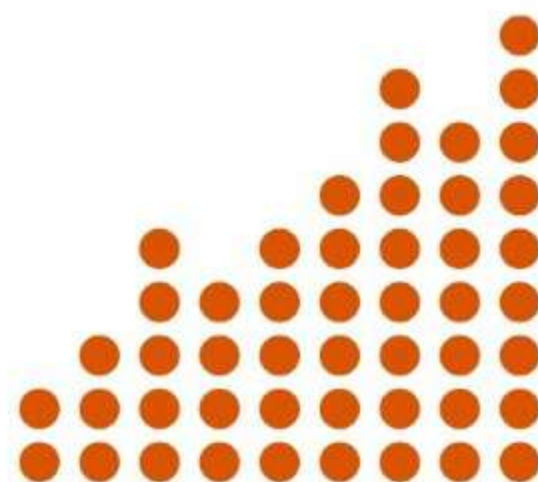




NEW FRONTIERS IN **COMMERCE AND MANAGEMENT STUDIES**

Editor(s) :

Dr. Soma Sur
Dr. Ashish Kumar Sana
Dr. Somnath Banerjee
Dr. Monalika Dey



New Frontiers in Commerce and Management Studies

St. Xavier's University, Kolkata

Fr. Lafont Centre for Excellence in Research and Innovation (LCERI)

In Association with

Indian Accounting Association, Kolkata Branch (AOP)

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Editors

Dr. Soma Sur, Dr. Ashish Kumar Sana, Dr. Somnath Banerjee, Dr. Monalika Dey

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Foreword

It gives me immense pleasure to present this book to the readers titled *“Emerging Issues in Accounting, Finance and Management.”* This edited volume has emerged from the One-Day National Conference organized by the Fr. Lafont Centre for Excellence in Research and Innovation (LCERI), St. Xavier’s University, Kolkata, in association with the Indian Accounting Association, Kolkata Branch, held on 26th July 2025.

Since its inception in 2017, St. Xavier’s University, Kolkata has steadily grown into a vibrant centre of higher education and research, offering diverse undergraduate, postgraduate, and doctoral programmes. Guided by the Jesuit vision of excellence, ethics, and service, the University continues to foster academic platforms that encourage critical inquiry and meaningful engagement with contemporary issues.

This book is a significant academic outcome of the Conference, bringing together scholarly contributions from academicians, research scholars, and industry professionals across the country. The chapters reflect the rapidly evolving landscape of Accounting, Corporate Finance, Banking, Taxation, Marketing, Human Resource Management, Analytics, Artificial Intelligence, Sustainability, and ESG frameworks. The volume thoughtfully addresses paradigm shifts in regulatory practices, governance standards, digital transformation, financial innovation, and sustainable business models.

By integrating theoretical perspectives with practical insights, this publication serves as a valuable reference for students, researchers, policymakers, and practitioners. It not only documents emerging trends but also promotes dialogue between academia and industry, thereby strengthening responsible leadership and sustainable development.

I congratulate the Editors — Dr. Soma Sur, Dr. Ashish Kumar Sana, Dr. Somnath Banerjee, and Dr. Monalika Dey — for their dedicated efforts in bringing out this volume. I am confident that this book will make a meaningful contribution to contemporary scholarship in Accounting, Finance, and Management.

I extend my best wishes for its wide readership and impact.

Rev. Dr. J. Felix Raj, S.J.

Vice-Chancellor

St. Xavier’s University, Kolkata

Preface

In an era marked by rapid regulatory reforms, technological disruptions, and evolving governance standards, the disciplines of Accounting, Finance, and Management are witnessing profound transformation. The increasing integration of analytics, artificial intelligence, sustainability frameworks, and digital financial systems has significantly reshaped both academic inquiry and professional practice. Organizations today are required not only to ensure compliance and financial prudence but also to embrace innovation, transparency, and responsible governance.

This edited volume, *New Frontiers in Commerce and Management Studies*, is a compilation of selected papers presented at the One-Day National Conference on “**Emerging Issues in Accounting, Finance and Management**”, organized by the Fr. Lafont Centre for Excellence in Research and Innovation (LCERI), St. Xavier’s University, Kolkata, in association with Indian Accounting Association, Kolkata Branch. The Conference brought together academicians, research scholars, and industry professionals from across the country to deliberate upon contemporary challenges and emerging opportunities in commerce and management.

The volume is thoughtfully structured across eight thematic tracks, each addressing a vital dimension of contemporary scholarship and practice.

The **Accounting** track examines accounting standards, regulatory frameworks, compliance mechanisms, disclosures, ethics, and corporate governance, highlighting the growing importance of transparency and accountability in financial reporting.

The **Corporate Finance** track explores critical financial decisions relating to dividends, capital structure, working capital management, and earnings management, emphasizing value creation and financial sustainability.

The **Banks and NBFCs** track focus on developments in banking, insurance, and non-banking financial institutions, particularly in the context of financial inclusion, digital transformation, and regulatory oversight. The **Taxation** track addresses taxation and e-governance, reflecting on digital tax administration, GST reforms, compliance systems, and the integration of AI-driven technologies in public finance.

The **Marketing** track engages with marketing management and strategic management perspectives, exploring evolving consumer behavior, competitive positioning, digital marketing trends, and global trade dynamics.

The **Human Resource Management** track integrates HRM and Organizational Behavior, examining talent management, employee engagement, diversity and inclusion, and sustainable workplace practices in a rapidly changing organizational environment.

The **Analytics** track highlights the transformative role of data analytics, artificial intelligence, machine learning, and digital disruption across accounting, finance, and management domains, underscoring data-driven decision-making and technological innovation.

Finally, the **Sustainability** track addresses environmental changes and sustainability issues in accounting, finance, and management, with special emphasis on ESG frameworks, responsible governance, and long-term value creation.

The contributions in this volume explore diverse and contemporary themes such as intellectual capital and intangible assets, earnings quality and corporate governance, mergers and acquisitions, digital banking transformation through UPI, tax literacy and e-governance, AI-driven taxation systems, ESG disclosures, sustainability reporting, diversity and inclusion initiatives, green HRM practices, and data-driven managerial decision-making.

Several papers critically examine evolving regulatory frameworks including Ind AS standards, GST and e-invoicing systems, and sustainability reporting norms, while others investigate behavioural finance dimensions, market perception through text mining, and the growing relevance of analytics and machine learning in strategic decision-making. The discussions on data privacy, digital adoption, corporate ethics, environmental responsibility, and governance transparency reflect the pressing concerns of contemporary business ecosystems.

A distinctive feature of this book lies in its methodological diversity—ranging from empirical studies, bibliometric analyses, literature reviews, and statistical investigations to conceptual explorations and policy-oriented discussions. The blend of theoretical rigor and practical relevance makes this volume a meaningful academic contribution.

We hope that this handbook will serve as a valuable reference for researchers, faculty members, students, policymakers, and practitioners. It is our sincere belief that the ideas presented herein will stimulate further research, encourage informed policy formulation, and foster responsible managerial practices in an increasingly digital and sustainability-driven global environment.

Editors

Dr. Soma Sur

Dr. Ashish Kumar Sana

Dr. Somnath Banerjee

Dr. Monalika Dey

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AN EMPIRICAL INVESTIGATION OF ANTECEDENTS AND EFFICIENCY OF INTELLECTUAL CAPITAL OF SELECT FIRMS LISTED IN INDIA

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Abstract

In the modern era of knowledge-driven business, the intangible resources especially, the Intellectual Capital (IC) have become critical in terms of enhancing the competitive advantage of a firm. This paper examines the effectiveness of Intellectual Capital (ICE) and the determinants that drive it among the sampled non-financial companies traded on the NSE500 index in India in the past eleven years (2014-2025). Based on the data received through annual reports, the analysis uses quantile regression to overcome the issue of skewness distribution and heteroscedasticity and provides finer details concerning various sets of efficiency levels. The analysis results indicate that Firm Size, Promoter Ownership, and Firm Value have a positive and significant improvement in ICE in all the quantiles. Leverage has a negative correlation with ICE at lower and middle quantiles, but Corporate Social Responsibility (CSR) seems to be more significant to the firms working at higher effectiveness levels. The effect of Firm Age is also not stable, so it is not true that older firms are more efficient in terms of using intellectual resources. Also, the foreign ownership, Return on Total Assets (RTA), and Return on Net Worth (RNW) do not show significant influences on ICE. This research offers a valuable contribution to the body of research because it provides the empirical data based on the Indian corporate environment and any practical implications to the managers and policymakers. The findings identify the necessity of context-specific approaches that would harmonise the firm characteristics and governance practice with the successful exploitation of intellectual capital.

Keywords: *Intellectual Capital Efficiency (ICE); Corporate Social Responsibility (CSR); Quantile Regression.*

1. Introduction

In current global business environment that is highly dynamic, competitive advantage is driven in a different way. Companies can no longer afford to stick to the physical resources or capital to remain competitive. Rather, intangible capabilities, particularly, Intellectual Capital (IC) are taking the centre-stage in innovation, value generation and sustainability. The MVAIC framework of Pulic captures the IC using four interrelated dimensions namely, human capital, which is the skills, expertise, and creativity of the employees; structural capital, comprising the organisational systems, processes and intellectual property; relational capital, which entails the networks and relationships of a firm with their customers and partners and capital employed, which is the net assets that the firm uses in value creation. All of these elements combine to define the capability of firms to learn, evolve and develop in a knowledge-based economy.

The importance of IC is more so in new markets such as India where technology changes, shifting consumer demands and increasing global competitiveness are compelling companies to enhance their intangible assets. Nonetheless, the strategic value of IC has been barely acknowledged in the conventional financial reports thus rendering it hard to evaluate by investors, managers, and policy makers the full contribution of the strategic value of IC to the performance of firms. This difficulty is

accentuated in the Indian market because of the heterogeneous state of the industrial environment where companies are located with a different level of technological maturity and technological innovation preparedness. With the increased application of digital tools, automation and knowledge-intensive processes by businesses, value created by human expertise, organisational systems and external relationships turns out to be even more important. Besides, the shift in the Indian economy towards a service-based and innovation-based economy implies that IC is at the core of productivity, competitiveness, and long-term sustainability determination. Therefore, not only is the understanding and measurement of IC relevant, but it is also critical to firms that have to make it in the changing dynamics of the corporate environment in India.

It is this invisibility in traditional reporting that has in turn brought about an academic and corporate interest in the measurement of Intellectual Capital Efficiency (ICE) which measures the effectiveness of firms in using their intellectual resources. In an effort to overcome this measurement hurdle, a number of frameworks have been suggested with Pulic Value Added Intellectual Capital (VAIC) model and an enhanced illustration of the same, the Modified VAIC (MVAIC) being the most utilized ones. However, there is a scarcity of empirical studies on the determinants of ICE, particularly in the context of India, although the number of such studies continues to increase. With firms becoming more dependent on intangible advantages, the possibility of the attributes of the firm size, age, leverage, and ownership structure, and even the CSR engagement determining ICE makes comprehending the role of these stated characteristics in designing informed and context-specific approaches to intellectual capital management crucially important. This paper aims to add to this debate by discussing ICE and the main antecedents of the same in a sample of non-financial companies listed on NSE500 index in India. This way, it contributes to the current debate regarding intellectual capital and provides practical implications to corporate decision-makers, investors, and policy-makers who have to sail through the turbulent waters of the contemporary knowledge economy.

Despite the fact that previous studies tend to investigate the relationship between IC and the performance of the firms, there is a lack of researches that examine the specific aspects that influence ICE, particularly in the Indian corporate environment. Most of the existing literature either ignores significant firm-level and governance variables or is based highly on profitability measures, and so there is a dearth of knowledge on how intangible resources are managed and optimised. To close this gap, the current paper assesses ICE and explores its main antecedents through the application of quantile regression within an eleven-year interval (2014-2025). This design takes in place the differences within the ICE distribution, and thus it is able to more accurately analyse the impact of various traits on firms at different levels of efficiency.

Objective of the Study

This study is motivated by two major objectives:

- To determine the extent of Intellectual Capital Efficiency (ICE) of sampled Indian listed firms.
- To establish and assess the primary antecedents, which have a great impact on ICE.

The rest of the paper is structured in the following way: Section 1 was about the introduction and objective of the study, Section 2 is a review of relevant literature and an outline of gap of research. The data, sampling procedures, and methodological approach are outlined in section 3. Section 4 shows and talks of the empirical results, basing on quantile regression. Section 5 ends with a summary of the main insights, implications and contributions.

