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From the Desk of Editor in Chief

It gives me immense pleasure to present the July–December 2025 issue of Amity Business Review, which brings together a compelling collection of scholarly contributions addressing some of the most dynamic and evolving dimensions of business, finance, and policy in today’s rapidly transforming landscape.

The papers featured in this issue explore diverse yet interconnected themes, ranging from the growing influence of digital financial ecosystems to institutional performance and policy-driven economic development. The study on The Rise of Finfluencers offers timely insights into how digital content creators are reshaping financial literacy and influencing retail investment behaviour. Similarly, Navigating Emerging Frontiers of Innovation and Sustainable Practices highlights the critical need for organizations to harmonize growth with sustainability imperatives. Complementing these perspectives, the research on Profitability Analysis provides valuable empirical insights into financial performance and sectoral resilience, while the analysis of Navaratna Central Public Sector Enterprises sheds light on public sector competitiveness in a changing economic environment. Further, the paper on Intellectual Property Rights underscores the pivotal role of innovation protection in fostering economic growth and enhancing global competitiveness.

Collectively, these contributions reflect rigorous research, practical relevance, and forward-looking perspectives. They not only enrich academic discourse but also offer meaningful insights for practitioners, policymakers, and researchers alike. I extend my sincere gratitude to all the authors for their valuable contributions and to the reviewers for their meticulous and insightful evaluations. We hope this issue stimulates thoughtful discussion, inspires further research, and contributes to informed decision-making in the fields of business and management.

Have an enjoyable and meaningful reading!

Prof. (Dr) Sanjeev Bansal

Editor-in-Chief

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Amity Business School, Amity University, Noida, Uttar Pradesh

Message from Editor

It gives us great pleasure to present the Volume 26, Issue No. 2, July–December 2025 of Amity Business Review (ABR). As we continue our journey into an increasingly dynamic and interconnected business landscape, scholarly engagement with emerging economic, technological and social transformations remains more crucial than ever. This issue brings together research that reflects the diversity and depth of current business thought. The contributions in this volume explore critical areas of financial innovation. Each article offers valuable theoretical insights as well as practical implications for educators, policymakers, and business leaders.

We invite readers to engage critically with the ideas presented in this volume. We hope this issue inspires continued research, dialogue and innovation within the academic and professional communities alike.

We look forward to your continued support and contributions in the years ahead.

Dr. Priyanka Agarwal

Editor

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Amity Business School, Amity University, Noida, Uttar Pradesh

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The Rise of Finfluencers: Examining Their Influence on Retail Investor's Financial Literacy and Investment Behavior

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Abstract

The emergence of financial influencers, commonly known as “finfluencers,” has reshaped how retail investors acquire financial knowledge and make investment choices. This research explores the influence of finfluencers on investors' financial literacy and behavior, assessing whether their influence leads to informed decision-making or increased risk exposure. The primary objective of this study is to evaluate the effectiveness of finfluencers in enhancing financial awareness among retail investors while identifying potential biases and misinformation challenges. A mixed-method research methodology is adopted, combining qualitative content analysis of finfluencer narratives with quantitative surveys and secondary data analysis. Data sources include structured surveys targeting retail investors, social media analytics, and publicly available reports from financial regulatory bodies. Furthermore, data analysis will employ statistical methods, sentiment analysis, and correlation techniques to evaluate how engagement with finfluencers affects investment patterns, risk appetite, and financial decision-making. The research findings suggest there is a strong correlation between the finfluencers and their influence on the investment behaviour of a retail investors. It also offers valuable insights into how finfluencers shape retail investor behavior, providing recommendations for regulators, policymakers, and financial educators.

Keywords: Financial Influencers, Behavioural Finance, Herd Mentality, Loss Aversion, Risk Appetite, Market Speculation, Financial Literacy, Investor Protection, Financial Awareness.

Chapter 1: Introduction

In an era where financial markets are more accessible than ever, retail investors are increasingly seeking guidance outside traditional financial institution. Digital platforms have emerged as powerful tool for financial education and investment discussions, paving the way for a new category of influencers – financial influencers or finfluencers. These individuals often self-pro-claimed experts, leverage digital networking platforms to disseminate financial

advice, market trends and investment strategies to broad audience primarily Gen Z and digital savvy investors. While some finfluencers possess formal financial expertise, others build credibility through personal experiences, relatable storytelling, and engaging content. This phenomenon raises critical questions about the quality of financial knowledge being impacted and the extent to which these influencers impact retail investors decision making process. The digital age has democratized financial

information, breaking barriers that once confined investment knowledge to professional advisors and institutional players. Retail investors, particularly millennials and Gen Z, now consume financial content at an unprecedented rate. Reports suggest that digital media has emerged a leading source of investment advice, often outpacing conventional financial news platforms. The growing popularity of commission – free trading applications such as Zerodha and Grow has further fueled this trend, enabling individuals to make quick trading decisions based on online insights. However, the lack of regulatory oversight on social media financial advice has led to concerns about misinformation, market manipulation and herd mentality.

1.1 Evolution of Financial Education and the Role of Finfluencers

Historically, financial literacy was cultivated through formal education, professional advisory services, and institutional reports. However, studies indicate that financial literacy levels remain low globally even in developed economies (Lusardi & Mitchell, 2014). Traditional financial education models often fail to engage younger audiences, who prefer visually appealing, digestible content over lengthy reports or classroom lectures. Finfluencers have bridged this gap by making financial concepts accessible through storytelling, real life case studies, and simplified jargon free explanations. Their ability to connect with audiences on a personal level fosters trust and engagement, driving retail investors to take financial actions based on their recommendations (Chen & Volpe, 2018).

Despite their growing influence, concerns about

the credibility of influencers remain. The financial industry operates on complex principles, and a lack of formal qualifications among some influencers raises ethical dilemmas. Misinformation can lead to poor investment decisions, financial losses, and unrealistic expectations among inexperienced investors. Regulatory bodies such as Securities and Exchange Board of India (SEBI) have issued warnings about unverified financial advice circulating on social media, urging investors to conduct thorough due diligence before acting on investment recommendations (SEBI, 2023).

1.2 Various Behavioural Biases and Impact of Finfluencers on Investment Decision-Making

The influence of finfluencers on investment choices is clearly reflected in various market trends. A notable instance is the GameStop short squeeze of 2021, which highlights how investment narratives driven by social media can create significant market disruptions. Retail investors, largely influenced by discussion on Reddit's and Wall Street Bets and YouTube Channels, collectively drive up the stock price, disrupting hedge funds strategies and challenging traditional market mechanisms (Sussman & Yermack, 2022). These occurrence highlights the significant role of social media in influencing investment behaviour, often fueled by market sentiment rather than thorough fundamental analysis.

Finfluencers intentionally or unintentionally, reinforce biases by preparing selective success stories, promoting high risk investments, or fostering fear of missing out (FOMO) through sensationalized content.

This can lead to impulsive decision making, speculative trading and increased financial

vulnerability among novice investors (Baker & Ricciardi, 2015).

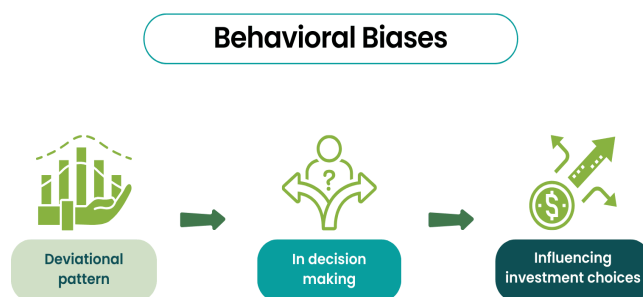


Figure 1.1: Influence of behavioural biases on investment behaviour

Retail investors often fall prey to behavioural biases, which can significantly impact their investment choices (Kahneman & Tversky, 1979). The most common biases influenced by influencers are as follows:

- **Herd Mentality:** Many investors follow trending stocks or investment strategies endorsed by popular influencers, often leading to market bubbles or losses when trend reverses. (Shiller, 2015).
- **Overconfidence Bias:** Continuous exposure to confident sounding financial advice on social media may lead investors to overestimate their market knowledge and risk-taking ability. (Barber & Odean, 2001)
- **Recency Bias:** Investors influenced by financial influencers may give disproportionate weight to recent events, leading to impulsive decision-making. (Shefrin, 2007)
- **Confirmation Bias:** Followers may seek content that reinforces their

existing beliefs rather than objectively analyzing financial information. (Nickerson, 1998)

On the other hand, some influencers contribute positively to financial literacy by promoting prudent investment strategies, risk management techniques, and the importance of long-term wealth building. Influencers advocating for diversified portfolios, systematic investment plans (SIPs), and fundamental analysis have helped educate retail investors about responsible investing (Cheng, 2021). The challenges lie in distinguishing credible influencers from those who prioritize subscribers' engagement metrics over investor welfare.

1.3 Regulatory Considerations and Future Implications

The increasing prominence of financial influencers has prompted regulatory discussions regarding the need for oversight in digital financial advice. Authorities in various jurisdictions are exploring

mechanisms to ensure that financial content shared on the social media adheres to the ethical standards and transparency requirements.

In India, the Securities and Exchange Board of India (SEBI) has taken a proactive approach against misleading financial content and unregulated investment advice. SEBI has introduced new guidelines requiring financial influencers to disclose any sponsorships or

affiliations with financial institutions. Additionally, SEBI has warned investors about the risks of blindly following social media based financial advice and emphasized the importance of seeking guidance from registered investment advisors. In its latest efforts, SEBI has also considered imposing stricter penalties on influence providing unauthorized financial advice, thereby aiming to curb the spread of misleading recommendations in the digital space (SEBI, 2023).

PERILS OF '5 MINS SURESHOT PROFIT'	
<ul style="list-style-type: none"> > Baap of Chart run by Nasir has 4.4L YouTube subscribers and over 7cr views with videos titled like 'Bas 5 minutes mein Sureshot Profit Karo' > He promotes himself as a stock market expert on social media and woos customers to enrol for various 'educational courses' > In these courses, Nasir assures clients of at least ₹3L profit if they invest based upon his recommendations > These investors are also 	<ul style="list-style-type: none"> invited to join private groups on WhatsApp and Telegram for more 'assured returns' trades > Contrary to Nasir's claims that he had been making profits of 20-30%, he, in fact, incurred a net trading loss worth nearly ₹3cr between Jan 1, 2021 and July 7, 2023 > He is seen to be misleading investors to deal in stocks on the basis of investment advice without having the requisite registration

Figure 1.2: SEBI crackdown on a financial influencer – Mr. Nasir aka Baap of Chart

Several key regulatory challenges are as follows:

- Ensuring compliance with financial advertising standards,
- Identifying and penalizing misleading or unverified investment recommendations,
- Holding influencers accountable for endorsements of financial products.

The Securities and Exchange Board of India (SEBI) has set clear regulations for SEBI

registered intermediaries and SEBI registered influencers to promote transparency and accountability in financial advisory and promotional practices.

For SEBI registered intermediaries, several restrictions and obligations have been outlined. These include prohibiting any association with unregistered entities for the promotion of advertisement of financial products and services. Furthermore, sharing client’s credentials is strictly prohibited. The

payment of referral based trailing fees is also prohibited, except in case where retail clients are charged a limited fee. Additionally, there is a cap of numbers of referrals accepted from retail clients. Intermediaries must actively dissociate themselves from the unregistered entity that misuse their name, products or services. In case of any violations, they are required to report the breach to the respective authorities. (SEBI, 2023).

For SEBI registered financial influencers, there is a strong emphasis on monitoring their revenue models to reduce conflicts of interests and prevent misleading incentives. These individuals must provide proper disclosures, including their contract details to facilitate grievance redressal. Moreover, they are required to comply with SEBI issued advertisement norms or guidelines to ensure ethical and transparent communication in financial advisory or recommendations. (SEBI, 2023).

These measures are proposed to safeguard investors rights and maintain integrity in financial services, ensuring that both the parties operate within regulated environment. As the financial ecosystems continues to evolve, the role of finfluencers is likely to expand further. The integration of artificial intelligence (AI) in content creation, personalized investment recommendations, and blockchain based financial education platforms may redefine how retail investors interact with financial information. Sentiment and Predictive Analysis will further enable influencers to forecast market movements, offering investors more informed decisions making tools. The challenge remains in balancing accessibility with

accountability, ensuring that social media remains a tool for financial empowerment rather than a breeding ground for speculation and misinformation. Furthermore, the integration of AI with decentralized finance (DeFi) platforms will open new avenues for automated investing and smart contract based financial services, positioning finfluencers as mediators between retail investors and AI powered trading strategies. As AI continues to evolve, influencers who adapt to these technological advancements while maintaining ethical standards and regulatory compliance will play a fundamental role in determining retail investor behaviour and financial literacy in the digital age.

Chapter 2: Review of Literature

This chapter explores existing research and theoretical perspectives on this topic, providing a foundation for understanding the role of finfluencers in shaping retail investor's investment decisions making process:

Siddhesh Baviskar, "Unveiling the Influence of Finfluencer's on India's Investment Climate: A Comprehensive Analysis", 2024: This research paper examines the influence of finfluencers on investment trends in India, particularly among individuals aged between 18 to 45 years who consume financial advice from the finfluencers from various social media channels such as YouTube, Instagram, etc. The study explores how financial influencers shape young adult's investment decisions, emphasizing factors such as trustworthiness, content delivery and regulatory challenges. The paper findings reveal that financial influencers significantly influence investment decisions in India, driven

by factors like relatability and persuasiveness alongside credibility. Additionally, it emphasizes that enhancing financial literacy and regulatory frameworks can empower individuals to make informed investment decisions and navigate the intricate landscape of financial advisory.

Prof. Dr. Ashwini Wanjari, Rajkamal, Dr. Yogesh Dhoke, “A Study on Impact of Finfluencer on the Investment Behaviour of Youngster with Reference to the Nagpur City”, 2024: This research paper explores the influence of social media on the investment performance of a young individuals and evaluates whether these financial influencers have enhanced the financial knowledge of an individual. This study was conducted based on primary data collected through questionnaire based in Google forms. The statistical technique such as Chi-Square Test has been deployed to analyze the response of around 122 respondents and the paper findings conclude that digital financial content creators positively impact investment choices and have significantly improved the financial markets awareness of the young investors of the Nagpur city.

Larz Kuerzinger, Philipp Stangor, “The Relevance and Influence of Social Media Posts on Investment Decisions of Young and Social Media Savvy Individuals – An Experimental Approach based on Tweets”, 2024: The researcher performed a study to investigate the impact of positive and negative tweets on the investment behavior of young, internet-enabled individuals. Using mediator analysis, the study shows that positive tweets have a considerable positive mediating role in influencing investment decisions, while negative tweets have a negative role. The results emphasize the indirect influence of social media sentiment on investment decisions. Moreover,

the researcher proposes that subsequent studies can make this experiment more precise by adding an incentive-based model, where participants earn their initial capital through a performance-based game. This approach can enhance emotional involvement and highlight loss aversion, offering a more realistic investment environment.

Ka Wai (Stanley) Choi, Wentao Mao, Shuk Ying Ho, Dickson Wu, “The Power of Prediction with Google Searches and Social Media Posts: Retail Investors Interest and IPO Pricing, 2024: This research analyses the association between online behavior of retail investor and initial public offering (IPO) pricing behavior. The data has been obtained mainly from two sources – Google Trends and StockTwits to analyze the effect of search volume, post number and reaction on the revision of price of 901 US IPOs. The results indicate that search and post numbers are positively related to the IPO price revision. Further, social media entries typically have more marked effects upon revisions to the IPO price. Still, as emotional intensity when discussing a stock through social media over a quarter in question turns out to be exceedingly diverse, empirical research verifies that Google Search usage has the considerable stronger impact.

Ni Yang, A.F. Perez, Ivan Indriawan, “Spillover between Investor Sentiment and Volatility: The Role of Social Media”, 2024: This study investigates the interplay between social media sentiment and market-implied instabilities among various asset classes such as equity, fixed income, foreign exchange and commodities. The findings reveal that volatility predominantly drives sentiment, with the VIX serving as a key transmitter. It also indicates that investor sentiment is largely impact by market

volatility even during economic downturns such as Brexit, 2008 Financial Crises, US-China Trade War, Covid-19 pandemic. Furthermore, the sentiment indices can be shifted from being net recipients to net sources of shocks during such periods, driven by the “echo chamber effect”, where social media strengthens the existing news, leading to some investors to perceive repeated signals as the new information.

Rachel Witkowski, “SEC on Social Media Influencers and AI Conflicts”, 2024: This article brings out the increasing anxiety of the U.S. Securities and Exchange Commission (SEC) on the impact of social media influencers and AI in financial markets, specifically the risk of conflicts of interest bringing in young investors toward high-risk actions. The SEC has also pursued enforcement against eight influencers involved in a scheme involving a \$100 million securities fraud. These persons took advantage of sites such as Telegram, Discord, and X.com (formerly Twitter) to project themselves as profitable traders, gaining massive followings. They made their followers buy particular stocks while quietly dumping their own shares once prices hit heights, without revealing their genuine motives.

