 7: One Way ANOVA -for **CRAR**
Average growth of **CRAR**

Details	Sum Of Squares	degree of freedom	Mean Squares	F-ratio	Critical Value F(@ 5%) (from the F-table)
Between groups	191.4241	**(10-1)**=9	21.2693	21.6129	**F(9,30)=2.14**
Within groups	29.5257	**(40-10)**=30	0.9841		
Total	**220.9498**	**(40-1)= 39**			

Table 7 shows that the calculated value of F is 21.6129 which is more than the table value 2.14 at 5% level with degree of freedom being V1=9 & V2= 30. So, the analysis supports the alternate hypothesis means there is significant difference in the average growth of CRAR of selected public & private sector banks in India during the study period.

H0: ρ = 0: (There is no significant difference in the growth of NPA of selected public & private sector banks in India).
H1: ρ ≠ 0: (There is significant difference in the growth of NPA of selected public & private sector banks in India).

Table 8: One Way ANOVA -for **NPA**
Average growth of **NPA**

Details	Sum Of Squares	degree of freedom	Mean Squares	F-ratio	Critical Value F(@ 5%) (from the F-table)
Between groups	37.8337	**(10-1)**=9	4.2037	4.3733	**F(9,30)=2.14**
Within groups	28.837	**(40-10)**=30	0.9612		
Total	**66.6707**	**(40-1)= 39**			

Table 8 shows that the calculated value of F is 4.3733 which is more than the table value 2.14 at 5% level with degree of freedom being V1=9 & V2= 30. So, the analysis supports the alternate hypothesis means there is significant difference in the average growth of NPA of selected public & private sector banks in India during the study period.

Conclusion:

An in-depth analysis has shown that the Capital to Risk-Weighted Assets Ratio (CRAR) and Non-Performing Assets (NPAs) of select Public Sector and Private Sector Banks in India operate independently of each other, with no notable correlation observed during the study period.The analysis indicates that the mean growth trajectories of CRAR and NPAs among the selected public sector and private sector banks diverge in a statistically significant manner, as demonstrated by ANOVA. Furthermore, the variability in average growth of NPAs from their mean growth differs substantially between the two sectors, as quantified by Levene statistics, whereas the variability in average growth of CRARs from their mean growth remains remarkably consistent across both sectors, underscoring a notable distinction in their growth dynamics and highlighting the need for sector-specific strategies.The discrepancy in average growth of NPAs from their mean growth can be attributed to a rich tapestry of internal and external factors that weave together to shape the performance of the selected public sector and private sector banks.

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SOUNDNESS OF DOMESTIC SYSTEMICALLY IMPORTANT BANKS (D-SIBS) IN INDIA: A COMPARATIVE STUDY

Wilson Peter Minz
Goutam Bhowmik

Abstract

The significance of banks that are considered systemically important lies in their interconnectedness, complexity, substitutability, cross-jurisdictional activity and size of the bank. The potential for a cascade effect from their failure could have a detrimental impact on the country's financial landscape. In this regard, the paper seeks to examine the financial performance and banking stability of the Indian D-SIBs (SBI, ICICI & HDFC) during the period 2017-18 to 2022-23. The CAMELS model is used in order to evaluate the financial strength of the D-SIBs. CAMELS Composite rankings is applied to draw conclusions through a comparative analysis of different parameters. Moreover, Altman Z-Score was employed to assess the degree of financial distress among the chosen banks. The analysis reveals that HDFC bank is ranked first under the CAMELS analysis, inspite of its earning efficiency received a marginal rating. SBI secures second place, mainly due to unsatisfactory rating for earning efficiency. ICICI Bank however, ranks third with both marginal earning efficiency and unsatisfactory management quality ratings. The Altman Z-score reveals that all three banks exhibit financial stability, with HDFC Bank being the most stable, followed by SBI and ICICI Bank. As stability is a dynamic phenomenon especially in the context of banking, continuous evaluation followed by corrective measures, if needed, assumes greater significance both for the banking system and economy as a whole. Therefore, present study will help to provide an insight about the financial health and stability of the Indian D-SIBs.

Keywords

Altman Z-Score, Banking Stability, CAMELS, Domestic Systematically Important Banks (D-SIBs), Financial Soundness

Introduction

The sudden downfall of US mortgage market in 2007 triggered the global recession that lasted from 2007 to 2009. Subsequently, series of events took place such as downfall of global financial institutions like the American International Group, Bear Stearns, and Lehman Brothers. The Global financial crises have demonstrated extreme fragility of world's financial system, as seen by how rapidly this turmoil spread to other institutions in the US system and the rest of the globe. Additionally, it demonstrated how a distressed bank may set off a cascade of events that would seriously harm the financial system (Paham et al., 2021). Subsequent studies conducted by Murphy (2008), Dell'Ariccia (2008), Darolles and Dubecq (2014), revealed that some financial institutions referred as "systemically important financial institutions" are vital to the financial system so much so that failing them could result in catastrophic consequences on the financial markets and the overall economy. Global Systemically Financial Institutions (G-SIFI's) are institutions that operate globally. Whereas, Domestic Systemically Financial Institutions (D-SIB's) are institutions that functions within a country. In the wake of the crisis the Basel Committee on Banking Supervision (BCBS) implemented several measures to strengthen the adaptability of banks in an economy. Basel III reform initiatives encompasses augmenting the quantity and quality of capital required by the banking sector, enhancing risk mitigation, enacting a leverage ratio to serve as safety net for risk-based framework, implementing capital conservation and countercyclical buffers and also establishing a global standard for liquidity- related risk. All internationally operating banks are subject to capital adequacy measures, which ensures banks should uphold an appropriate capital ratio in proportion to its risk exposure. Nevertheless, these steps are not enough to counter the hazards that SIBs represent.

To address the risk and challenges brought about by these banks the BCBS, at the request of the Financial Stability Board (FSB), was tasked with developing an evaluation methodology that would analyse systemic significance of Global SIFIs (G-SIFIs), as well as assessing the amount of going-concern loss absorbency capital that different proposed instruments could provide. As a result, in November 2011, BCBS rolled out a framework for classifying Global Systemically Important Banks (G-SIBs) and also to regulate the level of additional loss absorbency capital. Moreover, the G20 leaders urged the FSB and BCBS to construct a guideline for classifying Domestic Systemically Important Banks (D-SIBs) in addition to the methodology designed for Global Systemically Important Financial Institutions (G-SIFIs). In October 2012, the BCBS finally presented the guideline for classification of D-SIBs. On July 22, 2014, Reserve Bank of India issued a methodological framework to regulate D-SIBs in India. According to the framework, the RBI must publish the names of the banks that are classified as D-SIBs as of 2015 and classify them according to their Systematic Importance Scores (SISs) and assign them to the relevant buckets. Moreover, D-SIBs must adhere an additional common equity

requirement that varies from 0.20% to 1% depending on the bucket in which they have been assigned. The RBI evaluates all sample banks annually in June or July taking data from the end of March to determine the number D-SIBs in India. SBI and ICICI banks were designated as D-SIBs by the RBI in 2015-16. Wherein, SBI and ICICI bank were placed under third and first bucket respectively with an additional common equity tier 1 capital of 0.60% and 0.20% each. Further, HDFC bank received this designation in the subsequent fiscal year, which was 2017 and was assigned to bucket 1 with an additional common equity tier 1 capital of 0.20%.

D-SIB is a bank of such significance that an impending collapse of might cause substantial effects to the financial ecosystem. Therefore, in order to safeguard themselves from future losses and retain their stability, these banks must keep larger capital buffers. Under Such situations, regular monitoring of the soundness and stability of such banks has become a necessity. Therefore, present study will help to provide an insight knowledge about the financial health and stability of the D-SIBs in India. The paper has been organised as follows: The first section provides a brief introduction about Domestic Systemically Important Banks (D-SIBs). The second section presents a chronological review of relevant literature, identifying research gaps. The third section outlines the study's objectives and methodology for examining D-SIBs in India. The fourth section presents data analysis and discussion based on accounting models. Section five includes findings and conclusions drawn from appropriate models. Lastly, the sixth section acknowledges study limitations and suggests opportunities for future research.

Literature Review

A brief review of relevant literature is given below chronologically:

Bhowmik (2016) compared the soundness of State bank of India and ICICI bank during 2008-2015. The findings reveals that the soundness of SBI and ICICI bank in respect of quality of asset portfolio, liquidity management and quality of earnings has shown no significant difference during the study period. Hoverer, CRAR was found to be significantly difference in respect of two banks.

Porkodi et al., (2017) evaluated ICICI Bank's and HDFC Bank's financial stability over a five-year span (2013–2017). HDFC Bank has outperformed ICICI Bank in terms of financial viability.

Saha, D., (2018) analysed the bankruptcy risk among private commercial banks and non-conventional banks of Bangladesh for the period of eight years (2009-2016) and found out that non-conventional banks are in a more favorable condition than the conventional banks.

Rajendran & Sudha (2019) assessed HDFC Bank's financial health during 2015-2019 by using a range of financial ratios. The results demonstrate that the bank's financial stability was adequate during the research period.

Tandon et al., (2020) evaluated the risk and financial standing of Indian banks. The study's data set covers the years 2014–15 to 2017–18. HDFC bank outperformed than other banks in terms of risk management and performance.

Sogunro et al., (2021) assessed the financial condition of selected D-SIBs in Nigeria by

using CAMELS model for the period 2013-2018. The selected banks received a rating of 3, indicating that while their general health is marginal, there is no reason for significant concern.

Gupta & Jain (2022) examined the systemic risk and significance in Indian banking sector. The study took place over a period of nine years, from 2012 to 2019. The study suggests that moral hazard behavior occurs in the Indian banking sector. Nevertheless, regardless of their degree of distress, banks that are deemed systemically important are shown to participate in risky lending; in contrast, the least important banks exhibit the reverse behavior.

Narayan et al., (2023) determined which Indian financial institutions are systemically important and how much of an impact they have on the country's systemic risk at different times, both domestically and internationally. The study was carried out between 2004 and 2022. They discovered that there is a notable systemic risk convergence in India, as evident from the fact that State Bank of India, ICICI Bank, and HDFC Bank account for more than 50% of the total risk. Furthermore, important aspects which influenced systemic risk includes board's size, Basel criteria, loan, leverage, possibility of default, and liquidity.

The review mentioned above indicated that the majority of research have focused on identifying India's D-SIBs and assessing the systemic significance and moral hazard that exists in the Indian banking ecosystem through the use of several risk models. Few studies on the selected bank sample have also been conducted but, not on the aspect of D-SIBs in India. Therefore, the present study aims to conduct a compressive study on the financial soundness and banking stability of Indian D-SIBs.

3. Objectives Of The Study

1) To analyse financial soundness of D-SIBs in India.
2) To predict the bankruptcy risk of D-SIBs in India.

3.1. Methodology Of The Study

The present study compares the financial health and banking stability of the D-SIBs in India. Secondary data was obtained from the annual report of the respective banks (SBI, ICICI & HDFC) for the period 2017-18 to 2022-23. In the fiscal year 2015-16, SBI and ICICI Bank were designated as Domestic Systemically Important Banks (D-SIBs), while HDFC bank received this designation in the subsequent fiscal year, which was 2017. So, in order to conduct a comparative study, the aforementioned study period was chosen.

The methodology for this study involves several stages. The first stage is to prepare the data by calculating the financial ratios of CAMELS model for each bank for the period from 2017–2018 to 2022-23. Then, ranking from 1 to 5 will be allotted for each financial ratio for each bank. The second stage involves the analysis part which includes calculation of the CAMELS composite score by applying appropriate weightage to each parameter. Finally, the third stage includes the analysis of bank stability of D-SIBs by using Altman Z score model.

3.2. Model Specification

CAMELS model has been employed to assess the financial health of D-SIBs in

India. The six-factor CAMELS assessment mechanism is a widely used instrument to assess the robustness of a banking institutions. The US created and deployed the aforementioned model as an early detection system to assess banks' financial wellbeing using a variety of criteria. In this approach, there are six different types of measures that are used: capital sufficiency (C), asset quality (A), managerial efficiency (M), earning capabilities (E), liquidity (L) and sensitivity to market risk (S). In accordance with prior literature (Majithiya & Pattani 2010; Babar & Zeb 2011; Sarwar & Asif 2011; Masngut & Abdul Rahman 2012; Haq Ahmz 2020), the CAMELS ratios have been classified and presented in table 1 below:

Table:1 Ratio Classification for Components of CAMELS Ratings

	Components	Ratio	Weight	1	2	3	4	5
C	Capital adequacy	$\frac{Tire\ I + Tire\ II}{Risk\ weighted\ Assets} \times 100$	20%	> 14%	9% - 14%	4% - 8%	1% - 4%	< 1%
A	Asset's quality	$\frac{Non-performing\ Assets}{Advances} \times 100$	20%	< 1.5%	1.5% - 3.5%	3.5% - 7%	7% - 9.5%	> 9.5%
M	Management	$\frac{Operating\ expenses}{Total\ earnings} \times 100$	25%	≤ 25%	30% - 26%	38% - 31%	45% - 39%	≥ 46%
E	Earnings (ROA)	$\frac{Net\ profit}{Total\ Asset}$	15%	> 1.5%	1.25% - 1.5%	1.01% - 1.24%	0.75% - 1%	< 0.75%
	Earnings (ROE)	$\frac{Net\ profit}{Equity\ capital}$		≥ 22%	17% - 21.99 %	10% - 16.99%	7% - 9.99%	≤ 6.99%
L	Liquidity (Liquidity Coverage Ratio)	$\frac{HQLA}{Total\ Net\ cashout\ flow\ over\ 30\ days}$	10%	<100%	100% - 95%	95% -90%	90%-85%	>85%
S	Sensitivity	Beta	10%	β < 1	β=1	β >1	β >2	β < 3

Source: Babar & Zeb 2011; Majithiya & Pattani 2010; Sarwar & Asif 2011; Masngut & Rahman 2012; Haq Ahmz 2020.

Each of the ratios listed in table 1 offers a unique perspective for evaluating the general well-being and effectiveness of the respective banks. As it provides a comprehensive picture of how well the bank is performing and managing its various risks and operations. Therefore, the aforementioned ratios have been used for the computation of the CAMELS framework. The variables used for the computation of the CAMELS ratios have been derived from the annual report of the respective banks for the period 2017-18 to 2022-23. The ratios of each component were calculated by summing up the figure for each of the 14 variables for the above-

mentioned period for the respective banks (Annexure 1,2 & 3). Once the ratios for each of the six indicators have been determined, the individual components of each bank are ranked from 1 to 5. After giving weights to each component, the rankings of each component, they are combined to get an overall rank that indicates how well the banks are performing. Banks with ratings of 1 and 2 are usually considered of as strong banks, while those with ratings of 3 are regarded to be marginal performers, and banks with ratings of 4 or 5 are suspected to be an unsounded bank. The weights assigned to the CAMELS criteria of capital adequacy (0.20), asset quality (0.20), managerial efficiency (0.25), earnings (0.15), liquidity (0.10), and sensitivity to market risk (0.10) have been provided by the Federal Deposit Insurance Corporation (FDIC) and a US regulatory body. The assessment of composite scoring is shown by the following equation (1):

Equation 1: $$Composite\ Score = 0.2(C) + 0.2(A) + 0.25(M) + 0.15(E) + 0.1(L) + 0.1(S)$$

The CAMELS composite ratings have been explained and simplified in the table given below:

Table:2 Composite Rating Interpretation & Policy Response

Composite Ratings	Range	Descriptions	Interpretation & Policy Response
1	1.0-1.4.0	Strong	**Robust and substantial in every aspect** There is no need for a strong supervisory intervention.
2	1.50-2.40	Satisfactory	Fundamentally sound with a modest, fixable flaw **Minimal supervisory action.**
3	2.50-3.40	Fair	Conglomeration of shortcomings, if not redirected, the deficiencies would become serious. **Pre-requisites are more than regular supervision**
4	3.50-4.40	Marginal	Includes excessive flaws, if left unchecked, could negatively impact the bank's future viability. **Requires careful supervision.**
5	4.5-5.0	Unsatisfactory	High risk of failure in the immediate period. **The bank should be under constant supervision/ cease and desist order.**

Source: National Credit Union Administration (NCUA)

Following a CAMELS framework analysis of the D-SIBs' financial standing in India. The Altman Z score was used to gauge the D-SIBs' banking stability. The likelihood that a company will file for bankruptcy can be predicted using this formula. In scholarly research, Z-scores are employed to measure monetary distress of business entities and as a predictor of corporate defaults. Four ratios are combined linearly to compute Z-score. The components of Altman-Z score and explanations are presented in the table 3. After calculating the components of Altman Z-score, weights are been assigned to the respective components. Mathematical expression of Altman Z-score is given in the form of equation given 2 below:

Equation 2: $$Z = 6.56(x_1) + 3.26(x_2) + 6.72(x_3) + 1.05(x_4)$$

The Altman-Z score components and their explanations are summarised in the table as follows:

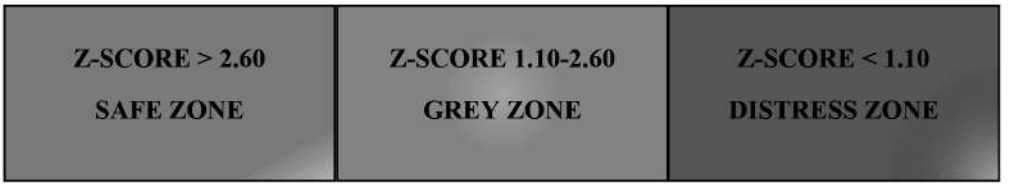
Table 3: Components of Altman-Z score & explanations

Components of Altman-Z score	Formula	Explanation
x_1	$\frac{Working\ Capital}{Total\ Asset}$	Bank's ability to cover monetary obligations
x_2	$\frac{Retained\ Earning}{Total\ Asset}$	Expresses the percentage of bank's cumulative profitability throughout time.
x_3	$\frac{Operating\ Profit}{Total\ Asset}$	Illustrates the managerial effectiveness in relation to the bank's profitability.
x_4	$\frac{Book\ value\ of\ equity}{Total\ Liabilities}$	Expresses the financial leverage i.e., the proportion of equity

Source: Compiled and constructed from various sources.

Following computation using the aforementioned formula, the banks distress level is represented by the Z-Score value, which is split into three levels:

Chart 1: Classification of banks distress levels



Source: Compiled and constructed from various sources

1.Data Analysis And Discussion

This section provides an empirical result and interpretation of financial performance and banking stability of D-SIBs operating in India. The financial performance of D-SIBs is measured with the help of CAMELS framework and banking stability is measured with the help of Altman z score analysis.