2. Review of Literature

Intellectual Capital (IC) has become a key focus in modern day managerial studies as companies all over the globe shift their production modes that were resource-focused to knowledge-based operations.

IC is a broader concept that defines the intangible attributes, such as, skills, systems, relationships, and organisational processes, which allow firms to be innovative and competitive in promoting productivity and maintaining a competitive advantage.

The initial researchers, Edvinsson and Malone (1997) and Stewart (1998) placed emphasis on IC as strategic asset that could create the long-term value that is not reflected in the conventional accounting systems. A broadly used typology of the efficiency of IC was developed over time, which included human capital (competencies and expertise possessed by employees), structural capital (processes inside the company, routines, patents, and technologies), relational capital (network of stakeholders and relationships in the market). The combination of these conditions supports the capacity of a firm to develop and exploit knowledge in the changing market settings.

In the emerging economies, especially in India, the applicability of ICE has grown to a great degree as a result of a high rate of digitalisation, greater globalisation and the emergence of knowledge-intensive industries, such as, IT services, pharmaceuticals, fintech, and telecommunications.

The current competitive markets of the Indian firms are such that long term survival is sealed with continuous innovation, learning agility and relationship management. The more organisations invest in digital technologies, training programs, data systems, and customer engagement platforms, the more their intangible resources are in the centre of determining the performance of the firm (Nimtrakoon, 2015).

Nevertheless, even having strategic value, ICE continues to be only partially reported in annual reports and this is very much because of the restrictions of conventional financial reporting systems. This partial invisibility renders stakeholders such as, investors, regulators, and managers, with the challenge of analysing the actual status and possibility of organisations in India. This gap has been the cause of increasing literature on academic literature that is eager to find effective mechanisms that can be used to quantify the Intellectual Capital Efficiency (ICE) concept which is a measure of how efficiently firms are able to convert intangible assets into value. IC efficiency is not just about the identification of intangible resources, but it is also concerned with how effective the intangible resources are in producing output, competitive advantage and financial success. Out of the numerous models that have been created to quantify ICE, Pulic (1998) Value Added Intellectual Capital (VAIC) model has become the most popular to use because of its simplicity, objectivity and the use of publicly available financial information. VAIC measures value added efficiency in three major forms namely Human Capital Efficiency (HCE), Structural Capital Efficiency (SCE) and Capital Employed Efficiency (CEE). Following the increasing role of the relational capital, subsequent scholars put VAIC in a new framework as the Modified VAIC (MVAIC) model where Relational Capital Efficiency (RCE) was incorporated (Nazari and Herremans, 2007). Some studies have been done in India to use VAIC and MVAIC to determine the relationship between IC and firm value. Based on a big sample of Indian firms, Kapoor and Saihpal (2022) discovered that IC generates significant improvements in the profitability of firms and their valuation on the market. Their discussion supported the notion that intangible capabilities are essential to companies operating in the changing economic environment in India. Nevertheless, their research was more performance-based and failed to examine more organizational and governance-related issues that affect the efficiency of IC utilisation. A number of empirical studies globally have found out that IC is strongly related to firm performance. Chen, Cheng, and Hwang (2005) established the positive relationship between IC and market valuation and financial performance of Taiwanese firms. Correspondently, Biswanath and Hoque (2019) and Xu and Liu (2020) provided strong evidence of ASEAN and Chinese markets that indicates that IC is crucial to the capacity of innovation, operational efficiency, and competitive power. All these international studies lead to the common conclusion that the companies that have efficiency in their IC are better suited to be able to adapt, innovate, and maintain long-term growth. Nevertheless, regardless of these revelations, the issue of what determines the efficiency of IC, compared to the level or outcome of IC, is under-

researched. The performance effects attract a lot of studies whereas the antecedents that influence the way firms utilise their intellectual capital are ignored.

ICE antecedents are still at an initial phase of research in the Indian academic arena. Even though other scholars such as Chatterjee, Ghosh, and Banerjee (2022) have used moderating demographic variables, including gender and age, to build the relationship between IC performance and structural equation modelling, they neither include key firm characteristics, including size, leverage, age, or governance variables. In the same manner, Sharma and Dharni (2021) placed focus on board composition and quality of governance in the formation of IC disclosure practices and did not directly measure IC efficiency. This creates huge gaps in the knowledge of the organisational forces behind the utilisation of IC. Abdallah et al. (2024) performed a large-scale bibliometric review of the global IC research and found that there are many possible determinants, such as organisational culture, leadership ability, board diversity, knowledge-sharing practices, etc. Nonetheless, they just worked conceptually, bringing out trends, but not presenting facts. Moreover, the majority of the world research is located in the developed market which restricts its applicability to the emerging economies such as India where the governance system, ownership arrangement, and the lack of resources vary greatly. The main point in the comparison of research is that IC is frequently tested as a separate variable that determines the performance of firms or as a dependent variable that is governed by disclosure practices. The number of studies that analyse ICE as the central dependent construct that is influenced by the firm level antecedents is very few.

In this way, the efficiency aspect, the quality of the process of converting intellectual resources into value, is not yet well addressed, especially in the environment of heterogeneous corporate culture of India.

3. Research Methodology

The given research project is a quantitative research design since it aims to examine the effectiveness with which the Indian listed companies exploit their intellectual capital and the organisational or governance-related conditions influencing this effectiveness. As intangible assets continue to gain relevance in the current knowledge-based markets, the methodology was well designed to have analytical rigour in addition to representing the subtle differences caused by firm-level factors as well as macroeconomic parameters. The general strategy incorporates a number of statistical tools that are highly appropriate to the kind of data, especially those that are able to remedy problems of skew, heteroskedasticity, and possible multicollinearity. This framework provides a good background to create quality and useful insights about Intellectual Capital Efficiency (ICE).

3.1 Data Sources and Sampling Framework

The analysis will be based on the secondary data to examine the long-term developments of the management of intellectual capital in firms as reflected in the annual reports of NSE500 listed companies. These reports have been obtained via publicly available platforms such as corporate websites, statutory filings and regulatory disclosure repositories. A time frame of eleven years (2014-2025) enables the analysis to capture different economic cycles and how different strategic responses of firms change over the years under analysis.

The sample did not include financial institutions. Their accounting formations, regulatory needs, and capital formations vary considerably as compared to non-financial firms and this may bias comparisons at the intellectual capital. Following the use of the required screening and exclusion criteria, the ultimate dataset was established to include 434 non-financial firms. These companies cut across a long range of industries including manufacturing, IT services, pharmaceuticals, consumer goods, energy and infrastructure. This diversity blend can also be seen in the fact that the findings are not limited to any specific industry environment but they represent the wider corporate landscape in India.

The annual observations of each company in relation to the studied years will result in a rich panel dataset, which can be analyzed as a cross-sectional and longitudinal dataset alike. This multi-year data, in addition to strengthening the results, allows finding out the long-term patterns and structural changes in the application of intellectual capital over time.

3.2 Measurement of Variables

The interest construct is Intellectual Capital Efficiency (ICE) that is quantified by Pulic Modified Value Added Intellectual Capital (MVAIC) model which is an established framework used in the study of intellectual capital. The MVAIC model breaks down intellectual capital into some of its aspects, such as, Human Capital Efficiency (HCE), Structural Capital Efficiency (SCE), Relational Capital Efficiency (RCE), that includes ICE, and Capital Employed Efficiency (CEE). Combined, these dimensions reflect the level of effectiveness of firms to translate intangible resources based on knowledge into value creation.

In order to test the motivation of ICE, the research includes a set of antecedent organisational and governance-related variables. Firm age is added to capture the experience and maturity of the organisation whereas firm size is in terms of natural logarithm of total assets, in capturing the scale effects that could either be beneficial or adverse to intellectual capital. The debt to equity ratio indicates leverage and therefore the analysis is able to take into account the impacts that financial structure has on strategic resource utilization.

The profitability is measured in two directions: Return on Total Assets (RTA) and Return on Net Worth (RNW) that provide two complimentary ways of looking at the efficiency of the firm. The variables of ownership are promoter shareholding and foreign institutional investor (FII) shareholding, both of which are usually associated with differences in management monitoring, strategic orientation and quality of governance. The Corporate Social Responsibility (CSR) scores derived out of annual reports are also incorporated in the study, and it is recognised that socially responsible companies could be more likely to invest in intangible assets as they have long term value creation. These variables taken as a combination would give a comprehensive picture of the internal and external forces that determine the capability of a firm to effectively manage its intellectual capital.

3.3 Statistical Techniques

A list of diagnostic tests was encountered to the dataset before choosing the strategy of analysis. Primary tests revealed that several of the variables were not normally distributed so that the standard Ordinary Least Squares (OLS) regression would not be suitable in estimating the data reliably. In response to this, the study uses quantile regression, which enables the impact of predictor variables to change at different points of ICE distribution.

Using this approach, a more refined sense of understanding is created by considering whether some factors are significantly important to low-performing firms, average performers, or high-performing firms. This heterogeneity was reflected by generating estimates at the 25th, 50th, and 75th quantiles.

The methodological integrity of the research was also enhanced through the use of robustness checks. Multivariate normality tests: these included Mardia skewness and kurtosis tests, Henze-Zirkler test and Doornik-Hansen omnibus test, these established significant violations of normativity. Average VIF was 1.06 which means that the problem of multicollinearity did not occur. Breusch-Pagan test also demonstrated that there was apparent heteroskedasticity, which supports the choice of quantile regression over OLS.

Graphical trend assessments were performed to supplement the inferential analysis to monitor the way ICE changed during the period of eleven years. These visual clues help in framing the results in broader contexts of the economic and strategic changes that have taken place in the Indian firms.

4. Results and Analysis

The study analyses the behaviour of Intellectual Capital Efficiency (ICE) by quantile regression in reference to firms of low performance, average performance and high performance. This is the choice of the method used since previous diagnostic tests indicated the non-normality and heteroskedasticity of the data that do not support the use of traditional regression. As indicated in Table 2, the effect of the organisational and governance factors is differentiated between the 25th, 50th and 75th quantile, varying in the methods of how firms are developing and exploiting their intellectual capital.

Table 1: Normality Test

Test	Test Statistic	Chi-squared (df)	p-value	Result
Mardia Skewness	5004.911	$\chi^2(220) = 3.84e+06$	0	Reject normality
Mardia Kurtosis	6130.065	$\chi^2(1) = 1.73e+08$	0	Reject normality
Henze-Zirkler	37.85487	$\chi^2(1) = 5.62e+05$	0	Reject normality
Doornik-Hansen		$\chi^2(20) = 1.09e+07$	0	Reject normality

Source: Author's work

Table 2: Quantile Regression

Antecedents	P> t			p>z
	25 percentile	50 percentile	75 percentile	
age	0	0.073	0.002	0
lvrg	0.01	0	0.395	0
size	0	0	0	0.138
ph	0.06	0.012	0	0
fh	0.226	0.52	0.47	0.025
csr	0.172	0	0	0.252
mktcap	0.024	0.02	0.042	0.543
rta	0.229	0.454	0.547	0.557
rnw	0.871	0.7	0.38	0.009
cons	0	0	0	0

Source: Author's work

The quantile regression findings provide an in-depth and stratified view of the effects that various organisational and governance-related variables have on the Intellectual Capital Efficiency (ICE) in the context of the level of performance. Rather than assuming that the behaviour of all firms is the same, this method enables us to see that antecedents vary among firms with low, moderate as well as high ICE. The results show critical differences which bring out the issues surrounding the issue of how firms acquire, govern and derive profit out of their intangible assets.

At the lower quantile (25th percentile) that contains the firms that have the worst experience with intellectual capital efficiency several predictors become important. The effect of leverage is extremely negative and statistically significant ($p = 0.01$). This implies that companies with high amounts of debt cannot easily invest in human capital development, process innovation or relationship building. In effect, investments in intangible capabilities are usually pushed to the sidelines in case debt obligations control the financial decision-making.

Conversely, the size of the firm and market capitalisation have a strong positive performance as well, despite the weak performance. This indicates that more large companies or those that are more highly

valued have structural advantages, including, more diversified revenue, superior access to resource and greater reputational strength which enables them to extract value on their intangible resources more efficiently than smaller companies. When their ICE is rather low, their scale cushions them to enable them to maintain utilisation of intangible assets.