Yudhvir Seetharam, Kingstone Nyarkurukwa, “Headlines or Hashtag? The Battle in the Social Media for Investor Sentiment in the Stock Market”, 2023: This research paper examines the challenging task of measuring investor sentiment, a latent variable normally measured by several indicators. The research emphasizes sentiment from internet sources, including social media and news media, to evaluate if these proxies are good measures for investor sentiment. Results find that, for most stocks, social media plays an important role in

news media sentiment, while the reverse is true for a specific subset of stocks. Additionally, the research points to increasing power of social media in determining financial stories, calling for regulatory thought to maintain responsible content sharing given its profound and extensive influence on financial markets.

Markus Munster, Felix Reichenbach, Martin Walther, “Robinhood, Reddit and the news - The Impact of Traditional and Social Media on Retail Investor Trading”, 2023: This study looks at the effect of social media tweets and news articles on retail trading activity on Robinhood through the analysis of net buying trends prior to and subsequent to these reports. The research collects data from various sources, namely Robinhood for retail investor trading behavior, the Pushshift API for tweets, All the News 2.0 for news stories, and Refinitiv Eikon Databases for overall financial data. To evaluate the impact of social media on retail trading activity, the study utilizes descriptive statistical methods and regression analysis. The results show that social media chatter and news reporting cause an increase in shareholder activity, although the effects are fleeting. Surprisingly, retail traders on Reddit tend to follow stock suggestions regardless of whether the sentiment is positive or negative. Conversely, their reaction to news stories is contrarian in nature—they tend to sell stocks that get good press and buy stocks with bad press. These findings offer insights into the changing dynamics between social media influence, retail investors, and mainstream financial news.

Sonja Warkulat, Matthias Pelster, “Social Media Attention and Retail Investor Behaviour: Evidence from Subreddit Wallstreetbets”, 2023: This paper explores the effect of Reddit's social media activity,

especially debate on r/Wallstreetbets (WSB), on investor risk-taking behavior and financial performance. Analyzing data on individual trades from a prominent trading platform, the study identifies that increased scrutiny on WSB tends to induce uninformed trading decisions, including short positions. The findings indicate that retail investors are more swayed by emotionally charged posts—particularly those showing anger and frustration—than by professional analyst suggestions. This serves to underscore the impulsive nature of investment decisions based on social media sentiment, illuminating the possible risks it may pose to investor well-being.

Jinshan Shu, “Social Media, Investor Firm Interaction and Information Efficiency of Stock Prices: Evidence from China”, 2023: The researcher examined how internet interactions among firms and investors affect stock prices' information efficiency, utilizing Chinese-listed companies as a sample between the years 2010 and 2022. According to the results, the electronic interactions have been influential in contributing to the improvement of market efficiency by means of mechanistic analysis. Furthermore, research shows that such augmented investor-firm interactions helped curb information asymmetry and remedy mispricing in the stock market and ultimately aided the development of a more informative and well-managed financial marketplace.

Zhen Zhoo, Xiangmin Li, “Social Media and Family Investment Behaviour”, 2023: This paper addresses the intricate interconnection between family investment patterns and social media impact. It discusses how online platforms affect a family's investment patterns, risk appetite, financial knowledge, and general financial planning. The research examines trends

from 75 nations from 2000 to 2022 through a regression model in order to evaluate the trends. The results identify the powerful influence of social media on budgeting behavior and investment planning. The study also examines the extent to which technology and money tools have helped people become more knowledgeable about money. The findings show that family investment behavior has changed in the age of the internet, with the web playing a significant role in redefining financial decision-making cycles among families.

Ms. Falguni Mathews, Akhilesh Bharatarajan, Jeetu Kunder, Abhishek Aji, Sahil Chavan, “Gen-Z Perception on Financial Influencers and How They Influence Financial Decisions”, 2023: This research delves into the growing power of financial influencers in investment choices, particularly among young investors who are seeking financial advice on social media. The study uses data from primary and secondary sources to give a detailed analysis of this trend. The research identifies that financial influencers have a crucial role in influencing investment decisions. Yet, the research points out that their content must be more aligned with investor needs to offer more informed and credible advice. Moreover, it emphasizes the need for new investors to take a conservative and critical approach while using financial influencers, calling for a more analytical attitude in assessing online financial advice.

Tong Li, Hui Chen, Wei Liu, Guang Yu, Yongtong Yu, “Understanding the Role of Social Media Sentiment in Identifying Irrational Herding Behaviour in the Stock Market”, 2022: This research article studies the effects of social sentiment on identifying irrational herding behaviour in the share market.

While working with the Chinese financial sector, the analysis scrutinizes sentiments in about 220,000 microblog writings utilizing deep learning methods in creating a herd behavior identification system. The research finds that social media has a significant impact on shaping irrational herding, supporting investor behavior theories that inform investment choices. The research shows how online sentiment can influence market trends, providing important insights for policymakers and investors in understanding and reducing herd-induced market volatility.

Chapter 3: Research Methodology

The research methodology section outlines the framework, tools and techniques used to conduct this study. It ensures the research objectives are met and analysis is accurate and reliable.

3.1 Purpose of the study

The primary intention of this study is to examine the influence of financial influencers (finfluencers) on the investment behaviour and financial literacy of a retail investors or an individual. By understanding the role played by social media platforms, the study aims to identify how these platforms shape investment decisions, and financial knowledge among individuals, particularly youth and tech savvy. The scope of this research is to focus on individuals aged between 18 to 45 years who actively consume financial content on social media platforms.

Objectives of the study

The study is guided by the following key objectives:

- To explore the extent to which financial influencers influence the investment decisions of a retail investor.
- To analyse the observed trustworthiness and sincerity of finfluencers in influencing individual investors.
- To review the effectiveness of digital creators in improving financial literacy and knowledge.

3.2 Research Design and Hypothesis

This research utilizes a mix of descriptive and analytical research designs, incorporating both quantitative and qualitative approaches to investigate the financial influencer role. The descriptive design is applied to describe how financial influencers influence investment choices, financial literacy, and retail investor confidence. On the other hand, the analytical research design examines the relationships between independent and dependent variables in more detail, presenting a better picture of their impact.

Key variables in this research are as follows: **1. Independent variable** – Financial Influencers and **2. Dependent Variables** – Investment Behaviour, Financial Literacy, Trustworthiness and Credibility.

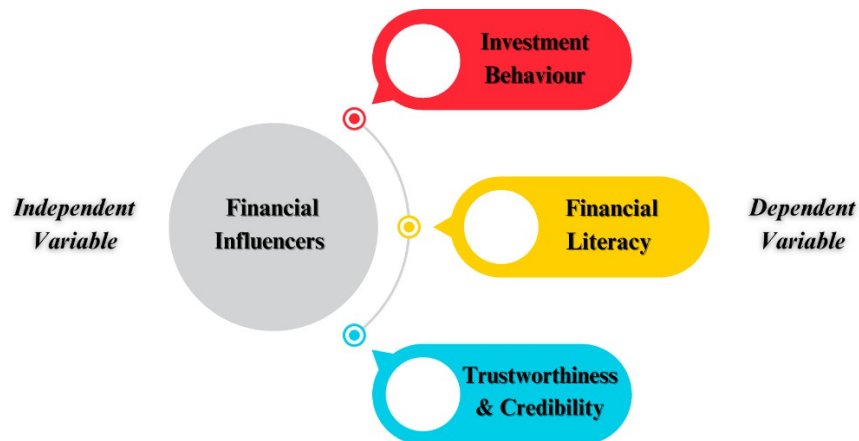


Figure 3.1: Relationship between independent variable and various dependent variables

Hypothesis 1:

H₀: Financial influencers have no significant influence on investment choices of retail investors.

H₁: Financial influencers significantly influence investment choices of retail investors.

Hypothesis 2:

H₀: Perceived trust and credibility of financial influencers do not affect the investment choices.

H₁: Perceived trust and credibility of financial influencers significantly affect the investment choices.

Hypothesis 3:

H₀: Financial influencers do not play part in enhancing the financial literacy among individual investors.

H₁: Financial influencers play part in enhancing the financial literacy among individual investors.

3.3 Data Type & Source

This study is based on primary data gathered by means of a well-structured questionnaire, which is likely to incorporate a range of aspects of the research. The questionnaire contains questions on demographic information, contacts with financial influencers, trust levels, and perceived influence on financial literacy and investment choices. In

order to increase accessibility and reach a wider segment of the population, the questionnaire is made available via Google Forms, enabling respondents to easily provide their opinions online.

3.4 Data Analysis Tool

To analyse the data collected, **SPSS (Statistical Package for the Social Science)** and Microsoft Excel is used as the primary statistical analysis tool. SPSS is chosen for its robust analytical capabilities and its ability to handle large datasets efficiently. Data processing will be done using Microsoft Excel, where the data will be cleaned, organised and categorized in a tabulated format, following which additional columns of data will be added whenever required.

- The **Correlation Analysis** is employed to determine the strength and direction of relationship between financial influencers and important dependent variables such as investment behaviour, financial literacy, and trust levels. On the other hand, **Regression Analysis** is also deployed to test the predictive influence of financial influencers on investment choice making and financial literacy.

In order to present a better picture of the respondents demographic profiles and patterns of engagement with financial influencers, the research also utilises **descriptive statistics** and graphical representations providing important insights into their interactions and investment choices.

Chapter 4: Analysis

This chapter presents the assessment of the collected data to measure the impact of

social media influencers on retail investors investment behaviour and financial literacy. The data is examined using descriptive statistics, correlation and regression analysis to examine key trends, strength and associations between different variables.

4.1 Demographic Analysis

Understanding the demographic attributes of respondents is essential for interpreting the results accurately. The following table summarizes the key demographic details of the participants:

Table 4.1: Demographic analysis of 90 respondents

Demographic Variables	Category	Frequency (x)	Percentage (%)
Age	18-24	71	78.70%
	25-34	17	19.10%
	35-45	2	2.20%
	Above 45	0	0.00%
Gender	Male	58	64.40%
	Female	32	35.60%
	Other	0	0.00%
Occupation	Student	65	72.20%
	Self-Employed	7	7.80%
	Unemployed	0	0.00%
	Employed	18	20.00%

Source: Authors own calculations

The total number of respondents in this study is 90.

Key observations from Demographic Analysis:

- The majority of respondents are from **18-24 years age group (78.70%)**, indicating that the younger individuals are more influenced by financial influencers.

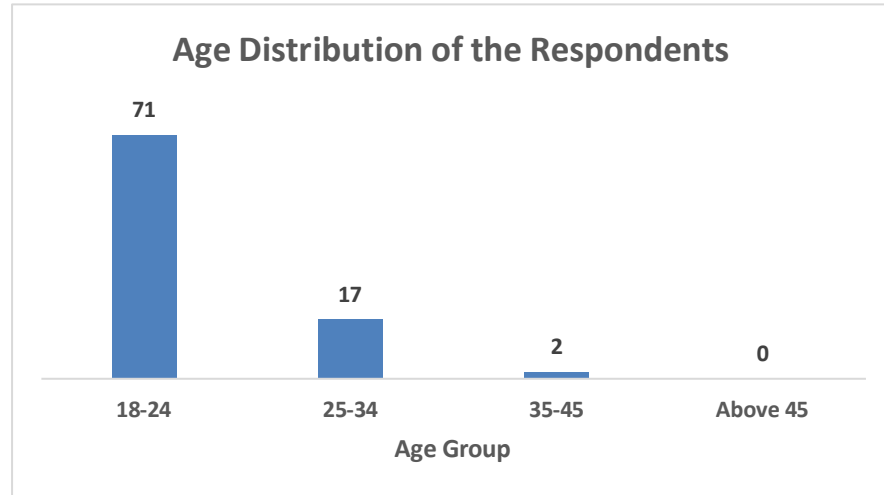


Figure 4.1: Age distribution of 90 respondents

- A higher proportion of respondents are **male (64.40%)**, though there is a considerable representation of females (35.60%).

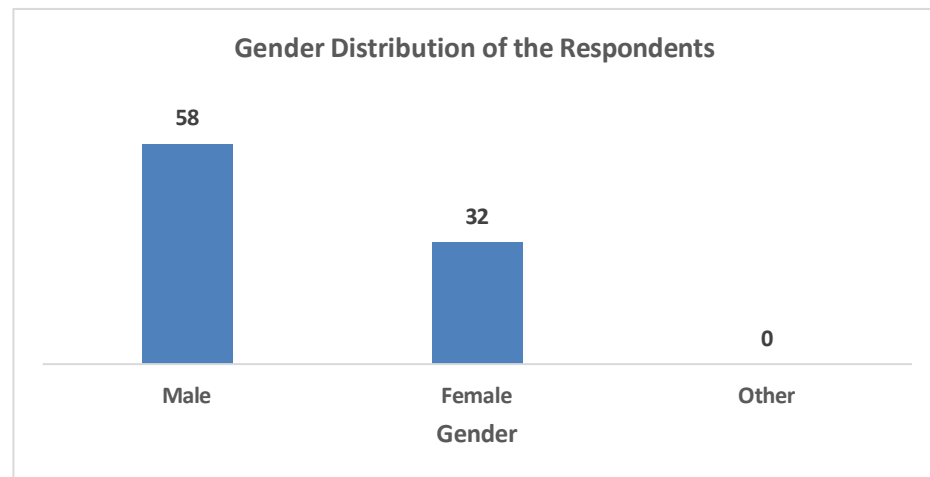


Figure 4.2: Gender distribution of 90 respondents

- Most participants are **students (72.20%)**, suggesting that the financial influencers predominantly impact younger individuals who are still in their academic phase and may have limited direct investments experience. A smaller proportion of respondents are **employed (20.00%)** and **self-employed (7.80%)**, reflecting that the working professionals are also influenced but to a lesser extent than the students.

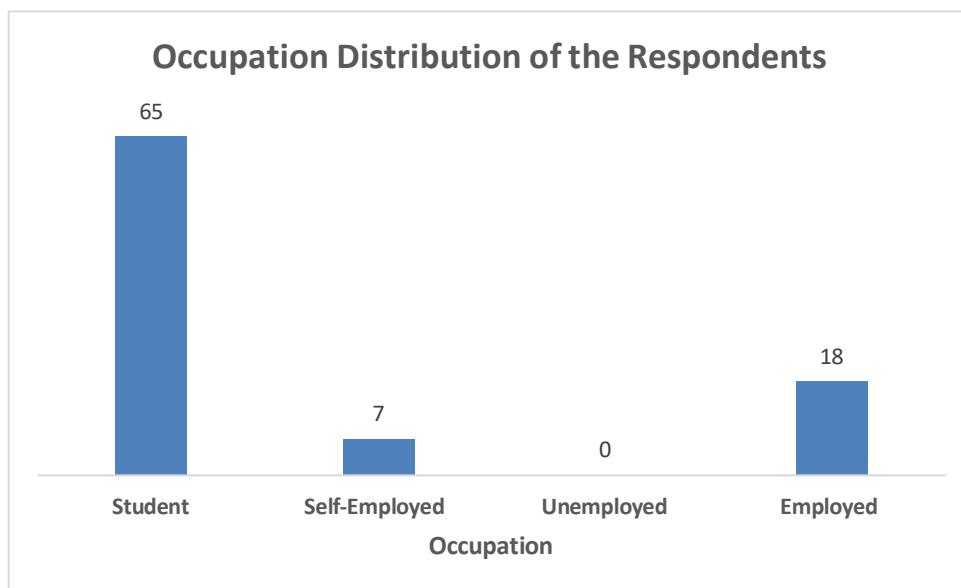


Figure 4.3: Occupation distribution of 90 respondents

4.2 Descriptive Statistics

Descriptive statistics provide an overview of datasets by summarizing key measures such as mean, median, standard deviation, minimum, and maximum values.

Table 4.2: Descriptive Statistics

Variables	N	Mean	Median	Standard Deviation	Minimum	Maximum
Social Media Reliance for Investment	90	3.07	3	1.26	1	5
Social Media Influencers Impact	90	3.18	3	1.26	1	5
Social Media Advice Accuracy	90	2.58	2	1.12	1	5
Cross-Verification of Information	90	3.42	3.5	1.43	1	5

Source: Authors own calculations

Key observations from Descriptive Statistics:

- Dependence on Social media for investment (**Mean = 3.07**): Investors demonstrate a moderate dependence on social media platforms for investment reliance.
- Social media influencers impact (**Mean = 3.18**): Digital creators have a notable influence on investing behaviour with response varying significantly.

- Social media advice accuracy (**Mean = 2.58**): Investors express concerns regarding the accuracy of financial advice on social media.

Cross verification of information (**Mean = 3.42**): Many investors cross check the information before making investment decisions, suggesting cautious behaviour.

4.3 Correlation Analysis

Correlation Analysis is a statistical method employed to quantify the intensity of the linear

association between two or more variables. The value of correlation coefficients lies between +1 and -1. Also, the sign of correlation coefficients indicates direction of the relationship a + sign indicates a positive relationship and a – sign indicates a negative relationship. Different mathematical methods are employed such as Karl Pearson’s Correlation Coefficient, Spearman’s Rank Correlation, Kendall’s Rank Correlation. I have adopted **Karl Pearson’s Correlation Coefficient** to measure the relationship between variables in this study.