Table 4: CAMELS ratings of D-SIBs in India

Bank	Capital adequacy		Assets quality ratio		Management quality		Earnings efficiency				Liquidity		Sensitivity to market risk	
	CAR	Rating	AQ	Rating	MQ	Rating	EE1	Rating	EE2	Rating	LQ	Rating	Sens	Rating
SBI	13.72%	2	2.08%	2	37.75%	3	0.22%	5	7.91%	4	144.84%	1	1.44%	3
ICICI	18.71%	1	1.55%	2	46.78%	5	0.11%	5	10.98%	3	125%	1	1.33%	3
HDFC	18.18%	1	0.33%	1	23.48%	1	0.25%	5	18.46%	2	122.40%	1	1.09%	3

Source: Complied and constructed by the authors

Table 4 presents the CAMELS ratios and ratings of D-SIBs. The ratios of each component of CAMELS framework were calculated by aggregating 14 key variables from their annual reports for the periods 2017-18 to 2022-23 (refer to Annexures 1, 2, and 3). ICICI bank has the highest CRAR of 18.71%, followed by HDFC bank with 18.18% and their rating of 1 indicates that CRAR of both the banks are adequately funded and retains a substantial amount of capital that completely matches their existing and prospective risk profiles, and have the capacity to withstand any losses that may occur in the future. On the other hand, SBI bank has the CRAR of 13.72% with a rating of 2 which suggests that SBI has moderately lower ability to absorb its losses than HDFC and ICICI banks. HDFC bank has an expectantly better asset quality of 0.33%, with a rating of 1, that suggests very high-quality assets with minimal credit risk. SBI & ICICI banks has an asset quality of 2.08% & 1.55% respectively with a rating of 2, suggesting that the banks have strong assets in its portfolio, but the caliber is less than that of HDFC bank. In terms of Management quality HDFC bank has received a rating of 1, indicating relatively efficient cost management than that of SBI and ICICI bank. All the banks have obtained unsatisfactory grading in terms of EE1 (ROA). In contrary, EE2 (ROE) HDFC bank has higher ROE of 18.46%, outperforming ICICI bank (10.98%) and SBI (7.91%). This indicates that HDFC bank is more efficient at

generating profits from its shareholders' equity than ICICI and SBI banks. Liquidity coverage ratio has been taken to measure the liquidity of the respective banks, where it can be witnessed that all the banks has obtained a rating of 1, indicating that banks have capability of meeting its short-term liquidity risk. Wherein, SBI bank has the highest liquidity of 144.84% followed by ICICI and HDFC bank with 125% and 122.40% respectively. Beta has been employed to measure the sensitivity to market risk ratio of respective banks. HDFC, ICICI and SBI banks has the beta of 1.09,1.33 and 1.44 respectively, which indicates that shares of the respective banks are riskier than the market. In other words, when the market increases, the investments of the respective banks are anticipated to increase more, and when the market decreases, they are anticipated to decrease more.

4.1. Overall, CAMELS composite score of D-SIBs

After analysing the CAMELS ratios in the previous table. Table 5 demonstrates composite scores of SBI, ICICI and HDFC banks based on the equation (i) mentioned earlier.

Table 5: CAMELS Composite scores of D-SIBs in India

Banks	C (20%)	A (20%)	M (25%)	E (15%)		L (10%)	S (10%)	Composite Ratings	Position
				EE1	EE2				
SBI	2	2	3	5	4	1	3	2.62	**Fair**
ICICI	1	2	5	5	3	1	3	2.85	**Fair**
HDFC	1	1	1	5	2	1	3	1.47	**Satisfactory**

Source: Complied and constructed by the authors

From above table it can be inferred that HDFC bank have obtained rating of 1.47 which indicates that the bank is fundamentally sound but exhibit some moderate weakness. With a few exceptions, most performance indicators were found to be positive, and the bank have effective measures in terms of managing its risk portfolios. Moreover, SBI & ICICI bank have obtained a rating of 2.62 & 3.43 respectively, indicating combination of weaknesses; if not redirected, the deficiencies would become serious, which may ultimately affect the bank's performance in the long run. The major reason attributable to unsatisfactory rating in EE1 (ROA) and marginal rating in EE2 (ROE) for SBI bank. Whereas, unsatisfactory ratings in management quality of ICICI bank.

HDFC, ICICI and SBI banks must put stress in order to improve there EE1 (ROA) effectively, as reduced ROA is an indication of high costs and dubious debt, both of which would eventually affect the bank's long-term profitability. Whereas, in case of EE2 (ROE) SBI bank has received a rating of 4, indicating that the bank is

generating moderate profit relative to its shareholders' equity. ICICI bank has obtained unsatisfactory rating in terms of management quality, as higher rating in management quality reflects that bank is spending a larger portion of its income on operating expenses.

4.2 Measurement of banking stability using Altman Z score

Table 6 represents the banking stability of D-SIBs in India. The table depicts that average liquidity
(ratio of working capital to total assets) of HDFC bank is highest at 0.73 followed by SBI bank and ICICI bank at 0.59 respectively. Which indicates that banks have the ability to finance

Table 6: Banking stability (Altman Z score) of D-SIBs in India.

SBI Bank							
Variables	**2018**	**2019**	**2020**	**2021**	**2022**	**2023**	**Average**
$\frac{Working\ Capital}{Total\ Asset}$	0.58	0.63	0.62	0.58	0.57	0.57	0.59
$\frac{Retained\ Earning}{Total\ Asset}$	0.03	0.03	0.03	0.03	0.03	0.04	0.03
$\frac{Operating\ Profit}{Total\ Asset}$	0.02	0.02	0.02	0.02	0.01	0.02	0.02
$\frac{Book\ value\ of\ equity}{Total\ Liabilities}$	0.07	0.06	0.06	0.06	0.06	0.07	0.06
ICICI Bank							
Variables	**2018**	**2019**	**2020**	**2021**	**2022**	**2023**	**Average**
$\frac{Working\ Capital}{Total\ Asset}$	0.49	0.61	0.61	0.59	0.62	0.62	0.59
$\frac{Retained\ Earning}{Total\ Asset}$	0.17	0.16	0.17	0.22	0.28	0.32	0.22
$\frac{Operating\ Profit}{Total\ Asset}$	0.03	0.02	0.02	0.03	0.02	0.03	0.03
$\frac{Book\ value\ of\ equity}{Total\ Liabilities}$	0.11	0.10	0.10	0.11	0.12	0.13	0.11

HDFC Bank							
Variables	**2018**	**2019**	**2020**	**2021**	**2022**	**2023**	**Average**
$\frac{Working\ Capital}{Total\ Asset}$	0.74	0.73	0.71	0.71	0.74	0.75	0.73
$\frac{Retained\ Earning}{Total\ Asset}$	0.39	0.37	0.39	0.41	0.44	0.39	0.40
$\frac{Operating\ Profit}{Total\ Asset}$	0.03	0.03	0.03	0.03	0.03	0.03	0.03
$\frac{Book\ value\ of\ equity}{Total\ Liabilities}$	0.11	0.13	0.13	0.13	0.13	0.13	0.13

Source: compiled and constructed by the authors.

its short-term obligations. The average retained earnings to total assets of HDFC bank is found to be higher at 0.40 followed by ICICI bank at 0.22. Moreover, SBI bank has the lowest retained earnings to total assets ratio of 0.03, indicating that the bank is not able to accumulate its earnings by using its assets, the reason being poor performance of the bank in the earlier years.

In terms of profitability (ratio of EBIT to Total assets) HDFC bank, ICICI bank and SBI bank has more or less same ratio of 0.03,0.03 and 0.02 respectively. In respect to Book value equity to Total liabilities all the banks have relatively low level of debt compared to its equity, indicating a positive sign of financial stability and lower financial risk.

Table 7: Z score of D-SIBs in India

Sl.No.	D-SIBs	2018	2019	2020	2021	2022	2023	Average Z score	Zone
1	SBI Bank	4.098	4.395	4.353	4.073	4.003	4.031	4.159	Safe
2	ICICI Bank	4.059	4.78	4.82	4.88	5.078	5.428	5.428	Safe
3	HDFC Bank	6.46	6.35	6.29	6.36	6.64	6.53	6.438	Safe

Source: compiled and constructed by the authors.

After analyzing the financial ratio of Altman Z score in the previous table, the overall Z score of the D-SIBs has been calculated by using the equation (ii) mentioned above. From the table 7, it can be depicted that all three banks exhibit financial stability, with HDFC bank being the most stable, followed by ICICI bank and SBI Bank. Although, SBI bank has secured a safe zone by obtaining a Z score of 4.159, it is comparatively lower than HDFC and ICICI bank. The major reason attributable to lower retained earnings to Total assets since 2018.

5. Summary of Findings and Conclusion

The Major findings of the study are summarised below:

- CAMELS analysis reveals that ICICI bank has the highest CRAR of 18.71%, followed by HDFC and SBI banks.
- HDFC bank's asset quality was found to be exceptionally strong followed by ICICI & SBI banks.
- Management quality of HDFC bank has received a rating 1, indicating relatively efficient cost management than that of SBI and ICICI bank.
- EE1 (ROA) of all the banks was found to be unsatisfactory. On the other hand, EE2 (ROE) of HDFC bank was found to be moderately strong followed by ICICI and SBI banks.
- In terms of liquidity SBI bank exhibiting a highest liquidity coverage ratio followed by ICICI and HDFC banks.
- In terms of Sensitivity to market risk shares of all banks were found to be riskier than the market.
- CAMELS Composite ratings reveals that HDFC bank have obtained rating of 1.47, which means that the bank is fundamentally sound but exhibit some moderate weakness. Moreover, SBI & ICICI bank have obtained a rating of 2.62% & 2.85% respectively, suggesting a collection of flaws; if not redirected, the deficiencies would become serious in the long run.
- Altman Z-score reveals that all three banks exhibit financial stability, with HDFC Bank being the most stable, followed by ICICI and SBI banks.

The above findings clearly demonstrate that the financial health of HDFC bank is found to be fundamentally sound with some moderate weakness. On the other hand, SBI & ICICI bank have financial, operational, or compliance weaknesses. The major reason attributable to unsatisfactory rating in EE1 (ROA) and marginal rating in EE2 (ROE) for SBI bank. Whereas, unsatisfactory ratings in management quality & EE1(ROA) of ICICI bank. Thus, the ICICI bank must closely monitor its management quality by managing and mitigating the factors contributing to inefficient management quality. Earning efficiency ratio (EE1 i.e., ROA) of all the banks were found to be unsatisfactory. Therefore, all banks must implement a comprehensive strategy to effectively increase ROA, as lower ROA may have a direct influence on banks' profitability in the long run. Moreover, all the banks must manage its beta, as higher beta indicates that an asset is highly sensitive to market movements, is risker, and tends to exhibit more significant price fluctuations. Whereas, in respect to banking stability HDFC bank was found to be most stable followed by ICICI and SBI banks. Although, SBI has secured a safe zone in terms of banking stability,

the Z- score of SBI bank is comparatively lower than HDFC and ICICI bank. The major reason attributable to lower retained earnings to total assets since 2018. Thus, the bank must implement some effective strategies in order to improve its retained earnings ratio so as to improve the financial health, stability and growth of the bank in the long run.

Thus, from the above study it can be concluded that supervisory attention is required especially in respect to earning efficiency ratio of all three banks, management quality in respect to ICICI bank and retained earnings to total asset ratio of SBI bank in order to avoid the possibility of distress and failure while performing their essential role as economic intermediaries.

6. Limitation and Scope of Future Research

Nevertheless, the present study has revealed significant results and contributions to the current corpus of literature regarding soundness and stability of D-SIBs in India, there are certain limitations mainly attributable to time and resource constraints. These are:

- Secondary data forms the bases of the study. It is therefore limited to the idea of accurately portraying the state of corporate activity and fully exposing the facts.
- The present study has analysed financial performance and banking stability of D-SIBs by using limited financial indicators, leaving a room for further studies on several aspects of financial performance of D-SIBs in India.
- In respect to CAMELS analysis only short-term liquidity risk i.e., Liquidity Coverage ratio (LCR) has been considered but, long term liquidity risk i.e., Net Stable Funding ratio (NSFR) has not been presented due non availability of data.

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ANNEXURES

Annexure 1: Financial Data of SBI Bank

CAMELS COMPONENTS	Variables	YEARS						Total
		2017-2018	2018-2019	2019-2020	2020-2021	2021-2022	2022-2023	
CAPITAL	**Total Capital**	247506.76	257619.86	291062.90	308892.73	342792.01	408579.07	1856453.33
	Total RWA	1945151.99	2008174.47	2188803.87	2249038.34	2478703.46	2783058.70	13652930.83
	CAR %	**12.72%**	**12.83%**	**13.30%**	**13.73%**	**13.83%**	**14.68%**	**13.60%**
ASSET QUALITY	**Net NPA**	110854.70	65894.74	51871.30	36809.72	27965.71	21466.64	314862.81
	Net Advance	1960118.54	2226853.67	2374311.18	2500598.99	2794076.00	3267902.13	15123860.51
	AQ%	**5.66%**	**2.96%**	**2.18%**	**1.47%**	**1.00%**	**0.66%**	**2.08%**
MANAGEMENT QUALITY	**Operating Expenses**	96154.37	114800.31	131781.56	150429.60	174363.43	189814.49	857343.76
	Total Earnings	306527.52	330687.36	368010.65	385337.89	406973.09	473378.14	2270914.65
	MQ%	**31.37%**	**34.72%**	**35.81%**	**39.04%**	**42.84%**	**40.10%**	**37.75%**
EARNING EFFICIENCY	**Net Profit**	-4556.29	2299.64	19767.80	22405.46	35373.88	55648.17	130938.66
	Total Assets	3616433.00	3888467.06	4197492.34	4845618.55	5360883.53	5954418.32	27863312.80
	EE1 (ROA)	**-0.13%**	**0.06%**	**0.47%**	**0.46%**	**0.66%**	**0.93%**	**0.47%**
	Net Profit	-4556.29	2299.64	19767.80	22405.46	35373.88	55648.17	130938.66
	TOTAL SHAREHOLDER FUNDS	230321.95	234495.66	251060.12	275561.56	305588.04	358931.32	1655958.65
	EE2 (ROE)	**-1.98%**	**0.98%**	**7.87%**	**8.13%**	**11.58%**	**15.50%**	**7.91%**
LIQUIDITY	**HQLA**	2871815.00	2871815.00	3257043.00	4558844.00	4736550.00	4833481.00	23129548.00
	TOTAL CASH OUTFLOWS	2089382.00	2089382.00	2355889.00	2848425.00	3093466.00	3525991.00	16002535.00
	Liquidity Coverage Ratio %	**137.45%**	**137.45%**	**138.25%**	**160.05%**	**153.11%**	**137.08%**	**144.54%**
SENSITIVITY TO MARKET RISK	**Beta**	**2.24**	**1.56**	**1.56**	**2.65**	**1.04**	**1.14**	**1.70**

Source: Compiled and constructed by the authors.

Annexure 2: Financial Data of ICICI Bank

CAMELS COMPONENTS	Variables	YEARS						Total
		2017-2018	2018-2019	2019-2020	2020-2021	2021-2022	2022-2023	
CAPITAL	**Total Capital**	1169.78	1160.90	1223.85	1501.47	1693130.30	1962822.90	3661009.20
	Total RWA	6349.08	6873.75	7594.90	7854.03	8835909.90	10705150.50	19569732.16
	CAR %	**18.42%**	**16.89%**	**16.11%**	**19.12%**	**19.16%**	**18.34%**	**18.71%**
ASSET QUALITY	**Net NPA**	27886.27	13577.43	10113.86	9180.20	6960.89	5155.07	72873.72
	Net Advance	566854.22	646961.68	706246.11	791801.39	920308.14	1083866.32	4716037.86
	AQ%	**4.92%**	**2.10%**	**1.43%**	**1.16%**	**0.76%**	**0.48%**	**1.55%**
MANAGEMENT QUALITY	**Operating Expenses**	55755.63	64258.88	71517.90	76271.67	73151.73	82439.02	423394.83
	Total Earnings	118969.10	131306.50	149786.10	161336.48	157536.32	186178.80	905113.30
	MQ%	**46.87%**	**48.94%**	**47.75%**	**47.27%**	**46.43%**	**44.28%**	**46.78%**
EARNING EFFICIENCY	**Net Profit**	7712.19	4254.24	9566.31	18384.32	25110.10	34036.64	99063.80
	Total Assets	11242810.40	12387938.91	13772992.32	15738122.45	17526373.84	19584904.97	90253142.89
	EE1 (ROA)	**0.07%**	**0.03%**	**0.07%**	**0.12%**	**0.14%**	**0.17%**	**0.11%**
	Net Profit	7712.19	4254.24	9566.31	18384.32	25110.10	34036.64	99063.80
	TOTAL SHAREHOLDER FUNDS	110629.70	114253.41	122960.06	157587.50	182052.49	214497.79	901980.95
	EE2 (ROE)	**6.97%**	**3.72%**	**7.78%**	**11.67%**	**13.79%**	**15.87%**	**10.98%**
LIQUIDITY	**HQLA**	4016364.40	5017111.10	6725599.50	10865265.30	12282884.30	13013397.80	51920622.40
	TOTAL CASH OUTFLOWS	3996537.80	4251658.70	5443179.40	7733538.50	9660410.00	10570439.30	41655763.70
	Liquidity Coverage Ratio %	**100.50%**	**118.00%**	**123.56%**	**140.50%**	**127.15%**	**123.11%**	**124.64%**
SENSITIVITY TO MARKET RISK	**Beta**	**2.03**	**0.92**	**1.63**	**1.68**	**0.94**	**1.39**	**1.43**

Source: Compiled and constructed by the authors.