Promoter holding has a minimal value in this quantile. Though it is a small effect, but it suggests that the concentration of ownership can still be demonstrating an effect on strategy even with weak players. Nonetheless, at this point, there are no significant associations between foreign shareholding, CSR performance, and profitability measures like RTA and RNW. The implication of this is that external investors, social engagement activities and traditional financial outcomes have no significant impact on the intellectual capital efficiency of low performing firms.

On to the median quantile (50th percentile), the effect of a number of factors becomes more evident and pronounced. Size of the firm and market capitalisation are still playing a positive and very influential role which is strengthening the argument that scale, and valuation are always relevant irrespective of the position of a firm on the ICE spectrum. At the same time, promoter holding is also of great importance ($p = 0.012$) and indicates that governance and strategic oversight take on greater importance when firms switch to lower to middle levels of efficiency in intellectual capital. The presence and role of key promoters appear to put the firms in a better position toward the knowledge-based growth.

CSR starts to have an impact towards the median level. This indicates that even those companies whose ICE results are moderate are actively resorting to stakeholder involvement, environment and social responsibility programs as a way of improving the relational capital and enhancing the intellectual capacity. As companies retreat into this intermediate field, they seem to realise that CSR can enhance brand recognition, stakeholders' confidence and innovation culture factors which can directly translate into intellectual capital.

The leverage has continued to exhibit negative correlation with ICE, which also reflects a limitation. High levels of debt even in the middle of the performance firms inhibit the investment in intangible assets, impairing the creation of knowledge-based resources and the upward movement of the firm. Profitability once again does not have any statistically significant effects indicating that the depth or quality of intangible assets are not directly related to conventional accounting performance.

At the higher quantile (75th percentile) of firms possessing the best ICE, the character of influence is more pronounced. The role of firm size, market capitalisation, promoter holding and CSR are all maintained or even increased. This trend demonstrates that the best performing companies can maximize the value of their intangible resources using scale, reputation, the presence of a consistent leadership structure and socially responsible actions. High-ICE companies seem to be strategic and proactive in the management of human, structural and relational capital.

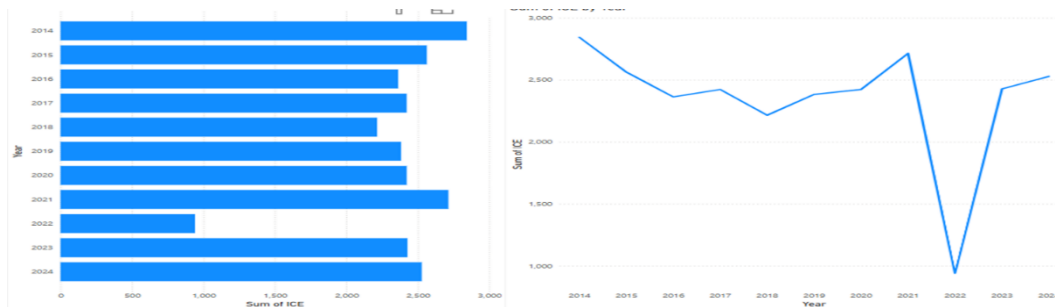
One of the most notable findings is that firm age has a negative relationship with ICE at this quantile ($p = 0.002$). On the one hand, older companies might be more informed and possessing historical background, yet, on the other hand, they might also be more rigid or have bureaucratic levels or even slower decision-making. These may be counterproductive in terms of agility and innovation, and it becomes more difficult to ensure high degrees of intellectual capital productivity in mature firms.

It is interesting to note that at this level leverage has less impact, indicating that high performing companies either control debt more or they do not rely on debt led growth strategies. Measures of profitability (RTA and RNW) once again do not matter, which confirms that ICE is not directly associated with the classic financial indicators.

When these patterns are taken collectively, several themes are depicted. The size and the valuation of a firm are always rated among key factors in determining performance at any level of performance. As

firms progress along the ICE spectrum, governance gains more relevance, and promoters are observed to have a distinct role in influencing the strategic orientation. CSR is especially effective when working with the most prosperous companies, where the relational capital and trust of stakeholders is an important consideration. Financial leverage, in turn, limits ICE to the firms at the bottom level and the middle level, and its influence becomes less significant on the high performers. Interestingly, firm age and profitability do not always have a positive effect on ICE.

FIGURE 1: Trend of Intellectual Capital Disclosure



SOURCE: Author's work

These findings are supported by the time-series charts that show a significant variation in ICE that happened between 2014 and 2024. This is demonstrated in the bar chart (figure 1) which indicates that there are visible dips especially in the year 2022, which could be attributed to economic uncertainties and disruption after the pandemic. This pattern is reflected on the line chart whereby the trend has dropped significantly in 2022 only to have a sharp recovery in 2023 and stabilised in 2024. These trends testify to the fact that ICE is conditional not just by the peculiarities of the firms but by more general macroeconomic changes, regulatory transformations, and strategic shifts.

The combination of regression and trend analysis statistics shows that the intellectual capital efficiency is dynamic and multidimensional. It is significantly different between performance levels, supporting the application of the quantile regression and indicating that the special consideration is required to reinforce ICE.

5. Conclusion

This paper aimed at gaining an insight into the level of exploitation of the intellectual capital of Indian companies and which aspects have the strongest impact on that level. The study used quantile regression to consider the non-normality and heteroskedasticity of the data, as the study used non-financial companies and the NSE500 index to establish the predictive results within a period of eleven years. The strategy allowed considering the factors beyond the average levels and analyse the differences in the antecedents of Intellectual Capital Efficiency (ICE) between low-, moderate-, and high-performing firms.

The results show that certain firm-level attributes always have an impact on the entirety of performance. Promoter ownership, market valuation and firm size were found to be effective and strong predictors of ICE. These findings underscore the role played by scale, consistent governance and favourable market reputation in establishing a favourable environment within which firms can efficiently take advantage of their intangible resources in terms of skilled work force, effective organisational mechanisms or relationship networks.

The trend of financial leverage however is the opposite. Its adverse impact on the ICE, especially among companies in lower and middle quantile, implies that excessive debt burden does not allow companies

to invest gradually in innovation, worker training, and knowledge systems. It means that when a firm is financially constrained, it may not be able to focus on long-term intangible asset building despite having realised the strategic importance of such a decision.

Corporate Social Responsibility (CSR) is more prominent in high ICE companies, which refers to the stakeholder trust as well as relationship-building in reinforcing the intellectual capital. The Strong firms in human and structural capital seem to implement CSR in a strategic manner and enhance their relational capital and develop a vicious circle of knowledge-driven development. Conversely, age of the firms, foreign ownership, and profitability indicators (RTA and RNW) do not always influence ICE. Their little impact supports the belief that the efficacy of intangible capital is less based on longevity or short-term financial results, but instead, it is founded on the concept of strategic flair, organisational capacity, and the direction of governance. These revelations have implications. To corporate leaders, the findings indicate the significance of having scalable structures, investing in talents and entrenching transparent and consistent governance practices.

The findings can be seen by investors as a reminder that the intellectual capital of a firm, which is not often visible in the conventional financial statements, is one of the key signs of resilience and growth potential. Even policymakers can be interested in promoting the greater disclosure of elements of intellectual capital, as they are quickly becoming significant in determining competitiveness in a knowledge-based economy.

Overall, this research contributes to the new literature on intellectual capital within the Indian setting. Future studies might be improved with sector-specific studies, more comprehensive post-pandemic studies, or mixed-method techniques that would measure antecedents of intellectual capital that cannot be easily measured.

References

- Abdallah, S., Koziol, C. and Lawrenz, J., 2024. *Corporate governance, learning culture and intellectual capital in emerging markets: A bibliometric perspective*. *Journal of Business Research*, (forthcoming).
- Barney, J.B., 1991. *Firm resources and sustained competitive advantage*. *Journal of Management*, 17(1), pp.99–120.
- Bontis, N., 2001. *Assessing knowledge assets: A review of the models used to measure intellectual capital*. *International Journal of Management Reviews*, 3(1), pp.41–60. <https://doi.org/10.1111/1468-2370.00053>
- Chatterjee, S., Saha, P. and Ghosh, R., 2022. *Demographic moderators in the intellectual capital–firm performance relationship: Evidence from Indian firms*. *Journal of Intellectual Capital*, 23(4), pp.765–788. <https://doi.org/10.1108/JIC-09-2021-0245>
- Chen, M.C., Cheng, S.J. and Hwang, Y., 2005. *An empirical investigation of the relationship between intellectual capital and firms' market value and financial performance*. *Journal of Intellectual Capital*, 6(2), pp.159–176. <https://doi.org/10.1108/14691930510592771>
- Edvinsson, L. and Malone, M.S., 1997. *Intellectual capital: Realizing your company's true value by finding its hidden brainpower*. New York: HarperBusiness.
- Firer, S. and Williams, S.M., 2003. *Intellectual capital and traditional measures of corporate performance*. *Journal of Intellectual Capital*, 4(3), pp.348–360. <https://doi.org/10.1108/14691930310487806>
- Freeman, R.E., 1984. *Strategic management: A stakeholder approach*. Boston: Pitman.
- Guthrie, J., Ricceri, F. and Dumay, J., 2012. *Reflections and projections: A decade of intellectual capital accounting research*. *The British Accounting Review*, 44(2), pp.68–82. <https://doi.org/10.1016/j.bar.2012.03.004>
- Kapoor, S. and Saihpal, P., 2022. *Intellectual capital efficiency and firm performance: Evidence from Indian companies*. *Asian Journal of Accounting Research*, 7(1), pp.123–138. <https://doi.org/10.1108/AJAR-08-2021-0117>

- Koenker, R. and Bassett, G., 1978. Regression quantiles. *Econometrica*, 46(1), pp.33–50. <https://doi.org/10.2307/1913643>
- Koziol, C. and Lawrenz, J., 2020. Corporate social responsibility and firm performance: The mediating role of corporate governance and board expertise. *Journal of Business Ethics*, 164(2), pp.371–386. <https://doi.org/10.1007/s10551-018-4063-7>
- Marr, B. and Schiuma, G., 2001. Measuring and managing intellectual capital and knowledge assets in new economy organisations. In: M. Bourne, ed. *Handbook of performance measurement*. London: GEE Publishing, pp.115–136.
- OECD, 2013. *Supporting investment in knowledge capital, growth and innovation*. Paris: OECD Publishing. <https://doi.org/10.1787/9789264193307-en>
- Petty, R. and Guthrie, J., 2000. Intellectual capital literature review: Measurement, reporting and management. *Journal of Intellectual Capital*, 1(2), pp.155–176. <https://doi.org/10.1108/14691930010348731>
- Pulic, A., 2000. VAIC™ – An accounting tool for IC management. *International Journal of Technology Management*, 20(5–8), pp.702–714. <https://doi.org/10.1504/IJTM.2000.002891>
- Roos, G., Roos, J., Dragonetti, N.C. and Edvinsson, L., 1997. *Intellectual capital: Navigating in the new business landscape*. London: Macmillan Press.
- Stewart, T.A., 1997. *Intellectual capital: The new wealth of organizations*. New York: Doubleday/Currency.

COGNITIVE BIAS AND THE LEGAL OVERSIGHT OF FINANCIAL FORECASTS IN M&A: INSIGHTS FROM HP AUTONOMY AND DIRECTIONS FOR FUTURE RESEARCH WITH AN INDIAN PERSPECTIVE

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Abstract

Both Mergers and Acquisitions though on one hand rely heavily on forward -looking financial forecasts which tend to influence valuation decisions, regulatory clearance and aid in integration strategies but on the other hand extensive research in behavioural economics reveal that such kind of forecasting are severely impaired by cognitive bias such as overconfidence, anchoring, confirmation bias and effects of framing issues. These biases even though may not be an outcome of any amount of fraudulent intent but nonetheless it can excessively compromise judgment ultimately leading to a strategic failure. A critical example is the Hewlett-Packard (HP) Autonomy acquisition which demonstrated how inflated revenue projections, aggressive accounting practices and biased due diligence can completely disrupt and erode a high-value transaction culminating in an \$8.8-billion write-down and getting tangled up with prolonged litigation particularly in the absence of any fraudulent activities. From the Indian perspective such similar concerns get intensified owing to fragmented due-diligence practices, highly optimised fuelled startup climate and legal standards that primarily focusses on penalising deliberate misrepresentation instead of observing the negligent overvaluation and rectifying the same. Although large-scale M&A activity especially under the Insolvency and Bankruptcy Code (IBC) continues to expand, India still lags behind in its regulatory approach to behavioural risk within the ambit of financial forecasting.