Table 3: Correlation Coefficient Matrix Table

Variables	Social Media Reliance For Investment	Social Media Influencers' Impact	Social Media Advice Accuracy	Cross-Verification of Information
Social Media Reliance For Investment	—	0.820 (<0.001)	0.441 (<0.001)	-0.078 (0.464)
Social Media Influencers' Impact	0.820 (<0.001)	—	0.380 (<0.001)	-0.030 (0.781)
Social Media Advice Accuracy	0.441 (<0.001)	0.380 (<0.001)	—	0.133 (0.210)
Cross-Verification of Information	-0.078 (0.464)	-0.030 (0.781)	0.133 (0.210)	—

Source: Authors own calculations

The correlation matrix presents the **Pearson Correlation Coefficients (r)** between different variables, along with the degree of freedom and p-value. This analysis helps in understanding the strength and direction of relationships between social media influencers and the investment

behaviour.

Key observations from Correlation Analysis: Dependence on social media for investment compared to the influence of social media personalities (r = 0.82): There is a strong positive correlation between

reliance on social media for investment decisions and the impact of social media influencers. This suggests that individuals who frequently depend on social media for investments decisions are more likely to be influenced financial influencers.

- **Dependence on social media for investment compared to the accuracy of social media advice (r = 0.44):** A moderate positive correlation is observed, indicating that those who rely on social media for investments perceive the advice given by influencers as accurate to some extent. However, the strength of the correlation is lower than the previous relationship, suggesting that reliance on social media doesn't always translate into perception of accuracy.

Dependence on social media for investment as compared to cross verification of information (r = -0.08): The

correlation is weak and negative, suggesting that reliance on social media for investment decisions doesn't necessarily lead to increased cross-verification of information.

- **Impact of social media influencers as compared to accuracy of social media advice (r = 0.38):** A moderate positive correlation indicates that those who are influenced by financial influencers tend to perceive their advice as more accurate. However, the relationship is not as strong as the correlation between social media reliance and influencer impact.

4.4 Regression Analysis

The table provides the regression model results, with Social media influencer's impact as the dependent variable. Below is the detailed analysis of each predictor's effect on the dependent variable:

Table 4: Regression Analysis

Predictor	Estimate	SE	t	p
Intercept	0.1511	0.3068	0.492	0.624
Social Media Reliance For Investment	0.7287	0.0907	8.032	<0.001
Cross-Verification of Information	-0.0218	0.057	-0.224	0.823
Financial Influencers Introducing New Investment Plans	0.0057	0.0652	0.086	0.573
Basics Clarifications by Influencers	0.0634	0.1	0.633	0.528
Influencers Providing Actionable Advice	0.2848	0.1163	2.449	0.016
Confidence Through Financial Influencers	-0.1497	0.1027	-1.459	0.148

Source: Authors own calculations

Key components of the table are as follows:

- **Estimate:** The coefficient value representing the magnitude and direction of the effect of each predictor on Social media influencers impact.
- **Standard Error (SE):** It measures the accuracy of the coefficients estimate. A smaller SE indicates higher precision.
- **T-Statistics (t-value):** It determines whether the predictor variable significantly influences the dependent variable. A larger absolute t value suggests stronger evidence against the null hypothesis.
- **p-value (p):** If $p < 0.05$, the predictor is regarded as statistically significant at a 95% confidence level.

Analysis of Predictor:

- **Intercept:**

Estimate: 0.15, p-value: 0.62

The intercept represents the baseline level of social media influencers impact when all the predictor variables are zero, since it is not significant ($p < 0.05$), it doesn't contribute meaningfully to the model.

- **Social media reliance on investment:**

Estimate: 0.73, p-value < 0.001 (Highly significant)

A strong positive correlation coefficient indicates who rely more on social media for investments decisions tend to be significantly influenced by financial influencers. This result is expected, as social media reliance often leads to greater exposure to influencer content, making them a primary source of investment related knowledge.

Social media reliance on investment is the most influential predictor; this highlights that users highly dependent on social media for investment decisions are more likely to be influenced by financial influencers.

- **Cross verification of Information:**

Estimate: -0.02, p-value: 0.82 (Not significant)

A negative but statistically insignificant relationship suggests that individuals who verify information from multiple sources don't necessarily show a lower or higher impact of financial influencers. This implies that cross-verification doesn't weaken or strengthen the role of influencers.

- **Financial influencers introducing new investment plans:**

Estimate: 0.01, p-value: 0.57 (Not significant)

A small positive coefficient suggests that the financial influencers introducing new investment plans have a negligible effect on increasing their overall impact. The high p-value indicates that merely introducing investment plans doesn't significantly contribute to influencer impact.

- **Basics clarifications by influencers:**

Estimate: 0.63, p-value: 0.53 (Not significant)

A positive but statistically insignificant coefficient suggests that while influencers

providing basics financial clarifications may have some impact, it is not a significant driver of the overall influence of the financial influencers.

- **Influencers providing actionable advice:**

Estimate: 0.29, p-value: 0.20 (Statistically significant)

A positive and significant coefficient indicates that influencers who provide direct and actionable investment advice have strong impact on individuals’ investment

decisions. This suggests that beyond just introducing plans or clarifying concepts and actionable recommendations drive engagement and trust in financial influencers.

Linear Regression Model Fit Measures:

Linear Regression is used to determine the association between independent variables (predictors) and a dependent variable (outcome). The model fit statistics help examine how well the regression model describes the variation in the dependent variable. The given table presents the model fit measures for a linear regression model analysis. Below is the detailed interpretation of the key metrics:

Table 4.5: Model Fit Measures

Model	R	R Square
1	0.84	0.71

Source: Authors own calculations

- **Correlation coefficient (R) = 0.84**

Correlation coefficient measures the strength and direction of the linear association between the dependent variable (Social media influencers impact) and the independent variables (predictors such as social media reliance on investment, Cross verification of information, financial influencers introducing new investment plans etc.). An R value of 0.84 signifies a strong positive relationship meaning the independent variables collectively explain a significant proportion of the variation in the dependent variables.

- **Coefficient of determination (R²) = 0.71**

The R² value denotes the proportion of variance

in the dependent variable that is described by the independent variables in the model. Furthermore, R² value of 0.71 (71%) depicts that 71% of the variation in “Social media influencers impact” is explained by the independent variables. The remaining 29% of the variation is due to factors not included in the model, such as external influences, individual biases or other unmeasured variables.

In nutshell, a strong R value (0.84) and high R Square (0.71) indicates that model is a **good fit**, meaning the independent variables, drastically influence the dependent variable.

Chapter 5: Findings and Recommendations

5.1 Findings

Based on the data analysis conducted through descriptive statistics, correlation and regression analysis of quantitative data of 90 respondents, the following key findings emerge:

- Impact of financial influencers on investment decisions:** The correlation analysis shows a strong positive relationship ($r = 0.82$) between social media reliance for investment decisions and the impact of financial influencers on investment behaviour. Furthermore, the regression analysis confirms that social media reliance on investment is the most significant predictor (Estimate = 0.73, p -value < 0.001), indicating that individuals who depend on social media for investment information are significantly influenced by financial influencers. Thus, Hypothesis 1 (H_1) is accepted, which indicates that financial influencers significantly impact the investment decisions of retail investors.
- Influence of perceived trustworthiness and credibility on investment decisions:** A moderate positive correlation ($r = 0.38$) is observed between social media influencers impact and perceived accuracy of their advice. On the other hand, the regression model suggests that influencers providing actionable investment advice significantly impact investment decisions (Estimate = 0.29, p -value = 0.20), reinforcing the importance of credibility in influencer impact. Thus, Hypothesis 2 (H_1) is accepted, which depicts that perceived trustworthiness

and credibility of financial influencers significantly influence investment behaviour of the retail investors.

- Contribution of financial influencers to financial literacy:** The mean score for financial literacy improvement is moderate (Mean = 3.18), indicating that influencers have a notable but varied impact on financial knowledge enhancement. Basics clarifications by financial influencers shows a positive yet statistically insignificant impact on financial literacy (Estimate = 0.63, p -value = 0.53). Therefore, Hypothesis 3 (H_1) is partially accepted, which suggests financial influencers contributes to improving financial literacy of the retail investors, but their impact is not statistically significant.

5.2 Recommendations

Based on study's findings, several key recommendations are proposed:

5.2.1 Strengthening Regulatory Oversight for Financial Influencers: Given the meaningful influence of financial influencers on investing decisions, regulatory bodies i.e. SEBI should establish strict guidelines to ensure transparency, accountability and accuracy in financial content shared online or digitally.

5.2.2 Enhancing Financial Literacy Programs: As financial influencers contribute to financial knowledge but with a statistically insignificant effects, structured financial education initiatives should be promoted to supplement creator's content. This will empower retail investors to make informed and independent financial decisions

5.2.3 Promoting Responsible Financial

Advisory Content: Since trustworthiness and credibility play a vital character in shaping investment decisions, digital platforms should introduce verification mechanisms to distinguish credible digital financial creators and mitigate the spread of misleading financial advice.

5.2.4 Raising Awareness on Investment Risks:

Investors should be encouraged to conduct independent investment research rather entirely relying on influencers recommendations. Awareness campaigns by SEBI and NISM can educate retail investors on the risks associated with blindly following financial influencers.

Chapter 6: Conclusion

Based on primary and secondary data collected through the questionnaire through the questionnaire and published research articles, several critical insights emerged regarding the influence of financial influencers on retail investors. The study confirms that social media platforms such as YouTube, Instagram, X.com (formerly known as Twitter), Telegram etc. significantly impact young investors financial literacy and investment behaviour. These platforms not only provide financial knowledge but also influence decision making process and risk perception of an individual. While financial influencers serve as an accessible source of information and engage effectively with their audience, concerns regarding transparency credibility and the potential for misinformation persist. Many financial influencers operate without formal qualifications leading to increased financial risk and potential market manipulation. Regulatory authorities such as SEBI in India and

SEC in USA are increasingly recognising these concerns implementing guidelines to ensure responsible financial content dissemination. The findings also suggests that the young investors rely heavily on influencers for investment recommendations, they often lack the expertise to critically evaluate the accuracy of advice, highlighting the need for enhanced financial education programs. Furthermore, the study emphasises that cross verification of financial information remains low, making investors vulnerable to biased or misleading content. Therefore, while financial influencers play an important role in shaping investment behaviour, it is crucial to establish stricter regulatory frameworks and promote awareness regarding financial risks to ensure informed and responsible investment decisions.

Chapter 7: Limitations of the Study

While this study provides valuable insights into the influence of financial influencers on investment behaviour and financial literacy, certain key limitations must be acknowledged:

7.1 Limited Sample Size: The study is based on a survey of 90 respondents, which may not be fully representative of the border population. A larger sample size could provide more generalizable results and greater statistical reliability.

7.2 Demographic Constraints: The research primarily focuses on individuals aged 18 to 45 years who actively consume financial content on digital platforms. This may exclude older aged investors or those who rely on traditional sources for financial recommendations, limiting the study's applicability to a wider audience.

7.3 Exclusion of External Market Forces: The study doesn't account for macroeconomic conditions, regulatory changes, or any other external factors that may independently influence investment behaviour beyond the role of financial influencers.

7.4 Subjectivity in Trustworthiness and

Creditability Perception: Perceived trustworthiness and creditability of financial influencers are subjective measures that may differ based on individual biases, aforementioned knowledge and personal understanding.

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Navigating Emerging Frontiers of Innovation and Sustainable Practices

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Abstract

Rapid technological advancement coupled with escalating environmental concerns has fundamentally reshaped the way organizations, industries, and policymakers approach development. This research investigates the evolving relationship between innovation and sustainable practices, focusing on emerging and unconventional contexts where traditional approaches may no longer be sufficient. Using a mixed-methods research framework, the study integrates qualitative insights and quantitative evidence to examine how innovative strategies and sustainability initiatives interact across diverse sectors.

The study reviews existing literature on innovation and sustainability to identify conceptual and practical gaps, which form the foundation for exploring under-examined domains. Through selected case illustrations, the research highlights how organizations successfully integrate innovative thinking with sustainability principles in non-traditional settings. The findings demonstrate that innovation and sustainability are not isolated pursuits but mutually reinforcing forces that shape organizational resilience, competitiveness, and long-term value creation.

This research contributes to academic discourse by offering a holistic perspective on the innovation–sustainability nexus and by outlining future directions for research, industry practice, and policy formulation. The insights presented aim to support organizations and decision-makers in navigating emerging frontiers where economic growth, environmental responsibility, and social well-being converge.

Keywords: *Innovation, Sustainable Practices, Emerging Trends, Green Innovation, Organizational Resilience*

1. Introduction

In the contemporary global landscape, innovation and sustainability have emerged as interdependent drivers of economic and social transformation. Organizations are increasingly required to balance technological advancement with environmental stewardship and social

responsibility. The convergence of innovation and sustainable practices has moved beyond theoretical discourse and now represents a strategic necessity for long-term survival and growth.

Technological acceleration, resource limitations, and climate-related challenges have compelled

businesses and institutions to rethink conventional development models. Innovation, once primarily associated with productivity and profitability, now plays a critical role in enabling sustainable outcomes. Similarly, sustainability has evolved from a peripheral concern to a central strategic objective influencing investment decisions, operational processes, and stakeholder relationships.

1.1 Background and Context

Innovation is traditionally defined as the implementation of new ideas, processes, or products that generate value. Over time, its scope has expanded to include organizational, social, and business model innovation. Parallel to this evolution, sustainable practices—encompassing environmental protection, social equity, and economic viability—have become integral to organizational strategy rather than optional initiatives.

The integration of innovation with sustainability reflects a shift from short-term, profit-centric approaches toward long-term value creation. Organizations operating at this intersection are better positioned to address global challenges while maintaining competitiveness and adaptability in dynamic markets.

1.2 Significance of Exploring Emerging Frontiers

Conventional innovation and sustainability frameworks may be inadequate in addressing the complexity of modern global challenges. Emerging frontiers represent unexplored or underutilized domains where novel combinations of innovation and sustainability can generate transformative outcomes. Exploring these

frontiers enables organizations to challenge established paradigms, unlock new opportunities, and develop resilient solutions aligned with societal needs.

This study emphasizes the importance of examining such contexts to understand how innovation and sustainability can be effectively integrated beyond traditional organizational and industrial boundaries.

1.3 Objectives of the Study

The primary objective of this research is to examine the dynamic relationship between innovation and sustainable practices in emerging and unconventional contexts. The specific objectives are:

1. To identify contemporary trends shaping innovation across industries.
2. To examine the application of sustainable practices in non-traditional settings.
3. To analyze the interdependence between innovation and sustainability.
4. To assess sector-specific and global implications of innovative sustainable practices.
5. To propose future research directions and practical recommendations for policymakers and organizations.

2. Review of Literature

The relationship between innovation and sustainability has been widely examined in academic and professional literature, particularly in the context of long-term economic growth and environmental responsibility. Early studies primarily viewed innovation as a driver of productivity and competitive advantage, with

limited consideration of its environmental or social implications. However, recent research has increasingly emphasized the need to align innovation processes with sustainable development goals.

Scholars have highlighted that sustainable innovation extends beyond technological advancements to include organizational restructuring, business model transformation, and stakeholder engagement. According to Porter and van der Linde, innovation driven by environmental considerations can lead to improved resource efficiency and cost reduction, thereby enhancing organizational performance. Similarly, Elkington's concept of the triple bottom line underscores the importance of balancing economic, environmental, and social objectives in innovation strategies.

Several studies have explored green innovation as a mechanism for reducing environmental impact while maintaining competitiveness. These studies suggest that firms adopting environmentally responsible innovations often experience improved brand reputation, regulatory compliance, and customer loyalty. Moreover, research indicates that sustainability-oriented innovation contributes to resilience by enabling organizations to adapt to regulatory changes and resource constraints.

Despite extensive literature on innovation and sustainability, gaps remain in understanding how these concepts interact in emerging and unconventional contexts. Many studies focus on large corporations in developed economies, leaving limited insight into diverse sectors,

developing regions, and non-traditional organizational structures. This research addresses these gaps by examining the integration of innovation and sustainability across emerging frontiers.

3. Research Methodology

3.1 Research Design

This study adopts a mixed-methods research design to provide a comprehensive understanding of the innovation–sustainability nexus. The mixed-methods approach enables the integration of qualitative insights with quantitative evidence, ensuring a balanced and in-depth analysis of the research problem.

3.2 Data Collection Methods

Primary data were collected through structured interviews and discussions with professionals from academia, industry, and policy-making bodies. These interactions provided qualitative insights into practical challenges, implementation strategies, and perceived outcomes of sustainable innovation initiatives.

Secondary data were gathered from peer-reviewed journals, conference proceedings, government reports, and credible industry publications. These sources were used to identify prevailing trends, theoretical frameworks, and empirical findings relevant to innovation and sustainability.