Annexure 3: Financial Data of HDFC Bank

CAMELS COMPONENTS	Variables	YEARS						Total
		2017-2018	2018-2019	2019-2020	2020-2021	2021-2022	2022-2023	
CAPITAL	**Total Capital**	118540.37	159457.64	184257.85	212546.30	255734.50	305564.85	1236101.51
	Total RWA	800125.98	931929.87	994715.74	1131143.88	1353510.85	1586634.96	6798061.28
	CAR %	**14.82%**	**17.11%**	**18.52%**	**18.79%**	**18.89%**	**19.26%**	**18.18%**
ASSET QUALITY	**Net NPA**	2601.02	3214.52	3542.36	4554.82	4407.68	4368.43	22688.83
	Net Advance	700033.84	869222.66	1043670.88	1185283.52	1420942.28	1661949.29	6881102.47
	AQ%	**0.37%**	**0.37%**	**0.34%**	**0.38%**	**0.31%**	**0.26%**	**0.33%**
MANAGEMENT QUALITY	**Operating Expenses**	23927.22	27694.76	33036.06	35001.26	40312.43	51533.69	211505.42
	Total Earnings	101344.45	124107.79	147068.27	155885.27	167695.40	204666.10	900767.28
	MQ%	**23.61%**	**22.32%**	**22.46%**	**22.45%**	**24.04%**	**25.18%**	**23.48%**
EARNING EFFICIENCY	**Net Profit**	18510.02	22332.43	27253.95	31833.21	38052.75	45997.11	183979.47
	Total Assets	11031861.70	12928057.06	15808304.37	1799506.64	21229343.30	25304324.43	88101397.5
	EE1 (ROA)	**0.17%**	**0.17%**	**0.17%**	**1.77%**	**0.18%**	**0.18%**	**0.21%**
	Net Profit	18510.02	22332.43	27253.95	31833.21	38052.75	45997.11	183979.47
	TOTAL SHAREHOLDER FUNDS	109599.12	153672.66	176358.71	209810.19	247326.17	289437.52	1186204.37
	EE2 (ROE)	**48.40%**	**14.61%**	**15.48%**	**15.18%**	**15.43%**	**15.94%**	**18.46%**
LIQUIDITY	**HQLA**	5730139.80	7442764.40	10393030.00	15036956.90	15813621.10	16673935.70	71090447.9
	TOTAL CASH OUTFLOWS	5834608.60	6293425.90	7822455.20	10434387.10	13055540.50	14639586.80	58080004.1
	Liquidity Coverage Ratio %	**98.21%**	**118.26%**	**132.86%**	**144.11%**	**121.13%**	**113.90%**	**122.40%**
SENSITIVITY TO MARKET RISK	**Beta**	**0.77**	**0.94**	**1.19**	**1.30**	**1.26**	**0.76**	**1.03**

Source: Compiled and constructed by the authors.

THE ROLE OF GST IN SIMPLIFYING THE INDIRECT TAX REGIME IN INDIA

Himadri Halder
Jyotirmoy Koley

Abstract

The Goods and Services Tax (GST) introduced in India on 1st of July, 2017, was a major change in the country's tax system. Before GST a lot of indirect taxes were imposed by the central and state governments both which were complex to calculate and an intricate web for businesses; GST harmonised all such indirect taxes creating a simple one country, one tax principle with a seamless flow of input credit. In this part of the paper, we will examine how GST aims at an easy solution to, in turn, the intricate indirect tax system in India and its wide range of impacts on the economy, business operations, compliance, and exchequer. Besides, the paper also talks about issues that surfaced during GST implementation and its contribution towards economic formalisation.

Keywords

Economic Formalisation, Goods and Services Tax (GST), Harmonisation, Indirect Taxes, Reforms in Indirect Taxes, Revenues Contribution

Introduction

Indirect Taxation plays a key role in the evolution of society. Indirect Tax may not have the same name in each country, but the idea behind is the same. The Goods and Services Tax (GST) is one of the biggest tax reforms in India implemented on 1st July 2017 which subsumed the previous indirect taxes in the country. GST, before it came into existence, the Indian taxation structure was a multi-layered beast with Central and State taxes. In this system, it was typical for the taxes that were levied multiple times on a single amount in the supply chain thus increasing the price of goods and services to end-users. In 1954, France became the first country to introduce GST which is now available in over 160 countries. Almost all countries have a unified GST whereas some countries like Brazil, and Canada have a dual GST model where the Central and State both levy the tax. Even in India, we are following the dual model of GST consisting of CGST and SGST/UTGST.

Great Step by Team India, Great Step towards Transformation, Great Steps towards Transparency, this is GST.

-PM Narendra Modi

The GST system in India is divided into four slabs: 5%, 12%, 18%, and 28%. Necessities such as food, medicine, and shelter are placed in the lower tax brackets, luxury items are placed in higher tax slabs, and a flat 3% tax is placed on gold and other precious metals.

The government has incorporated many structural changes into the indirect taxation structure of the nation and has worked to ensure that the GST runs smoothly. The GST regime has achieved many of its objectives, and there are new measures brought into the law for the benefit of the taxpayers. The government also took crucial decisions on the GST rates of a host of goods and services as per the recommendations of the GST Council.

Table-1: Some Common GST Rates of Everyday Items

Goods & Services	GST Rates
Milk, Eggs, Educational Services, Curd, Lassi, Health Services, Unpacked Foodgrains, Unbranded Atta/Maida, Unpacked Paneer, Gur, Besan, Unbranded Natural Honey, Fresh Vegetables, Salt, Prasad, etc.	0%
Silver, Gold, Articles of Jewellery, Coins, Silver filigree work, Handmade imitation jewellery, etc.	3%

Tea, Coffee, Hearing Aids, Domestic LPG, Economy Class Flights and Railway Tickets, Curd, Lassi, Buttermilk, Natural Honey Packaged, Cashew Nuts, Cinnamon, Drugs or Medicines, Certain Cancer Drugs, etc.	5%
Beverages containing milk, Diabetic foods, Tender coconut water (Packaged), Condensed milk, Agarbattis, Tooth powder, Notebooks, Paper stationery, Carpets, Umbrellas, Kitchenware, Bicycles, etc.	12%
Smartphones, Printers, Mineral Water, Computers, Outdoor Catering, Supply of Works Contract, Movie Tickets, Hair oils, Toothpaste, Car Seats, etc.	18%
Caffeinated Beverages, Carbonated Beverages, Pan masala, Cement, Air-Conditions, Cigarettes, Dish Washing Machines, Small Passenger Cars, Monitors, Projectors, Lottery, Motorcycles, Entertainment event tickets, Gambling, etc.	28%

(Source: Compiled from CBIC-GST.GOV.IN as on 23.09.2024)

Please note that the list above is not comprehensive and is only an example of the goods and services that are notified following the 54th GST Council meeting held on September 9, 2024. It might change in the near future.

Table-2: History of Implementation of GST in India

Year	Activity
2003	Suggestion by Kelkar Task Force for GST based on VAT principle
Feb, 2007	The announcement made by the then Hon'ble Union Finance Minister in the Budget (2007-08) that GST would be introduced with effect from April 01, 2010.
Sept, 2009	The Empowered Committee decided to constitute a Working Group to give their recommendations on GST.
Nov, 2009	Empowered Committee released its FIRST DISCUSSION PAPER on GST, based on inputs from the Government of the Centre and States.
March, 2011	The Constitution (115th Amendment) Bill, 2011 to give concurrent taxing powers to the Union and States was introduced in Lok Sabha which was lapsed in 2014 and was replaced with the Constitution (122nd Amendment) Bill, 2014.
Nov, 2012	A "Committee on GST Design", consisting of the officials of the Government of India, State Governments and Empowered Committee was constituted.

Jan, 2013	The Empowered Committee deliberated on the proposed design including the Constitution (115th) Amendment Bill and submitted the report
March, 2013	Goods and Services Tax Network (GSTN) is a private company established for the Government's sole purpose is to set up an IT infrastructure and service for Central and State Governments, taxpayers and other stakeholders towards GST implementation.
Aug, 2013	The empowered committee suggestions were looked into by Ministry in consultation with the Legislative Department along with that of Parliamentary Standing Committee within which they drafted some changes in amending bills.
Sept, 2013	The final draft Constitutional Amendment Bill incorporating the above-stated changes was sent to the Empowered Committee for consideration.
Nov, 2013	Additional recommendations were incorporated in the draft Constitution (115th Amendment) Bill and the revised draft were again sent to EC for its consideration.
June, 2014	The draft Constitution Amendment Bill in March 2014 was sent to the EC after approval of the new Government.
Dec, 2014	The Constitution (122nd Amendment) Bill, 2014 was introduced in the Lok Sabha on 19 December 2014 by then Hon'ble Minister of Finance, Late Arun Jaitley.
May, 2015	Constitution Amendment (122nd) Bill was passed by Lok Sabha on 6 May 2015 and referred to the 21-member Select Committee of Rajya Sabha.
July, 2015	Select Committee submitted its report to the Rajya Sabha on July 22, 2015
June, 2016	The Ministry of Finance released a draft model law on GST in the public domain for views and suggestions.
Aug, 2016	On 3rd August 2016, the Constitution (122nd Amendment) Bill, 2014 was passed by Rajya Sabha with certain amendments. The changes made by Rajya Sabha were unanimously passed by Lok Sabha, on 8 August, 2016
Sept, 2016	The Bill was adopted by the majority of State Legislatures wherein approval of at least 50% of the State Assemblies was required. The final assent of Hon'ble President of India was given on 8th September 2016
April, 2017	The Parliament passed the following four bills and the President has given its Assent

July, 2017	**GST law made applicable from 1 July 2017 in India (8 July in J&K)**

(Source: Overview of GST, Final Indirect Tax Book, CA Nikunj Goenka)

1.1 Examining the Subsumed Taxes Under GST:

Table-3: Earlier Indirect Taxes which are subsumed in GST

Central Taxes	State Taxes
Central Excise Duty	State VAT
Duties of Excise (Medicinal and Toilet Preparations)	Purchase Tax
Additional Duties of Excise (Goods of Special Importance)	Luxury Tax
Central Sales Tax	Entry Tax (All forms)
Additional Duties of Customs (commonly known as CVD)	Entertainment Tax **(except those levied by the local bodies)**
Service Tax	Taxes on lotteries, betting, and gambling
Special Additional Duty of Customs (SAD)	State cesses and surcharges in so far as they relate to the supply of goods or services

(Source: Compiled from CBIC-GST.GOV.IN as on 23.09.2024 after 54th GST Council Meeting)

To streamline the tax environment, lower compliance costs, and improve revenue efficiency, GST combined these various levies into a single, cohesive structure.

1.2 Advantages for Implementation of GST in India:

The introduction of GST has the following main advantages:

i. Eliminates the cascading effect of taxation: By subsuming most Central & State taxes into a single tax and by allowing a set-off of prior-stage taxes for transactions across the entire value chain, it would mitigate the ill effects of cascading, improve competitiveness and improve the liquidity of the businesses

ii. Boost to 'Make in India' initiatives: GST will give a major boost to the 'Make in India' initiative of the Government of India by making

goods and services produced in India competitive in the national as well as international markets.

iii. Unified tax regime for both Central and State Governments: GST has replaced most of the existing indirect taxes on goods and services levied by the Central and State Governments into a single tax i.e., GST. This will facilitate the ease of doing business and will also address the controversial matter of double taxation of the same transaction as sales and services.

iv. Minimum physical interface between the taxpayer and the department.

v. Government revenue is anticipated to increase due to the GST's ability to increase taxpayer compliance and broaden the tax base.

2. Literature Review:

Many research work has been done on the GST and simplification of the indirect tax regime by so many academicians and researchers over the years. Some of the important related literatures are presented below.

Vasanthagopal (2011) in his research paper, finds, that to sum it up, all the above-mentioned benefits are going to be reliant on a neutral, reasonable structure of GST and balancing the conflicting interests of various stakeholders, along with a complete political commitment to a radical tax overhaul constitutional amendment, the switchover to a 'flawless' GST would be a giant step for the indirect taxation system. Give a new impetus to India's economic change. It is also mentioned that over 140 countries have introduced GST which all countries have introduced in one form or another to the other and GST rapidly emerging as the "indirect tax of choice" in Asia and the Pacific region.

Garg (2014) has studied how the GST would affect India's tax system has been looked into. He did try to point out the goals of the proposed GST plan and any opportunities and risks it may pose. He decided that the GST was the first logical step since Indian independence towards a complete overhaul of indirect taxation. The GST tax applies to all sales of goods and services or a combination of both. Be it big, medium or small enterprises, intermediaries, importers and exporters, traders, professionals, and consumers, every sector of the economy would be directly affected by the GST.

Shukla, et al. (2022) in their study of the part digitalization, especially via the GST played in the metamorphosis of Indian tax administration. It just shows how fast India has become digitized with the use of digital payments. GST being one of the main catalysts of digitalization has simplified tax processes, minimized compliance burden, and enhanced tax administration efficiency. This paper is about digitalization, or more specifically, digital invoicing, and how it affects the taxes that the government receives. Potential research questions stemming from this summary include the impact of digitalization on tax revenue, challenges and opportunities, compliance burdens, long-term implications, and unintended consequences.

Kumar (2014) concluded that the implementation of the GST in India would help eradicate the fiscal distortion caused

by India's current indirect tax structure and would probably foster a non-location based, equitable tax system.

Gupta (2014) in her study, finds the introduction of the GST into the Indian framework is expected to generate economic development by facilitating commercial benefits that the VAT system did not address. Therefore, the prospect of a collective benefit for business, commerce, agriculture, and regular consumers as well as for the federal government and state governments may be brought about by the GST.

3. Research Objectives:

The study's primary objective is to overview the concept of Goods and Service Tax (GST) and its effectiveness in reducing tax compliance burdens, preventing tax avoidance and evasion, promoting formalization of the economy, addressing implementation challenges, and comparing India's GST implementation to other countries. The study also aims to focus on understanding how GST simplifies India's indirect tax structure and increases Government revenues.

4. Methodology:

The present study is exploratory. It is purely based on the secondary data. It is a complete study on the actual indirect tax collection, before and after the implementation of the Goods and Services Tax (GST). Here, actual indirect tax collection means all types of indirect tax collection minus customs duty in both pre and post GST period. In the study, GST includes all types of indirect taxes except customs duty. The data have been collected from various Government research publications and reports from the Ministry of Finance, The Central Board of Indirect Taxes and Customs (CBIC) and other relevant government bodies, academic journals, magazines and related research papers on the implementation of the GST and its impact on the indirect tax collection and web-based resources. The study covers seven years before and after the implementation of GST in India. The pre-GST period is from 2010-11 to 2016-17 and the post-GST period is from 2017-18 to 2023-24. Various tables, charts and statistical tools like paired t-test have been used in the study to analyse the data with the help of Statistical Package SPSS-26 to attain the research objectives.

5. Hypothesis:

One hypothesis has been set to achieve the research aim.

H_0: There is no difference between the average of the indirect tax collection and GST collection

H_1: There is a difference between the average of the indirect tax collection and GST collection

6. Analysis and Discussions:

6.1 Conceptual Discussion:

6.1.1 The Structure of Indirect Taxation in India before GST:

Before the execution of GST, India's indirect tax system was a complex web of multiple taxes, levied both by the central and state governments, including:

(i) **Taxes Imposed by Central Government**: Excise Duty, Service

Tax, Customs Duty, Central Sales Tax (CST).

(ii) **Taxes Imposed by State Government**: VAT, Entry Tax, Entertainment Tax, Luxury Tax, and Octroi.

The primary issues with the pre-GST tax regime were:

i. **Cascading effect of taxation**: Different taxes were levied at multiple stages of production, leading to "tax on tax." This increased the cost of goods and services.

ii. **Lack of uniformity**: Different states had different VAT rates, and businesses operating across multiple states had to comply with various state laws, increasing administrative complexity.

iii. **Tax barriers between states**: Interstate trade was hampered by Central Sales Tax (CST) and state entry taxes, which added to the cost and complexity of doing business across state lines.

6.1.2 Introduction of GST and Reforms in Indirect Taxation in India:

The GST was introduced as a destination-based, multi-stage tax applicable to the supply of goods and services. It was aimed at creating a unified national market, removing tax barriers between states, and simplifying compliance for businesses. GST replaced a multitude of indirect taxes and introduced a dual GST model, where the central and state governments jointly levy taxes.

6.1.2.1 Important Features of GST:

i. Dual Structure: GST is levied both by the central government (Central GST or CGST) and the state governments (State GST or SGST) on intra-state transactions, while inter-state transactions are subject to Integrated GST (IGST).

ii. Input Tax Credit (ITC): ITC allows businesses to claim credit for taxes paid on inputs at every stage of production, ensuring that tax is only paid on the value added.

iii. Destination-based Taxation: GST is charged at the place of consumption rather than the place of production, removing tax barriers between states and promoting inter-state trade.

iv. Standardization of Tax Rates: GST rates were initially divided into multiple tax slabs (5%, 12%, 18%, and 28%), but this standardization eliminated the variance in tax rates across states for similar goods and services.

6.1.2.2 Highlights of the Influences of GST:

The GST has been instrumental in streamlining India's indirect taxation system. Several key elements highlight GST's influence:

i. Consolidated tax framework: GST consolidated various indirect taxes (such as VAT, excise duty, and service tax) into a single, comprehensive system.

ii. Diminished tax stacking: GST reduces the cumulative effect of taxes by

enabling input tax credits throughout the supply chain.

iii. Simplified compliance: A centralized platform, the GST Network, facilitates registration, return filing, and tax payments, easing compliance processes.

iv. Enhanced interstate trade: The Integrated GST (IGST) component streamlines cross-state transactions and decreases border checkpoints.

v. Greater transparency: GST's digital infrastructure promotes clarity and reduces opportunities for tax evasion.

vi. Standardized tax rates: GST introduced uniform tax rates across states, eliminating regional disparities and fostering a unified national market.

vii. Clearer classification: GST harmonized the categorization of goods and services, minimizing ambiguity and disputes.

viii. Expanded tax base: The comprehensive nature of GST has widened the tax base, potentially increasing revenue collection.

ix. Lower logistics expenses: The removal of interstate barriers has improved the efficiency of goods movement, potentially cutting logistics costs.

x. Boosted competitiveness: The simplified tax structure may improve the ease of doing business and attract foreign investment.

Despite implementation challenges and ongoing refinements, GST has significantly contributed to simplifying India's indirect tax landscape.

6.1.3 The Role of GST in Simplification of the Indirect Taxation Regime

i. Unification of Multiple Taxes: GST subsumed a range of central and state taxes, leading to a single unified tax regime. Taxes such as VAT, Excise Duty, Service Tax, CST, and Entry Tax were replaced by GST, reducing the need for businesses to manage multiple tax systems. Businesses, particularly those operating across multiple states, no longer need to navigate varying state VAT laws and comply with different tax authorities.

ii. Elimination of Cascading Effect: One of the most significant advantages of GST is the elimination of the cascading tax effect. Under the previous regime, taxes were levied at every stage of the supply chain without provision for claiming credits on taxes paid. GST introduced a seamless system of Input Tax Credit (ITC), ensuring that tax is levied only on value addition. This reduced the overall tax burden on goods and services, resulting in lower prices for consumers and better profitability for businesses.

iii. Ease of Compliance: GST introduced a fully online system for tax registration, filing returns, and tax payment, replacing the manual systems that existed under the previous tax regime. The Goods and Services Tax Network (GSTN) serves as the IT backbone of the GST system. Businesses benefit from the simplification of compliance processes, including unified returns

for CGST, SGST, and IGST, reducing administrative burdens.

iv. **National Market Creation**: By removing inter-state tax barriers, GST has created a seamless national market, encouraging businesses to expand beyond their home states. The elimination of taxes like CST and entry taxes made inter-state trade more cost-effective. This has led to increased efficiency in supply chains, reduced logistics costs, and greater integration of the Indian market.

v. **Transparency and Reduced Tax Evasion**: The introduction of GST has enhanced transparency in the tax system. The matching of invoices for input tax credit and the e-way bill system have reduced opportunities for tax evasion. Tax compliance has improved, and the government has seen an increase in indirect tax revenues, even as rates for many goods and services have been rationalized.