This paper connects insights from behavioural science and blends it with legal analysis to suggest a reform agenda for India to come up with. Alongside inclusion of mandatory third-party validation of forecasts, bias finding due diligence protocols, situation based financial disclosures and acknowledging 'forecasting negligence' as a legitimate ground for liability are the key recommendations. Analogously it also recommends that regulators such as SEBI and CCI should also incorporate behavioural risk disclosures in their mechanisms for high-value M & A dealings.

Our lessons from the HP-Autonomy case and recent developments in Indian M&A dealings, this paper argues for the adoption of a behaviourally informed legal framework which in turn would enhance accountability, minimise risks arising from inaccurate valuations and offer stronger protection to stakeholders in an ever increasing and fast competitive environment.

Keywords- *Cognitive Bias, Behavioural Economics, Financial Forecasting, HP- Autonomy Case, Due Diligence.*

Introduction

Behavioural economics and psychology affirm cognitive biases stimulates foreseeable fallacies while judging which further leads to major skewing of these predictions.

This paper has made all endeavours to inspect the connectivity between cognitive biases and the legal frameworks in force that administer financial predictions in Merger and Acquisitions dealings vide relying on the lessons learnt from Autonomy acquisition. The vital lessons learnt are that showing overconfident predictions analogously used with weak legal omission can erupt chaos by defaming and showing reputations instigating the intent to come up with robust regulatory safeguard policies.

In the recent times a rising graph of India is witnessed in Mergers and Acquisition's economic segment which shifts regulations and distinct cultural factors giving both favourable chances and roadblocks in alleviating the risks linked in with biased financial estimation. This paper focusses to investigate the cognitive biases that affects financial predictions in Mergers and Acquisitions by analysing the effect of legal governance vide the lens of HP Autonomy case paving the ways for future research eyeing the Indian context.

Understanding Cognitive Bias in Financial Forecasting

The term Cognitive Biases refers to systematic errors that occurs owing to human misjudgement which emancipate from misjudgement and faulty inference while processing complex information. It is to be borne in mind that in reality such type of biases disrupts the manager's expectations leading to severely faulty forecastings. Varied other kinds of faulty cognitive biases related to Mergers and Acquisition Forecasts are in force today, such as in Overconfidence Bias, managers are prone to overestimate their knowhow or by exceeding their ability to foresee future financial outcomes which results in overtly optimistic forecasts. Confirmation Bias is a situation which occurs when the rule makers tend to process or interpret information relying on the contrary data available alongside. Anchoring Bias is a situation that occurs wherein peremptory information or predictions overtly influence ensuing predictions irrespective of fresh evidence suggesting for an immediate change. Optimism Bias is an intrinsic tendency of humans to expect positive outcomes unreasonably overlooking the risks and uncertainties associated with it. Such biases completely distort the goals imagined of for reliable predictions and favourable financial outcomes.

Financial predictions serve multiple high value purposes such as valuation modelling, synergy estimation and risk assessing but at the same time it includes several challenges like uncertain financial predictions and outcomes pertaining to earning revenues, incurring costs and maintaining synergies particularly more when integrating complex organisations. In Information Asymmetry, the acquiring firm may undergo restrictive or may have very limited access to correct data and maybe compelled to place too much reliance on the target's managerial assertions. Such actions may in fact inflate forecasts to facilitate acquisition at a premium while acquirers may ignore the potential risks owing to competitive pressure. Such pressures would pop up owing to the usage of varied business models, market scenarios and integration issues skewing up the correct predictions. These challenges demand legal vigilance for assuring transparency and accountability. Research suggests that legal oversight of financial predictions taken from pre-existing legal anatomy across the world shows that it compels parties to disclose accurate information and restrict outlaying inaccurate forecasting in Merger and Acquisition transactions but at the same time it is perceived to be challenging while executing the same. Nevertheless, it is still highly recommended to have some sort of legal considerations disclosure compulsion to be in force to ensure transparency of Mergers and Acquisition forecasting in a trustworthy manner. Courts generally assess as to whether at all the predicting inaccuracies if any has at all misguided the investors or not in Materiality standards. Therefore, Due Diligence is the need of the hour vide which forecasting can be done by acquirers and then advisors to verify such forecasts while enforcing challenges would continue to persist as proving wrongful intent or recklessness behind

inaccurate forecasting is tough, often leading to limitation of legal recourse. The HP Autonomy case highlighted these challenges and revealed gaps in oversight mechanisms.

Lessons For India's Legal and Regulatory Framework

HP with a malafide intent to earn wrongful gain misrepresented the revenues, inflated the profits by representing the hardware sales to be software sales in order to portray higher margins which was actually not the case in reality. However, in its defence HP stated that it was misled as it fell prey to Autonomy's inaccurate disclosures violating both UK and US securities laws. An intense observation reveals the legal gap that evolves inspite of the existence of the disclosure laws in the UK or US, enforcement axes on the ability to prove that the forecast was misleading during the time it was construed, not simply in reflection. Autonomy in their defence continued to state that they in good faith came up with the forecasts completely relying on the available information making prosecution difficult. From the Indian perspective, India's SEBI (LODR) regulations make it mandatory for listed companies to disclose accurately but enforcement is reactive, not preventive. As such, India should come up with robust forward-looking statement regulations, mandating companies to disclose vital assumptions behind financial forecasts and construe penal actions for companies who make material misstatements while making M & A disclosures even if it gets disclosed later.

From the context of materiality disclosure, it becomes very pertinent to understand what is being disclosed. In the case of HP-Autonomy the legal team had to prove that Autonomy's forecast misstatements were "material" i.e., significant enough to influence investor decisions. Autonomy's defence argued that some disputed transactions were immaterial to the company's overall financial health. The threshold for materiality is subjective and difficult to establish, especially for complex, fast-growing companies like Autonomy. The courts often give the benefit of the doubt unless systematic fraud is proven. Indian courts also face challenges in interpreting materiality under current securities law. Thus, India should issue guidelines or quantitative benchmarks for determining materiality in financial forecasts. It should empower SEBI to review M&A disclosures proactively, particularly in large cross-border or sector-sensitive deals (e.g., tech, telecom, pharma).

The span of due diligence done by HP for Autonomy was in weeks which was conducted by using top-tier advisors (e.g., KPMG, Barclays), but it was heavily reliant on Autonomy's internal data, without enough independent verification. Rushed, and did not include forensic auditing, despite the high acquisition premium. Post-acquisition audits revealed accounting inconsistencies that should have been red flags. India still lacks a legal requirement to perform forensic level due diligence in M&A, even in large deals. Legal liability is often limited unless gross negligence is proven. Due diligence in Indian M&A is often checklist-driven, especially in deals involving family owned or unlisted targets. India should mandate forensic accounting or third-party validation in large-value or sensitive M&A. This expands the role of independent directors and legal advisors in scrutinizing forecast assumptions. When we take the perspective of enforcement challenges HP took years to gather sufficient evidence to pursue civil and criminal charges which proved that Autonomy knowingly misled HP rather than making poor forecasts in good faith which was legally and logistically difficult. Cross-border legal issues between two different jurisdictions such as the US and the UK often slow down investigations and extraditions as seen in the case of Mike Lynch, who was extradited in the year 2023 and convicted in 2024. It is the usual trend followed by enforcement agencies to usually take action only after financial losses become evident in the naked eye and proving intent remains difficult giving corporate leaders the chance to escape liability by citing reliance on internal teams and external advisors. In India, fraud enforcement bodies like the SFIO, ED and SEBI are fragmented and slow especially when dealing with international matters. Thus, India should consider forming a dedicated M&A fraud task force under SEBI or the Ministry of Corporate Affairs to handle forecast related disputes more effectively. This facilitates cross-border cooperation with enforcement agencies in jurisdictions where Indian firms are acquiring assets.

This Introduces executive accountability provisions (like the U.S. Sarbanes-Oxley Act), requiring CEOs/CFOs to personally certify forecast disclosures.

The areas like that of disclosures in HP Autonomy case we find that the revenue classifications were misleading where India's current status has moderate enforcement which helps to tighten forward looking disclosure rules. From the materiality perspective, if we see the subjective legal standard in India, it has quite vague guidance which defines materiality thresholds for merger and acquisitions forecasts. In respect to due diligence HP overly relied on internal data which while the format in India is checklist oriented where the prime focus for India should mandate forensic audits for large M& As which create a dedicate merger and acquisition fraud and fast track cases. In HP- Autonomy case if we see there are a lot of cross border delays where it is hard to prove the intent where India's current standard is slow and fragmented so it's essential to have a dedicated M& A fraud units and fast track cases. When we see from the lens of disclosure, we find the HP Autonomy had misleading revenue classification where wrong future analysis was done. The HP Autonomy debacle reflects a systemic failure in both internal governance and external legal enforcement. As India sees more domestic and international M&A deals, the Autonomy case offers key lessons. It highlights the need for stronger safeguards. By acknowledging legal weaknesses and understanding cognitive biases in financial decisions, India can better protect investors and improve corporate governance. Strengthening these areas will aid India to build greater trust and credibility as a reliable global investment mature market.

The Case

HP case was a case which is known for the hasty decision of collaborating with Autonomy. The breakdown of this company is not sheer bad luck it was a result of fraud and deep psychological flaws of HP's management process. The subsequent audits revealed that Autonomy was not at all a giant software company it claimed to be. In reality they sold low margin hardware but documented it as high margin software revenue and furthermore they forced sales onto distributors to expand the revenue figures before the end of a quarter even though the products had not been actually brought by any buyers. This disaster pointed out that such disasters reflect how smart staffs of an organization make useless decisions falling prey to psychological traps. HP's authorities including the CEO was so desirous of the deal to work that they likely ignored the data that contradicted their growth expectations. They also relied excessively on Deloitte and KPMG at the cost of ignoring internal dissent, anchoring their valuation on Autonomy's inflated promises and lastly their overconfidence to easily integrate a complex foreign company and realize synergies that did not exist completely ousted them in the competitive market. This fallout turned out to be severe and spanned over a decade as in the year 2022, the High Court of UK held the employees of Autonomy liable for civil fraud. While in 2024, the founder of HP Mike Lynch was convicted of criminal fraud. The SEC (USA), SFO (UK) and FBI were all involved highlighting the drastic failure of legal oversight during the deal. The HP-Autonomy case has given us a bitter experience to learn from and to remain cautious so as to not repeat history. It offered a blueprint of what not to repeat which is especially relevant for current Indian global markets and the emergent economies. This lesson teaches us that it would be wrong to solely rely on management narratives. It is a must for the auditors to verify the operational realities and not just place sole reliance on the spreadsheets. Permission to include diverse voices in management decision making is of utmost necessity to incorporate.

Conclusion

Cognitive psychology and legal oversight should blend together for better understanding and improving financial forecasting in Mergers and Acquisitions. The case of HP Autonomy has offered us valuable information of the catastrophic results that were faced because of biased forecasts and faulty legal scrutiny. India has a unique mixture of cultural and economic factors which in turn poises both challenges and opportunities for addressing these issues. To improve the functioning of Mergers and

Acquisitions, India needs to integrate human behaviour with strict laws, an approach which can ensure market transparency, lower financial risks and aid in building long-term value.

Due diligence is worth the need and is always preferable as it plays a key role in finding hidden issues before they become costly disasters. In HP's case of failed acquisition of Autonomy, poor decision making was a result of four specific psychological traps. HP completely underestimated the difficulty they would face to merge the companies and make profit leading to impossible timelines. Executives also failed to pay heed to the warnings flashed by the analysts as they were overconfident that they would turn Autonomy into a major success. The Authorities relied on information that supported the deal while ignoring crystal clear and evident red flags revealed during investigation. Decision makers also got stuck on Autonomy's past success failing to adjust their offer despite discovering accounting issues.

The HP case gave a wonderful lesson, it showed insights that how easily deals can meet a catastrophic fallout due to psychological errors and weak oversight, acting as a crucial caution for India and similar developing markets. In order to protect investors, a proactive approach is the need of the hour, boardroom biases need to be eliminated, laws around financial accuracy needs to be reinforced, and due diligence needs to be treated as a deep investigative process rather than a simple checklist. As Indian businesses expand globally applying these experiences and learnings are advisable to attain sustainable growth.