3.3 Sampling Technique

A purposive sampling technique was employed to select participants and case contexts relevant to emerging innovation and sustainability practices.

This approach ensured that the data collected were directly aligned with the objectives of the study.

3.4 Data Analysis

Qualitative data were analyzed using thematic analysis to identify recurring patterns and themes related to innovation strategies and sustainable practices. Quantitative data were examined using descriptive analysis to support qualitative findings and provide measurable insights where applicable.

4. Emerging Frontiers of Innovation

Emerging frontiers of innovation refer to domains where traditional innovation models are being redefined to address contemporary challenges. These frontiers include digital transformation, green technologies, social innovation, and inclusive business models.

Digital innovation has significantly influenced sustainable practices by enabling efficient resource management, data-driven decision-making, and reduced operational waste. Technologies such as artificial intelligence, the Internet of Things, and cloud computing support sustainability by optimizing energy consumption and improving supply chain transparency.

Social innovation represents another critical frontier, focusing on addressing societal challenges through innovative solutions. Unlike conventional innovation, social innovation prioritizes social value creation alongside economic returns. Initiatives in education, healthcare, and community development demonstrate how innovation can drive inclusive and sustainable growth.

5. Sustainable Practices in Non-Traditional Contexts

Sustainable practices are increasingly being implemented beyond traditional corporate environments. Educational institutions, public sector organizations, startups, and community-based enterprises are adopting sustainability-oriented innovations to enhance efficiency and social impact.

In academic institutions, sustainability initiatives include digital learning platforms, paperless administration, and energy-efficient infrastructure. Startups often integrate sustainability into their core business models, leveraging innovation to address environmental and social challenges from inception.

Public sector organizations are also adopting innovative sustainable practices to improve service delivery and governance. E-governance systems, smart city initiatives, and renewable energy projects exemplify how sustainability and innovation intersect in non-commercial contexts.

6. Analysis and Discussion

The analysis reveals a strong interdependence between innovation and sustainability across emerging frontiers. Organizations that integrate sustainability into their innovation strategies demonstrate higher adaptability and long-term viability. Innovation enables the development of sustainable solutions, while sustainability considerations guide responsible and ethical innovation.

The findings suggest that innovation driven solely by technological advancement may lead to short-term gains but can result in long-term

environmental and social challenges. Conversely, sustainability initiatives without innovative support may struggle to achieve scalability and impact. Therefore, a balanced integration of both is essential.

Furthermore, the study highlights that emerging contexts provide unique opportunities for experimentation and learning. These environments encourage flexible approaches, stakeholder collaboration, and context-specific solutions, which are critical for addressing complex global challenges.

7. Implications of the Study

7.1 Managerial Implications

Managers are encouraged to embed sustainability into innovation planning and decision-making processes. Adopting a long-term perspective enables organizations to align innovation initiatives with environmental and social goals, thereby enhancing competitiveness and stakeholder trust.

7.2 Policy Implications

Policymakers can support sustainable innovation by providing regulatory incentives, funding mechanisms, and collaborative platforms. Policies that encourage research, development, and adoption of green technologies play a vital role in fostering sustainable economic growth.

7.3 Academic Implications

The study contributes to academic literature by expanding the understanding of innovation and sustainability beyond traditional settings. It provides a foundation for future research

exploring sector-specific applications and comparative analyses across regions.

8. Conclusion

Innovation and sustainability are no longer independent pursuits but interconnected dimensions shaping the future of organizations and societies. This research demonstrates that integrating innovative thinking with sustainable practices enables organizations to navigate emerging challenges and seize new opportunities.

By exploring emerging frontiers and non-traditional contexts, the study highlights the transformative potential of sustainability-oriented innovation. The findings underscore the need for collaborative efforts among academia, industry, and policymakers to foster solutions that promote economic growth, environmental protection, and social well-being.

9. Future Scope of Research

Future research may focus on empirical studies across specific industries or regions to validate and extend the findings of this study. Comparative analyses between developed and developing economies can further enhance understanding of context-specific innovation and sustainability dynamics. Additionally, longitudinal studies can provide insights into the long-term impact of sustainable innovation initiatives.

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Profitability Analysis of the Top 5 Commercial Banks of India

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Abstract

This study investigates the impact of capital adequacy, cost efficiency, bank size, and credit risk on the profitability of the top five Indian commercial banks based on market capitalisation, measured by return on assets (ROA) and return on equity (ROE). Adopting a cross-sectional research design, secondary data were obtained from the annual reports of the selected banks and the CMIE Prowess database. ROA and ROE served as dependent variables, while capital adequacy ratio (CAR), cost efficiency, total assets (size), and non-performing asset ratio (credit risk) were the explanatory variables. Ordinary least squares (OLS) regression was applied to assess relationships. The study finds that cost inefficiency, credit risk, and capital adequacy negatively affect profitability in India's top banks, with ROA and ROE responding differently to firm-level factors. Bank size shows mixed effects, dampening ROA but enhancing ROE, highlighting scale-related trade-offs. The study acknowledges certain limitations while outlining directions for future exploration.

Keywords: Banks, Market Capitalization, Profitability, India

1. Introduction

A well-functioning banking system is essential for economic transformation, serving as a core institutional foundation for growth. However, unlike in developed economies, banking sectors in many emerging nations, including India, tend to be less stable (Sufian & Habibulla, 2009a). In India, several banks face challenges such as fraud, insolvency, rising non-performing loans (NPLs), underperformance by newly licensed banks, and slower-than-expected profitability growth. The ongoing discussion on low, single-digit interest rates adds to these complexities. These conditions

make India a unique setting for examining how both internal and external factors influence bank profitability.

Profitability, a firm's ability to generate income, is a critical measure for any business sector. In banking, it reflects both current performance and potential for future growth. A profitable banking industry stabilises the financial system and supports broader economic development. While some Indian commercial banks maintain strong profits, others struggle, prompting questions about which indicators bank managers should prioritise when assessing performance. This study focuses on identifying shared determinants of profitability among Indian banks.

A robust banking system should deliver sustained profits, quality customer service, and sufficient funds to support lending. At the micro level, banks must remain profitable to survive in an increasingly competitive environment. At the macro level, adequate profits help absorb economic shocks and maintain financial stability. According to the Basel Committee on Bank Supervision (BCBS), operational risks, arising from failures in processes, people, or systems, can undermine bank performance. In India, profitability can be influenced by bank-specific factors such as cost efficiency, liquidity, size, overhead cost management, capital adequacy, and NPL levels, as well as macroeconomic factors such as inflation and GDP growth.

Although profitability determinants have been widely studied globally, relatively few studies focus on India, and none specifically examine the top five commercial banks by market capitalisation. Earlier research in India has examined various aspects of bank profitability: Amandeep (1983) explored multiple determinants using regression, trend, and ratio analyses; Mishra (1992) linked declining profits to rising liquidity and reserve requirements; Bansal *et al.*, 2018 compared Indian and foreign banks, noting higher costs and risk provisions in Indian banks; Vennet (2002) emphasized operational efficiency; Goddard *et al.* (2004a, 2004b) found a positive link between profitability and the capital-to-assets ratio; Satish *et al.* (2005) highlighted the importance of technological adoption; and

Bhayani (2006) applied the CAMEL model to assess private bank performance. This study builds on these insights by analysing internal drivers of profitability for India's top five commercial banks, addressing an identified research gap.

India's banking system comprises public, private, foreign, specialised, and cooperative banks. In recent years, private commercial banks (PCBs) have expanded their role significantly, as shown by asset growth, deposit mobilisation, and lending volumes. However, profitability across the industry has declined, making it timely to investigate the underlying causes. Understanding these drivers is vital for researchers, policymakers, investors, and bank management. Using balanced data from 2012 to 2022, this study examines bank-specific determinants of profitability for the top five Indian commercial banks based on market capitalization. The findings aim to provide practical insights to improve banking sector performance and contribute to more effective regulation and operational decision-making.

This paper is structured as follows: Section 2 reviews the literature. Section 3 describes data and methodology. Section 4 presents results and discussion. Finally, section 5 shows the conclusion of the paper.

2. Overview of the Top 5 Commercial Banks of India

List of 5 Best Banks in India (Market capitalization)			
Rank	Bank Name	Type	Market Capitalization (₹ Crore)
1	HDFC Bank	Private	14,72,995
2	ICICI Bank	Private	10,12,122
3	State Bank of India	Public	7,13,970

4	Kotak Mahindra Bank	Private	4,34,467
5	Axis Bank	Private	3,66,092

Source: RBI

HDFC Bank, established in 1994 and headquartered in Mumbai, is one of India's leading private sector banks. Under the leadership of CEO Sashidhar Jagdishan, the bank offers a comprehensive range of services, including personal and corporate banking, loans, credit cards, and investment products. Renowned for its efficient digital support and user-friendly mobile application, HDFC Bank has maintained a strong market position with a market capitalisation of ₹14,72,995 crore. As of the latest data, it operates 9,092 branches across the country, has a price-to-earnings (P/E) ratio of 20.80, and its current market price stands at ₹1,925, reflecting robust investor confidence and consistent financial performance.

ICICI Bank, founded in 1994, is a prominent private sector bank in India, currently led by CEO Sandeep Bakhshi. The bank provides a diverse portfolio of services, including retail and corporate banking, insurance, loans, and wealth management solutions. Recognised for its fast and efficient customer service across both digital channels and an extensive branch network, ICICI Bank has established a strong presence in the Indian banking sector. With a market capitalisation of ₹10,12,122 crore and a price-to-earnings (P/E) ratio of 20.00, it maintains a solid market position. Operating 6,613 branches nationwide, the bank's current market price stands at ₹1,432.40, reflecting sustained investor interest and steady performance.

The State Bank of India (SBI), established in 1955, is the country's largest public sector bank

and a cornerstone of India's financial system. Led by CEO Dinesh Kumar Khara, it offers a wide range of services, including savings accounts, personal and business loans, corporate banking, and government-backed schemes. Known for reliable customer service, SBI supports its clients through an extensive network of branches and ATMs across urban and rural areas. With a market capitalisation of ₹7,13,970 crore and a price-to-earnings (P/E) ratio of 9.00, the bank reflects both its vast scale and significant role in the economy. Operating 22,740 branches nationwide, its current market price of ₹800 underlines its position as a key player in India's banking landscape.

Kotak Mahindra Bank, established in 1985, is a leading private sector bank in India, currently led by Interim CEO Dipak Gupta. The bank offers a broad spectrum of services, including savings and current accounts, loans, investment banking, and insurance, catering to both retail and corporate clients. Known for its highly responsive customer service across digital platforms and branch networks, it has built a strong reputation in the financial sector. With a market capitalisation of ₹4,34,467 crore and a price-to-earnings (P/E) ratio of 22.10, Kotak Mahindra Bank demonstrates consistent market strength. Operating through 2,013 branches nationwide, its current market price of ₹2,185.20 reflects sustained investor confidence and steady financial performance.

Axis Bank, established in 1993, is a major private sector bank in India, headed by CEO Amitabh Chaudhry. It offers a wide range of financial

services, including personal banking, corporate loans, wealth management, and credit card facilities, catering to both individual and business clients. Known for its strong combination of good digital support and a robust branch network, the bank ensures accessibility and convenience for its customers. With a market capitalisation of ₹3,66,092 crore and a price-to-earnings (P/E) ratio of 13.10, Axis Bank maintains a solid presence in the financial sector. Operating 5,706 branches nationwide, its current market price of ₹1,182.20 reflects steady market performance and investor confidence.

2. Related studies.

The profitability of commercial banks has been a significant focus of empirical research, with determinants explored across cost efficiency, credit risk, capital adequacy, revenue diversification, liquidity, and macroeconomic environments. The literature shows that while certain drivers of profitability are consistent across markets, others are highly contingent on institutional, regulatory, and competitive contexts.

Operational efficiency is widely recognized as fundamental to bank performance. In Vietnam, Hanh and Huy (2021) identify that disciplined planning of operating and interest costs significantly increases accounting net profit. This aligns with Iloska's (2014) findings in Macedonia, where reducing operating expenses and controlling loan loss provisions improve returns on assets (ROA), while larger size and a greater loan share contribute positively. Evidence from Bangladesh reinforces the centrality of cost control: Islam and Hasan Rana (2017) demonstrate that high operating costs and NPLs erode ROA and return on equity (ROE). However, a higher loan-to-deposit ratio can partly

offset these adverse effects. Collectively, these studies point to a universal truth — that cost efficiency enhances profitability — yet the degree of impact is often mediated by a bank's asset mix, scale, and lending quality.

Credit risk is one of the most frequently tested determinants in the literature, with remarkable consistency in its negative relationship with profitability. In Pakistan, Khan and Ahmad (2017) find that lowering NPL levels improves financial performance. Turkish evidence from Akbaş (2012) reveals that higher loan loss provisions and greater deposit market concentration diminish ROA and ROE. Besmir Çollaku & Muhamet Aliu (2021) quantify this link for Kosovo, estimating a 0.19% decline in ROA for every 1% increase in the NPL ratio. Ethiopian findings from Abera Lemi *et al.* (2020) similarly identify credit risk as a statistically significant drag on performance, compounded by adverse effects from growth in money supply. The convergence of these results — across both developing and mature banking systems — suggests that effective credit risk management is not just beneficial but essential for sustained profitability.

The role of diversification is more complex. Evidence from India shows that banks that expand into non-interest income, particularly through trading operations, enjoy both higher profitability and improved risk-adjusted returns, especially when asset quality is low (M. Mostak Ahmad, 2017). This suggests diversification can act as a hedge against credit risk. However, in Ghana, Duho *et al.*, (2020) find that diversification initially reduces profit efficiency, with performance improving only over time, forming a U-shaped curve. The contrast between these contexts implies that while diversification has potential, its net effect depends on how

strategically it is implemented, the maturity of the revenue streams, and the competitive environment.

Capital strength and size frequently appear as profitability enablers, though the magnitude varies. Coccorese and Girardone (2020) report a modest positive relationship between capital and profitability in UK banks, consistent across normal and crisis periods. In Turkey and the Balkans, capital adequacy is found to be a significant driver (Akbaş, 2012; Kosumi & Kosumi, 2021), as it is in India (Al-Homaidi *et al.*, 2018), where larger branch networks and sound asset management also enhance performance. Size advantages are evident in economies of scale and market leverage (Al-Omar & Al-Mutairi, 2008). However, Slagle (2021) demonstrates that in the U.S., the effects of monetary policy interventions like quantitative easing (QE) on profitability are largely size-neutral, indicating that macro-financial policy impacts can bypass scale advantages.

Liquidity management is shown to influence profitability in both direct and conditional ways. Research on Jordanian commercial banks (2013–2017) finds that liquidity and legal liquidity ratios significantly affect ROA and ROE, and that bank size moderates these relationships. Holding excessive liquidity may depress profitability due to foregone investment opportunities, whereas inadequate liquidity risks undermining depositor confidence and solvency. Thus, optimal liquidity management is a balancing act between safeguarding short-term obligations and enabling profitable lending.

External conditions shape bank profitability across multiple channels. In Malaysia, GDP growth, adequate capital, and liquidity all have favorable effects, while inefficiency is detrimental (Olalere *et al.*, 2017). In Africa,

Yakubu and Bunyaminu (2021) show that economic globalization can negatively affect bank profitability, possibly due to exposure to global market volatility and competitive pressures. Ethiopian evidence suggests GDP and inflation are supportive of performance, but money supply expansion and poor credit quality undermine it (Lemi *et al.*, 2020). In India, GDP growth, inflation, interest rates, and exchange rates are all significant determinants of profitability (Al-Homaidi *et al.*, 2018), indicating that banks must adapt their strategies to macroeconomic cycles and policy shifts.

Bank size is a widely examined determinant of profitability, often proxied by the natural logarithm of total assets. Theoretically, larger banks may benefit from economies of scale, enabling cost efficiencies and enhanced profitability (Naceur & Goaid, 2008). However, beyond a threshold, diseconomies of scale may emerge due to managerial complexity and operational inefficiencies (Obamuyi, 2013). Empirical findings remain inconclusive: while some studies report a positive association (Flamini *et al.*, 2009; Bikker & Hu, 2002), others find negative (Boyd & Runkle, 1993; Saira *et al.*, 2011) or non-significant relationships (Micco *et al.*, 2007; Athanasoglou *et al.*, 2008). Mixed results suggest that size may interact with market structure, governance, and strategic orientation, warranting further investigation through non-linear modeling and segmented analysis.

According to the published literature, numerous studies have been undertaken on the factors impacting bank performance. However, there aren't many in India, and no research has explicitly looked at the top five commercial banks there.

Objective of the study.

To analyse the profitability of the top five commercial banks of India on the basis of market capitalisation by taking ROA and ROE as proxies for bank performance, and taking cost efficiency, credit risk, capital adequacy, and bank size as independent variables.

After critically reviewing the literature, the study has formulated the hypotheses as follows.