6.1.4 Effect of GST on Various Stakeholders:

i. **Businesses**: Before induction of GST businesses had to comply with a complicated web of taxes across multiple states, resulting in high compliance costs and inefficiencies. After induction of GST, the single tax structure has reduced compliance costs and simplified the overall process, benefiting especially small and medium enterprises (SMEs) through schemes like the Composition Scheme, which allows for simplified returns with lower tax rates for small businesses.

ii. **Consumers**: Before introduction of GST, the cascading effect of taxes led to higher prices for goods and services, as businesses passed on the tax burden to consumers. After introduction of GST, the elimination of tax-on-tax and input tax credit mechanisms has led to lower overall prices for many goods and services, especially in sectors like logistics and manufacturing.

iii. **Government**: Before introduction of GST, the central and state governments faced challenges in tax collection due to tax evasion, complex compliance requirements, and inefficiencies in the system. After introduction of GST, indirect tax has improved tax collection through better compliance and a broader tax base. The increased transparency and digitization of the tax system have also reduced corruption.

6.1.5 Limitations Faced during Implementation of GST:

i. **Initial Compliance Burden**: Businesses, especially small enterprises, faced difficulties transitioning to the new system due to the complexity of the GST portal and frequent changes in GST rules and rates.

ii. **Multiple Tax Slabs**: The existence of multiple tax slabs (5%, 12%, 18%, 28%) created confusion in the classification of goods and services, with some businesses facing difficulties in determining the applicable rates.

iii. **Technological Challenges**: The initial rollout of the GST Network (GSTN) faced technological glitches, leading to delays in return filing and mismatches in input tax credits, which posed challenges for businesses in the early stages of implementation.

6.2 Technical Analysis and Discussion: In this section, total indirect tax revenue collections before and after implementation of GST have been analysed, discussed and presented below.

6.2.1 Indirect Taxes Collection Before and After GST

Table-4

Total Collection of Various Indirect Taxes from Financial Year 2010-11 to 2016-17

Financial Year	Total Indirect Tax Collection (₹ crore)*	Custom Duty Collection (₹ crore)	Indirect Tax Collection excluding Custom Duty (₹ crore)	% of Indirect Tax Collection on Total Indirect Tax Collection
2010-11	345127	135813	209314	60.65
2011-12	392444	149328	243116	61.95
2012-13	474482	165346	309136	65.15
2013-14	497060	172085	324975	65.38
2014-15	544772	188016	356756	65.49
2015-16	709825	210338	499487	70.37
2016-17	861625	225370	636255	73.84

(Source: Department of Revenue, Ministry of Finance, Government of India, https://dor.gov.in)

*The above indirect tax collection excludes cess administered by other than the Department of Revenue.

Observation: The data indicates a consistent rise in government revenue from indirect taxes, with collections showing an upward trend overall between 2010–11 and 2016–17.

i. Total indirect tax collection increased from ₹345,127 crore in 2010-11 to ₹861,625 crore in 2016-17.

ii. Custom duty collection rose from ₹135,813 crore in 2010-11 to ₹225,370 crore in 2016-17.

iii. Indirect tax collection excluding customs increased from ₹209,314 crore in 2010-11 to ₹636,255 crore in 2016-17.

iv. The percentage of non-customs indirect taxes in total indirect taxes increased from 60.65% in 2010-11 to 73.84% in 2016-17.

v. A substantial increase occurred in 2015-16, with total indirect tax collection reaching ₹709,825 crore, custom duty at ₹210,338 crore, and other indirect taxes at ₹499,487 crore.

vi. The upward trend continued in 2016-17, with the highest collection figures: ₹861,625 crore (total), ₹225,370 crore (customs), and ₹636,255 crore (other indirect taxes).

Table-5

Total Indirect Taxes Collection from Financial Year 2017-18 to 2023-24 in India (Post-GST Period)

Financial Year	Total Indirect Tax Collection (₹ crore)*	Custom Duty Collection (₹ crore)	Indirect Tax (GST) Collection excluding Custom Duty (₹ crore)	% of Indirect Tax (GST) Collection on Total Indirect Tax Collection
2017-18	911653	129030	782623	85.85
2018-19	937321	117813	819508	87.43
2019-20	953513	109283	844230	88.54
2020-21	1074810	134750	940060	87.46
2021-22	1289662	199728	1089934	84.51
2022-23	1381934	213371	1168563	84.56
2023-24	1495853	233067	1262786	84.42

(Source: Department of Revenue, Ministry of Finance, Government of India, https://dor.gov.in)

*The above indirect tax collection is excluding cess administered by other than Department of Revenue.

Observation: The data indicates a zic-zac and downward trend in government revenue from indirect taxes, between 2017-18 and 2023-24.

i. Total indirect tax collection increased from ₹911,653 crore in 2017-18 to ₹1,495,853 crore in 2023-24.

ii. Customs duty collection rose from ₹129,030 crore in 2017-18 to ₹233,067 crore in 2023-24.

iii. Indirect tax (GST) excluding customs increased from ₹782,623 crore in 2017-18 to ₹1,262,786 crore in 2023-24.

iv. GST consistently made up over 84% of total indirect tax collection, ranging from 84.42% in 2023-24 to 88.54% in 2019-20.

v. Total indirect tax collection increased to ₹1,074,810 crore and GST (excluding customs) reached ₹940,060

crore in 2020-21.

vi. Both total indirect tax and GST collections continued to grow strongly in subsequent years.

As evident from the table, the monthly average GST collection has been on the rise for the past few years and the growth is especially significant in the last two financial years. This trend should continue for the next few years as India's economy expands and the government does more to simplify and enforce GST.

By Comparing Table 4 and Table 5 it is thoroughly observed that the shift from the pre-GST indirect tax structure to GST has been a big leap for the Indian economy. The constant rise in GST collections is a good sign of this reform working. GST will play an even bigger role as the driving force of economic prosperity as India continues to grow and develop.

6.3 Hypothesis Testing:

Paired Sample t-test:

Paired sample t-test analysis is done to investigate the significant difference between the average of the perception of the same sample in two different situations. Here, researchers have tried to examine whether there is any difference in the average tax revenue collection of the Indian Government before and after the implementation of GST.

Hypothesis:

H_0: There is no difference between the average of the indirect tax collection and GST collection

H_1: There is a difference between the average of the indirect tax collection and GST collection

Table-6

Paired Samples t-Test									
		Paired Differences					t	df	Sig. (2-tailed)
		Mean	Std. Deviation	Std. Error Mean	95% Confidence Interval of the Difference				
					Lower	Upper			
Pair 1	Indirect Tax Collection in Pre-GST Period - Indirect Tax Collection in Post-GST Period	-19.99143	5.72045	2.16213	-25.282	-14.701	-9.246	6	0.000

(Source: Compiled by researchers)

Interpretation: The above table shows that the p-value of the test at the 1% level of significance is 0.000 which is less than 0.01. So, the null hypothesis is rejected and the alternative hypothesis is accepted. Therefore, it can be concluded that there is a difference between the average of the indirect tax collection and GST collection. This means the average indirect tax revenue collection after the implementation of GST has significantly increased.

7. Findings of the Study:

The outcomes of the study have been depicted below.

i. There is a difference between the average of the indirect tax collection and GST collection.
ii. Simplification of Indirect Taxes: GST has greatly simplified the indirect tax structure in India by amalgamating so many taxes into one single tax. That way it's made it easier for businesses to comply and there's no more trickle-down effect of taxes i.e., everything is more expensive for the consumer in earlier indirect tax regimes because of the cascading effect.
iii. Increase in Indirect Tax Revenues: GST which came into existence in 2017 has seen a rise in indirect tax revenues. This is mainly because of the wider tax base, less evasion of tax and better compliance tools that GST provides.
iv. Positive Impact of Digitalization: The digital infrastructure and technology that has been used for GST implementation has made a big difference in making it an easy tax system and improving revenue collection. With the help of e-filing, e-invoicing, and e-way bills, the whole process of GST has become a lot easier and paperless for taxpayers.
v. Pre-GST Period: VAT, CST, service tax and whatnot- these were the types of taxes that were prevalent in the pre-GST indirect tax regime. This often led to duplicate taxes and burdensome bureaucratic red tape. It made it hard to comply with businesses, and it was hard to collect taxes that way.
vi. Ever since the enactment of the Goods and Services Tax (GST) Act, the taxation system has become a lot more organized and logical. Nowadays with digital tools and the single-window approach, it has become much easier to comply and much harder to evade tax. And the indirect tax revenues have skyrocketed due to this.

8. Conclusion:

In India, the indirect taxation structure has become more efficient and just, with the implementation of GST. It subsumed several indirect taxes into a single levy has reduced business compliance costs, removed the cascading effect of indirect taxation, and increased revenue for the government for different welfare activities which has ultimately led to economic growth. Although problems still exist, with the passage of time they will be solved. GST on the whole has had a positive impact and it is one of the major milestones in India's tax reform.

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THE INFLUENCE OF CSR AND GREEN TAX IN ENHANCING GREEN ENERGY EFFICIENCY, ESG PERFORMANCE, AND SUSTAINABLE GREEN ECONOMY

Asha Sharma

Abstract

Understanding the function of CSR and green tax laws becomes essential as businesses negotiate the difficulties of environmental sustainability in order to promote green energy practices and improve ESG performance. This study looks at how CSR programs enhance the **ESG performance, and green energy effectiveness, and sustainable green economy.** *The report also assesses how effective green tax laws are as a tool for encouraging companies to improve their ESG* **performance, and green energy effectiveness. The secondary objective of the study is to find out the** *green tax* **on sustainable green economy.**

The preliminary information was gathered by a 5-level structured questionnaire survey. Since 19 variables in this study have been taken, 262 samples were collected. The respondents in this study were professionals, investors, and other stakeholders. The simple approach of gathering samples of random sampling was adopted. Basic statistics were performed, and PLS-SEM analysis included the assessment of Measurement and Structural Model was performed.

Result reveals that CSR programme are favorably correlated with enhanced ESG performance and the efficacy of green tax. Furthermore, it was found that green tax laws successfully encourage ESG performance and **green energy effectiveness** *which support the development of a more sustainable and sustainable green economy. However, depending on the industry context and regulatory framework, the effect of a green tax varies. In order to increase the efficacy of green energy and improve ESG results, the study offers insightful management implications for implementing integrated CSR strategies and green tax laws. By examining many industries and geographical areas, future study could build on these findings and create more thorough sustainability frameworks.*

Keywords

Corporate Social Responsibility (CSR), Green Tax, Sustainable Green Economy, ESG Performance, and Green Energy Effectiveness

Introduction

CSR as essential instruments for advancing a green economy has increased due to the world's movement towards sustainability. Globally, businesses are embracing CSR practices more and more as a way to improve their ESG performance in addition to meeting legal obligations.

Green taxes are financial instruments used to penalize ecologically damaging activity and reward sustainable conduct in an effort to encourage eco-friendly practices. These taxes are applied to activities or products that generate pollution, waste, or carbon emissions. For instance, carbon taxes, plastic taxes, and energy taxes are commonly used to reduce greenhouse gas emissions and promote cleaner production methods. The earnings collected from green taxes can be redirected towards financing green investments, research and development in sustainable technologies, and other initiatives that support the transition to a sustainable green economy. Green taxes thus serve as a regulatory mechanism to align corporate behaviors with broader environmental goals.

Green taxes are becoming more popular as helpful policy instruments to advance a sustainable economy and increasing the effectiveness of green energy. These tools complement corporate social responsibility (CSR). Understanding the relationship between CSR, green taxes, and the green economy is essential to comprehending how governments and companies may work together to accomplish sustainability objectives. CSR projects frequently include expenditures in waste management, renewable energy, and community welfare, all of which improve the efficacy of green energy. Green taxes also give businesses a financial incentive to reduce their carbon footprints and implement more environmentally friendly practices, which improves their ESG performance. Corporate social responsibility (CSR) and green taxation work together to support green energy and a healthy green economy as companies strive to comply with international sustainability requirements.

Beyond their financial performance, corporate social responsibility (CSR) refers to a company's ethical duty to make a substantial contribution to society. It entails implementing sustainable business practices that take stakeholders, society, and the environment into account. CSR is concerned with lowering carbon footprints, boosting the use of renewable energy, improving resource efficiency, and supporting sustainable business models within the framework of sustainable green economy. By using environmentally friendly techniques

Green investment refers to the allocation of capital towards projects, assets, or companies that aim to have a positive impact on the environment. It includes investments in renewable energy, energy efficiency, sustainable agriculture, green buildings, and clean technologies. For companies, green investments can take the form of sustainable infrastructure development, adopting energy-efficient processes, or investing in R&D for eco-friendly products. Green investments are crucial for fostering a sustainable green

economy as they facilitate the development and scaling of sustainable technologies, reduce dependence on fossil fuels, and create green jobs. Institutional investors, including pension funds and sovereign wealth funds, are increasingly prioritizing green investments, driven by the growing awareness of climate risks and the need for sustainable returns.

A sustainable green economy is characterized by low carbon emissions, resource efficiency, and social inclusivity. It is an economic system that aims to achieve sustainable development without degrading the environment. The sustainable green economy emphasizes the importance of aligning economic activities with environmental sustainability by integrating green investments, eco-friendly policies, and sustainable business practices. CSR initiatives, supported by green tax policies and green investments, are fundamental to building a sustainable green economy. They help in reducing environmental degradation, promoting economic resilience, enhancing energy security, and fostering social equity. The transition to a sustainable green economy is not only vital for mitigating climate change but also offers significant opportunities for economic growth, innovation, and employment.

These elements contribute to creating a sustainable and resilient economic model that aligns with global environmental goals, such as the Paris Agreement and the United Nations' Sustainable Development Goals (SDGs). The coordinated effort of governments, businesses, and financial institutions in promoting CSR, implementing green taxes, and encouraging green investments is essential to drive systemic change towards a more sustainable and inclusive global economy by 2047 and beyond.

Corporate governance disclosures are a significant component of a company's non-financial reporting. Numerous studies look at the factors that influence corporate governance reporting, including size, culture, and financial success, as well as external and internal factors. Others study the influence of corporate governance reporting by utilizing simple stand-ins for corporate governance metrics, such as board composition attributes, to analyze the impact on the accuracy of financial reporting and firm valuation. However, there may be a relationship between the variables influencing corporate governance reporting, and a number of quantitative studies fail to take this relationship and its range of impacts into proper consideration. For example, corporate governance reporting aims to uncover the underlying governance processes that may be affected by and result from detrimental financial performance.

The goal of this study is to better understand how green energy efficiency, ESG performance, and the green economy as a whole are impacted by green tax and corporate social responsibility regulations. It tries to determine whether these factors influence and support sustainable green economy in order to give stakeholders, business owners, and policymakers information on how to effectively maximize policies for sustainable development. The findings of this research will aid in defining

how moral business conduct and fiscal policies could facilitate a more just and sustainable economic system.

Research problems comes into mind
How does CSR programme impactful for sustainable development?
Does CSR progamme improve ESG Performance of an organisation?
Does CSR programme leads to green energy, green investment and green economy?
Does CSR progamme has linkage to Green tax?
How does green tax help for a better society and sustainable economy?
Does green energy help to meet the vision of green energy and green investment?

Review of Literature:
The current study has significance for understanding the concept and scope of further study. A literature review was done in order to identify the research gap. Research papers published in international journals, books, and magazines were examined in order to gain an understanding of the previous work.

CSR and ESG Performance
Social reputation via CSR awarding requires a full ESG commitment in environmental, social, and governance pillars (Uyar et al., 2022)drawing on social reputation theory, we focus on the non-financial benefit (social reputation. The study seeks to enhance the current understanding of how corporate social responsibility (CSR) and environmental, social, and governance (ESG) factors influence firm performance (Hsu & Chen, 2024). the relationship of CSR practices–asymmetric information and ESG performance–asymmetric information (Usman et al., 2020). l framework, while ESG provides a measure of assessment for investors. It could be argued that ESG is currently overtaking CSR as a measure of sustainability in the corporate world (O'Neill, 2023). the concepts of CSR, ESG, and corporate citizenship have received a great deal of attention in academia and industry (Park et al., 2023)the concepts of CSR (corporate social responsibility
Most of the studies are relating to corporate governance mechanisms board of directors (size, composition, and diligence), audit committee (size, composition, and diligence) and audit quality. (Al-Homaidi et al., 2019) other papers add one more factor i.e. foreign and institutional ownership for the study (Almaqtari et al., 2020).
Some more factors incorporate such as corporate governance practices, internal audit, management processes, internal control processes and risk identification processes, cost-effective alternative assurance mechanisms,(Richard & Odendaal, 2021).
Internal assurance mechanisms with external assurance provision is presented(Richard & Odendaal, 2021). At the same time firm efficiency is measured throughreturn on equity (ROE) and the market to book ratio (Berbou & Sadqi, 2020) concentration, and presence of employees in the ownership structure, as well as some cognitive aspects of governance, represent the basis for discussion. Secondary data of a sample of 44 listed companies in the

Casablanca Stock Exchange was analyzed using multiple linear regression. The results of this empirical study revealed that the financial and stock market performance of the companies that are captured by the return on equity (ROE) and the market to book ratio (Berbou & Sadqi, 2020)

Most of the authors focused on corporate governance mechanisms. Author applied aspects likeboard of directors, audit committee, and audit quality for the study. The result reveals thatthere is no significant impact of corporate governance mechanisms on contribution to the quality of financial reporting. It is suggested toneed to developthe models of financial reporting quality and revise the role corporate governance(Al-Homaidi et al., 2019).

Some of the authors have included financial innovation in their study.The study explores the effect of corporate governance on financial innovation in Taiwan's banking industry. The results find that the impact of corporate governance on banks' innovative financial services has increased. Moreover, the greater financial innovation services, the higher the bank profitability and value has been found out (Wang & Cao, 2022).