References

- *ACL Netherlands B.V. and others v Lynch and another [2022] EWHC 1178 (Ch). The judgment detailed the fraudulent inflation of revenues through complex hardware reselling and reseller agreements.*
- Bazerman, M. H., & Moore, D. A. (2013). *Judgment in Managerial Decision Making* (8th ed.). Wiley. *The concept of anchoring on a purchase price is a documented M&A pitfall.*
- Tetlock, P. E. (2005). *Expert Political Judgment: How Good Is It? How Can We Know?* Princeton University Press. *The failure of sophisticated professional networks to detect the fraud suggests a systemic breakdown in professional scepticism.*
- *ACL Netherlands B.V. and others v Lynch and another [2025] EWHC 1836 (Ch) (Quantum Judgment). The valuation was based on what HP would have paid for the business in its "True Position."*
- Lovallo, D., & Sibony, O. (2010). *The Case for Behavioral Strategy*. McKinsey Quarterly, 2010(2), 20–29.

FINANCIAL SHENANIGANS AND PROFESSIONAL ETHICS: A STUDY

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Abstract:

Some historical corporate collapses on the part of auditor's failure erode investors' confidence on audit service and measures have become necessary to monitor the role of the auditor. In this paper, three multinational companies including two US multinationals, namely, Enron and Lehman brothers and one Indian multinational, namely, Satyam are selected conveniently for case study. It is to note in this context that Enron and Lehman brothers are not coming under the purview of Indian context. However, the lessons from those companies are taken into consideration for the greater understanding of the importance of professional ethics in audit service. These three companies played significant role to the economy of the country concerned. 'The Enron case clearly demonstrates the value of the traditional work of International Federation of Accountants (IFAC) and its more recent public interest initiatives' leading to the promulgation of international Standards on Auditing and the IFAC Code of Ethics, including its new rules on independence etc. The other initiatives incorporate strengthening the processes and transparency of the work of International Auditing Practice Committee(IAPC), establishment of Forum of Firms(FOF) to improve the standard and consistency of audits of transnational entity, establishment of an independent review board to oversee the activities of IFAC and FOF, implementation of IFAC compliance regime, establishment of the International Forum on Accountancy Development (IFAD) to improve corporate reporting and the alignment of national standards with global standards for accounting, auditing, corporate governance and market regulation. The objective of the study is to deal with ethical standards of the auditors in the context of corporate collapse accelerated by way of financial shenanigans.

Key words: *Professional ethics, Transparency, Corporate Governance, Financial shenanigans.*

1. Introduction

Some historical corporate collapses on the part of auditor's failure erode investors' confidence over audit service and measures have become necessary to monitor the role of the auditor. In this study US multinationals, Enron and Lehman brothers and Indian multinational of Satyam are selected conveniently for case study. It is to note in this context that the Enron and Lehman brothers are not coming under the purview of Indian context, yet the lessons from those companies are taken into consideration for reinforcing the importance of professional ethics in audit service. Hence, a summary of those companies are discussed here. The study covers three case studies including Enron Corporation, Satyam and Lehman Brothers. A thorough investigation was conducted over Enron debacle and the role of auditor in this regard. The third section made a good deal of attempts to Satyam scam to unveil fraud risk factors and auditor's responsibility thereof. The fourth section deals with Lehman brothers and the causes of its collapse. The last section concludes the observation.

The fall down of Enron, Satyam, Lehman brothers' took place in different perspective. After Enron collapse, it was discovered that successive failures of Enron's management, its statutory auditor-Arthur Andersen, the supreme financial regulatory bodies of the USA- the SEC and FASB and credit rating agencies accelerated a chain reaction in this regard. In Satyam, there was violation of the corporate governance system. There was internal control failure as well as audit failure that escalated the collapse of the computer service giant. The Lehman delved into the sub-prime mortgage crisis with over exposure in derivative business. However, the investment bank could have saved the crisis had Ernst and Young, the auditor of the Lehman brothers- reported qualified opinion about derivative contracts.

In India there are numerous provisions introduced later on in Companies Act 2013 effective from 1st April 2014 dealing with internal financial control(section 134(3) & (5)), business relationship of the auditor(section 141),other services of the auditor (section 144),rotation of auditor and audit committee recommendation (section 139), complying with auditing standards, audit report and fraud reporting (section 143) , National Financial Reporting Authority(NFRA) with extended authority for maintaining quality of audit practices [S132(S210A)], punishment for contravention (section 147),fraud (section 447) which are directly or indirectly influencing audit functioning for improvement of audit quality.

2. Review of Literature

Professional ethics, code of conduct, continuing professional education, auditor's independence, peer review may resolve the conflict of interest in Professional ethics in a holistic way. Several articles have been offered in the field of corporate governance but a few deals with ethics and independence of statutory auditors.

In the article "Audit Firm Rotation and Audit Quality" Barbara Ariel, Richard G Brody and Kurt Pany have questioned about quality and cost effectiveness of audit firm rotation besides the increased responsibility of the audit committee consequent upon the enactment of Sarbanes Oxley Act 2002. C Terry Grant and Mary Thomas Keim have also taken up efforts in their work entitled "Corporate Governance and the Sarbanes Oxley Act of 2002" in which they have discussed various provisions of the act and its impact on management, board, audit committee and above all independence of statutory auditor. For this purpose, the Public Company Accounting Oversight Board (PCAOB) by the Congress through the Sarbanes Oxley Act of 2002 is a steppingstone towards good corporate governance. The Board exercises power over the external auditors in the process of registering accounting firms with an intent to investigate the quality of accounting practices and pending suits against them. The Board also functions on making rules and setting standards in order for quality control and to safeguard the ethics and independence in the audit process. Professor Ian Percy through the article "Adding Credibility through assurance services" of IFAC in June 1999 tries to add credibility to assurance services over financial information. In the Editorial Comment on the "Performance Gap in the Audit Profession" in The Chartered Accountant vol xx, part-II, it was indicated that the present-day accounting and the auditing function need to be upgraded and molded in such a fashion that the society is able to gather the maximum benefits from the relentless efforts of the committed professional. At this juncture, Namasiku Liandu, Assistant Audit Manager at KPMG, London published his article "Audit Risk in a Brave New World" in The Accounting world, December 2004. pp.37-43, he has qualified audit risk as occupational hazard. The assurance of high-quality financial reporting for which the assurance of high quality of audit standards have become essential for corporate transparency and market integrity have become highlighted in the article "the process and Assessment of International Standards for Audit" by Stavros B Thomadakis. In another article on "The Public Interest Oversight Board Overseeing standards of audit education and ethics for accounting profession" the author has emphasized on the qualification and behavioral aspects of the auditor in formulating the audit standards. The standards may be principle based and technically efficient to enhance the convergence of audit standards and compliance becomes stronger.

In 1960, American Institute of Certified Public Accountant (AICPA) clearly stated that 'the responsibility of the independent auditor for failure to detect fraud arises only when such failure clearly results from failure to comply with generally accepted auditing standards. In 1977, the AICPA introduced SAS16 entitled 'The Independent Auditor's Responsibility for the Detection of Errors or Irregularities', so as to clarify authoritative pronouncements on the topic.

In the UK, The Consultative Committee of Accountancy Bodies (CCAB) published their first Auditing Standards in 1980. The explanatory forward to the standards outlines the current UK position. In India, the research effort with regard to finding audit techniques efficient in the detection of fraudulent behaviour has been directed at the 'red flag' approach, i.e., the identification of circumstances in which fraudulent activity is, in fact, taking place. One major study of this nature was that of Albrecht,

Cherrington, Payne, Roe and Romney in 1980 and in a number of several other articles under literature review. 'The Enron case clearly demonstrates the value of the traditional work of IFAC and its more recent public interest initiatives' (Johnston, Peter,2002).

3. Objectives of Study

The basic objective of study is to reinforce the importance of professional ethics in the context of corporate collapse accelerated through financial shenanigans mechanism.

4. Research Methodology

This is basically a descriptive study based on secondary data, including books, journals, magazines, newspaper, periodicals, reports, etc.

5. Enron Corporation

Enron followed aggressive accounting practice and created Special Purpose Entities (SPEs) to raise finance for various purposes but for reporting the debt in the consolidated financial statement. In other words, it had 'to perform cosmetic surgery on their balance sheets' (Khan, J, February18,2002, p.84.). During 1990s, SEC and the FASB made a good deal of efforts to find a way out of the problems posed by SPEs.

'There is a presumption that consolidated financial statements are more meaningful than separate statements and this is usually necessary when one of the companies in the group directly or indirectly has a controlling financial interest in the other companies' (AICPA, 1959). 'Because of a gaping loophole in accounting practice, companies can create arcane legal structures, often called Special Purpose Entities (SPEs). Then the parent can bankroll up to 97 percent of the initial investment in an SPE without having to consolidate it.....The controversial exception that outsiders need invest only 3 percent of an SPE's capital for it to be independent and off the balance sheet came about through fumbles by the Securities and Exchange Commission and the Financial Accounting Standards Board'(D, Henry. 2002, pp.36-37). Enron created hundreds of SPEs 'to download underperforming assets from its financial statements to the financial statements of related but unconsolidated entities' (Michael C.Knapp, (Fifth edition, p.12). The shocking experience was that Enron sold assets to their SPEs at inflated prices and recorded the 'paper' gains in its periodic income statements. Enron made minimum disclosures for its SPEs transactions and that left no idea about the company's real financial position. (D. Henry,2002). The Wall Street Journal agreed on the complex nature of off-balance liabilities and related party transactions (J, Emshwiller ,2002).

'Accounting principles generally forbid a company from recognizing an increase in the value of its capital stock in its income statementThe substance of the Raptors [SPE transactions] effectively allowed Enron to report gains on its income statement that were backed almost entirely by Enron stock, and contracts to receive Enron stock, held by the Raptors' (Powers, W.C.2002, pp.129-130.). In fact, Enron sought for capital to transform from the natural gas supplier to a new economic intermediary that induced it to create SPEs and related accounting mechanism. Enron realized that maintaining high credit rating was essential to convince lenders to invest in the company. So, it prepared lucrative financial position, each succeeding period. The motive behind was to sustain stock at high level. Enron set a price 'triggers' on SPE loan agreement that would force the company to provide additional stock as collaterals against the given loan or for further negotiation with the SPEs. 'What made Enron's stock price so important was the fact that some of the company's most important deals with the partnership [SPEs] run by Mr. Fastow-deals allowed Enron to keep hundreds of millions of dollars of potential losses off its books- were financed, in effect, with Enron stock. Those transactions could fall apart if the stock price fell too far' (Eichenwald, 5th edition, p.9). As Enron's stock price experienced a steep fall in 2001, Enron's SPEs suffered huge losses. By October2001, the fall of Enron's stock prices, loss of SPEs, pressure from Andersen –Enron's statutory auditor, forced the company's management to control the troubled SPEs and to incorporate them in the Enron's consolidated financial

statements and again to restate the company's earnings for last five years from 1996 to 2000. On 2 December 2001, the company filed petition for bankruptcy via Internet.

It was said that Andersen gained about \$52 million of fees in the year 2000. Questions raised about auditors' independence as the accounting firm earned huge consulting fees from their audit clients. 'It is obvious that Andersen helped Enron cook the books. Andersen's Houston office was pulling in \$1 million a week from Enron- their objectivity went out the window' (SmartPros.com, December 4, 2001). On January 17, 2002 Kenneth Lay- Enron's chairman through a press release decided to discharge Andersen as its independent auditor (Kenneth Lay, 2002). In 2002 the U.S. Congress passed Sarbanes-Oxley Act. The Act significantly undertakes some effective measures including establishment of Public Company Accounting Oversight Board (PCAOB) (Section 101) for the regulation of auditing profession in the United States. The Board is empowered for issuing auditing standards, quality controls and independence standards (Section 103), inspection of registered public accounting firms (Section 104), investigation and disciplinary proceedings (Section 105) etc.