- H1:** Capital adequacy ratio (CAR) is positively associated with bank profitability (ROA, ROE).
- H2:** Credit risk (CR) is negatively associated with bank profitability.
- H3:** Cost efficiency (CE) is positively associated with bank profitability.
- H4:** Bank size (BS) is positively associated with bank profitability.

3. Methodology

Research Design-The study follows a cross-sectional research Design.

Sampling Design- The study adopted the purposive sampling technique for data collection

Regression model

$$\text{Model-1, } ROA_{it} = \beta_0 + \beta_1CAR_{it} + \beta_2CR_{it} + \beta_3CE_{it} + \beta_3CR_{it} + \beta_4BS_{it} + \epsilon_{it} \dots \dots \dots (1)$$

$$\text{Model-2, } ROE_{it} = \beta_0 + \beta_1CAR_{it} + \beta_2CR_{it} + \beta_3CE_{it} + \beta_3CR_{it} + \beta_4BS_{it} + \epsilon_{it} \dots \dots \dots (2)$$

Where:

- i* = bank index (1 to 5)
- t* = time index (2011–2022)
- sit*= idiosyncratic error term

Data collection.

Secondary data of the five largest Indian commercial banks in terms of market capitalization—HDFC Bank, ICICI Bank Limited, State Bank of India, Kotak Mahindra Bank Limited, and Axis Bank

were obtained from the CMIE Prowess IQ database and respective annual reports covering an eleven-year period from 2011 to 2022.

Dependent Variables (Profitability Measures)

ROA (Return on Assets). Indicates how efficiently a bank uses its total assets to generate after-tax profit. Higher ROA reflects better asset utilization and operational performance.

ROE (Return on Equity). Measures profitability relative to shareholders’ equity, showing the return generated on owners’ investments. A higher ROE implies stronger value creation for equity holders.

Independent Variables (Determinants)

CAR (Capital Adequacy Ratio) – Assesses a bank’s capital strength by comparing total equity to total assets, reflecting its ability to absorb potential losses and maintain stability.

CE (Cost Efficiency) – Represents the proportion of total expenses to total revenue, indicating the bank’s operational efficiency in controlling costs relative to income.

CR (Credit Risk) – Captures the extent of a bank’s asset exposure to loans by measuring total loans as a share of total assets. Higher values may imply greater default risk.

BS (Bank Size) – Expressed as the natural logarithm of total assets to normalize scale differences; serves as a proxy for economies of scale and institutional size effects.

Table 1: Study Variables

Variable Abbreviation	Type	Variable	Measurement	Prior Studies
ROA	Outcome	Return On Asset	(Net Profits after Tax/Total Assets)	Al-Homaidi <i>et al.</i> , (2018)
ROE	Outcome	Return on Equity	(Net Profits after Tax/Total Equity)	Islam, M. S. (2021)
CAR	Predictor	Capital Adequacy Ratio	(Total Equity /Total Assets).	Islam, M. S. (2021)
CE	Predictor	Cost efficiency	(Total expenses/Total Revenue).	Abdullah <i>et al.</i> , (2017)
CR	Predictor	Credit Risk	(Total Loan/Total Assets).	Islam, M. S. (2021).
BS	Predictor	Bank size	Nature Logarithm of Total Assets	Abdullah <i>et al.</i> , 2017

Statistical Tools. The study has applied the statistical software STATA version 17 for data analysis.

Significance Level- The study uses a significance level for conducting statistical tests at 1%, 5%, 10%.

4. Result and discussion.

The descriptive statistics in Table 2 provide an overview of the central tendencies and dispersion of key financial variables across 55 firm-year observations. These metrics offer preliminary insights into the performance, efficiency, and risk profiles of the sampled firms, forming the empirical foundation for subsequent analysis. Return on Assets (ROA) exhibits a mean of 0.01207, indicating that firms, on average, generate approximately 1.2% profit per unit of

asset employed. The relatively low standard deviation (0.00583) suggests limited variability in asset profitability, with values ranging from -0.0019 to 0.01996. This narrow spread implies a consistent operational performance across the sample.

Table 2: Descriptive Statistics

Variables	Observation	Mean	Standard deviation	Minimum	Maximum
ROA	55	0.01207	0.00583	-0.0019	0.01996
ROE	55	14.1237	13.8910	-7.3397	66.5964
CE	55	0.39484	0.09352	0.25781	0.63117
CR	55	0.84843	0.0278	0.78628	0.90388
Car	55	0.00155	0.00148	0.00018	0.00563
BS	55	5.86362	0.43292	4.81735	6.69789

Return on Equity (ROE), by contrast, shows a higher mean of 14.12%, accompanied by a substantial standard deviation of 13.89. The wide range—from a minimum of -7.34% to a maximum of 66.60%—reflects significant heterogeneity in shareholder returns, possibly driven by differences in leverage, profitability, or capital structure. Cost Efficiency averages 0.3948, with a standard deviation of 0.0935. The values span from 0.2578 to 0.6312, indicating moderate dispersion in operational efficiency. This metric captures the extent to which firms manage their input-output processes, and the observed variation may reflect differences in managerial practices or scale economies. Credit Risk is tightly clustered around a mean of 0.8484, with minimal variation (SD = 0.0278). The

narrow range (0.7863 to 0.9039) suggests that firms exhibit relatively uniform risk exposure, potentially due to regulatory constraints or standardized lending practices within the sector. The Capital Adequacy Ratio presents a notably low mean of 0.00155, with a standard deviation of 0.00148. The range is narrow (0.00018 to 0.00563), which may indicate undercapitalization or reflect the use of scaled or transformed values. This metric is critical for assessing financial resilience and regulatory compliance. Banks size measured in logarithmic terms, averages 5.86 with a standard deviation of 0.43. The smallest bank in the sample has a size of 4.82, while the largest reaches 6.70, indicating moderate variation in institutional scale.

Table 3: Correlation analysis of the top five commercial banks

Variables	ROA	ROE	CE	CR	CAR	BS
ROA	1.0000					
ROE	0.2901	1.0000				
CE	-0.7464	-0.2117	1.0000			
CR	-0.6882	0.1111	0.3149	1.0000		
Car	0.4544	-0.4846	-0.3481	-0.5693	1.0000	
BS	-0.5868	0.4192	0.4620	0.5656	-0.8302	1.0000

Table 3 presents the Pearson correlation coefficients among six key financial and

governance variables for the top five commercial banks. These coefficients indicate the strength

and direction of linear relationships between variables, offering preliminary insights into potential associations relevant to firm performance and risk. Return on Assets (ROA) is positively correlated with Return on Equity (ROE) ($r = 0.2901$), suggesting that higher asset profitability tends to align with improved shareholder returns, albeit modestly. However, ROA shows strong negative correlations with Cost Efficiency (CE) ($r = -0.7464$), Credit Risk (CR) ($r = -0.6882$), and Board Size (BS) ($r = -0.5868$), indicating that less efficient operations, higher risk exposure, and larger boards are associated with lower asset returns. ROE exhibits a weak negative correlation with CE ($r = -0.2117$) and CR ($r = 0.1111$), but a moderate positive association with BS ($r = 0.4192$). This implies that firms with larger boards may deliver higher equity returns, potentially due to enhanced strategic oversight or resource access.

Interestingly, ROE is negatively correlated with Capital Adequacy Ratio (CAR) ($r = -0.4846$), suggesting that more highly capitalized firms may

experience lower equity returns, possibly due to conservative financial policies. Cost Efficiency is positively correlated with both CR ($r = 0.3149$) and BS ($r = 0.4620$), but negatively with CAR ($r = -0.3481$). These relationships suggest that more efficient firms may also bear higher credit risk and operate with larger boards, while maintaining lower capital buffers. Credit Risk shows a moderate negative correlation with CAR ($r = -0.5693$), indicating that firms with higher risk exposure tend to have lower capital adequacy. Additionally, CR is positively associated with BS ($r = 0.5656$), implying that larger boards may coincide with elevated risk levels, potentially due to slower decision-making or diluted accountability. Finally, CAR and Bank Size are strongly negatively correlated ($r = -0.8302$), which may reflect structural trade-offs between size and capital buffers. Overall, the correlation matrix highlights several theoretically consistent relationships and potential multicollinearity concerns that warrant attention in regression modelling.

Table.4: Estimated result of BP test

	Var	SD = sqrt (Var)
ROA	.000034	.0058326
e	0.00000395	.0019887
u	0	0

Test: $\text{Var}(u) = 0$ $\chi^2(01) = 0.00$,

Prob > $\chi^2 = 1.0000$.

Authors Calculation*

From the above table it is clearly seen that prob. Value is more than 0.5. so, we are using OLS method.

Table.5: Regression Analysis of ROA

ROA	Co-efficient	Std. err.	t	$p > t $	[95% conf. interval]
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CE	-.0349505	.0044883	-7.79	0.000***	-.0439655	-.0259354
CR	-.1069617	.0165891	-6.45	0.000***	-.1402819	-.0736414
Car	-.8066749	.4598095	-1.75	0.085*	-1.730229	.1168796
BS	-.0028268	.0016458	-1.72	0.092*	-.0061324	.0004789
Cons	.1344389	.0158033	8.51	0.000***	.1026971	.1661808
R-SQUARED WITHIN=0.6176 BETWEEN=0.9781 OVERALL=0.7991			OBSERVATION PER GROUP MIN=11 AVG=11.0 MAX=11			

***significant at 1%, **significant at 5%,* significant at 10%.

Authors Calculation*

Table 5 presents the results of a panel regression model examining the impact of cost efficiency, credit risk, capital adequacy, and board size on firm profitability, measured by Return on Assets (ROA). The model demonstrates strong explanatory power, with an overall R-squared of 0.7991, indicating that approximately 80% of the variation in ROA is explained by the included variables. Cost Efficiency (CE) exhibits a statistically significant negative relationship with ROA ($\beta = -0.0349, p < 0.001$). This suggests that higher cost efficiency scores—implying lower operational efficiency—are associated with reduced asset profitability. The coefficient is economically meaningful and precisely estimated, with a narrow 95% confidence interval (-0.0440 to -0.0259). Credit Risk (CR) also shows a significant negative association with ROA ($\beta = -0.1070, p < 0.001$), indicating that firms with greater exposure to credit risk tend to generate lower returns on assets. This finding aligns with the expectation that riskier lending practices may impair asset performance due to

potential defaults or provisioning costs. Capital Adequacy Ratio (CAR) has a negative coefficient ($\beta = -0.8067$), which is marginally significant at the 10% level ($p = 0.085$). Although the effect size is large, the wide confidence interval (-1.7302 to 0.1169) suggests uncertainty in the estimate. This may imply that higher capital buffers, while enhancing solvency, could constrain asset utilization and profitability. Bank Size is negatively associated with ROA ($\beta = -0.0028$), with marginal significance ($p = 0.092$). This suggests that larger banks may experience slightly lower asset profitability, potentially due to bureaucratic inefficiencies or diminishing returns to scale. However, the effect is economically modest and warrants cautious interpretation. The constant term is positive and highly significant ($\beta = 0.1344, p < 0.001$), representing the baseline level of ROA when all explanatory variables are held at zero. This intercept captures the average profitability in the absence of cost inefficiency, credit risk, capital constraints, and size effects.

	Var	SD = sqrt (Var)
ROE	193.1857	13.89912
e	54.9364	7.411909
u	0	0

Test: $\text{Var}(u) = 0$ $\chi^2(01) = 0.00$,

Prob > $\chi^2 = 1.0000$.

Authors Calculation*

From the above table, it is clearly seen that prob. Value is more than 0.5. So, we are using the OLS method.

Table 7: Regression Analysis of ROE

ROE	Coefficient	Std. err.	z	P> z	[95% conf. interval]	
CE	-71.39907	17.54475	-4.07	0.000***	-105.7862	-37.01199
CR	-106.9437	64.84682	-1.65	0.099**	-234.0411	20.15371
Car	-4247.414	1797.392	-2.36	0.018***	-7770.239	-724.5902
BS	12.38512	6.433337	1.93	0.054**	-.2239912	24.99423
_cons	67.00568	61.77498	1.08	0.278	-54.07105	188.0824
R-squared: Within = 0.2374 Between = 0.6720 Overall = 0.4593			Obs per group: min = 11 avg = 11.0 max = 11			

***significant at 1%, **significant at 5%, *significant at 10%

Authors Calculation*

Table no 7 represent the regression results which reveals several significant relationships between bank-specific variables and Return on Equity (ROE). Capital Efficiency (CE) exhibits a strong negative association with ROE ($\beta = -71.40$, $p < 0.001$), indicating that inefficiencies in capital utilization substantially diminish profitability. Similarly, Credit Risk (CR) shows a negative effect ($\beta = -106.94$), though only marginally

significant ($p \approx 0.099$), suggesting that higher risk exposure may erode returns, albeit with less statistical certainty. The Capital Adequacy Ratio (CAR) has a pronounced and statistically significant negative impact on ROE ($\beta = -4247.41$, $p = 0.018$), implying that stringent regulatory capital requirements may constrain profit generation, possibly due to conservative lending practices. Conversely, Bank Size demonstrates a positive and borderline significant

effect ($\beta = 12.39$, $p \approx 0.054$), hinting that larger banks may benefit from economies of scale or operational diversification that enhance profitability. The model's overall explanatory power is moderate, with an R^2 of 0.4593, suggesting that nearly 46% of the variation in ROE is accounted for by the included predictors. These findings underscore the importance of strategic capital management and scale in shaping bank performance, while also highlighting the trade-offs imposed by regulatory prudence and risk exposure.

5. Conclusion

This study empirically investigates the determinants of profitability among India's top commercial banks in terms of market capitalization, using Return on Assets (ROA) and Return on Equity (ROE) as performance metrics. Drawing on panel regression models and correlation diagnostics, the analysis reveals that cost efficiency and credit risk consistently exert negative influences on both asset and equity returns. Capital adequacy, while essential for regulatory compliance, appears to constrain profitability—particularly ROE—suggesting a trade-off between financial resilience and shareholder value. Bank size exhibits mixed effects, negatively associated with ROA but positively with ROE, indicating scale-related nuances in operational and strategic outcomes. The high explanatory power of the ROA model ($R^2 = 0.7991$) and moderate fit of the ROE model ($R^2 = 0.4593$) affirm the relevance of the selected predictors and underscore the importance of firm-level characteristics in shaping bank performance. The findings offer actionable insights for bank managers, regulators, and policymakers. Enhancing operational efficiency and tightening credit risk controls can directly improve

profitability outcomes. The inverse relationship between capital adequacy and ROE suggests that while regulatory buffers are vital, overly conservative capital structures may dilute shareholder returns. Larger banks may leverage scale advantages to boost equity performance but must remain vigilant against bureaucratic inefficiencies that impair asset utilization. These insights can inform strategic decisions around resource allocation, governance reforms, and risk-adjusted performance metrics in the Indian banking sector.

While the study provides robust empirical evidence, several limitations merit acknowledgment. First, the sample is restricted to five leading banks, which may limit generalizability across smaller or regionally focused institutions. Second, the models exclude macroeconomic variables (e.g., GDP growth, interest rates) that could influence profitability dynamics.

Future research could expand the sample to include a broader spectrum of banks and incorporate dynamic panel techniques (e.g., GMM estimators) to address potential endogeneity. Integrating macroeconomic controls and richer governance indicators would enhance explanatory depth. Additionally, longitudinal studies examining post-reform or post-crisis periods could yield insights into structural shifts in profitability determinants.

Conflict of interest

The authors declared no conflict of interest among themselves and others

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Significance of Intellectual Property Rights on Indian Economy: A Study

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Abstract

Intellectual property's potential can be considered as a driver of economic progress and social and cultural well-being for such a vast developing country named India. This study carried out completely based on secondary data and focuses not only on the overview of intellectual property rights (IPRs), but also keeps a deep look into their significance on Indian economy. It is very important to protect the interest and rights of people to evolve in creativity and innovation which is directly linked to the growth and prosperity of the entire nation. Innovation requires a great amount of investment but have an important role on Indian economy which promotes investment, and technological development to enhance the Gross Domestic Product (GDP) of our country. Economic development and IPRs are interdependent; robust IPRs protection encourages innovation, which raises industrial output, creates jobs, and increases competitiveness to survive and sustain in the dynamic and evolving world. The study comes to the conclusion that although IPRs are essential tools for economic advancement; their application must balance in promoting innovation to maintain sustainable economic growth of the nation.

Keywords: - IPRs, Economic Growth and Development, Government Initiatives, Future Opportunities and GDP.