One of the studies found relating corporate governance to stock market performance. Multiple linear regressions technique has been used here. The results revealed that the financial and stock market performance with measures (return on equity and the market to book ratio) significantly correlate with the adoption of the hybrid corporate governance approach. The study deals with corporate governance and its impact on business performance in the context of Moroccan listed companies (Berbou & Sadqi, 2020)

On the behalf of previous literature hypothesis has been framed:

H_{01} CSR programme is positively influence to the ESG performance

CSR and **green energy effectiveness**

The study adds something new to the body of knowledge on corporate governance in India. It offers thoughtful observations on corporate governance practices (Almaqtari et al., 2020). A different author makes note of affordable substitute assurance methods in information retrieval in South Africa. It explains how using and disclosing corporate governance practices can improve the legitimacy of its corporate reporting (Richard & Odendaal, 2021). Hypothesis framed like-

H_{02} CSR programme is positively influence to the **green energy effectiveness**

CSR and Green Tax

This paper examines in detail the literature and theories surrounding CSR, Malaysian government's role in protecting the environment, the challenges of green marketing and the state of CSR within the hotel industry

Large corporations will engage in tax evasion by deducting CSR expenses in order to lower their tax liability, according to this research (Abdullah et al., 2021). It also examines the relationship between CSR practices and green finance (GF) behavior and how these two factors work together to promote sustainable tourism in Bangladesh (Rahman et al., 2024). Based on above literature, hypothesis has been framed:

H_{03} CSR programme is positively influence to the **green tax**

CSR and Sustainable green economy

Many developing nations have embraced the new economic paradigm of sustainable green economy in recent years, and governments and multilateral institutions have promoted it. This emerging socioeconomic environment is where businesses will implement their CSR (Shah et al., 2016)

Based on above literature, hypothesis has been framed:

H_{04} CSR programme is positively influence to the **sustainable green economy**

Green Tax and ESG Performance

The notions of green financing and green tax have emerged as crucial tools in today's international corporate climate for encouraging ecologically conscious behaviour. (Deb et al., 2024) the concepts of green financing and green tax have become pivotal instruments for fostering environmentally responsible practices. The purpose of 20this study is to comprehensively assess how green financing and green tax collectively influence CSR through various dimensions, including employees, customers, and communities. This research employs a partial least squares structural equation modeling (PLS-SEM

Based on above literature, hypothesis has been framed:

H_{05} Green tax is positively influence to the **ESG performance**

Green Tax and Sustainable green economy

Using data from the Emerging Seven (E7) countries, this study empirically investigates how sharing economy practices like eco-design, supplier green management (SGM), internal green management (IGM), and customer green management (CGM) contribute to the achievement of the Sustainable Development Goals (Tu et al., 2023)this study empirically examines the impact of sharing economy activities such as corporate social responsibilities (CSR. Based on above literature, hypotheses have been framed:

H_{06} Green tax is positively influence to the **green energy effectiveness**

H_{07} Green tax is positively influence to the **sustainable green economy**

RESEARCH METHODOLOGY

Sample design and data collection

The preliminary information was gathered by a 5-level structured questionnaire survey. The participants in this study were professionals, investors, and other stakeholders. Accordingly, the sample size is established using the study's question-to-population ratio, which ranges from 5/1 to 10/1 (Hair et al., 2010). Since 20 variables in this study can be observed, 200 samples are required. However, the authors chose to disseminate 400 surveys to minimise hazards throughout the sample collection procedure and finally received 262 fully filled responses. The simple approach of gathering samples of random sampling was adopted.

Measurement of variables

Table 1: Variable used for the linkage between CSR, Green Tax and Sustainable green economy

Due to the theoretical construct's complexity and the fact that measures of a single dimension offer a somewhat constrained view of a firm's performance in the pertinent social and environmental domains, it was challenging to create a truly representative measure of CSR (Wolfe, 2003). A thorough literature review served as the foundation for introducing measurement items. Operationalizations that had been shown effective in earlier studies were employed to facilitate cumulative research.

Variable Name	Variable Details	Symbols
	Exogenous Variables	
Impact on Sustainable green economy	Policy and Regulation Support	IA1
	Green Product Demand in the Market	IA2
	Global Trade and Green Standards	IA3
Green Energy Effectiveness	**Renewable Energy Adoption Rate**:	GEe1
	Energy Efficiency Improvement	GEe2
	Green Technology Investment	GEe3
	Cost Efficiency	GEe4
ESG Performance	Environmental Impact	ESG1
	Social Contributions	ESG2
	Governance Quality	ESG3
	Sustainable future goals	ESG4
	Endogenous Variables	
CSR	Community Engagement	CSR1
	Integration Capabilities	CSR2
	Environmental Initiatives	CSR3
	Sustainable Supply Chain	CSR4
	Social benefit and living standard	CSR5
Green Tax	User Adoption Rates	GT1
	Tax Incentives for Renewable Energy	GT2
	Pollution Tax	GT3

Table 1 presents the selected dependent and independent variables for the study. For the study, **impact on sustainable green economy**, **green energy effectiveness**, **ESG performance** have been considered as the dependent variable **CSR and green tax** have been considered as independent variables.

Research Objective

This study aims to explore the influence of CSR on green energy efficiency, ESG performance, and the overall green economy. **The purpose of the study is to find out the** green tax **on green tax, ESG performance, and green energy effectiveness, and sustainable green economy.** It seeks to uncover how these factors interrelate and contribute to sustainable green economy, providing insights for policymakers, businesses, and stakeholders on optimizing strategies for sustainable development. The findings of this research will help delineate the pathways through which responsible corporate practices and fiscal measures can drive a more sustainable and inclusive economic model.

Result Analysis

Testing research model

According to Williams et al. (1991) and Ritchie (1992), testing a research model is done to ensure that it and its components are acceptable and adequate for the particular study setting. Basic statistics were performed, and PLS-SEM analysis included the assessment of Measurement and Structural Model was performed. The measurement model establishes the reliability and validity of the construct. The structural model ascertains the significance of hypothesized relationships. Different hypotheses were proposed to evaluate the relationship of predictors to the outcome.

Reliability and validity

Following the PLS-SEM method, constructs' reliability and convergent validity are evaluated using composite reliability (CR), rho, factor loading, Cronbach's alpha and average variance extracted (AVE). The results in Table 2 indicate the reliability and validity of the variables.

Table 2 Construct Reliability and validity

	Factor loading	Cronbach's alpha	*CR (rho_a)	CR (rho_c)	** (AVE)
	CSR	0.793	0.798	0.857	0.546
CSR1	0.703				
CSR2	0.779				
CSR3	0.725				
CSR4	0.736				
CSR5	0.748				
		0.693	0.692	0.812	0.52

ESG1	0.703				
ESG2	0.716				
ESG3	0.732				
ESG4	0.732				
		0.855	0.886	0.901	0.695
GEe1	0.812				
GEe2	0.819				
GEe3	0.81				
GEe4	0.893				
		0.396	0.515	0.652	0.377
GT1	0.713				
GT2	0.636				
GT3	0.04				
GT4	0.771				
		0.787	0.794	0.876	0.702
IA1	0.864				
IA2	0.85				
IA3	0.798				

*CR- Composite reliability

**AVE- Average variance extracted

The factors that determine validity and reliability are presented in Table 2 using average variance extracted (AVE), composite reliability (CR), and Cronbach's alpha (CA). Reliability test (Cronbech Alpha) and Exploratory test have been applied to check the significant impact of COVID 19 on the Indian Education working pedagogy (Balaji et al., 2020)faculties and Parents. For the purpose of analysis, Non probabilistic convenient sampling has been used for the methodology. Various statistical tools has been applied like Frequency distribution, Parametric and Non Parametric test like T Test, Annova Test, Kruskal-Wallis Test, Reliability test (Cronbech Alpha. Whereas composite reliability (CR) is loading-oriented, Cronbach's alpha (CA) is correlation-oriented. Cronbach's Alpha coefficients were used to gauge the scales' dependability. A composite reliability value of 0.743 to 0.86 was found in Cronbach's alpha for the adoption of ESG performance and **green energy effectiveness**. If it is within the range of "0.6 to 0.8," it is deemed

satisfactory. With all the factors combined, it is found to be good and moderate for sustainable green economy because the value is approximately 0.0.693.

Discriminant Validity

Table 3 measures discriminant validity after determining reliability.

Table 3 Discriminant Validity

	CSR	ESG	GEe	GT
CSR				
ESG	0.881			
GEe	0.533	0.81		
GT	1.129	1.157	0.793	
IA	0.475	0.822	0.747	0.799

Construct validity, also known as discriminant validity, is seen in Table 3. The findings show that there is no discernible correlation between any of the factors. The high discriminant between the measures of unrelated constructs is expressed by the low correlation. It is concluded that there is a statistically significant, strong positive association.

Goodness of Fit

Table 4 Fitness of Model

	R-square	R-square adjusted
ESG	0.621	0.62
GEe	0.375	0.372
GT	0.516	0.515
IA	0.346	0.343

The R2 values of each endogenous component should be evaluated by the researchers to gauge the in-sample predictive potential of the model. Consequently, the evaluation of the coefficient of determination (R2) is one of the primary components of the structural model assessment. The primary construct in the current study are (dependent variables) of ESG performance, green energy, sustainable green economy. The total R2 (0.62) of the estimated structural model shown in Figure 1 is determined to be about moderate. In this instance, it indicates that the endogenous construct ESG performance can be explained by the CSR accounting for 62% of the variance on ESG performance and 51.5% on green tax, while on green energy effectiveness 37.2% and on sustainable green economy 34.3%.

Hypothesis testing

H_{01} CSR programme is positively influence to the **ESG performance**
H_{02} CSR programme is positively influence to the **green energy effectiveness**
H_{03} CSR programme is positively influence to the **green tax**
H_{04} **CSR** programme is positively influence to the **sustainable green economy**
H_{05} **Green tax** is positively influence to the on **ESG performance**
H_{06} **Green tax** is positively influence to the **green energy effectiveness**
H_{07} **Green tax** is positively influence to the **sustainable green economy**

Seven Hypotheses have been tested. First four are relating to indentify the influence of CSR and next three of green tax. The first hypothesis evaluates whether CSR programme positively impact the ESG' performance. The result shows that CSR has a direct effect on firms' performance ($\beta = 0.249$, $t = 4.401$, $p < 001$). The study concludes that of CSR programme is positively related to the **ESG performance**. Hence, Hypothesis 1 was accepted. The second hypothesis evaluates the positive relationship between CSR programme and **green energy effectiveness**. The result indicates that CSR is not positively related to **green energy effectiveness** ($\beta = 0.03$, $t = 0.516$, $p < 0.606$). Hence, the H2 is rejected.

Additionally, the analysis shows that **CSR** programme directly affects to the **green tax** ($\beta = 0.719$, $t = 23.207$, $p < 000$). The study concludes that CSR influences green tax. Hence, the H3 is accepted. The hypothesis sought to ascertain effect of CSR programme on sustainable green economy (CPI). The results revealed that **CSR** programme does not favourable association to sustainable green economy ($\beta = -0.073$, $t = 1.075$, $p = 0.282$). Hence, the hypothesis was not supported.
The fifth hypothesis states that a green tax has a favorable impact on **ESG performance**. The finding shows a positive relationship between green tax and **ESG performance**, and statistically significant ($\beta = 0.59$, $t = 12.361$, $p = 0.000$). Hence the hypothesis was accepted. The result further reveals that green tax intention has a direct relationship with the **green energy effectiveness** ($\beta = 0.59$, $t = 11.146$, $p < 000$). Therefore, hypothesis 6 was accepted. The hypothesis 7 indicates that there is favourable association between green tax and sustainable green economy ($\beta = 0.055$, $t = 0.649$, $p = 0.517$). Therefore, green tax influence ESG, **green energy effectiveness** and finally enhance the impact on sustainable green economy. The hypothesis 7th was accepted. Finally it can be concluded that 5 hypothesis out of 7 has been approved.

Table 5 Significance of the relationship between CSR, Green Tax and Sustainable green economy

	Original sample (O)	Sample mean (M)	Standard deviation (STDEV)	T statistics (|O/STDEV|)	P values	Hypothesis
CSR -> ESG	0.249	0.25	0.057	4.401	0	**Ho accepted**
CSR -> GEe	0.03	0.031	0.058	0.516	0.606	Ho rejected
CSR -> GT	0.719	0.719	0.031	23.207	0	**Ho accepted**
CSR -> IA	-0.073	-0.076	0.068	1.075	0.282	Ho rejected
GT -> ESG	0.59	0.589	0.048	12.361	0	**Ho accepted**
GT -> GEe	0.59	0.591	0.053	11.146	0	**Ho accepted**
GT -> IA	0.639	0.643	0.064	10.012	0	**Ho accepted**

Structural model

The next step in structural modelling is assessing the hypothesized relationship to substantiate the proposed hypotheses.

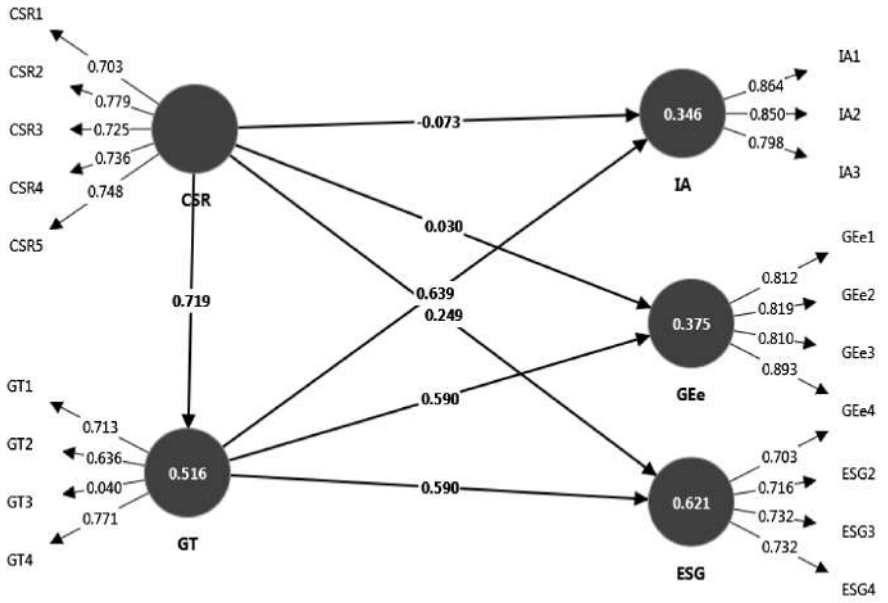

Figure 1 Path diagram

Model Fit

Table 5 Model Fit

	Saturated model	Estimated model
SRMR	0.117	0.13
d_ULS	2.885	3.549
d_G	0.818	0.885
Chi-square	1981.296	2093.024
NFI	0.586	0.563

The NFI value of 0.586 is deemed to be a satisfactory fit and offers comprehensive details regarding the PLS path model NFI computation.

Discussions

In this study, CSR programme is positively related to the **ESG performance**. This result is in line with the conclusion made by (Albitar et al., 2023); (Hsu & Chen, 2024). However, this finding contradicts the work by (Usman et al., 2020) who found that CSR practices and ESG performance are contemporaneous and weakly associated with asymmetric information, On the other hand, **CSR** programme directly affects to the **green tax**. This result is in line with the conclusion made by (Abdullah et al., 2021);(Punitha & Mohd Rasdi, 2013). CSR programme is positively related to the **Green Energy Effectiveness** (Khan & Liu, 2023);(Rahman et al., 2024). The further development of ER-HRM to better understand the factors driving innovation in green technology and organizational performance is supported by our study. However, the study found a positive impact between CSR and the adoption of green finance (Punitha & Mohd Rasdi, 2013);

The results also show that green tax has a positive and significant impact on CSR(Deb et al., 2024)

The results also show that green tax has a positive and significant impact on CSR(Deb et al., 2024). The study shows that **CSR** programme is not found positively related to the **sustainable green economy, find a similar work by** (Shah et al., 2016). **A contradictory result by** (Ye & Dela, 2023) that green investments and financing significantly and favorably affect CSR and sustainable performance. **Green tax** is positively related to the **ESG performance green energy effectiveness** (Guang-Wen & Siddik, 2022). **Green tax** is positively related to the **sustainable green economy** (Marco-Fondevila et al., 2018);(Tu et al., 2023).

Conclusion

Together, the effects of green taxation, CSR, ESG performance, and energy efficiency all contribute significantly to long-term, sustainable green economy. Green energy effectiveness highlights how important it is to utilize renewable energy,

which lowers carbon footprints, saves money, and improves brand reputation. A company's commitment to sustainability is increasingly indicated by its ESG performance, with companies that exhibit good ESG practices attracting more investors, earning better market valuations, and reducing regulatory and reputational issues. The alignment of corporate operations with society expectations necessitates the implementation of CSR. Organizations that participate in significant CSR initiatives, like community development and environmental protection, establish more robust relationships with stakeholders and attain a competitive advantage.

Meanwhile, **Green Tax** policies serve as an effective mechanism to encourage eco-friendly business practices and deter environmentally harmful activities. These taxes push companies to innovate and adopt sustainable production methods, ultimately reducing liabilities and establishing them as sustainability leaders. Together, these factors create a robust framework that not only drives financial growth but also promotes environmental stewardship, ensuring a resilient and sustainable sustainable green economy for the future.

The objective was to measure the impact of CSR and green tax **on sustainable green economy.** Primary data collected through structured question based on 5-point likert's scale professionals, investors, and other stakeholders. Smart PLS model applied for the assessment of Measurement and Structural Model. The effectiveness of green taxes and improved ESG performance are positively connected with CSR programs, according to the results. Additionally, it was discovered that green tax laws effectively promote ESG performance and the efficacy of green energy, both of which aid in the creation of more sustainable and sustainable green economy.

Managerial implications

The managerial implications of focusing on green energy effectiveness, esg performance, CSR programs should be in line with the long-term objectives and core values of the business to help managers stand out from the competition, enhance employee engagement, and forge better ties with the community. Furthermore, managers must comprehend the ramifications of Green Tax laws. To reduce costs and improve compliance, they must evaluate prospective tax liabilities and investigate sustainable methods that can be eligible for tax breaks. Managers may create a sustainable future, promote long-term growth, and create a competitive edge by incorporating these elements into business strategy.

Limitations and Future Scope

The study on ESG Performance, CSR, Green Tax, and Green Energy Effectiveness offers insightful information, but it also has several flaws that create room for more research. A significant constraint is the dependence on certain datasets and geographic limitations, which could restrict the applicability of the results to other areas and industries. Furthermore, the study mostly concentrates on the direct effects of these variables, possibly ignoring the

impact of outside variables that could have an impact on the results, such as changes in government regulations, the state of the world economy, and technological improvements.