6. Satyam Computers

Satyam scam was to some extent different from Enron's accounting manoeuvre. There was gross manipulation of accounting figures with overstating assets and understating liabilities and highly inflated revenue figures and operating margins over several years. B. Ramalinga Raju, Chairman of Satyam, admitted to Rs.7800 crore fraud. The company created a mechanism for maintaining dodgy records in protected passwords, manipulating share prices, conducting aggressive recruitment of employees to justify inflated revenues, to duplicate fixed deposit certificates, etc. Keeping cash in term deposits in the bank for several years instead of alternative investment opportunity cannot justify financial prudence. Even there was fictitious cash balance also. The Central Bureau of Investigation (CBI) found Raju was in convenience with the finance department of the company generated fake invoices in the invoice management system to show nonexistent sales and tried to adjust the huge salary of approximately 48000 employees of the company. Serious Fraud Investigation Office (SFIO), a multidisciplinary investigative agency as referred to by the Ministry of Corporate Affairs (MCA), found that Mr. Raju and his family might resort to insider trading by systematically offloading their stakes in the company and artificially inflating the stock price with imaginary profits and book building efforts. SFIO reported a serious control deficiency in the system that entertained unauthorized transactions, unauthorized payments and non-detection of unauthorized activities. No internal passwords were allowed to access the database of Oracle Financials, which increased the possibility of unauthorized changes to programmes. There was violation of the governance system. Transparency and accountability are two essential ingredients of corporate governance standards. Again, in India the market capitalization criterion has not worked successfully as to justify the quality of governance in companies (Chattopadhyay, 2008). However, there should be more emphasis on Clause 49 of the listing agreement.

From audit approach PwC could have confirmed FD receipts from banks, verified the contracts against which fictitious bills were raised and the existence of cash and bank balance. The auditors could have brought open computer system weaknesses and complex systems to the notice of the audit committee. The PCAOB stated that auditors 'did not bring these control deficiencies to the notice of audit committee and thereby facilitated the continuance of the fraudulent practices unabated'. Auditors 'deliberately did not make any extensive changes in the audit plan which clearly establishes his motives and intentions in allowing the fraudulent practices to continue'. Investigation revealed that PwC received statutory audit fees along with consultancy fees much more than its peers in other companies in India. It is interesting to note that PW Bangalore had not audited financial reports of Satyam. It was outsourced to Lovelock and Lews (LL). After 9 years of the Scam SEBI bans PwC from auditing in India for 2 Years and orders pay back of Rs 13 crore of wrongful gains (The Hindu-Business Line, 2018). However, it was on the part of the MCA having done a good job to rescue the company.

7. Lehman Brothers

The collapse of Lehman brothers originated from 'bad regulation, lack of transparency and market complacency brought about by several years of positive returns' (Zingales, Luigi, 2008). There was increased competition in the United States among the commercial banks (lenders) since 2000 to provide the house building loan at sub-prime (lower) interest to the customers without verifying their solvency position. The operation led to the rising of home prices. During that period customers defaulted, and commercial banks issued mortgage-backed securities through securitization process. Investment banks like Lehman brothers, etc. held large positions in mortgage-backed securities. These securities were issued and even rated high as sweet deals of credit rating agencies to enhance public confidence. Commercial banks could realize the nonperforming loan to the extent of securitization. Real estate prices fell down in consequent upon large clients defaulted. Keeping in line with fall in real estate prices, the value of mortgage-backed securities declined. Lehman accounted for unprecedented huge loss. In either case, the company accrued huge losses against lower-rated mortgage-backed securities during 2008. The securities in liquidity crisis were valued using unobservable, firm supplied estimates that did not provide adequate disclosure (Zingales, Luigi, 2008). Moreover, these securities were issued under limited disclosure. And the 'lack of transparency in the issuing process made it difficult to determine who owned what' (Zingales, Luigi, 2008). The collapse of Lehman brothers' under the circumstances was due to overexposure to derivative contracts of those securities.

In spite of looming financial crisis, the auditor of Lehman brothers –Ernst and Young (E&Y) did not express any reservations on the issue. Just two months later, Lehman collapsed.

8. Professional Ethics

Ethics is an unbounded rationality that is easy to perceive but difficult to measure. In reality, ethics sometimes becomes illusion. However, for the sake of the profession, some guidelines have been framed by the Institute in a specific way for its members for adherence in practice and that are to some extent enforceable by law. In this respect, professional ethics as noted earlier refers to the DO and DONOT of the profession. Because of the judgmental nature of the profession, soundness of principles prevails overrule. 'For example, the honesty principle is easily put into law in cases of fraud, misstatements, forgery etc but it is far more difficult to have a law for integrity, loyalty and the pursuit of excellence. The members of the profession are required to maintain a higher standard of conduct than is called for by law'. Professional ethics guide the auditors to adhere to auditing standards in the conduct of audit of financial statements. Clause 9 of Part I of Second Schedule to the Chartered Accountants Act 1949 requires the auditors to comply with auditing standards in practice. Otherwise, they would be held guilty of professional misconduct.

In the context of corporate governance regulation, the role of professional ethics is worthy to mention. The role of the statutory auditor is so vital that it can affect all the users of the financial statements to the extent of their individual decision-making function.

Corporate governance environment of a company incorporates the interest of the users, and their satisfaction must improve corporate governance practice of an entity. So, auditors' role in this regard is of intense significance.

In India, the chartered accountants are regulated by the code of conduct in accordance with ICAI Act 1949. The First and Second Schedules to the Act prescribe a list of circumstances under which a chartered accountant is deemed to be guilty of professional misconduct. The Council of ICAI is empowered to enquire into the conduct of chartered accountants in other circumstances also. For application of code of conduct of all chartered accountants is referred to in Part III of First Schedule to the Chartered Accountants Act 1949. Part-I of the First Schedule is applied for professional misconduct in relation to chartered accountants in practice. Part II of the First Schedule applies to chartered accountants in employment. The Second Schedule deals with misconduct which requires action by the High Courts.

Professional ethics also encompasses independence of the professionals which has now become a debatable issue across the globe. Independence of the auditor signifies independence in fact and

independence in appearance. 'An auditor professionally strives for independence in facts which represent the mental attitude of the auditor. That is the auditor favours neither the client nor those who read the financial statements. However, the accounting profession must also be concerned with whether other parties believe that the auditor is independent. In this case the auditor must avoid relationships that suggest that independence has been lost'. A merger of the two aspects provides that the auditor concerning such values as credibility, integrity and objectivity has to comply with different rules, regulations, acts, auditing standards etc. in the performance of audit attestation service.

The over-riding motto has been 'pride of service in preference to personal gain'. A code of professional conduct is set measures of discipline and conventions voluntarily established by the members and that may have a force of law. Any breach of code of conduct would result in the member being deregistered from practicing the profession.

The code bears high moral value as it claims that the members discharge their duties and responsibilities paying due regard to the interest of the general public. However, in the event of a member straying away from the path of duty would be suitably dealt with by the professional body.

9. Conclusion

It may be concluded from case studies that there was lack of auditor's independence along with, in fact, honesty, integrity, objectivity and confidentiality. It may also be concluded the quality of audit deserves more improvement and suggested that auditors should be aware of professional responsibilities. Reasonable skills and care become an indispensable part of the profession. In the context of Satyam scandals SFIO has recommended some effective measures including rotation of auditors, peer review, disciplinary proceedings against errant auditors by independent authority etc. for the transparency of the profession, some of which are properly addressed in companies act 2013 later on.

Last but not least, strengthening ethical standards of the auditor is the need of the hour. Auditors cannot be allowed to be at the mercy of the management of the company. They should 'think straight and talk straight'. Some critics of Arthur E. Andersen often said that 'Arthur Andersen wouldn't put up with anything that wasn't complete, 100% integrity. If anybody did anything otherwise, he'd fire them. And if clients wanted to do something he didn't agree with, he'd either try to change them or quit' (R. Frammolino, 2002, online).

References

- *Accounting Research Bulletin No.51 (1959) Consolidated Financial Statements*, New York: AICPA.
- Arel, Barbara and others, (2005) 'Audit Firm Rotation and Audit Quality', *The CPA Journal*.www.nysscpa.org
- Bailey, Larry P. (1994) *Responsibility and Function of The Independent Auditor*, GASS GUIDE, Harcourt Brace Professional Publishing, p.2.05.
- Basu, Dr.B.K (2004) 'An Insight into Auditing –a multidimensional approach' June, p.8.6
- Basu, Dr.B.K(2009) 'Social Audit on US Financial Crisis And its Impact on Indian Economy', at Institute of Environment and Management, Lucknow, 5th September.
- Chattopadhyay,P(2008), *Corporate Misgovernance*, IAA Research Foundation.
- Eichenwald, K and F.Norris, (2002) 'Enron Auditor Admits It Destroyed Documents', *The New York Times Online*, January11.
- Hamburger, "Watkins Tells of 'Arrogant' Culture."
- Henry,D, H.Timmons, S.Rosenbush, and M.Arndt,(2002), 'Who Else Is Hiding Debt?' *Business Week*, January28, pp.36-37.
- Johnston, Peter (2002), 'Comment on Enron and the Global Accountancy Profession's Commitment to the Public Interest', *President, IFAC*.February12.
- J.Khan, J,'Off Balance Sheet-And Out of Control', *Fortune*,
- J.Emshwiller and R.Smith, (2002), 'Murky Waters: A Primer On the Enron Partnerships', *The Wall Street Journal Online*, January21.

- Khan, J and J.D.Glater, (2001), 'Enron Auditor Raises Specter of Crime,' *The New York Times Online*, December 13.
- Khan, J (2002), 'One Plus One Makes What?' *Fortune*, January 7, p.89.
- Knapp, Michael C 'Contemporary Auditing Real Issues & Cases', Thomson, Southwestern (5th edition), p.12.
- Lawsuit Seeks to Hold Andersen Accountable for Defrauding Enron Investors, Employees', *SmartPros.com*, December 4, 2001.
- Lehman Annual Reports of 2007 & 08.
- Liandu, Namasiku., 'Audit Risk in a Brave New World', *The Association of Chartered Certified Accountants*, www.accaglobal.com
- Luigi Zingales, Cause and Effects of the Lehman Brothers Bankruptcy', *National Bureau of Economic Research and Center for Economic Policy Research, University of Chicago Graduate School of Business*, October 6, 2008.
- Frammolino, R and J. Leeds, (2002), 'Andersen's Reputation in Shreds', *Los Angeles Times (online)*, 30/1/2002.
- Sikka, Prem (2009): "Accounting for the auditors in a financial meltdown", on guardian.co.uk at 16.30 BST on Thursday, September 18, 2008.
- The Hindu-Business Line, (11.01.2018)
- The Institute of Chartered Financial Analysts of India (ICFAI) University, (2006), *Auditing 1*, p.408.
- Thomadakis, Stavros B (2006), 'Overseeing standards of audit, education and ethics for the accounting profession', presented to the president committee of IOSCO, Hong Kong, 7 June.
- W.C.Powers, R.S.Troubh, and H.S.Winokur, (2002) 'Report of Investigation by the Special Investigative Committee of the Board of Directors of Enron Corporation', February 1, pp.129-130.

MERGERS AND ACQUISITIONS IN INDIAN PHARMACEUTICAL SECTOR AND FINANCIAL ACCOMPLISHMENTS: A STUDY ON SELECT BSE LISTED COMPANIES

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Abstract

Realizing different potentials and implementing scope decisions are the main objectives of corporate restructuring, which usually takes place in tandem with mergers and acquisitions (M&As). As per Dhingra (2019), the contemporary industrial ownership model is characterized by substantial global mergers and acquisitions, which have fundamentally transformed numerous industries. In essence, they are calculated choices made by corporate entities that aim to achieve inorganic growth by merging two or more companies under joint ownership while diluting their individual identities.

The intense pricing animosity and government price regulations that constitute the splintered Indian pharmaceutical industry. The main objectives of this research are to establish the theoretical underpinnings of financial conduct as well as segment performance assessment derived from M&As, quantify it for the chosen sample companies in the Indian pharmaceutical sector over a ten-year study period, from the fiscal year 2014–2015 to 2023–2024, and empirically compare that performance, both before and after the mergers and acquisitions tenure. The study's divergent findings may be helpful to policymakers and accounting standards setters, as well as to pharmaceutical businesses looking to mergers and acquisitions as a way to make strategic decisions.

Keywords: *Corporate restructuring, Inorganic growth, pharmaceutical industry, Segment performance.*

I. Introduction

The enormous volume of worldwide mergers and acquisitions (M&A) activity that characterizes today's corporate ownership structure has drastically altered a number of industries. M&As are strategic moves made by corporate entities with the goal of achieving inorganic growth by merging two or more companies under common ownership, hence erasing each company's unique identity (Shah, 2018). Each M&A is unique and can provide strategic insights for a variety of reasons, including gaining synergy, growing market share, acquiring unique capabilities and resources, diversifying operating performance, accelerating earnings, tax considerations, technological advancement, cost savings, and other objectives (Patel, 2017).

Performance appraisal is the process of determining the effectiveness and efficiency of an action. Organizational performance can be assessed by comparing the value that an organization has created utilizing its productive assets and intellectual capital to the value that its owners would expect to receive (Armstrong & Baron, 2005).