Introduction

IPRs are one's legal rights in respect of the 'property' created by one's mind – such as an invention, or an artistic work, or piece of music, or a name or slogan or symbol, or a design, which is used in commerce, in the form of books, music, computer software, designs, technological know-how, trade symbols, etc. These rights are governed by specific legislation like the Patents Act, Copyright Act, and Trade Marks Act. The Indian government has also established a National IPR Policy to promote and strengthen the IPR ecosystem. Intellectual property is an intangible

property or proprietary asset, which applies to any

product of the human intellect that has commercial value and enjoys monopoly under IPR act in the use of that particular intellectual property. In many developed countries, successful planning and strict enforcement of IPRs have a huge contribution in their economic growth. The real tools for the revenue generation and expansion of any firm are creativity, aptitude, innovation, and imagination to survive and sustain in the competitive and changing world. The modern global economy has made IPR a

a crucial part of development strategies and economic policies. Intellectual property protection has become adopted priority in a knowledge-driven world where technical advancement, creativity, and invention are major forces behind the success in global competitive market in long run. The function of IPR is especially important for developing nation like India since it has a direct impact on technology transfer, industrial growth, foreign direct investment (FDI), and general competitiveness in international markets. Economic Reforms-1991 introduced by Government of India (GOI) in Indian economy and its engagement with the international trade system is key component of India's path toward fortifying its IPRs framework. It is very important to protect the interest and rights of the people to induce in innovation and technological advancement which are directly linked towards the development and growth of the country.

Literature Review: -

Bouet (2015) studied "India's trade-related aspects of IPRs compliant pharmaceutical patent laws: what lessons for India and other developing countries" and said that the Patent (Amendment) Act of in 2005, India switched from a process patent system to a product patent regime to comply with the Trade-Related Aspects of Intellectual Property Rights (TRIPS) agreement. There will be immediate national and worldwide ramifications since so many developing countries have come to rely on inexpensive generics. Tn (2023) studied "IPRs and Trade Secrets Protection in the Indian Software Industry: An Evaluation of the Legal Framework" and said that This research looks on the IPR and tradeseecret protection laws in India in light of the country's burgeoning software industry. It takes a look at the present legal structure, how it's being used, how well it's working, and where it falls short. The study draws on a broad range of secondary

sources, including relevant statutes, case law, policy papers, and academic research to give helpful insights from key informant interviews with industry players. Kanwar and Lai (2001) analyzed the impact of IPR on economic growth and welfare using an expanding-variety type model of Research and Development (R&D).

Kwan and Lai (2003) demonstrate that when taking into account a transitional dynamic there exists a limited optimal degree of IPR protection. They calibrate their model using US data to evaluate the impact of optimal IPR on welfare.

They looked to explain factors responsible from deviation of R&D from the optimal level specifically knowledge spillovers and creative destruction. Lai (1998) when assessing the relation between economic growth and IPR finds that when FDI is the major channel of technology transfer and there is high rate of protection than the rate of innovation rises in the North and the South. Kwan and Lai (2003) find that tightening IPR protection would have as consequence an immediate fall in consumption and a rising of the R&D expenses in the sector. In the next period, consumption would rise as a result of more investment in R&D which has as consequence faster innovation and growth. Kwan and Lai (2003) show that tradeoff between actual consumption and future consumption implies the existence of an optimal IPR that maximizes the utility of the representative agent. Extension realized by the authors, assume that the rate of imitation is dependent of accumulation of knowledge of past imitations. Strengthening IPR has a positive effect on innovation by stimulating R&D activities while imitation reduces R&D activities. IPR protection was modeled as the part of imitation rate that could be impacted by the government policies. The collection of means

of industrial policies used is composed from length and breadth of patent, protection of trademarks, copyrights and trade secrets. Ginarte and Park (1997) studied the indirect effect of IPR on growth through the impact which exerts on physical, human and R&D capital accumulation. They concluded that

IPR protection influences the capital accumulation which in turn affects growth.

Objectives of the Study: -

1. To identify and analyze the contribution of IPRs towards Indian economy.
2. To study the government initiatives to protect the IPRs in India.
3. To aware about the future opportunities of IPRs towards Indian economy.

Data Base and Research Methodology: -

This study carried out completely based on secondary data which was obtained from various sites and reports such as articles, journals, magazines, Government reports. This study focuses not only on the overview of IPR but also takes a deep look on IPRs and government initiatives and their contributions towards Indian economy.

Relevance of IPRs in India: -

IPR is crucial for fostering innovation, creativity, and economic growth by providing incentives for creators and inventors, protecting their creations, and promoting a competitive market in the age of globalization. They encompass patents, trademarks, copyrights, and other forms of creations of the mind, providing exclusive rights to inventors and creators to earn fixed and reasonable royalty. These rights incentivize innovation, ensure recognition and economic benefits for creators, and promote a healthy competitive environment and survive in the economy for long run. Some of the positive impacts of IPRs are:

1. IPRs are important for free flow

of energy in enhancing invention and research. They provide incentive to the individuals for new creations of products, works, and services according to the taste and preferences of consumers, as these are dynamic in nature.

2. They enhance innovation and creativity by protecting the rights of inventors and artists to filing the disclosure of information of patents to create newer and/or better products after expanding lots of money in self-run research and development programme.
3. They may be helpful in the solution of global challenges in the field of alternate sources of energy, new products to the farmers and development of low-cost drugs and other necessary products for poor people at relatively low price than foreign competitors leads to save the drain of foreign currency.
4. IPRs are necessary to stimulate economic growth by encouraging fair trading which would contribute to economic and social development across all industries and globally that promotes to earn foreign currencies leading in rise of GDP of the nation.

Economic Benefits of IPRs:-

The influence of IPRs on the procedures of monetary improvement and its development is mind-blowing and dependent on different factors of the liberalized economy come into force in July 1991 by Ministry of Finance, GOI. In principle, more grounded frameworks for the insurance of licensed innovation could either improve or constrain monetary development. Eventually, the proof is rising that more grounded and increasingly certain licensed innovation law could well build them monetary development and cultivate advantageous change, along these lines improving formative possibilities in the way that

advances with dynamic challenges. There are two significant reasons. First to start with, numerous factors influence the development of manners that can command the effect of TRIPS. Second, the monetary hypothesis brings up that licensed innovation rights could have a lot of consequences for development, some positive and some negative.

Impact of IPRs Laws on India's Economic Development:-

1. Fostering Innovation and Creativity:-

Exclusive rights over inventions are granted by IPR laws to creators and inventors, providing legal protection that encourages R&D. This protection fosters a culture of invention by guaranteeing that innovator can benefit from their work without worrying about quick replication. Technological developments and patent filings have increased in India as a result of the country's improved IPR frameworks, especially in fields like biotechnology, information technology, and pharmaceuticals. The creation of new goods and services as a result of this surge in invention has improved living standards and stimulated economic growth.

2. Attracting FDI: - One important factor influencing foreign investors' decision to invest in a nation is a strong intellectual property rights framework. India is a desirable location for FDI because of its robust intellectual property rights, which reassure investors that their products and innovations will be protected from unlawful usage. In addition to supporting India's economic expansion, the foreign investment inflow has made it easier for the country to transfer technology, develop its workforce, and integrate into international value chains. This dynamic has been especially noticeable in the manufacturing and service sectors, where international partnerships have facilitated the adoption of cutting-edge technologies and industry best

practices.

3. Improving Global Competitiveness: - India's standing in the world market has improved as a result of bringing its IPR laws into compliance with international standards. With the assurance that their intellectual property is safeguarded, Indian companies have been able to grow globally. Further integrating India into the global economy, this alignment has also made it easier for the nation to engage in international trade and partnerships.

4. Global Integration Market: -

India's entry into the international market has been greatly facilitated by its ratification of the TRIPS agreement. Along with increasing India's reputation among trading partners, this compliance has drawn foreign investment, especially in knowledge-intensive industries. However, this integration comes with difficulties, like striking a balance between public health demands and strict intellectual property rights, as seen by discussions about access to reasonably priced medications. Therefore, even while global market integration has made it possible for economies to thrive, TRIPS compliance requires caution to guarantee that the advantages are shared fairly and don't jeopardize fundamental public interests.

5. Access to essential effects: -

India has implemented specific provisions within its patent laws to ensure public access to essential medicines while complying with international intellectual property standards. Under specific circumstances, the government may permit the manufacture of generic versions of copyrighted medications without the patent holder's approval. This is known as compulsory licensing. The purpose of this act is to enhance access to life-saving therapies and handle public health emergencies. These legal frameworks demonstrate India's dedication to striking a

balance between the demands of public health and intellectual property rights, guaranteeing that its citizens may continue to obtain and buy necessary medications.

Drawback and Misuse of IPRs on Economic Development: -

Sometimes the downside of IPRs restricts the technology to be utilized within the simplest way to protect the innovations from the evil efforts of competitors. Spirit of competition keeps check balance on price and similarly as on the standard of the merchandise. IPRs laws like copyright, trademark and patents create a monopoly within the market by creating barriers for the competitor to use the innovation. Competition makes sure that producers must consider the benefit and satisfaction of the client, because if the client isn't satisfying the he or she's going to shift to other competitors within the market. But this law doesn't apply when there is a monopoly within the market. The consumer will get no other options and should buy the merchandise at the value determined by the producer.

Government Initiatives to protect IPRs in India: -

The Indian government has implemented various initiatives to protect IPRs, including the National IPR Policy of 2016, with the noble mission to foster innovation and creativity. These measures are designed to create a supportive environment for IPR development, registration, and enforcement in the society.

Key Initiatives that have implemented by government are:

- **National IPR Policy, 2016: -**

This policy provides a comprehensive framework for streamlining registration, enhancing enforcement, and raising public awareness for the interest of creators and users of intellectual

property.

- **Legislative Measures: -**

The government has enacted various acts to protect different forms of IPRs, including the Copyright (Amendment) Act, 2012, and the Patents (Amendment) Act, 2005.

- **Dedicated Institutions: -**

Patent Office, Copyright Office, and Trademark Registry are established to facilitate the registration and protection of the IPRs in India.

- **Intellectual Property Right Scheme: -**

The Ministry of Micro, Small & Medium Enterprises (MSME) offers support for legal and intellectual property filing, including patents, trademarks, copyrights, designs, and geographical indications, etc.

Key Aspects and Future Opportunities of IPRs: -

IPRs landscape presents both challenges and opportunities for future economic growth and social development of our country. Future opportunities lie in leveraging IPRs for innovation, attracting investment, and fostering a knowledge-based economy. The key opportunities are:

- **Robust IPR Regime: -**

India has a well-established legal framework for patents, trademarks, copyrights, and other forms of IPR, aligned with international standards.

- **Increase Awareness and Utilization: -**

A key focus should be on increasing awareness about the significance of IPRs among individuals, businesses, and

research institutions in promoting the monetization and commercialization.

- **Innovation and Technological Advancements: -**

Protection of IPRs laws is crucial for driving innovation, especially in the sectors like bio-technology, artificial intelligence, and emerging technologies.

- **Economic Growth and Competitiveness: -**

Leveraging IPRs, India can boost its economic growth, enhance its global competitiveness, and attract FDI to earn more of foreign currencies.

- **Collaboration and Partnerships: -**

Opportunities exist for collaboration among businesses, researchers, and other stakeholders to develop innovative solutions and secure IPR protection.

- **Start-up Ecosystem: -**

IPR protection is vital for start-ups to safeguard their innovations, attract fund, and compete with the global counterparts.

- **Traditional Knowledge: -**

Protecting and promoting traditional knowledge is another area of opportunity to benefit its holders from commercialization and globalization after the implementation of New Industrial Policy-1991, by GOI.

- **AI and IPRs: -**

The intersection of AI and IPRs presents significant opportunities for businesses to develop creativity and innovation in gaining competitive advantages of the

liberalized economy introduced in 1991 by GOI.

- **Career Opportunities: -**

The growing focus on IPRs has created various career opportunities including employment in the economy.

Conclusion: -

India's IPR framework is dynamic and presents significant opportunities for future growth and attracting more of FDI which will ultimately lead to enhance the employment opportunities and overall GDP of our country. By addressing the challenges and capitalizing on the opportunities, India can strengthen its position as a hub for innovation, creativity, and economic prosperity to be more competitive with the global counterparts. However, awareness, implementation, and enforcement of IPR laws are vital for realizing their full potential for economic development since it fosters innovation, earn foreign currencies and strengthens home grown firms. Not merely registered, but meticulous protection of IPRs will lead to the indispensable road to economic growth to foster societal progress, economic expansion and technological improvement in supporting creativity and innovation. The basic objective of the IPRs is to help in meeting the challenges in the development such as reducing poverty, stimulating economic growth, improving the health status and access to education and contributing towards the overall sustainable development of the nation. India will definitely harness its proportionate share in global trade by exploration in IPRs for progress in the knowledge economy, fostering innovation, protecting creators, and driving economy towards future growth and prosperity.

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Analysis of Profitability of Navaratna Central Public Sector Enterprises in India during the Post- Liberalization Era through Technical Efficiency Scores (TES): A Study

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Abstract

Navaratna companies have played a vital role in the growth and development of Indian economic since inception. They contribute to the country's GDP, create employment and export goods and services. In the year, 1997 Navaratna scheme was first introduced by the government of India, to 9 PSEs but today as on January 2023, there are 13 Navaratna companies. Government provided autonomy to some identified large sized Miniratna companies in terms of investment in a single project so that these companies could expand their business in domestic as well as overseas boundaries. Profitability is an important term for any small or large business enterprise because without profit no business can survive for a long period of time. Profitability is a measure of an organization's revenue relative to its expenses. A PSEs can earn maximize its profit if it conducts its business operation in most efficient manners. In this study profitability of Navaratna Central Public Sector Enterprises (CPSEs) was analysed applying Data Envelopment analysis techniques (DEA) and for making inter-firm comparison in terms of consistency of their profitability, the ratio of mean to standard deviation of technical efficiency scores (TES) was calculated. For analysing the nature of trend in TES of each company, linear trend equations were fitted and in order to examine whether the slopes of trend lines were statistically significant or not |t| test was applied. The study reveals a wide variation in the TES across the Navaratna CPSEs during the period under study.

Keywords: Profitability, Navaratna Companies, Autonomy, Earning Capability

Introduction

Pandit Jawaharlal Nehru, India's first Prime Minister was the mastermind behind the creation of Public Sector Enterprises (PSE). Nehru's first vision was to improve infrastructure and development of basic and heavy industrialization.

He hailed PSE as Temple of modern India by giving them an imperious position in driving the economy. Nehru recommended Centralized

economy model and promoted economy-based import substitute industrialization. He thought that the development of basic and heavy industry will modernize Indian economy. Later, Nehru's vision was carried forward by Dr V. Krishnamurthy, who was also known as the father of PSE.

PSE can be classified as Central Public Sector Enterprises (CPSEs), State Level Public Sector Enterprises (SLPEs), or Public Sector Banks (PSBs). CPSEs, are those companies which are managed and controlled by the government agencies. CPSEs have played a vital role in the growth and development of India economy. It contributes in the development of infrastructure, public welfare, capital formation, economic sovereignty and intellectual property rights. The commercial viability of CPSEs is increasing day by day. These days, CPSEs is expanding its business not only in the domestic market but also in overseas boundaries. In today's world, most countries follow a mixed economy, whereas CPSEs compete with the private sector by giving equal opportunities for success in competition. In India, CPSEs are government-owned enterprises in which the Indian government owns 51% or more of the paid-up share capital.

After independence, India was facing severe financial crisis and weak infrastructure facility, at that time PSEs have played an important role in fostering growth and development of Indian economy. India has to face many big challenges related to economic sovereignty, unemployment, sanitation, health, education, inequality of income and wealth, poverty and lack of food etc. Another big challenge was to provide good quality of services related to logistics, electric supply, water supply, infrastructure of road and banking facilities.

India's five-year plan and industrial policy in 1956, emphasized the development of CPSEs. In midst 1950, there were only 9 CPSEs and the total

investment of the government was only 29 crores whereas today the number of CPSEs as on 2019 is 348 with total investment of ₹16.41 lakh. The total paid up share capital of CPSEs in the financial year 2019 was ₹200.76 lakh crores with the revenue of ₹24.43 lakh crore. The share of output of CPSEs in GDP was 8.23 per cent in the year 2006 which increase 15 to 16 per cent in 2020. The total gross revenue from 248 CPSEs in the financial year 2022 was ₹31.95 trillion which was greater than the financial year 2021(24.08 trillion). According to Public Enterprises Survey, in the year 2020-21 the number of profits making CPSEs was 177 with the total profit of ₹1.89 crore. There are 51856 employes are working in CPSEs sector.

CPSEs have also played major role in shaping the industrial landscape by renovating the technologies. These companies are engaged in various industrial activities like manufacturing engineering, steel, heavy machinery, textile, pharmaceuticals, Petro-chemical, power, etc. The central government identified some profit making Central Public Sector Enterprises (CPSEs) and empowered them by granting some operational and financial autonomy to equip them to react proactively to market forces. After an assessment based on some selected criteria, the Government of India introduced four scheme such as 'Maharatna', 'Navaratna,' 'Miniratna-Category-I, and 'Miniratna- Category-II', by the department of Public Enterprises, for the purpose of granting enhanced power to those identified CPSEs so that it could expand their operations in domestic as well as in foreign market. In the year 1997, the Government introduced "Navaratna" scheme and grant this status to large sized PSEs based on their outstanding performance and importance to the economy. A company must fulfil certain criterion for getting Navaratna status. A Navaratna company get some financial and operational

freedom such as it can invest up to Rs 1000 crore or 15 % of their net worth on a single project without any government approval and in a year, it can spend up to 30% of its net worth not exceeding Rs 1000 cr. Presently there are 14 Navaratna CPSEs. They are Bharat Electronic Limited (BEL), Container Corporation of India Limited (CONCOR), Hindustan Aeronautics Limited (HAL), Mahanagar Telephone Nigam Limited (MTNL), National Aluminum Company Limited (NALCO), National Buildings Construction Corporation Limited (NBCC), Neyveli Lignite Corporation Limited (NLC), Oil India Limited (OIL), Rashtriya Ispat Nigam Limited (RINL), Rural Electrification Corporation Limited (REC), Shipping Corporation of India Limited (SCI), Engineers India Limited (EIL), Power Finance Corporation (PFC), and National Minerals Development Corporation (NMDC).