To comprehend the wider application of the findings, future research should broaden by adding a more diverse variety of sectors and geographical places. Studies with a longer duration may offer a more thorough understanding of the long-term consequences of green energy programs. A more thorough understanding of the long-term impacts of ESG performance and green energy projects on financial and non-financial measures may be obtained through longitudinal studies. More research is required to look at how company behavior and green tax policies interact, particularly how different tax regimes affect sustainable practices in various market scenarios. Last but not least, in order to gather comprehensive viewpoints from industry stakeholders and provide deeper insights into the drivers behind and obstacles to the adoption of sustainable practices, future research endeavors may want to incorporate qualitative research methodologies.

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UNRAVELLING THE WEB: A BIBLIOMETRIC ANALYSIS OF THE IMPACT OF SOCIAL MEDIA ON INVESTOR SENTIMENT

Christina N
Arindam Banerjee

Abstract

This bibliometric analysis explores the dynamic relationship between social media and investor sentiment, shedding light on the evolving landscape of financial decision-making in the digital age. As the prevalence of social media platforms continues to rise, so does their influence on investors' perceptions, behaviours, and market dynamics. This paper employs bibliometric techniques to systematically analyze the existing body of literature, identifying key themes, trends, and gaps in research related to the impact of social media on investor sentiment.

The study delves into academic publications, drawing insights from scholarly articles, conference papers, and reviews across disciplines such as finance, economics, and communication studies. By synthesizing the collective knowledge amassed in this field, the analysis aims to uncover patterns in research focus, methodologies employed, and emerging areas of interest. Additionally, the study investigates the geographical distribution of research contributions, highlighting regional disparities in the exploration of this crucial intersection between social media and financial decision-making.

Keywords

Social Media, Investor Sentiment, Financial Decision-making, Bibliometric Analysis, Market Dynamics

Introduction

In the rapidly evolving landscape of financial decision-making, the role of social media in shaping investor sentiment has become a focal point of academic inquiry. As social media platforms continue to gain prominence, their impact on investors' perceptions, behaviours, and market dynamics has become increasingly significant (Gao et al., 2023). This bibliometric analysis delves into the dynamic relationship between social media and investor sentiment, aiming to provide a comprehensive understanding of this intersection within the context of finance, economics, and communication studies.

The prevalence of social media introduces a myriad of factors influencing financial decision-making, ranging from real-time information dissemination to the amplification of market sentiment (Ting et al., 2022). This paper explores the existing body of literature through bibliometric techniques, shedding light on key themes, emerging trends, and potential research gaps in the field. By systematically analyzing academic publications, including scholarly articles, conference papers, and reviews, this study aims to unravel patterns in research focus, methodologies employed, and geographical disparities in the exploration of social media's impact on investor sentiment.

Research Methodology

The dataset for this analysis was extracted from Dimensions using specific search criteria. The keywords "behavioural finance," "social media," "Investor Sentiment," "Investor Perception," and "Financial Decision Support" or "Financial Decision-making" were applied to Article Title, Abstract, or Keywords. The resulting dataset, obtained on 7 February 2024, comprised 658 articles across various publication types, including articles, chapters, monographs, edited books, preprints, and proceedings.

To explore the publication and citation structure, the study employed bibliometric techniques. The analysis is presented in two main subsections: publication and citation structure, and an examination of publications by leading authors. The annual trend of publications from 2013 to 2023 is visualized in Figure 1, illustrating the growth and fluctuations in research output over the years (Li et al., 2024).

In the examination of leading authors, a list of the top 10 authors was compiled based on their contributions to the field, including the number of publications, total citations, and average citations per publication (Wang & Yang, 2023). This analysis offers insights into the research impact of individual authors and their influence on the broader academic landscape.

For network analysis, VOSviewer was utilized to visualize co-occurrence networks of terms, bibliographic coupling of sources (journals), and bibliographic coupling of countries (Sun et al., 2023). The resulting visualizations provide a comprehensive overview of thematic clusters, interconnections between sources, and collaborative networks among countries.

Limitations

While this research provides valuable insights into the relationship between social media and investor sentiment, several limitations should be acknowledged. Firstly, the study relies on data available up to February 2024, and thus, may not capture the most recent developments in the field. Secondly, the analysis is based on academic publications indexed in Dimensions, which may not encompass all relevant research on the topic. Additionally, the study focuses primarily on English-language publications, potentially overlooking important contributions in other languages. Lastly, the bibliometric analysis, while informative, does not delve into the qualitative aspects of individual studies, such as methodological rigor or theoretical contributions, which could impact the overall understanding of the field.

Data

The dataset has been extracted from Dimensions. In search criteria the keywords — "behavioural finance" AND "Social Media" AND "Investor Sentiment" OR "Investor Perception" AND "Financial Decision Support" OR "Financial Decision-making" occurring at any of the places—Article Title, Abstract or Keywords have been applied. The Dimensions database returned 658 matches as a result of this search (shown in Table 1). This resulted in the dataset for doing studies in the field of "finance" and they focus on the intersection of behavioural finance, social media, investor sentiment or perception, and financial decision-making or decision support.

Table 1. Number of Articles Considered for Analysis

Title, Abstract or Keyword	
"behavioural finance" AND "Social Media" AND "Investor Sentiment" OR "Investor Perception" AND "Financial Decision Support" OR "Financial Decision-making"	
Article	223
Chapter	240
Monograph	30
Edited Book	89
Preprint	73
Proceedings	3
Total	**658**

This dataset has been extracted from Dimensions on 7 February 2024.

Results

The results have been discussed in the following two subsections: publication and citation structure, and analysis of publications of leading authors.

Publication And Citation Structure

In figure 1, the total number of publications has been shown.

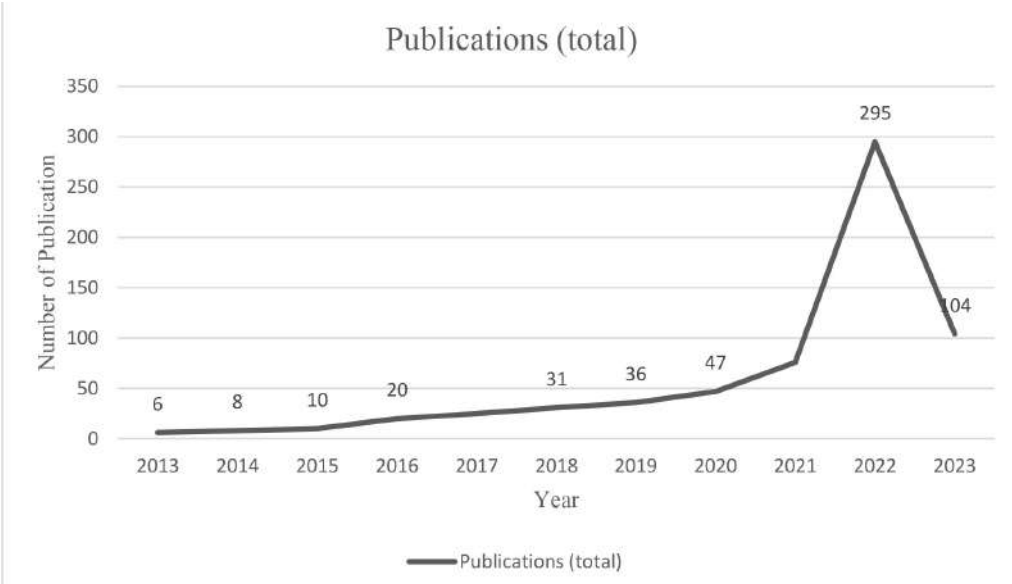

Figure 1. Annual Number of Publications in the Field of Investor Sentiment.

The Figure 1 illustrates a progressive trend in the number of publications from 2013 to 2023. During the initial years from 2013 to 2018, there is a gradual but consistent increase in the number of publications, reflecting steady growth in research output. Notably, 2019 witnesses a significant jump, with publications rising from 31 in 2018 to 36, suggesting a potential surge in research activity. The years 2020 and 2021 show a more pronounced acceleration, reaching 47 and 76 publications, respectively, indicating increased productivity, possibly fueled by factors such as enhanced funding or collaborative initiatives. The most striking feature is the remarkable surge in 2022, where the number of publications soars to 295, pointing towards a potential breakthrough, heightened research activity, or a surge in the field's significance. However, 2023 marks a noticeable decline, with publications dropping to 104, suggesting a shift in dynamics, completion of major projects, or changes in research focus. This fluctuation underscores the need for a nuanced analysis, considering

qualitative factors and specific research areas, to unravel the underlying reasons behind the observed trends. It may be valuable to investigate the content and impact of the publications, as well as explore external factors such as funding availability, policy changes, or emerging trends within the field. Furthermore, examining the distribution of publications across different subfields or authors could provide a more comprehensive understanding of the dynamics influencing the overall data.

Top 10 Leading Authors

An analysis of Top 10 leading authors, the result has been summarized in Table 2.

Table 2. Top 10 Authors and their Citations

Name, Organization, Country	Publications	Citations	Citations mean
Arvid Oskar Ivar Hoffmann University of Adelaide, Australia	4	97	24.25
Jinesh Jain Panjab University, India	3	15	5.00
Che-Wei Liu Indiana University Bloomington, United States	3	3	1.00
Nicole L Cade University of Pittsburgh, United States	2	14	7.00
Caren Sureth-Sloane University of Paderborn, Germany	2	19	9.50
Yiuman Tse University of Missouri–St. Louis, United States	2	1	0.50
Xinyuan Tao New Jersey Institute of Technology, United States	2	4	2.00
Elisa Tosetti University of Padua, Italy	2	1	0.50
Renee Prunty Methodist University, United States	2	1	0.50
Smadar Siev Ono Academic College, Israel	2	2	1.00

The table 2. presents a comprehensive overview of leading authors and their research impact based on the number of publications, total citations, and average citations per publication. Arvid Oskar Ivar Hoffmann, affiliated with the University of Adelaide in Australia, stands out as a prolific author with four publications and an impressive total of 97 citations, averaging 24.25 citations per publication, indicating a substantial impact in the academic realm. Jinesh Jain, associated with Panjab University in India, has contributed three publications with a total of 15 citations, resulting in an average of 5.00 citations per publication, showcasing a moderate impact. Che-Wei Liu, from Indiana University Bloomington in the United States, has authored three publications but received only three citations, translating to an average of 1.00 citations per publication, reflecting a relatively lower impact.

Nicole L Cade, based at the University of Pittsburgh in the United States, has two publications with 14 citations, yielding an average of 7.00 citations per publication, indicating a notable impact. Caren Sureth-Sloane, affiliated with the University of Paderborn in Germany, demonstrates a substantial impact with two publications and 19 citations, averaging an impressive 9.50 citations per publication.

Yiuman Tse, from the University of Missouri–St. Louis in the United States, presents two publications with only one citation, resulting in an average of 0.50 citations per publication. Xinyuan Tao, associated with the New Jersey Institute of Technology in the United States, showcases a moderate impact with two publications and four citations, averaging 2.00 citations per publication.

Elisa Tosetti, based at the University of Padua in Italy, and Renee Prunty, affiliated with Methodist University in the United States, both present two publications with only one citation each, yielding an average of 0.50 citations per publication. Smadar Siev, from Ono Academic College in Israel, demonstrates a modest impact with two publications and two citations, averaging 1.00 citation per publication.

In summary, Arvid Oskar Ivar Hoffmann and Caren Sureth-Sloane emerge as leading authors with substantial research impact, while others in the list display varying degrees of influence based on their publication and citation metrics.

Network Analysis Using Vosviewer

In the following subsections, network analysis of co-occurrence, bibliographic coupling of sources and authors have been carried out.

Analysis Of Co-Occurrence

Cluster-wise Analysis of Co-occurrence Network: Key Themes and Interconnected Concepts in Academic Literature, The resulting image has been shown in figure 2.

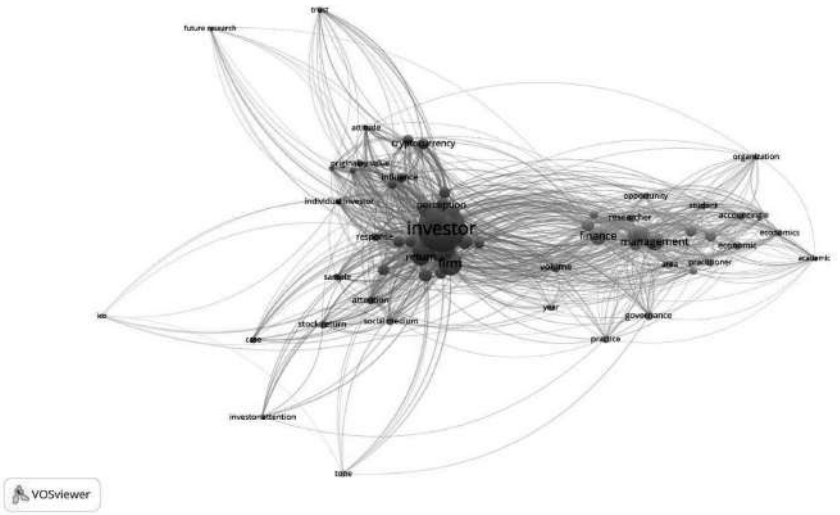

Figure 2. Network Visualization of Co-occurrence

Each cluster has been identified by a theme the description of which is given below:

Certainly! Let's provide a cluster-wise interpretation for the terms in the table:

Cluster 1: Comprises a diverse range of terms related to various aspects of academic literature, particularly in fields such as finance, decision-making, and investor behavior. Notable terms include 'covid,' indicating a focus on the impact of the pandemic on financial markets and decision processes. 'Investor sentiment' and 'retail investor' suggest a keen interest in understanding the emotional aspects influencing investment choices. 'Effect' and 'factor' point towards a concentration on cause-and-effect relationships, while 'return' and 'volatility' highlight a focus on market dynamics. Overall, this cluster appears to represent a broad and interconnected network of terms spanning finance, investment, and behavioral aspects.

Cluster 2: Encompasses terms associated with academic disciplines, research methodologies, and organizational topics. Terms like 'academic,' 'researcher,' 'management,' and 'conference' suggest a focus on scholarly activities, indicating a cluster related to academic research and professional development. 'Economics,' 'business,' 'innovation,' and 'technology' emphasize the interdisciplinary nature of this cluster, reflecting a holistic approach to understanding economic and business phenomena. 'Development' and 'organization' indicate a focus on organizational aspects and development strategies. This cluster likely represents a hub for discussions related to academic

disciplines, research practices, and broader economic and business contexts.

Cluster 3: Is more specialized, focusing on terms related to investor attention and behavior on social media platforms. 'Investor attention,' 'social medium,' and 'stock return' suggest a keen interest in understanding how social media influences investor decisions and market outcomes. This cluster may represent a niche area of research exploring the intersection of finance, technology, and social media in the context of investment activities.

Cluster 4: Includes terms like 'ico' and 'tone,' which may indicate a focus on initial coin offerings and sentiment analysis. These terms suggest a specific interest in the cryptocurrency space, exploring the financial implications of ICOs and the tone of communication within this domain.

Cluster 5: Is represented by the term 'future research,' indicating a separate focus on discussing and planning for future research endeavors. This cluster may serve as a meta-discussion on the direction of research in the academic domain, emphasizing the importance of ongoing inquiry and exploration.

Cluster 6: Is represented by the term 'Year,' which may indicate a focus on temporal aspects or the examination of trends and changes over time. This cluster could involve research that analyzes and interprets data across different years, providing insights into how certain phenomena evolve.

The network visualization of co-occurrence reveals distinct clusters that represent diverse thematic areas within academic literature. Each cluster reflects a specific focus, ranging from financial and behavioral aspects to academic disciplines, social media influence, cryptocurrency, future research considerations, and temporal trends.

Bibliographic Coupling Of Sources

Bibliographic coupling between two sources (journals) increases when there is a greater number of common references between their publications. In this case, only those sources have been picked up which has at least three publications. The count of citations for a publication was however kept to the default value of 1. With such criteria, 21 sources were obtained. For each source, VOSviewer calculates the total link strength of the bibliographic coupling links. The sources in the final graph are selected on the basis of total link strength (TLS). The nodes which are closer to each other have publications that are co-cited together. The result has been shown in figure 3.

Table 3. Bibliographic Coupling of Journals or Sources

Journals or Sources	Documents	Citations	Total link Strength
ssrn electronic journal	64	226	2875
contemporary accounting research	3	113	859
Journal of behavioral finance	7	22	607
Review of behavioral finance	7	31	556
Journal of behavioral and experimental finance	5	132	463
International journal of finance & ecosystem	3	10	422
European journal of finance	3	17	387
Heliyon	3	8	349
International review of Financial analysis	5	16	341
International review of economics & finance	3	26	331
Cogent economics & finance	3	15	277
Contributions to management science	3	16	260
Economic research	3	18	245
International journal of bank marketing	5	79	224
Qualitative research in financial markets	5	37	209
Expert systems with applications	3	218	198
Journal of business research	5	95	180
Global encyclopedia of public administration	227	12	122
Journal of financial services marketing	3	36	91

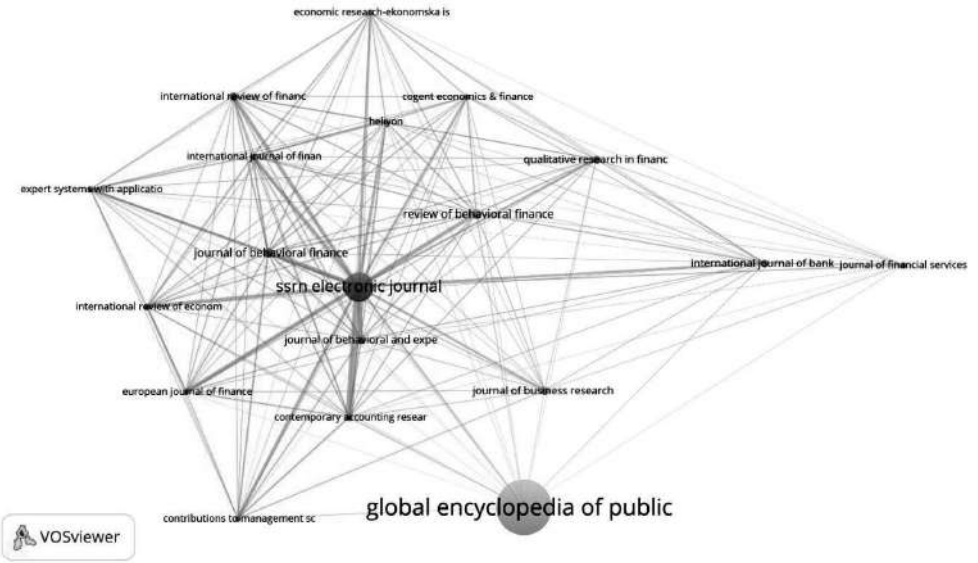

Figure 3. Bibliographic Coupling of Journals or Sources

The figure 3. provides information on bibliographic coupling of journals or sources based on the number of documents, citations, total link strength, and clustering. Bibliographic coupling refers to the measure of similarity between two sources based on the references they share. Here's an interpretation of the provided data:

Leading Source in Bibliographic Coupling (SSRN Electronic Journal): The SSRN Electronic Journal takes the lead in bibliographic coupling with a substantial number of documents (64) and citations (226). The high total link strength of 2875 indicates a strong connection with other sources, placing it in Cluster 1.