The Indian pharmaceutical market is typically characterized by government price restriction, fierce price competition, and fragmentation. It accounts for 20% of all pharmaceutical transactions worldwide and is ranked third in both volume and value (Agarwal and Bhattacharjea, 2006) and also it meets around 70% of the international journals on pharmaceutical research and development. This thriving industry has made a significant contribution to the nation's GDP, is constantly being upgraded through

R&D, and has seen several M&As during the past ten years. Therefore, the motto of these corporate mergers and acquisitions is a novel research platform, as is the critical assessment of the financial performance after the mergers and acquisitions.

With an emphasis on the Indian pharmaceutical sector, the study's first section presents the basic concept of M&As in light of the previously laid out factors. The second section contains the literature reviews used to identify the research gap, and the third section discusses the objective of the study. Fourth section of this paper discusses the research technique. The idea of financial performance and the trends in the Indian pharmaceutical industry are summed up in the fifth segment. Nevertheless, the analytical component is covered in this study's sixth portion. The seventh section concentrates on providing a final observation, whereas the eighth portion addresses the study's limits and possible future research directions in this field.

II. Literature Review

The rationales for mergers and acquisitions (M&As), which have been the focus of extensive research worldwide, are complex and difficult to fully explain using a single approach. Examining the elements that promote M&A activity and the reasons behind it is necessary to comprehend its impacts, with a focus on the pharmaceutical industry. The financial and strategic decision-making perspectives of the resulting firm are usually taken into consideration when conducting corporate mergers and acquisitions. A number of research studies, which primarily focus on the firm's size and age, R&D intensity, product diversification, and cost reduction, view M&As as one of the strategic decision-making tools. Another area of interest is the analysis of share price movement and return. Few research shows neutral results, while the majority show a favourable increase in share price. Numerous financial literatures on business mergers and acquisitions are available, both domestically and internationally. The literature evaluation for this subject usually focuses on the financial performance of the company that results from mergers and acquisitions.

Beena (2006) has examined the financial performance of the Indian pharmaceutical industry before and after mergers and acquisitions. She has examined 64 merger and 63 acquisition situations in her studies. Performance metrics that have been taken into consideration include net profit margin, return on capital employed, return on net worth, R&D intensity, advertisement intensity, cost intensity, and export-import intensity. Using a multiple regression model and descriptive statistics, this study found that, in comparison to the pre-merger study period, the merging firms' overall performance improved during the post-merger period.

On the other hand, Mishra and Chandra (2010) in their research attempted to analyse the impact of various factors attributing to the performance of an entity like – current firm size, current market size, current market share, lagged selling intensity, lagged R&D intensity, lagged foreign technology purchase intensity to explain post M&A effect on Indian pharmaceutical firms etc. They have applied descriptive data analysis and multiple regression model to analyse the study objectives and concluded that Indian pharmaceutical sector has failed to reap the benefits of M&A in terms of profitability. In-house R&D also failed to provide any distinct advantage to the firm in terms of their profitability. The effect of mergers on financial performance before and after the merger on Glaxo Smith Kline as a sample representator of Indian pharmaceutical sector have studied by Sami (2014). She had applied applies independent t-test for analysing pre and post-merger performance of Glaxo Smith Kline. The study results showed that company performance improved in terms of sales and net earnings but there was no change in debt equity and return on equity ratio.

Shah and Nakum (2019) used the convenience sampling method to gather secondary data on Sunpharma Ltd.-Ranbaxy Laboratories and Torrent Pharma-Elder Pharma in order to evaluate the financial viewpoints on mergers and acquisitions in the Indian pharmaceutical industry. To analyze the available financial data of the sample companies, the study used a variety of applied research techniques and accounting tools, such as comparative ratios (EPS, ROE, and ROCE). They came to the

conclusion that there were notable shifts in profitability as indicated by EPS, ROE, and ROCE, and that the study's findings had little bearing on overall wealth and shareholders' profitability.

In her research, Sami (2014) attempted to compare financial performance prior to and during the merger. After considering the financial parameters of the chosen sample business, GlaxoSmithKline, such as sales, net earnings, debt-to-equity ratio, and return on equity ratio, she employed the independent t-test to support the study's objectives. The results of the study showed that although sales and net earnings improved after business mergers, the debt-to-equity and return-on-equity ratios did not.

Additionally, Dhingra (2019) looked at the financial performance of five sample companies in the Indian pharmaceutical industry before and after mergers and acquisitions: Sun Pharmaceuticals, Lupin, Cipla, Dr. Reddy's, and Aurobindo Pharma. Her study's primary objectives were to ascertain how the acquiring company's market value, operational effectiveness, financial risk, research intensity, and profitability were impacted by the M&A transaction. After considering performance indicators like Net Profit Margin, Return on Net Worth/Equity, Return on Capital Employed, Gross Profit Margin, Operating Profit Margin, Liquidity Ratio, Current Ratio, Total Debt/Equity, and Interest Coverage Ratio, she used S.D. and covariance tests to support the research objectives. The study's findings, which showed that the Indian pharmaceutical industry engaged in more consolidation through asset sales, alliances, mergers, and acquisitions, were in line with global trends. Most businesses are merging to increase the range of products they offer and, as a result, to continue operating without taking on more risks.

▪ Research Gap

Increased product expansion, access to authorized facilities, distribution channels, cost savings, tax breaks, and other factors are driving mergers and acquisitions among entities under Indian pharmaceutical sector. From the literature study the following set of limitations are identified in this ground –

- a. One of the motives behind M&A is to avail of the essence of synergy and thereby reduce firm's risk perception. Again, in respect of evaluation of business and well as financial risks there exist only a handful of studies, which essentially requires further extension in this field.
- b. Furthermore, a share price reflects the value of a company. The rise and fall of share price affect a company's market capitalization and therefore its market value. M&A activity typically influences the share price of the resulting company.
- c. A few studies on the pharmaceutical industry in India have been conducted on this topic; in particular, the identification of post-merger financial performance in a precise manner leads to the identification of reasons of performance changes and achievement of merger objectives in this sector.

III. Objective Of Study

The present study is both explorative and empirical in nature, basically focused on the following set of objectives :

- i. To find out more about the concept of mergers and acquisitions, particularly in relation to the Indian pharmaceutical sector, and the impact these transactions have on the profits of the resulting entity.
- ii. To investigate the impact of the M&As activity on the acquirer firm's liquidity perspective.
- iii. To appraise the ramification of the M&A activity on the acquirer firm's solvency viability.
- iv. To empirically examine the influence of the M&A activity on the acquirer firm's profitability aspect.
- v. To formulate a subjective observation on financial efficiency parameters of the resulting company.

A. Quartile 1: Large Market Capitalisation									
Sl No.	Name of Pharma Company	BSE Trade Sumbol	BSE Security Code	Market Capitalisation	Merger Cases	Acquisition of Shares Cases	Sale of Asset Cases	Acquirer Co.	Target Co.
1	Sun Pharmaceutical Industries Ltd.	SUNPHARMA	524715	406339.42	26	25	9	11	49
2	Divis Laboratories Ltd.	DIVISLAB	532488	145078.6	37	13	7	18	39
3	Cipla Ltd.	CIPLA	500087	114843.16	-	12	12	8	16
4	Torrent Pharmaceuticals Ltd.	TORNTPHARM	500420	109186.1	4	2	4	2	8
5	Mankind Pharma Ltd.	MANKIND	543904	98181.3	5	1	2	1	7
6	Dr. Reddy's Laboratories Ltd.	DRREDDY	500124	92374.26	51	37	97	31	66
7	Lupin Ltd.	LUPIN	500257	90132.89	4	17	5	3	23
8	Zydus Lifesciences Ltd.	ZYDUSLIFE	532321	86038.06	13	19	13	8	37
9	Aurobindo Pharma Ltd.	AUROPHARMA	524804	64722.73	14	34	10	19	39
10	Alkem Laboratories Ltd.	ALKEM	539523	57587.86	2	4	1	1	6

IV. Research Methodology

An empirical and theoretical approach are combined in this study. The exploratory part is supported by authors' books on the issue, a range of articles published in different journals, and an abundance of online resources on the research topic.

The empirical component of the study examines the impact of mergers and acquisitions on the pharmaceutical business using a sample of Indian pharmaceutical companies that are listed on the BSE. This section of the study is mostly based on secondary data, such as the range of information offered in audited annual reports that are available on the websites of sample companies.

Data Source: The audited yearly reports of the selected sample companies are taken into consideration as secondary data. The majority of the information is taken from the CMIE Prowess IQ database.

Sample: Only hundred and sixty-two (162) pharmaceutical companies have a track record of M&A activity out of the two hundred and three (203) pharmaceutical companies that were listed on the Bombay Stock Exchange (BSE) as of March 31, 2025. The 162 pharmaceutical firms are arranged in descending order on the basis of outstanding market capitalization as of March 31, 2025 and four distinct quartiles are created, with ten companies in each quartile, as follows :

B. Quartile 2: Moderate Capitalisation									
Sl No.	Name of Pharma Company	BSE Trade Sumbol	BSE Security Code	Market Capitalisation	Merger Cases	Acquisition of Shares Cases	Sale of Asset Cases	Acquirer Co.	Target Co.
1	Strides Pharma Science Ltd.	STAR	532531	5585.03	14	26	14	14	40
2	Hikal Ltd.	HIKAL	524735	4912.89	1	8	3	5	7
3	Sun Pharma Advanced Research Company	SPARC	532872	4697.51	-	1	1	1	1
4	Unichem Laboratories Ltd.	UNICHEMLAB	506690	4197.93	7	7	4	7	11
5	Orchid Pharma Ltd.	ORCHPHARMA	524372	3602.09	4	10	3	11	6
6	Sequent Scientific Ltd.	SEQUENT	512529	3406.61	14	16	6	10	26
7	Gufic Biosciences Ltd.	UFICBIO	509079	3159.74	3	4	-	3	4
8	Dishman Carbogen Amc Ltd.	DCAL	540701	3047.07	1	2	1	1	3
9	Advanced Enzyme Technologies Ltd.	ADVENZYME S	540025	3038.17	-	9	-	1	8
10	Aarti Drugs Ltd.	AARTIDRUGS	524348	3011.33	2	10	-	7	5

C. Quartile 3: Low Capitalisation									
Sl No.	Name of Pharma Company	BSE Trade Sumbol	BSE Security Code	Market Capitalisation	Merger Cases	Acquisition of Shares Cases	Sale of Asset Cases	Acquirer Co.	Target Co.
1	Medicamen Biotech Ltd.	MEDICAMEQ	531146	618.61	-	6	-	5	1
2	Kilitch Drugs (India) Ltd.	KILITCH	524500	556.93	-	6	1	7	-
3	Nectar Lifesciences Ltd.	NECLIFE	532649	518.02	-	3	-	3	-

4	Ind-Swift Laboratories Ltd.	INDSWFTLAB	532305	491.43	1	9	2	8	4
5	Jenburkt Pharmaceuticals Ltd.	JENBURPH	524731	441.77	-	2	-	2	-
6	Zim Laboratories Ltd.	ZIMLAB	541400	419.18	-	2	-	1	1
7	Kerala Ayurveda Ltd.	KERALAYUR	530163	409.11	1	6	1	5	3
8	Venus Remedies Ltd.	VENUSREM	526953	401.22	-	4	-	4	-
9	Titan Biotech Ltd.	TITANBIO	524717	396.68	-	4	-	4	-
10	Lyka Labs Ltd.	LYKALABS	500259	381	3	9	4	13	4

D. Quartile 4: Very Low Capitalisation									
Sl No.	Name of Pharma Company	BSE Trade Sumbol	BSE Security Code	Market Capitalisation	Merger Cases	Acquisition of Shares Cases	Sale of Asset Cases	Acquirer Co.	Target Co.
1	Parnax Lab Ltd.	PARNAXLAB	506128	121.75	2	1	-	1	2
2	Source Natural Foods and Herbal Supplements Ltd.	SOURCENTRL	531398	119.73	-	2	1	3	-
3	Mangalam Drugs & Organics Ltd.	MANGALAM	532637	119.26	2	3	1	2	3
4	Lasa Supergenerics Ltd.	LASA	540702	88.39	1	2	1	2	2
5	Makers Laboratories Ltd.	MAKERSL	506919	83.2	1	1	-	-	2
6	Ind-Swift Laboratories Ltd.	INDSWFTLAB	532305	72.02	1	9	2	8	4
7	Vivo Bio Tech Ltd.	VIVOBOT	511509	58.05	1	3	-	2	2
8	Vista Pharmaceuticals Ltd.	VISTAPH	524711	49.69	-	4	-	4	-
9	Zenith Health Care	ZENITHHE	530665	24.84	2	1	-	1	2
10	Decipher Labs Ltd.	DECIPHER	524752	11.5	2	1	-	1	2

Firms with a negligible number of M&A cases are not included in the sample, and the pharmaceutical company with the next position in respect of market capitalization, is given due consideration when choosing the sample entity for each of the four quartiles. For the purposes of this study, a total of forty pharmaceutical companies duly listed in BSE are taken into consideration.