The company qualified for Navaratna status has to fulfill the following criteria's: -

1. It should be Miniratna category-1 company and have schedule "A" status
2. Having a record of at least three "excellent" or "very good" Memorandum of Understanding (MoU) ratings in the last five years, and having a composite score of 60 or above in the six selected parameters, namely,
 - Net profit to net worth,
 - Manpower cost to total cost of production/services,
 - Profit before depreciation, interest, and taxes to capital employed,
 - Profit before interest and taxes to turnover,
 - Earnings per share and
 - Inter-sectorial performance.

Role of Navaratna companies in the Indian economy

Navaratna companies are the group of Central

Public Enterprises, which is managed and controlled by the central government of India. It has played a significant role in the growth and development of economic sovereignty. These companies are one of the largest and successful PSU in India. The key role played by the Navaratna companies in India is mentioned below:

1. Contribution to GDP: Navaratna companies are major contributors to India's Gross Domestic Product (GDP). According to the Department of Public Enterprises (DPE), the contribution of Navaratna companies to India's GDP increased from 3.64% in 2015-16 to 4.02% in 2019-20.
2. Job creation: Navaratna companies are significant employers, providing employment opportunities to a large number of people across various sectors. According to the same report, Navaratna companies employed around 1 lakh people in 2019-20. (Data collected from Wikipedia)
3. Revenue generation: Navaratna companies generate significant revenue for the government through their operations and investments. According to the Ministry of Finance, the Net profit of Navaratna companies increased from Rs. 1,57,57,559 crores in 2020-21 to Rs. 2,48,78,154 crores in 2021-22 (Data collected from Department of Public Enterprises Survey).
4. Investment in R&D: Navaratna companies invest in research and development, leading to the development of new technologies and products that benefit the economy and society.

According to the Department of Public Enterprises, Navaratna companies invested around Rs. 683.95 crores in R&D in 2021-22 (Data collected from Department of Public Enterprises Survey).

5. Infrastructure development: Navaratna companies are often involved in the development of critical infrastructure projects such as highways, airports, and ports. For instance, Bharat Heavy Electricals Limited (BHEL), a Navaratna company, has been involved in the construction of power plants and other infrastructure projects across the country (Data collected from Department of Public Enterprises Survey).
6. Contribution to Exchequer: Navaratna Companies contribute around ₹ 5,07,19,342 to government exchequer as on 2021-22 (Data collected from Department of Public Enterprises Survey).

Role of public sector enterprises in the Indian economy

Public sector enterprises (PSEs) play a major role in the growth and development of Indian economy. These enterprises are owned and operated by the government and are involved in various sectors such as manufacturing, energy, transportation, petrochemical, drugs and pharmaceuticals, cement, mining and coal minerals, fertilizer, telecommunications, and finance. PSE contributed 10.05 per cent in the total market capitalization listed in Bombay Stock Exchange (BSE) and ₹97,230 crores of fresh capital as on 2019 (Data collected from Department of Public Enterprises Survey). Here

are some of the key roles played by PSEs in the Indian economy, along with some data to support these roles:

1. Contribution to GDP: PSEs are major contributors to India's Gross Domestic Product (GDP). According to the DPE survey, the contribution of PSEs to India's GDP increased from 7.46% in 2015-16 to 14% in 2023.
2. Employment generation: PSEs are significant employers, providing employment opportunities to a large number of people across various sectors. According to DPE report, around 18.9 Lakh people are engaged in PSE Sectors.
3. Revenue generation: PSEs generate significant revenue for the government through their operations and investments. According to the Ministry of Finance, the profit after tax of PSEs increased from Rs. 1,30,661 crores in 2015-16 to Rs. 1,45,487 crores in 2019-20.
4. Investment in R&D: PSEs invest in research and development, leading to the development of new technologies and products that benefit the economy and society. According to the Department of Public Enterprises, PSEs invested around Rs. 29,725 crores in R&D in 2019-20.
5. Infrastructure development: PSEs are often involved in the development of critical infrastructure projects such as highways, airports, and ports. For instance, Indian Oil Corporation Limited (IOCL), a PSE, has been involved in the construction of petroleum refineries and pipeline networks across the country.

In summary, PSEs are significant contributors to the Indian economy, generating revenue, creating jobs, investing in R&D, contributing to infrastructure development, and enhancing the country's global competitiveness.

Profitability is a measure of any organization's income relative to its expenses. Profitability is an important term for any small or big organization because without profit a company cannot remain in business for a long time. Hence, we can say that a company's growth is directly related to its profit margin. The profitable increase in turnover, productivity, efficiency and avoidance of unnecessary expenses can lead to maximization of profitability. The key factor for the profitability of any business is revenue from sales of product and services. The higher profitability determines the greater engagement in entrepreneurial activities; the greater the profitability, the more will be enhancement of technological innovations and economic growth; the higher the profitability, the greater is the opportunity to accumulate the capital stock and labour inputs. The present study deals with the analysis of profitability of Navaratna CPSEs by applying Technical Efficiency Scores (TESs). The TESs was derived using DEA (Data Envelopment Analysis) technique.

Brief Profile of Navaratna CPSEs

BEL: Founded in 1954 as a CPSEs under the Ministry of Defense. It is one of the largest Government-owned aerospace and defence electronics company in India with a sales turnover of 14,233 crore and coupled with the net profit of 2,069 for the year 2021. The company deals in a product like Avionics radars, Weapon system, Electronic Voting Machine and IFF. On June, 2007, BEL was awarded the status of Navaratna status by the Central Government of India.

EIL: Established in 1965 in New Delhi under the ownership of Petroleum and Natural Gas by the Central Government of India. EIL manufactures the products like Chemical fertilizer, Crude, Petroleum refining, Petro-chemicals, Mining and Metallurgy, Onshore and Offshore Oil and Gas, Terminal and Storage, Underground Crude Oil storage, Infrastructure and Urban development. EIL is also engaged in many unconventional energy resources projects like Solar, 2 G ethanol, bio-fuel etc. On 24 June, 2014, **EIL was conferred the status of Navaratna status by the Central Government of India.**

HAL: It is one of the biggest and oldest aerospace and defence producer in the world. Incorporated in the year 1940, in Bangalore under the ownership of the Ministry of Defence. The company is engaged in the manufacturing of products like aircraft, helicopter, avionics and communication equipment for military. On 22 June, 2007 the company awarded with the Navaratna status by Central Government of India. **SCI:** India's largest Shipping company, founded in 1961 in Mumbai under the ownership of Ministry of shipping with a sales turnover of 4,425.44 crore and coupled with a profit of 302.35 crore for the year 2020. Its 63.75 per cent of equity share is owned by the Central Government of India. The function of SCI is to regulate the vessels servicing for National Global lines. The services which are provided by the SCI are Tankers, Bulk carrier, Container, Offshore, Break-Bulk, Dry Docking, Costal and Passenger Service and Ship Building Consultancy etc. SCI was conferred with Navaratna status on 1st August, 2008 by the Government of India.

CONCOR: Established in 1988 in New Delhi under the ownership of Ministry of Railway with an aim to enhance modern multimodal transport logistics. It is engaged in both domestic and

international services. It deals in a business of intermodal freight transport. Its 56 per cent of equity share are owned by the Central Government. On July 23, 2014, CONCOR was awarded with the Navaratna status by Central Government of India.

MTNL: India's largest Telecommunication company, founded in 1986 under the ownership of Department of telecommunication, subordinate company of Bharat Sanchar Nigam Limited which hold 100 per cent of its share stock. Engaged in a product like Mobile telephony, fixed-line telephony, digital television wire and wireless broadband IPTV. Moreover, MTNL enjoys the benefit of operational and financial autonomy due to its Navaratna status.

NACL: It is the largest desegregated company, founded in 1981 under the ownership of the Ministry of Mines, which deals in a product like-Bauxite, Aluminium, Aluminium Hydrate, Aluminium refinery, Aluminium smelting and casting, Power generation, and Rail and port operation. Its 51.5 per cent of equity stock are owned by the Central Government. As per McKenzie report NACL manufactures Metallurgical grade alumina and bauxite at cheaper cost among all the countries in the world. NACL is rated third highest among all the CPSEs in net export earning as per PSE survey report. On 7th January, 1981 NACL was conferred with the Navaratna status by the Central Government.

NLC: Incorporated in 1956 as CPSEs under the ownership of the Ministry of Coal. India's highly honoured and prestigious company which deals in the products like -Lignite and Electrical Power. NACL annually produce 30 million tonnes of lignite from the state of Tamil Nadu and Rajasthan. It was awarded with the Navaratna status by Central Government in the year 2011.

NMDC: India's largest Iron-ore producer, which

produce more than 30 million tonnes of Iron-ore annually. Inaugurated in 1958 in Hyderabad under the ownership of Ministry of Steel. Its 69.65 per cent of equity share is owned by the Central Government of India. In 2018, NMDC was awarded the Corporate Social Responsibility Award from CSR category in London. In the year 2002, NACL was conferred with the Navaratna status by the Central Government of India.

RINL: It is a first largest shore-based unified Steel plant which deals in a product like- wire rode, TMT-Re-bars, rounds, square flats, angles, channels, and Rail wheels. Founded in 1982 in Vishakhapatnam, also known as Vizag Steel Plant and wholly owned company by the Central Government of India. Its annual capacity is 7.3 million tonnes and its expected capacity is 20 million tonnes by 2027. On November 16, 2010, RINL was awarded with the Navaratna status by the Central Government of India.

REC: India's Largest Power producer company and subsidiary of Power Finance Corporation. Established in 1969 under the ownership of the Ministry of Power by the Central Government of India. REC is listed on both NSE and BSE. It provides loans to Central and State sector Power utilities across the country, State and Rural Electric Cooperatives, NGOs and Private Power Developers. It's 52.63 per cent share are controlled by PFC. On May, 2008, REC was conferred with the Navaratna status by the Central Government of India.

NBCC: Founded in 1966 under the Ministry of Housing and Urban Affairs. It deals in three main segments i.e., Project Management Consultancy, Engineering Procurement and Construction and Real Estate Development. NBCC accomplish the projects like AMRUT, PMGSY, Solid Waste Management and Developmental work in North East Region. On June 23, 2014, NBCC got

Navaratna status by the Central Government of India.

OIL: Established in 1959 as a CPSEs under the Ministry of Petroleum and Natural Gas. It is one of the largest Crude oil and Natural Gas producer in India with a sales turnover of 31,153 crore and coupled with a profit of 6,607 crore for the year 2022. It deals in a production of Crude oil, liquid petroleum Gas, Natural Gas and transportation of Crude Oil. In the year 2010, OIL was conferred with the Navaratna status by the Central Government of India.

Literature Review

Banu (2022) took a comprehensive approach to assessing the profitability of seven sugar companies over a period of ten years. It was observed from the study that the ROCE of the sugar companies showed a declining trend in terms of profitability.

Garg and Gulia (2022) made an attempt to analyse the impact of liquidity on profitability in steel companies during the period 2016–2020 by using selected accounting ratios such as operating profit, gross profit, net profit, and return on capital employed and selected statistical techniques such as correlation, regression, etc. The study showed that the current and quick ratio was significant during the study period, but to nourish the working capital, the company needed to uphold more current or liquid assets. ROA and ROE have enhanced year over year, but the ratio is very low, which means the company is not making adequate investments in working capital.

Meghanathi and Chakrawal (2021) in their work, made an analysis of the liquidity and profitability of selected oil and gas companies

during the period of five years starting from 2016–17 to 2020–21. The outcome of the study stated that GAIL performed better among all sample companies in terms of profitability by managing its liquidity during the study period.

Bhavesh Prabhakar (2020) made an analysis on financial performance of selected CPSEs in India. For analyzing the data important ratio such as profitability, liquidity, efficiency and solvency and significant statistical techniques like – maximum, minimum, standard deviation and coefficient of variation were applied. The study concluded that CIL and NTPC performed well in terms of profitability ratio while the profitability ratio of HPCL and the remaining six companies was not much significant. Whereas, CIL was placed in the top position in terms of liquidity as compared to the other six companies.

Jain and Jain (2020) carried out a study to analyse the impact of liquidity and solvency on the profitability of Coal India Limited from the period 2010 to 2019. The study revealed that solvency does not have a significant positive impact on profitability, whereas liquidity has a significant positive impact on profitability.

Hema and Vanaja (2020) made an attempt to analyse the financial performance of selected public sector oil and gas companies for a period of five years, starting from 2014–15 to 2018–19. The study disclosed that ONGC proved itself to be the best performer in terms of profitability, liquidity, and operating efficiency, managing all its activities in a proper manner with greater efficiency.

Kaur (2019) conducted a research study to analyse the financial performance of Tata Steel

and SAIL during the period of 5 years, starting from 2014 to 2018. The study disclosed that in terms of all parameters, such as efficiency in working capital management as well as the use of an optimal capital structure, Tata Steel proved itself more efficient than SAIL.

Baskar (2019) made an attempt to assess the relationship between liquidity and profitability of Indian tyre companies during the period of ten years, starting from 2008–09 to 2017–18. The result of the study concluded that, in terms of liquidity and profitability, Goodyear India Ltd. obtained a better position as compared to others. It was also concluded that the firm should control its costs to enhance its profitability.

Gahlot (2019) made an analysis of the financial performance of five Maharatna companies, namely CIL, BHEL, NTPC, and ONGC, during the period from 2013–14 to 2017–18. The research study stated that CIL and BHEL were able to manage their liquidity in a more efficient manner than all the other companies. NTPC and CIL were the fastest-growing companies during the study due to their increasing efficacy in asset management.

Patjoshi (2019) made an attempt to assess the financial performance of HINDLCO and NALCO, an aluminum manufacturing companies in India during the period 2005-06 to 2014-15. The result of the study revealed that the based-on profitability and investment margin, NALCO obtained better position as compared to HINDALCO during the study period.

Akshya (2018) conducted an empirical study to identify the impact of liquidity on profitability of ONGC. For identifying the impact of liquidity

on profitability some selected ratios such as gross profit ratio, net profit ratio and operating profit ratio were used. The study disclosed that the liquidity ratio and operating profit ratio were declining continuously during the study period and there was a fluctuation in Gross Profit Ratio and Net Profit Ratio.

Biswas (2018) examined the financial performance of BHEL and BEL during the period of 2011 to 2015. The study revealed that BHEL was more efficient in managing its fixed assets as well as current assets as compared to BEL, which implied that BHEL is able to earn more profit by employing a minimum investment in assets as compared to BEL.

Yadav (2017) conducted a study on profitability analysis on the seven selected Maharatna companies during the period 2014–15 to 2016–17 by applying various accounting ratios such as ROA (return on asset), ROE (return on equity), NPM (net profit margin), EPS (earnings per share), and ROCE (return on capital employed). The study concluded that CIL scored greater value in terms of profitability, ROA, ROE, NPM, and EPS, followed by NTPC, ONGC, GAIL, and IOC. SAIL and BHEL were the only companies that reported a negative trend in the three financial years in terms of ROA, ROE, NPM, and EPS.

Singh and Sur (2016) conducted a cross-sectional comparative study on the profitability of Maharatna companies in India during the post-liberalization era. The study used technical efficiency score to measure the profitability of based on ROCE. Based on average TES of ROCE, BHEL and ONGC were the top CPSEs during the study period while GAIL and IOCL

found place in the last two positions. From all the CPSEs, BHEL and ONGC jointly captured top most position during period under study.

Singh and Sur (2016) analyzed the profitability performance of Maharatna CPSEs by applying Data Envelopment Analysis technique. The result of the study showed that ONGC and BHEL performed well in terms of profitability as measured by consistency coefficient of TES and NTPC and SAIL were placed in the last two ranks during the study period.

Padma (2016) made a comprehensive study on the financial performance of the steel industry by using selected accounting ratios such as gross profit ratio, net profit ratio, and operating profit ratio. The study revealed that APL Apollo Steel and Tata Steel occupied the top positions in terms of ROA, EPS, ROE, and ROCE.

Khan and Safiuddin (2016) made an attempt on liquidity and profitability performance of Telecom companies during the period 2010 to 2015. The result concluded that Vodaphone performed well as compared to Bharti Airtel in terms of liquidity, profitability.