Prominent Journals in Cluster 1: Several journals, including 'Contemporary Accounting Research,' 'Journal of Behavioral Finance,' 'Journal of Behavioral and Experimental Finance,' 'International Journal of Finance & Ecosystem,' 'European Journal of Finance,' and 'International Review of Financial Analysis,' are part of Cluster 1. These journals demonstrate significant bibliographic coupling, suggesting a close interrelation in terms of referenced documents.

Cluster 2 (Review of Behavioral Finance, Heliyon, Cogent Economics & Finance): 'Review of Behavioral Finance,' 'Heliyon,' and 'Cogent Economics & Finance' form Cluster 2. Although they have fewer

documents and citations compared to Cluster 1, they exhibit notable bibliographic coupling, as reflected in their total link strengths (556, 349, and 277, respectively).
Cluster 3 (International Journal of Bank Marketing, Qualitative Research in Financial Markets, Journal of Financial Services Marketing): 'International Journal of Bank Marketing,' 'Qualitative Research in Financial Markets,' and 'Journal of Financial Services Marketing' constitute Cluster 3. These sources, with varying document and citation counts, share a bibliographic coupling strength, evident in their total link strengths (224, 209, and 91, respectively).
Other Journals (Journal of Business Research, Economic Research, Expert Systems with Applications, Journal of Financial Services Marketing): Journals like 'Journal of Business Research,' 'Economic Research,' and 'Expert Systems with Applications' have their own distinct clusters, indicating a level of bibliographic coupling but with less intensity compared to the larger clusters.
Outliers (Global Encyclopedia of Public Administration): 'Global Encyclopedia of Public Administration' stands out with a high document count (227) but a relatively lower citation count and total link strength. It appears to be less tightly coupled with the other sources in the table.
The bibliographic coupling analysis reveals distinct clusters of journals or sources with strong interconnections based on shared references. The SSRN Electronic Journal, along with several other journals in Cluster 1, demonstrates a robust network of bibliographic coupling. Clusters 2 and 3 exhibit their own interconnected journals, while outliers like the 'Global Encyclopedia of Public Administration' suggest a unique position in the bibliographic landscape. This analysis provides insights into the relationships and interdependencies between different academic sources in the field.

Bibliographic Coupling Of Countries

For the analysis, the default values for the minimum number of documents and citations for a country were retained at 3 and 1, respectively. Out of the 68 countries considered, 39 countries satisfied these thresholds. The findings are depicted in Figure 4.

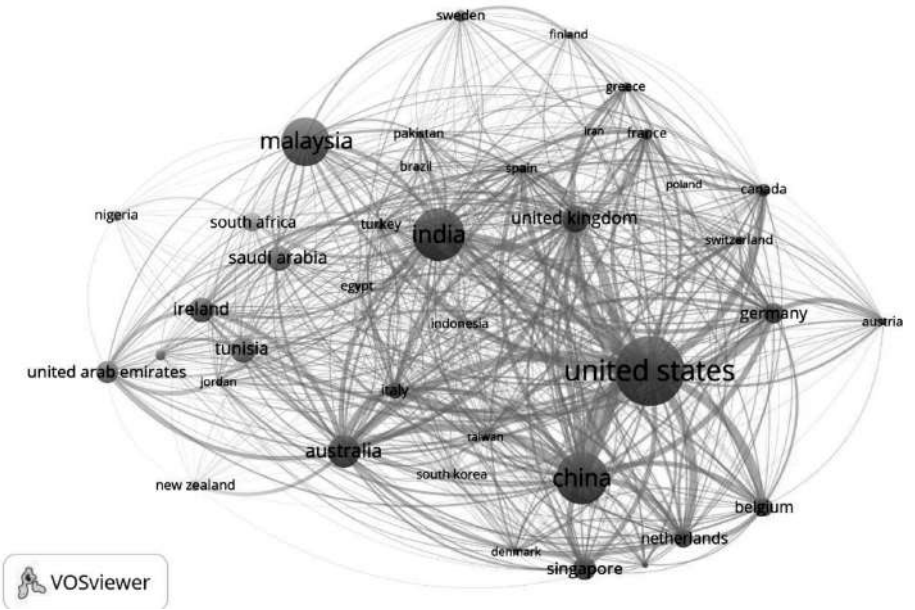

Figure 4. Bibliographic Coupling of Countries

The Figure 4. shows information on bibliographic coupling of countries based on the number of documents, citations, and total link strength within each cluster. Bibliographic coupling measures the degree of similarity between countries in terms of their shared references.

Cluster 1: Global Academic Powerhouses

This cluster includes major academic contributors, such as the United States, China, and the United Kingdom, with high document counts, citations, and substantial total link strength. These countries exhibit strong academic connections, reflecting their prominent roles in global research collaborations.

Cluster 2: Middle Eastern Collaboration

Cluster 2 includes countries like Jordan, Saudi Arabia, and the United Arab Emirates. Despite having fewer documents and citations compared to Cluster 1, these countries demonstrate significant total link strength, indicating strong collaborative ties within the Middle East.

Cluster 3: Diverse Regional Collaboration

Cluster 3 showcases a diverse collaboration among countries like Ireland, Malaysia, Pakistan, and Turkey. While these countries may have fewer documents individually, their total link strength suggests meaningful

collaboration across different regions.

Cluster 4: African Academic Collaboration

Cluster 4 focuses on African countries, with Nigeria and South Africa as key contributors. Although the document and citation counts are comparatively lower, the total link strength suggests a concentrated academic network within the African continent.

Cluster 5: Nordic Academic Network

Cluster 5 highlights Nordic countries, with Finland and Sweden. Despite having fewer documents, the Nordic countries demonstrate strong total link strength, indicating a cohesive academic network within the region.

Cluster 6: Brazilian Academic Influence

Brazil stands out in Cluster 6 with a notable total link strength. This suggests that Brazil plays a central role in academic collaborations within this cluster.

Cluster 7 to Cluster 11: Regional Collaborations

These clusters consist of countries like Indonesia, Egypt, South Korea, Iran, and Poland, each forming distinct regional academic networks. The total link strength in these clusters reflects the interconnectedness of countries within specific regions.

Cluster 12: New Zealand's Unique Position

New Zealand, in Cluster 12, demonstrates a moderate document count but a strong total link strength. This suggests a unique position and strong collaborative ties within a specific academic context.

The analysis of bibliographic coupling across clusters reveals diverse patterns of collaboration among countries. While Clusters 1 and 2 represent global and regional academic powerhouses, respectively, the subsequent clusters showcase collaborative networks within specific regions or thematic areas. The total link strength provides insights into the strength of academic connections, indicating the depth of collaboration among countries in various clusters.

Findings

The findings of this bibliometric analysis offer valuable insights into the evolving landscape of financial decision-making, particularly in the context of the dynamic relationship between social media and investor sentiment. The discussion is organized into key themes, including the publication and citation structure, leading authors' analysis, and network analysis.

Publication and Citation Structure: The observed progressive trend in the annual number of publications from 2013 to 2023 underscores the growing significance of the intersection between social media and investor sentiment. The substantial increase in publications in 2019, followed by a more pronounced acceleration in 2020 and 2021, suggests a surge in research activity. However, the remarkable spike in 2022, with a staggering 295 publications, raises questions about the underlying factors driving this surge. The subsequent decline in 2023 prompts further investigation into the dynamics, potential completion of major projects, or shifts in research focus.

The fluctuations in publication trends highlight the need for a nuanced analysis, considering qualitative factors, specific research areas, and external influences such as funding availability or policy changes.

Examining the distribution of publications across subfields or authors can provide a more comprehensive understanding of the factors influencing the observed trends.

Top 10 Leading Authors Analysis: The analysis of the top 10 leading authors reveals varying degrees of research impact based on the number of publications, total citations, and average citations per publication. Arvid Oskar Ivar Hoffmann and Caren Sureth-Sloane emerge as leading authors with substantial research impact, demonstrating the influence of their contributions in the academic realm. Other authors in the list display varying levels of impact, highlighting the diversity in research contributions within the field.

This analysis underscores the importance of recognizing individual author contributions, as their work shapes the overall landscape of research on social media and investor sentiment. The varying impact metrics provide a nuanced understanding of the influence of different authors within the academic community.

Network Analysis Using VOSviewer: The network analysis of co-occurrence, bibliographic coupling of sources, and bibliographic coupling of countries reveals distinct thematic clusters and collaborative networks. The co-occurrence network illustrates key themes and interconnected concepts in academic literature, ranging from broad topics like finance, decision-making, and investor behavior to more specialized areas such as the impact of the COVID-19 pandemic on financial markets.

Bibliographic coupling of sources highlights clusters of journals with strong interconnections based on shared references. The SSRN Electronic Journal emerges as a leading source, forming Cluster 1 along with several other journals. Clusters 2 and 3 represent additional interconnected journals, emphasizing the thematic cohesion within these clusters.

Bibliographic coupling of countries unveils diverse patterns of collaboration, with global academic powerhouses like the United States, China, and the United Kingdom forming a prominent cluster. Regional collaborations, thematic networks, and unique positions of countries like Brazil and New Zealand are also evident, providing a comprehensive view of the global research landscape.

Conclusion:

In conclusion, this bibliometric analysis offers a comprehensive overview of the dynamic relationship between social media and investor sentiment. The observed trends in publication and citation structure, the impact of leading authors, and the interconnected networks within academic literature and countries contribute to a nuanced understanding of this evolving intersection. The fluctuations in publication trends underscore the need for ongoing research to delve deeper into specific areas and factors influencing the field's dynamics.

The analysis provides a foundation for future research endeavors, guiding scholars to explore emerging themes, address gaps in the literature, and collaborate across regions and disciplines. As social media's influence on financial decision-making continues to evolve, ongoing scholarly inquiry is crucial for staying abreast

of developments and contributing to the growing body of knowledge in this interdisciplinary field.

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VALUE CREATION THROUGH MERGER & ACQUISITION "A CASE STUDY OF PUNJAB NATIONAL BANK"

Anjanee Kumar Rai
Madhu Bhartia

Abstract

This study explores value creation through mergers and acquisitions (M&A) by analyzing the case of Punjab National Bank (PNB), a prominent public sector bank in India. In the context of increasing competition in the Indian banking sector, M&A has emerged as a vital strategy for enhancing operational efficiency, expanding market share, and broadening geographic reach. The focus is on PNB's merger with United Bank of India (UBI) and Oriental Bank of Commerce (OBC) in 2020, one of the largest consolidations in Indian banking history. This research investigates the financial implications of the merger, assessing its effects on PNB's profitability, asset quality, and customer reach. Through an analysis of financial metrics and pre- and post-merger performance data, the study reveals that, despite initial integration challenges and asset quality issues, PNB has effectively leveraged economies of scale, reduced operational redundancies, and expanded its customer base, leading to enhanced financial performance. Additionally, it highlights post-merger integration challenges and risk management considerations, offering valuable insights into M&A as a value creation strategy in the Indian banking sector.

Keywords

Merger, Acquisition, Banking, Financial Performance

Introduction

The Indian banking sector has seen significant consolidation through mergers and acquisitions (M&A), largely driven by economic reforms, competitive pressures, and regulatory initiatives. M&A serves as a strategic tool for value creation, enabling banks to strengthen capital, enhance market positioning, and achieve operational efficiencies. Regulatory bodies, especially the Reserve Bank of India (RBI) and the Ministry of Finance, have actively promoted consolidation, notably through the 2020 merger of 10 public sector banks (PSBs) into four larger entities. This restructuring aimed to address rising non-performing assets (NPAs), improve credit growth, and boost financial service diversity. A prime example is the 2020 merger of Punjab National Bank (PNB) with United Bank of India (UBI) and Oriental Bank of Commerce (OBC), which transformed PNB into India's second-largest public sector bank by assets, creating a more resilient and competitive financial institution.

Value Creation

Value creation involves enhancing the worth of a company, investment, or asset for shareholders by generating financial returns that exceed the cost of capital. This is achieved through strategies that improve operational efficiency, drive revenue growth, optimize capital structure, and effectively manage risks, ultimately maximizing wealth for stakeholders.

Merger of Punjab National Bank

The merger of Punjab National Bank (PNB) with United Bank of India (UBI) and Oriental Bank of Commerce (OBC), effective April 1, 2020, transformed India's banking landscape, establishing PNB as the country's second-largest public sector bank with assets totaling approximately ₹17.94 lakh crore (around $240 billion). This consolidation expanded PNB's customer base to over 180 million and increased its branch network to around 11,000, supported by over 13,000 ATMs. Despite initial challenges, such as a gross non-performing asset (NPA) ratio of 14% inherited from UBI and OBC, PNB has focused on improving asset quality, reducing this ratio to about 10.5% by 2023. The merger also aimed for cost savings, projecting operational efficiency gains of 5-10% through the elimination of redundancies. Additionally, substantial technological integration was undertaken to align IT infrastructure across the banks, enhancing customer service. Overall, the merger underscored the strategic importance of consolidation in fostering resilient and competitive financial institutions in India.

Review of Literature

(Kaur P. &Kaur G. 2016)"Mergers and Acquisitions in Indian Banking Sector: An Analysis of Profitability and Market Share"-The study analyzed the profitability and market share impact of M&A in the Indian banking sector between 2000 and 2015. The findings showed that post-merger profitability, as measured by ROA and ROE, improved significantly, implying

that M&A resulted in value creation for the banks involved. However, the success was more pronounced in private sector banks.

(Anil, K. & Reddy G. 2017)"Market Reaction to Mergers and Acquisitions in Indian Banks: Evidence from Event Study" -This research investigated the stock market reaction to M&A announcements in Indian banks. Using event study methodology, the authors concluded that M&A events generally led to positive abnormal returns, indicating value creation for shareholders. The study also found that the size and type of the merger influenced the magnitude of the gains.

(Kumar S. &Sujit K. S. 2018) "Post-Merger Performance of Indian Banks: An Event Study Analysis"- This paper conducted an event study analysis on the financial performance of Indian banks after mergers. The results suggested that the efficiency and profitability of banks increased significantly after the merger, leading to value creation. Additionally, the study found that large public sector banks benefitted more from mergers compared to smaller banks.

(Sharma S. & Thakur, M. 2019)"Evaluating Post-Merger Financial Performance in Indian Banks Using Financial Ratios"-Sharma and Thakur's study examined the post-merger financial performance of Indian banks using financial ratios. The research concluded that while short-term profitability may dip due to integration costs, long-term value creation was evident as banks improved in areas like cost-efficiency and capital adequacy.

(Gupta P & Mishra, R. 2020)"Performance Evaluation of Indian Banks Post-Merger: A Financial and Market-Based Analysis" This study evaluated the post-merger performance of Indian banks using both financial and market-based measures. The findings indicated that while M&As led to improved operational performance, the immediate market response was mixed. The study emphasized that successful integration was crucial for realizing long-term value creation.

Research Methodology

Research Design

This research analyzes the financial performance and non-performing assets (NPA) of selected banks from 2014 to 2024, assessing the impact of mergers and acquisitions on key financial indicators. Using secondary data, primarily from audited financial statements, the study focuses on metrics related to profit generation and other essential financial components.

Objective of the Study

- To analyze the effect of non-performing assets (NPA) on the overall performance of the selected banks.
- To evaluate the impact of NPAs on shareholder equity in the chosen banks in India.
- To investigate how NPAs affect the total investments of the selected banks.
- To recommend guidelines for the

improvement and development of the selected banks in India.

- To provide a comprehensive roadmap for the effective management and utilization of mergers and acquisitions within the selected banks in India.

Hypothesis of the Study

We start with the following hypothesis

- There is no relationship between the Investment of selected banks and its Non Performing Assets (NPA).
- There is no relationship between the total cash with RBI and its Non Performing Assets (NPA).
- There is no relationship between the total funds of selected banks and its Non Performing Assets (NPA).
- There is no relationship between the total capital of selected banks and its Non Performing Assets (NPA).
- There is no relationship between the mergers and acquisitions and its Non Performing Assets (NPA).

Statistical Tools& Techniques used

For the analyzing the data, ANOV, Correlation and Simple Regression Analysis technique used for analyzing the impact on dependent variables of several independent variables.

$$y=f(X_s)$$

y = Depended variable (Net NPA)

X_s = explanatory variables or independent variables

(Investment, Cash With RBI, Total Fund, Total Capital)

$$y = \beta_1 + \beta_2 X_i + \beta_3 X_{ii} + \beta_4 X_{iii} + \beta_5 X_{iv} + \mu_i$$

y = Depended variable (Net NPA)

X_i = explanatory variables or independent variable (Investment, Cash With RBI, Total Fund, Total Capital)

$\beta_{1\ and}\beta_{2=}$ parameters or slope of coefficients.

$\mu_{i=}$ residual or error terms

Analysis of Value Creation through Merger and Acquisition of Punjab national Bank

Table: 1

Financial performance of Pre Mergers and Acquisitions of PNB

BALANCE SHEET OF PUNJAB NATIONAL BANK (in Rs. Cr.)	MAR 19	MAR 18	MAR 17	MAR 16	MAR 15
	12 mths	12 mths	12 mths	12 mths	12 mths
EQUITIES AND LIABILITIES					
SHAREHOLDER'S FUNDS					

Equity Share Capital	920.81	552.11	425.59	392.72	370.91
TOTAL SHARE CAPITAL	**920.81**	**552.11**	**425.59**	**392.72**	**370.91**
Revaluation Reserve	3,582.23	3,683.82	3,750.53	2,844.78	1,387.55
Reserves and Surplus	40,284.09	36,838.37	37,670.86	35,072.64	37,321.06
Total Reserves and Surplus	43,866.32	40,522.19	41,421.39	37,917.42	38,708.61
TOTAL SHAREHOLDERS FUNDS	**44,787.13**	**41,074.31**	**41,846.98**	**38,310.14**	**39,079.52**
Deposits	676,030.14	642,226.19	621,704.02	553,051.13	501,378.64
Borrowings	39,325.91	60,850.75	40,763.34	59,755.24	45,670.55
Other Liabilities and Provisions	14,806.28	21,678.86	16,016.21	16,273.94	17,204.89
TOTAL CAPITAL AND LIABILITIES	**774,949.46**	**765,830.10**	**720,330.55**	**667,390.46**	**603,333.60**
ASSETS					
Cash and Balances with Reserve Bank of India	32,129.13	28,789.03	25,210.00	26,479.07	24,224.94
Balances with Banks Money at Call and Short Notice	43,158.91	66,672.97	63,121.65	47,144.02	31,709.23
Investments	202,128.22	200,305.98	186,725.44	157,845.89	151,282.36
Advances	458,249.20	433,734.72	419,493.15	412,325.80	380,534.40
Fixed Assets	6,224.85	6,349.33	6,273.25	5,222.73	3,551.48
Other Assets	33,059.15	29,978.07	19,507.06	18,372.94	12,031.19
TOTAL ASSETS	**774,949.46**	**765,830.10**	**720,330.55**	**667,390.46**	**603,333.60**
OTHER ADDITIONAL INFORMATION					
Number of Branches	6,989.00	6,983.00	6,938.00	6,760.00	6,560.00
Number of Employees	70,810.00	74,897.00	73,919.00	70,801.00	68,290.00
Capital Adequacy Ratios (%)	9.73	9.20	11.66	11.28	12.89

KEY PERFORMANCE INDICATORS					
Tier 1 (%)	7.49	7.12	8.91	8.41	9.67
Tier 2 (%)	2.24	2.08	2.75	2.87	3.23
ASSETS QUALITY					
Gross NPA	78,472.70	86,620.05	55,370.45	55,818.33	25,694.86
Gross NPA (%)	16.00	18.00	13.00	13.00	7.00
Net NPA	30,037.66	48,684.29	32,702.10	35,422.56	15,396.50
Net NPA (%)	6.56	11.24	7.81	8.61	4.06
Net NPA To Advances (%)	7.00	11.00	8.00	9.00	4.00
CONTINGENT LIABILITIES, COMMITMENTS					
Bills for Collection	27,335.90	27,858.61	25,779.13	55,173.05	61,002.82
Contingent Liabilities	305,400.13	0.00	0.00	359,017.11	293,586.00

Source: author completion from banks official website

Analysis & Interpretation of Pre Merger and Acquisition of Punjab National Bank

Table: 2

ANOVA

Model		Sum of Squares	Df	Mean Square	F	Sig.
1	Regression	.239	1	.087	274.410.	.000
	Residual	.000	4			
	Total	.239	5			

The Table 2 analyses variance between Net NPA and Investment, Cash With RBI, Total Fund, Total Capital from 2015- 19 The value of $P < 0.05$ and $F = 274.410$.so the relationship is significant and mergers and acquisitions plays an important role in NPA. The test is calculated at 5% degree of freedom.

Table: 3

Model Summary

Model	R	R Square	Adjusted R Square	Std. Error of the Estimate	Change Statistics					Durbin-Watson
					R Square Change	F Change	df1	df2	Sig. F Change	
1	.854	.814	.786	.00185	.856	274.410	1	4	.000	1.178

Table 3 shows model summary, From the table it can be seen that the value of R is 0.854 which shows a very high degree of positive correlation and the value of R square is 0.814 which means Net NPA explains 81% variability in financial performance. The value of adjusted R square is 0.854 which explains well that Net NPA is one of the factors that affect Investment, Cash with RBI, Total Fund, Total Capital of PNB after mergers and acquisitions. In this case the Durbin Watson test is 1.178 which indicates that the relationship is significant.

Table: 4

Coefficients

Model B		Unstandardized Coefficients		T	Sig.
		Std. Error			
1	(Constant)	3.785	.124	18.5	.000
	Total Capital	.226	.004	14.854	.000
2	Cash With RBI	.208	.000	.125	.000
3	Total Fund	10.478	.000	3.264	.000
4	Investment	1.874	.000	.0.478	.000

Table No 4 shows the value of the coefficient i.e. the B value of the function which shows the rate of change in employment .The value of B for the function is 0.226 which means that a unit change in NPA of PNB brings about 0.226 times change in total capital and the B value is positive so it clearly tells that if Total capital will increases by one unit NPA will increase by 0.336 times.

$$Y= 3.785+0.226X + 0.208X_i +10.478\ X_{ii}+ 1.874X_{iii}$$

The above regression equation of Investment, Cash with RBI, Total Fund, Total Capital brings out clearly the exact relationship between NPA and Investment, Cash With RBI, Total Fund, Total Capital.

Financial performance of Post Mergers and Acquisitions of PNB

Table: 5
Financial performance of Post Mergers and Acquisitions of PNB

BALANCE SHEET OF PUNJAB NATIONAL BANK (in Rs. Cr.)	MAR 24	MAR 23	MAR 22	MAR 21	MAR 20
	12 months	12 months	12 months	12 months	12 months
EQUITIES AND LIABILITIES					
SHAREHOLDER'S FUNDS					
Equity Share Capital	2,202.20	2,202.20	2,202.20	2,095.54	1,347.51
TOTAL SHARE CAPITAL	**2,202.20**	**2,202.20**	**2,202.20**	**2,095.54**	**1,347.51**
Revaluation Reserve	0.00	8,455.13	7,048.62	7,200.41	4,758.69
Reserves and Surplus	104,274.37	89,198.33	86,236.07	81,641.36	56,251.28
Total Reserves and Surplus	104,274.37	97,653.46	93,284.69	88,841.77	61,009.97
TOTAL SHAREHOLDERS FUNDS	**106,476.57**	**99,855.66**	**95,486.90**	**90,937.31**	**62,357.49**
Deposits	1,369,712.81	1,281,163.10	1,146,218.45	1,106,332.47	703,846.32

Borrowings	50,429.85	51,291.73	45,681.41	42,840.31	50,225.43
Other Liabilities and Provisions	35,215.78	29,520.87	27,418.27	20,522.52	14,236.68
TOTAL CAPITAL AND LIABILITIES	**1,561,835.01**	**1,461,831.36**	**1,314,805.02**	**1,260,632.62**	**830,665.91**
ASSETS					
Cash and Balances with Reserve Bank of India	65,032.91	78,176.58	56,636.12	43,958.83	38,397.85
Balances with Banks Money at Call and Short Notice	64,071.67	76,932.23	76,010.66	67,390.88	37,595.18
Investments	420,318.21	395,996.72	372,167.76	392,983.25	240,465.64
Advances	934,430.59	830,833.98	728,185.68	674,230.08	471,827.72
Fixed Assets	12,318.78	12,051.07	10,673.61	11,020.90	7,239.07
Other Assets	65,662.85	67,840.78	71,131.20	71,048.68	35,140.45
TOTAL ASSETS	**1,561,835.01**	**1,461,831.36**	**1,314,805.02**	**1,260,632.62**	**830,665.91**
OTHER ADDITIONAL INFORMATION					
Number of Branches	0.00	10,076.00	10,098.00	10,769.00	7,040.00
Number of Employees	0.00	104,120.00	103,144.00	101,802.00	68,781.00
Capital Adequacy Ratios (%)	15.97	15.50	14.50	14.32	14.14
KEY PERFORMANCE INDICATORS					
Tier 1 (%)	0.00	12.69	11.73	11.49	11.91
Tier 2 (%)	0.00	2.81	2.77	2.83	2.24
ASSETS QUALITY					
Gross NPA	56,343.05	77,328.00	92,448.04	104,423.42	73,478.76
Gross NPA (%)	5.73	9.00	12.00	14.00	14.00

Net NPA	6,798.77	22,585.00	34,908.73	38,575.70	27,218.90
Net NPA (%)	0.73	2.72	4.80	5.73	5.78
Net NPA To Advances (%)	0.54	3.00	5.00	6.00	6.00
CONTINGENT LIABILITIES, COMMITMENTS					
Bills for Collection	0.00	34,377.60	37,786.05	40,491.16	28,049.91
Contingent Liabilities	0.00	644,471.88	605,180.05	383,279.78	210,800.74

Source: author compilation from banks official website

Analysis & Interpretation of Post Merger and Acquisition of Punjab National Bank

Table: 6
ANOVA

Model		Sum of Squares	df	Mean Square	F	Sig.
1	Regression	.368	1	.092	395.770.	.000
	Residual	.000	4	.		
	Total	.368	5			

The Table 6 analyses variance between Net NPA and Investment, Cash With RBI, Total Fund, Total Capital The value of P < 0.05 and F= 395.770 so the relationship is significant and mergers and acquisitions plays an important role in NPA. The test is calculated at 5% degree of freedom.

Table: 7
Model Summary

Model	R	R Square	Adjusted R Square	Std. Error of the Estimate	Change Statistics					Durbin-Watson
					R Square Change	F Change	df1	df2	Sig. F Change	
1	.968	.936	.934	.01235	.936	395.770	1	4	.000	.382

Table 7 shows model summary. From the table It can be seen that the value of R is 0.968 which shows a very high degree of positive correlation and the value of R square is 0.936 which means Net NPA explains 93.6% variability in financial performance. The value of adjusted R square is 0.934 which explains well that Net NPA is one of the factors that affect Investment, Cash with RBI, Total Fund, Total Capital of PNB after mergers and acquisitions. In this case the Durbin Watson test is 0.382 which indicates that the relationship is significant.

Table: 8
Coefficients

Model		Unstandardized Coefficients		T	Sig.
		B	Std. Error		
1	(Constant)	2.971	.134	22.202	.000
	Total Capital	.336	.017	19.894	.000
2	Cash With RBI	.802	.000	.330	.000
3	Total Fund	13.938	.000	4.294	.000
4	Investment	1.947	.000	.630	.000

Table No 8 shows the value of the coefficient i.e. the B value of the function which shows the rate of change in employment .The value of B for the function is 0.336 which means that a unit change in NPA of PNB brings about 0.336 times change in total capital and the B value is positive so it clearly tells that if Total capital will increases by one unit NPA will increase by 0.336 times.

$$Y= 2.971+0.336X + 0.802X_{i} +13.938\ X_{ii}+ 1947X_{iii}$$

The above regression equation of Investment, Cash with RBI, Total Fund, and Total Capital brings out clearly the exact relationship between NPA and Investment, Cash with RBI, Total Fund, and Total Capital.

Findings & Outcomes of Value Creation of Punjab National Bank after Merger & Acquisition.

Balance Sheet Analysis

- **Equity Share Capital:** Increased from Rs. 1,347.51 Cr. in March 2020 to Rs. 2,202.20 Cr. in March 2024, indicating strong shareholder confidence.
- **Total Shareholders' Funds:** Rose significantly from Rs. 62,357.49 Cr. in March 2020 to Rs. 106,476.57 Cr.

in March 2024, showcasing a solid financial base post-merger.

- ❖ **Deposits:** Grew from Rs. 703,846.32 Cr. in March 2020 to Rs. 1,369,712.81 Cr. in March 2024, reflecting increased customer trust and expanded banking operations.
- ❖ **Advances:** Increased from Rs. 471,827.72 Cr. in March 2020 to Rs. 934,430.59 Cr. in March 2024, indicating greater lending capacity and enhanced business activity.
- ❖ **Total Assets**: Grew from Rs. 830,665.91 Cr. in March 2020 to Rs. 1,561,835.01 Cr. in March 2024, highlighting substantial asset growth post-merger.

Key Performance Indicators

- ❖ **Capital Adequacy Ratio:** Improved from 14.14% in March 2020 to 15.97% in March 2024, indicating stronger capital reserves.
- ❖ **Gross NPA:** Decreased from Rs. 73,478.76 Cr. in March 2020 to Rs. 56,343.05 Cr. in March 2024, showing improved asset quality.
- ❖ **Net NPA:** Dropped from Rs. 27,218.90 Cr. in March 2020 to Rs. 6,798.77 Cr. in March 2024, indicating better recovery and resolution of bad loans.

Statistical Analysis

ANOVA : The analysis of variance indicates a significant relationship between Net NPA and the variables Investment, Cash With RBI, Total Fund, and Total Capital, with F = 395.770 and $P < 0.05$.

Model Summary

- ❖ **R Value:** 0.968, indicating a very high positive correlation.
- ❖ **R Square:** 0.936, meaning Net NPA explains 93.6% variability in financial performance.
- ❖ **Adjusted R Square:** 0.934, confirming the robustness of the model.
- ❖ **Durbin-Watson:** 0.382, suggesting that the relationship is statistically significant.

Regression Analysis

Coefficients

- ❖ Total Capital: B = 0.336, indicating that a unit increase in Total Capital results in a 0.336 unit increase in Net NPA.
- ❖ Cash with RBI: B = 0.802.
- ❖ Total Fund: B = 13.938.
- ❖ Investment: B = 1.947.

- Regression Equation: $\mathbf{Y= 2.971+0.336X + 0.802X_i + 13.938 X_{ii} + 1947X_{iii}}$
- **Balance Sheet Growth:** PNB's equity share capital increased from ₹1,347.51 crore in March 2020 to ₹2,202.20 crore in March 2024, reflecting increased shareholder confidence and the infusion of additional capital. Similarly, total shareholders' funds surged from ₹62,357.49 crore to ₹106,476.57 crore during the same period, indicating stronger financial base

post-merger. This growth reflects the successful consolidation of the merged entities and the bank's ability to raise capital, fueling its expansion and lending capacity.

- Deposits also showed impressive growth, increasing from ₹703,846.32 crore in March 2020 to ₹1,369,712.81 crore in March 2024. This rise signifies greater customer trust, which can be attributed to the larger branch network, enhanced service delivery, and increased market presence post-merger. Advances also nearly doubled from ₹471,827.72 crore to ₹934,430.59 crore, highlighting the bank's expanded lending capacity and heightened business activities. This growth in advances indicates PNB's enhanced ability to provide loans and credit facilities to corporates, SMEs, and retail customers. The overall total assets of the bank grew significantly from ₹830,665.91 crore in 2020 to ₹1,561,835.01 crore in 2024, showcasing substantial growth in asset size post-merger. This increase can be attributed to the combined strength of the merged banks' portfolios and their diversified assets across various sectors.
- **Key Performance Indicators:** PNB's capital adequacy ratio (CAR) improved from 14.14% in 2020 to 15.97% in 2024, which signifies stronger capital reserves. A higher CAR indicates that the bank has increased its ability to absorb potential losses, making it more resilient in the face of financial challenges. The improved capital base post-merger ensures that PNB can meet regulatory requirements and support increased lending without compromising financial stability. Importantly, the bank's gross NPA reduced from ₹73,478.76 crore in March 2020 to ₹56,343.05 crore in March 2024. This significant improvement in asset quality shows the bank's ability to reduce bad loans through better credit risk management, recoveries, and resolution of stressed assets. The decrease in NPAs reflects the bank's efforts to clean up its balance sheet and enhance profitability post-merger.
- Similarly, net NPA showed an even sharper decline, dropping from ₹27,218.90 crore in 2020 to ₹6,798.77 crore in 2024. This reduction in net NPAs indicates that PNB has improved its loan recovery processes and achieved better outcomes in terms of bad loan resolutions, contributing to healthier financial performance. This decline highlights the effectiveness of the merged entity's risk management practices and greater focus on managing asset quality.
- **Statistical Analysis:** The ANOVA analysis demonstrates a statistically significant relationship between Net NPA and key financial variables, including Investment, Cash with

RBI, Total Fund, and Total Capital, with an F-value of 395.770 and P-value less than 0.05. This suggests that these variables collectively have a strong influence on the bank's Net NPA performance.

- **Regression Analysis:** The model summary indicates an R-value of 0.968, meaning there is a very high positive correlation between Net NPA and the independent variables (Total Capital, Cash with RBI, Total Fund, and Investment).
- The R-squared value of 0.936 implies that these variables explain 93.6% of the variability in Net NPA, signifying the robustness of the model. An Adjusted R-square of 0.934 further confirms the reliability of the results, suggesting that even after accounting for the number of predictors, the model remains strong in explaining the relationship between financial performance and NPAs.
- The Durbin-Watson statistic of 0.382 indicates a significant relationship in the model, suggesting there is no strong auto-correlation in the residuals, meaning the model's predictions are statistically reliable.
- **Coefficients and Regression Equation:** The regression analysis reveals the relationship between Net NPA and key financial variables:
- Total Capital (B = 0.336) shows that for every unit increase in Total Capital, Net NPA increases by 0.336 units. This positive coefficient suggests that higher capital might be associated with more lending, which could, in turn, marginally increase NPAs if loans are not properly managed.
- Cash With RBI (B = 0.802) has a relatively strong positive effect on Net NPA, indicating that liquidity reserves with the central bank are tied to asset quality, possibly as a buffer against NPAs.
- Total Fund (B = 13.938) has a very high coefficient, suggesting that an increase in total funds could lead to a larger impact on Net NPA. This could be because larger loan portfolios, if not adequately monitored, can lead to more stressed assets.
- Investment (B = 1.947) shows a smaller yet positive influence on NPAs, indicating that a higher level of investments could contribute to an increase in NPAs, possibly due to exposure to market risk.
- The regression equation, $Y= 2.971+0.336X+0.802X_{i}+13.938X_{ii}+ 1947X_{iii}$, quantifies the relationship between these financial variables and Net NPA. This equation shows that changes in total capital, cash reserves, total fund, and investment directly influence the level of NPAs, with Total Fund having the largest impact.

Table of Summery of Hypothesis Testing

Bank	Financial Variable(H_0)	Pre-Merger P-value	Post-Merger P-value	Pre-Merger Decision	Post-Merger Decision	Interpretation
PNB	Investments	< 0.05	< 0.05	Reject Ho	Reject Ho	Significant relationship exists
	Total Cash with RBI	< 0.05	< 0.05	Reject Ho	Reject Ho	Significant relationship exists
	Total Fund	< 0.05	< 0.05	Reject Ho	Reject Ho	Significant relationship exists
	Total Capital	< 0.05	< 0.05	Reject Ho	Reject Ho	Significant relationship exists
	Mergers & Acquisitions	< 0.05	< 0.05	Reject Ho	Reject Ho	Significant relationship exists

Conclusion

In conclusion, the merger of Punjab National Bank (PNB) with United Bank of India (UBI) and Oriental Bank of Commerce (OBC) has yielded significant value creation and operational improvements. The substantial growth in equity share capital, total deposits, and advances reflects increased shareholder confidence and customer trust post-merger. Furthermore, the marked improvement in PNB's capital adequacy ratio and reduction in both gross and net non-performing assets (NPAs) demonstrate effective credit risk management and enhanced financial stability. Statistical analyses confirm a strong correlation between Net NPA and key financial variables, emphasizing the influence of capital structure and liquidity on asset quality. The regression model indicates that effective management of total funds is critical to minimizing NPAs, underscoring the importance of sound financial practices. Overall, PNB's post-merger performance highlights the benefits of consolidation in the banking sector, providing a robust framework for future mergers aimed at fostering resilience and growth.

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