Pervez and Yameen (2016) analyzed the performance of SAIL for a period of ten years by applying selected profitability, liquidity, solvency, and efficiency ratios and statistical techniques such as standard deviation, correlations, and multiple regression. The study disclosed that the gross profit ratio of SAIL was high and significantly positive, but the ROA, operating ratio, ROE, ROCE, and net profit ratio were not satisfactory due to a significant declining trend during the study period.

Mahesh and Thangaraj (2016) conducted a study to assess the association between profitability and liquidity of IOCL, HPCL, and BPCL. The result of the study showed that all the selected petroleum companies were quite efficient in terms of operating efficiency, but their liquidity was not good during the period under study.

Kumar (2016) made an attempt to **examine** the profitability performance of Tata Steel Limited during the period of fifteen years, starting from 2000-01 to 2014-15. The outcome of the study indicated that the overall profitability performance of Tata Steel Limited was excellent in all the given years during the period under study.

Gap in the Existing Research

The analysis of the significant study proposal indicates that most of the studies were concerned with the financial performance analysis of the Maharatna CPSEs, very few studies were conducted on the profitability performance of Navaratna CPSEs. However, the outcomes derived from these studies were contradictory in the nature and therefore, no definite conclusion can be drawn from these studies. Moreover, no comprehensive studies were carried out to deal with the matter relating to profitability performance of the Navaratna CPSEs in India in the recent times considering all the major factors and determinants of profitability. Only a very few studies on the issues addressed in present study was conducted in the recent past in which any one or two dimensions of profitability performance were taken into consideration. In this study an attempt will be made to analyse the profitability trends in the selected Navaratna Central Public Sector Enterprises in India through Technical

Efficiency Scores by using Data Envelopment analysis method (DEA).

Objectives of the study

- i) To measure the profitability of the selected Navaratna CPSEs using both conventional ratio analysis and Technical Efficiency Scores (TES).
- ii) To ascertain the status of the profitability of the companies under study more precisely based on both composite ranks of the conventional ratio and those of TES.
- iii) To identify the nature of trends in the profitability of the sample companies in terms of selected profitability indicators as well TES during the study period.
- iv) To identify the major factors which influence the profitability of the companies selected in the study.
- v) To ascertain the status of the companies under study in respect of the efficiency of their asset management.

Data Source and Methodology of the Study

This study is based on all Navaratna CPSEs. The data of these companies for the period 2013-2022 used in this study will be collected from secondary sources such as Capitaline corporate data base, CMIE reports, published annual reports of the companies and other prominent sources. The collected data will be analysed through Technical Efficiency Scores and Data Envelopment Analysis (DEA).

To determine the profitability of the selected Navaratna CPSEs Ratio analysis has been used in this study. For analysing the profitability of the companies under study, some major contributory factors of profitability such as efficiency of fixed assets turnover ratio (FATR), inventory turnover ratio (ITR), debtor's turnover ratio (DTR), debt

equity ratio (DER) and cash turnover ratio (CTR) were taken as input and value added capital employed (VACE) were taken as output to address the efficiency of fixed asset management, inventory management, debtor's management and cash management of the Navaratna CPSEs respectively. The higher turnover ratio indicates that the company is more efficient in generating revenue from its asset whereas, low turnover ratio indicates weak sales, inventory glut or a dull market demand.

Data Envelopment Analysis (DEA) is a non-parametric method used in operations research and management science to evaluate the relative efficiency of a set of decision-making units (DMUs) that use multiple inputs to produce multiple outputs. The method was developed by Charnes, Cooper, and Rhodes in the 1970s.

DEA is used to measure the efficiency of DMUs by comparing their input-output ratios with those of other DMUs. It allows for the identification of DMUs that are technically efficient and those that are not. The method assumes that the DMUs operate under the same production technology, and it measures the efficiency of each DMU in terms of its ability to produce the same level of outputs as other DMUs with the minimum level of inputs.

DEA has several advantages over other methods for measuring efficiency, such as linear programming and stochastic frontier analysis. It is non-parametric, meaning that it does not require any assumptions about the underlying production function or the distribution of the data. It is also flexible and can handle multiple inputs and outputs simultaneously. Additionally, DEA provides a ranking of the DMUs based on their efficiency scores, which can be used to identify best practices and areas for improvement.

DEA has been used in various fields, including

manufacturing, healthcare, education, and finance. In the context of financial analysis, DEA has been used to evaluate the efficiency of banks, insurance companies, and other financial institutions. In the case of the Navaratna companies study mentioned earlier, DEA will be used to evaluate the efficiency of the selected companies in converting their inputs into outputs, which will provide insights into their profitability trends.

Empirical Result and Discussion

It was observed from table-1 that BEL scored the highest efficiency value 1.00, based on VACE during study the period 2012-2013, 2013-2014, 2014-2015, 2015-2016, 2016-2017, 2017-2018, 2018-2019, 2019-2020, 2020-2021 and 2021-2022 while it was least on 2021-2022 (0.95). On an average, it was 1.00. The second highest efficiency value of TES was scored by EIL (1.00) during the year 2013-2014, 2014-2015, 2015-2016, 2017-2018, 2019-2020, 2020-2021 and 2021-2022 while it was minimum in the year 2012-2013 (0.92), 2016-2017 (0.99), 2018-2019 (0.96). The average mean value of EIL was 0.99. The third highest efficiency value with respect to VACE was scored by REC (1.00) during the study period 2013-2014, 2014-2015, 2016-2017, 2017-2018, 2019-2020, 2020-2021 while it was least in 2012-2013, 2015-2016, 2018-2019 and 2021-2022. The mean of company was 0.99. The TES of the OIL was 1.00, in the year 2012-2013, 2015-2016, 2017-2018, 2018-2019, 2019-2020, 2020-2021, 2021-2022 whereas it was least in 2013-2014 (0.98), 2014-2015 (0.66) and 2016-2017 (0.46). The average value of TES achieved by OIL was 0.89. In NBCC the TES fluctuates between 0.22 (2020-2021) to 1.00 in the year 2021-2022. The mean average value was value 0.77. The TES of MTNL during the study period

was 1.00 in the year 2012-2013, 2013-2014, 2016-2017, and it was minimum in the year 2014-2015 (0.20), 2017-2018 (0.98), 2018-2019 (0.49), 2019-2020 (0.34), 2020-2021(0.23), 2021-2022 (0.20). The average TES value of MTNL was 0.64. The efficiency score of NMDC based on VACE was 1.00 during the study period 2013-2014, 2015-2016, 2016-2017, 2018-2019, 2019-2020 and 2021-2022 while it was least in the year 2012-2013 (0.98), 2015-2015 (0.93), 2017-2018 (0.95) and 2020-2021(0.99). The average mean was 0.99 during the period under study. The TES of NACL ranged between 1.00 (2013-2014, 2015-2016, 2016-2017, 2018-2019, 2019-2020 and 2021-2022) and 0.99 (2012-2013), 0.91 (2014-2015), 0.96 (2017-2018), 0.98(2020-2021). The mean TES of NACL was 0.98. The TES of NLC varied widely between 0.95 (2014-2015), 0.82 (2019-2020), 0.98 (2020-2021) to 1.00 (2012-2013, 2013-2014, 2015-2016, 2016-2017, 2017-2018, 2018-2019 and 2021-2022). The TES of RINL based on VACE was 1.00 during the study period 2014-2015 to 2017-2018 and 2019-2020 to 2021-2022. The average mean of RINL was 0.88. The VACE value of CCL was 1.00 in the year 2012-2013, 2013-2014, 2014-2015, 2015-2016, 2016-2017 and 2017-2018 while it was least (0.32) in 2020-2021. The TES of CCL was 0.85. The efficiency score of HAL based on VACE was 1.00 in the year 2012-2013, 2014-2015, 2015-2016, 2017-2018 and 2021-2022 and average mean was 0.80. The TES of SCI was 1.00 during the year 2012-2013, 2016-2017 and 2019-2020 while it was least (0.06) in 2013-2014. The consistency coefficients (C.C) of TES of Navaratna CPSEs (as disclosed in Table 2) were 62.93 (BEL), 3.28 (CCL), 36.98 (EIL), 3.50 (HAL), 1.69 (MTNL), 33.77 (NACL), 2.44 (NBCC), 17.16 (NLC), 39.31 (NMDC), 4.69 (OIL), 3.84 (RINL), 37.38 (REC), 1.56 (SCL).

Based on average TES, BEL captured the highest rank, followed by EIL, REC, NACL, NLC, RINL, NMDC, OIL, CCL, HAL, NBCC, MTNL and SCI respectively in that order while in respect of the consistency scores of TES, BEL established itself as the most consistent performer, followed by NMDC, REC, EIL, NACL, NLC, OIL, RINL, HAL, CCL, NBCC, MTNL and SCI respectively in that order during the study period. Table 1 also reveals that BEL secured highest TES in ten years 2012-2013, 2013-2014, 2014-2015, 2015-2016, 2016-2017, 2017-2018, 2018-2019, 2019-2020, 2020-2021 and 2021-2022 of the period under study while the highest score of efficiency was obtained by EIL in seven years 2013-2014, 2014-2015, 2015-2016, 2017-2018, 2019-2020, 2020-2021 and 2021-2022 and REC, OIL, NACL, NLC, RINL, NMDC, OIL, CCL, HAL, NBCC also proved themselves as best performer in terms of value generating capability (as expressed by the TES) in six years 2013-2014, 2014-2015, 2016-2017, 2017-2018, 2019-2020 and 2020-2021, seven years 2012-2013, 2015-2016, 2017-2018, 2018-2019, 2019-2020, 2020-2021, 2021-2022, six years 2013-2014, 2015-2016, 2016-2017, 2018-2019, 2019-2020 and 2021-2022, seven years 2012-2013, 2013-2014, 2015-2016, 2016-2017, 2017-2018, 2018-2019 and 2021-2022, respectively. Another notable outcome of the study is that SCI was placed in the last position in terms of efficiency in value generating capability.

A wide variation in efficiency scores across the selected Navaratna CPSEs over the years during the period under study was observed. The higher the average efficiency scores, the higher is the efficacy of the company in value generating capability by making proper utilization of its different assets. In the study period the maximum value of average efficiency score of the Navaratna

companies was observed in BEL while the minimum value was found in SCI. From the table it can be concluded that in most of the year under study NCL, NMDC, NBCC, CCL, OIL, REC and HAL was able to enhance its value generating capability with the help of smaller turnover ratios. On the other hand SCI was not able to enhance its value generating capability using higher turnover ratios.

Analysis of Trend of TES

In Table 3 an attempt was made to ascertain the nature of trend in TES of each of the Navaratna CPSEs during the period under study.

Table 3 discloses that out of thirteen Navaratna companies, only MTNL showed declining trend in TES over the study period which was found to statistically significant. The negative values of slope of the trend lines indicate negative relationship between technical efficiency and time whereas the notable positive value of the slope of the equations reflects positive association between technical efficiency and time. However, the insignificant positive values of slopes of trend lines were observed in BPCL, CCL, EIL, NBCC, NMDC, NLC, OIL, RINL, REC, NACL, HAL and SCI which depicts that no definite trend were observed in these companies with respect to VACE.

Conclusion

The present study deals with the aspect of technical efficiency with respect to the value generating capability in terms of VACE. The study discloses a wide variation in the level of TES across the Navaratna companies in India during the period study. Based on average TES, BEL captured the highest position in terms of average VACE and proved themselves as most consistent performer in terms of value generation

as measured by consistency coefficient (C.C) of TES during the study period while SCI was placed in last position during the same period and proved themselves as most inconsistent performer in terms of value generating capability.

The analysis of composite scores based on combination of average and consistency aspects of the TES of the Navaratna CPSEs under study discloses that BEL established themselves as the best performer among the Navaratna CPSEs in terms of value generating capability during the study period whereas SCI was unable to prove themselves as significant performer.

A significant declining trend in the value generating capability as reflected in the TES was observed in 40 per cent cases while in 20 per cent cases a significant upward trend was observed but in the remaining 40 per cent cases no noticeable trend in values generating capability was noticed during the study period.

On a whole, the empirical analysis as made in this study reflects managerial inefficiency in value generating capability in 40 per cent of the Navaratna companies in India during the study period. This managerial inefficiency seems to be the outcome of excessive government interventions. In fact, lack of complete autonomy and lack of fund in managing the business operations compelled the concerned managers to choose a second best alternative input mix rather than choosing the best allocation of resources. As a result, the managerial inefficiencies in business operations of the companies under study could not be removed.

Thus, a policy of decontrolling the Navaratna CPSEs by minimizing the government interference is suggested to improve their managerial efficiency.

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Table: 1 Company-wise Technical Efficiency Scores (TES) based on Value Added to Capital Employed (VACE) of Navaratna CPSEs

Year Company	BEL	CCL	EIL	HAL	MTNL	NACL	NBCC	NLC	NMDC	OIL	RINL	REC	SCI
2013	1.00	1.00	0.92	1.00	1.00	0.99	1.00	1.00	0.98	1.00	0.30	0.98	1.00
2014	1.00	1.00	1.00	0.62	1.00	1.00	1.00	1.00	1.00	0.82	0.77	1.00	0.06
2015	1.00	1.00	1.00	1.00	0.20	0.91	1.00	0.95	0.93	0.66	1.00	1.00	0.29
2016	1.00	1.00	1.00	1.00	1.00	1.00	0.54	1.00	1.00	1.00	1.00	0.99	0.46
2017	1.00	1.00	0.99	0.41	1.00	1.00	1.00	1.00	1.00	0.46	1.00	1.00	1.00
2018	1.00	1.00	1.00	1.00	0.98	0.96	0.53	1.00	0.95	1.00	1.00	1.00	0.66
2019	1.00	0.53	0.96	0.70	0.49	1.00	1.00	1.00	1.00	1.00	0.73	0.92	0.31
2020	1.00	0.61	1.00	0.77	0.34	1.00	0.37	0.82	1.00	1.00	1.00	1.00	1.00
2021	1.00	0.32	1.00	0.52	0.23	0.98	0.22	0.98	0.99	1.00	1.00	1.00	0.18
2022	0.95	1.00	1.00	1.00	0.20	1.00	1.00	1.00	1.00	1.00	1.00	0.96	0.57
Average	1.00	0.85	0.99	0.80	0.64	0.98	0.77	0.98	0.99	0.89	0.88	0.99	0.55
Maximum	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Minimum	0.95	0.32	0.92	0.41	0.20	0.91	0.22	0.82	0.93	0.46	0.30	0.92	0.06
S.D	0.02	0.26	0.03	0.23	0.38	0.03	0.31	0.06	0.03	0.19	0.23	0.03	0.35
Consistency Coefficient (C.C)	62.93	3.28	36.98	3.50	1.69	33.77	2.44	17.16	39.31	4.69	3.84	37.38	1.56

Source: Compiled and computed from Capitaline Corporate Database, Capital Market Publishers (India) Ltd. Mumbai

Table: 2 Company-wise Composite Rank of Profitability of Navaratna CPSEs based on TES

Company	Mean Value	Rank	Consistency Coefficient	Rank	Sum of Rank	Ultimate Rank
BEL	1	1	62.93	1	2	1
CCL	.85	9	3.28	10	19	9.5
EIL	0.99	2.5	36.98	4	6.5	3
HAL	0.80	10	3.50	9	19	9.5
MTNL	0.64	12	1.69	12	24	12
NACL	0.98	7.5	33.77	5	12.5	5
NBCC	0.77	11	2.44	11	22	11
NLC	0.98	7.5	17.16	6	13.5	6
NMDC	0.89	7	39.31	2	9	4
OIL	0.88	8	4.69	7	15	7
RINL	0.98	7.5	3.84	8	15.5	8

REC	0.99	2.5	37.38	3	5.5	2
SCI	0.55	13	1.56	13	26	13

Source: Compiled and computed from Capitaline Corporate Database, Capital Market Publishers (India) Ltd. Mumbai

Table: 3 Company –wise Trends in Profitability of Navaratna CPSEs

Company	Constant	t value	Coefficient	t value	R	F	R-Square
BEL	1.010**	103.37	-.003	-1.732	.522	3.000	.273
CCL	1.117**	7.325	-.049	-2.003	.578	4.012	.334
EIL	.967**	55.06	.004	1.307	.419	1.708	.176
HAL	.874**	5.33	-.013	-.496	.173	.246	.030
MTNL	1.092**	5.206	-.081*	-2.40	.648	5.80	.421
NACL	.972**	47.27	.002	.658	.227	.434	.051
NBCC	1.023**	5.02	-.047	-1.422	.449	2.02	.202
NLC	1.001**	25.15	-.005	-.746	.255	.557	.065
NMDC	.971**	56.09	.002	.890	.300	.793	.090
OIL	.777**	5.975	.021	1.012	.337	1.024	.113
RINL	.643**	4.716	.043	1.95	.569	3.83	.324
REC	.998**	54.308	-.002	-.798	.272	.637	.074
SCI	.575	2.149	-.002	-.0521	.018	.003	.000

Figures in the parentheses indicate |t| values ** Significant at 1 per cent level. * Significant at 5 per cent level.

Source: Compiled and computed from Capitaline Corporate Database, Capital Market Publishers (India) Ltd. Mumbai.

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