Period of Study: Study tenure ranging from the financial year 2015-16 to 2024-25, i.e., for eleven consecutive financial years.

Research Hypotheses:

H₀₁: Merger and acquisitions have no significant impact on the liquidity perspective of the selected pharmaceutical companies.

H₀₂: Merger and acquisitions have no significant effect on the solvency position of the selected pharmaceutical companies.

H₀₃: M&As have no significant ascendancy on the profitability aspect of the selected pharmaceutical companies.

H₀₄: M&As have no significant impact on the financial efficiency parameters of the selected pharmaceutical companies.

Statistical Method:

The year in which the selected sample units are merged and acquired, has regarded as zero (0) in this study. Majority of the chosen pharma firms have completed M&A activity during the financial year 2019-20 and 2020-21 and accordingly these two financial years are jointly considered as zero. Using the merger completion year as the starting point, averages for a series of accounting ratios were calculated for four years before (from 2015-16 to 2018-19) and four years after (from 2021-22 to 2024-25) the merger to analyse the impact of M&As on the financial conduct. Further, the period within which the majority of M&As took place, has been identified as pre-M&A period. In order to ascertain the consequences of corporate mergers on the financial conduct, performance indicators like - Cash to Current Liabilities, Cash to Average Cost of Sales, Current Ratio, Quick Ratio, Net Cash Flow from Operating Activities, Net Cash Inflow from Investing Activities, Net Cash Flow from Financing Activities, Debt to Equity Ratio, Debt Service Coverage Ratio (DSCR), Interest Coverage Ratio, PAT as % of Total Income, Cash Profit as % of Net Worth, Return on Equity, Basic EPS, Raw Material Turnover, WIP Turnover, Finished Goods Turnover, Debtors Turnover and Creditors Turnover ratios are employed. For the purpose of comparing the financial performance between pre and post M&As period, statistical method Paired-t Test is applied on pre and post-merger average of the chosen performance measuring accounting ratios through SPSS software to substantiate the research objectives.

V. Financial Repercussion of Indian Pharmaceutical Industry – A Perview

The ability of a company to produce income, manage costs, and preserve long-term financial stability can be referred to as financial performance, and it provides an invaluable instrument for each of an entity's stakeholders. Such performance is usually assessed using the conventional metrics of liquidity, solvency, and profitability issues in financial literature. It is a thorough evaluation of how well a company uses its resources, accounting for income, equity, assets, liabilities, and total profitability. Any business's foundation is its financial behaviour, which is assessed using a range of accounting ratio indicators in addition to other performance evaluation standards. Therefore, financial performance evaluation is crucial for all types of firms.

Liquidity is the capacity of a business to generate cash or cash equivalents instantly, whereas solvency is the capacity of a business to settle obligations when they become due. One of the primary objectives of profitability analysis is to assess a company's ability to turn a profit.

The Indian pharmaceutical industry, known as the 'Pharmacy of the World,' dominates the production of vaccines and generic medications. Globally, it is rated 14th in terms of value and third in terms of volume. In nations like the US and the UK, the industry supplies a sizable amount of the demand for generic drugs and vaccines. The main elements driving this sector's growth include a large market, cost competitiveness, and R&D potential. Hence, a critical assessment of the financial performance of the Indian pharmaceutical industry is pertinent.

VI. Pre and Post Mergers and Acquisitions Financial Performance - A Comparative Evaluation

Liquidity, solvency, and profitability indicators are used to analyze financial conduct. For the forty chosen sample companies in four distinct quartiles, financial accomplishment indicators are examined independently before and after the M&A activities. For each chosen sample company, the pre and post M&As performance indicating average ratios are calculated and performance indicators are tabulated as below :

Table 1: Paired Samples T-Test Results - Liquidity Analysis									
(Calculated through SPSS)									
Sl. No.	Pre-Post M&A(s) Pair	Paired Differences					t	d.f.	Sig. (2-tailed)
		Mean	Std. Deviation	Std. Error Mean	95% Confidence Interval of the Difference				
					Lower	Upper			
1.	Cash to Current Liabilities	.00217	.49284	.07792	-.15545	.15979	.028	39	0.978 H₀₁ - Accepted
2.	Cash to Avg. Cost of Sales	5.72115	36.84528	5.82575	-17.50484	6.06254	-.982	39	0.332 H₀₁ - Accepted
3.	Current Ratio	-.37021	1.19082	.18829	-.75106	.01063	-1.966	39	0.046 H₀₁ - Rejected
4.	Quick Ratio	-.23039	.89757	.14192	-.51745	.05666	-1.623	39	0.013 H₀₁ - Rejected
5.	Net Cash Flow from Operating Activities	- 2354.970 25	5930.35178	937.6709 5	- 4251.58876	-458.35174	-2.512	39	0.016 H₀₂ - Rejected
6.	Net Cash Flow from Investing Activities	2030.305 62	6065.17631	958.9885 8	90.56814	3970.04311	2.117	39	0.041

									H₀₂ - Rejected
7.	Net Cash Flow from Financing Activities	484.53015	3253.94826	514.49439	-556.13299	1525.19329	.942	39	0.352 H₀₂ - Accepted

According to the statistical table above, the first two important liquidity ratios do not show results that are statistically significant. In contrast, I might reject the null hypothesis H_{01} for the second two ratios - the current ratio and the quick ratio - and come to the conclusion that the resulting sample companies' post-merger liquidity has been significantly impacted. the post-merger performance of M&As may be significantly impacted by Net Cash Flow from Operating Activities and Net Cash Flow from Investing Activities. Since the results for the third cash flow component - Net Cash Flow from Financing Activities - are not statistically significant, null hypothesis H_{01} may be accepted.

Table 2: Paired Samples T-Test Results - Solvency Analysis									
(Calculated through SPSS)									
Sl. No.	Pre-Post M&A(s) Pair	Paired Differences					t	d.f.	Sig. (2-tailed)
		Mean	Std. Deviation	Std. Error Mean	95% Confidence Interval of the Difference				
					Lower	Upper			
1.	Debt to equity ratio	.32547	2.15663	.34099	-.36426	1.01519	.954	39	0.346 H ₀₃ - Accepted
2.	DSCR	-8.23574	29.07669	4.59743	-17.53491	1.06344	-1.791	39	0.081 H ₀₃ - Accepted
3.	Interest Coverage Ratio	-18.99103	132.27142	20.91395	-61.29348	23.31143	-.908	39	0.369 H ₀₃ - Accepted

From the Table 2, it is evident that M&As might not significantly affect the post-merger state of solvency of the chosen pharmaceutical companies.

Table 3: Paired Samples T-Test Results - Profitability Analysis									
(Calculated through SPSS)									
Sl. No.	Pre-Post M&A(s) Pair	Paired Differences					t	d.f.	Sig. (2-tailed)
		Mean	Std. Deviation	Std. Error Mean	95% Confidence Interval of the Difference				
					Lower	Upper			
1.	PAT as % of Total Income	5.20317	29.13341	4.60640	-4.11415	14.52048	1.130	39	0.046 H₀₄ - Rejected
2.	Cash Profit as % of Net Worth	.92750	19.16824	3.03077	-5.20280	7.05780	.306	39	0.048 H₀₄ - Rejected
3.	Return on Equity	2.37681	23.45274	3.70820	-5.12374	9.87736	.641	39	0.045 H₀₄ - Rejected
4.	Basic EPS	-4.64730	32.32497	5.11103	-14.98533	5.69073	-.909	39	0.369 H₀₄ - Accepted

Table 3 shows that, for the first three profitability indicators, I may reject the null hypothesis, H_{04} , and conclude that M&As have a significant impact on the post-merger profitability of the resulting companies.

Table 4: Paired Samples T-Test Results - Efficiency Analysis									
(Calculated through SPSS)									
Sl. No.	Pre-Post M&A(s) Pair	Paired Differences					t	d.f.	Sig. (2-tailed)
		Mean	Std. Deviation	Std. Error Mean	95% Confidence Interval of the Difference				
					Lower	Upper			
1.	Raw Material Turnover	-.03904	3.33918	.52797	-1.10696	1.02888	-.074	39	0.941 H₀₅ - Accepted
2.	WIP Turnover	-6.68792	40.92001	6.47002	19.77477	6.39893	-1.034	39	0.038 H₀₅ -Rejected
3.	Finished Goods Turnover	.54322	20.21246	3.19587	-5.92104	7.00748	.170	39	0.046 H₀₅ -Rejected
4.	Debtors Turnover	.01582	2.87248	.45418	-.90284	.93449	.035	39	0.042 H₀₅ -Rejected
5.	Creditors Turnover	.05613	1.90842	.30175	-.55421	.66647	.186	39	0.853 H₀₅ - Accepted
6.	P/E Ratio (in times)	-34.253	97.7531	15.4561	-65.5155	-2.98956	-2.216	39	0.033 H₀₅ -Rejected

Significant results are shown by the second, third, fourth, and sixth activity ratios in this case. However, there is no statistically significant difference between the first and fifth financial efficiency indicators. Therefore, I may say that for WIP Turnover, Finished Goods Turnover, Debtors Turnover and P/E Ratio; M&As have statistically significant impact on accounting efficiency level of the pharmaceutical industry.

VII. Conclusion

The empirical investigation produces contradictory results about the liquidity situation as indicated through the chosen accounting ratios and the components of cash flows for the selected sample enterprises under the Indian pharmaceutical sector. The study's factual findings suggest that M&As might not significantly impact the Indian pharmaceutical industry's financial status. Once more, the profitability test results suggest that M&As have a favourable effect on the emerging firms' capacity to produce profits after the merger. The research findings show that this industry's efficiency level increases statistically during the post-M&A period, yet results on efficiency viewpoints are also inconsistent. How effectively and fairly both positive and neutral or even negative outcomes are

leveraged to achieve the benefits of the business merger determines whether M&As are successful or unsuccessful.

VIII. Study Limitations and The Area Of Future Research

The validity of the study's conclusions may be impacted by the following limitations:

- i. Outstanding market capitalization is the main parameter utilized to choose BSE-listed Indian pharmaceutical companies, but other sample selection criteria would produce different results.
- ii. The database's scope is restricted to the calculated ratio indicator values obtained from the CMIE Prowess IQ database.
- iii. This study only looked at ten years; a longer time frame would produce more accurate findings.
- iv. This study only considers a small number of selected financial performance-indicating ratios; other relevant ratios exist but are not included for this inquiry.
- v. For this study, only forty sample pharmaceutical firms are taken into consideration as the representative of the entire pharma industry; a larger sample would yield more accurate results.

The current study broadens the following areas of the Indian pharmaceutical industry that warrant more research under this domain:

- i. Future studies on the strategic impacts of M&As on the performance of acquiring firms might be relevant.
- ii. Prospective studies could consider other factors, which would open up new perspectives and show their importance in relation to the financial performance obtained from M&A.

Bibliography

- Adhikari B., Kavanagh M., Hampson B. (2023). *A Study on Financial Performance Analysis of Selected Companies Pre & Post- Merger and Acquisition with Reference to India*. *Tuijin Jishu/Journal of Propulsion Technology*, 44(5), 2603-2609.
- Armstrong, M., & Baron, A. (2005). *Managing performance: performance management in action*. CIPD publishing.
- Agarwal, M., & Bhattacharjea, A. (2006). *Mergers in India. A Response to Regulatory Shocks*. *Emerging Markets Finance and Trade*, 42(3), 46-65
- Barney, J. B. (1988). *Returns to Bidding Firms in Mergers and Acquisitions: Reconsidering the Relatedness Hypothesis*. *Strategic Management Journal*, 9(S1), 71-78.
- Beena, S. (2006). *Mergers and Acquisitions in the Indian Pharmaceutical Industry: Nature, structure and Performance*.
- Bhattacharyya, S. S., & Naser, S. (2020). *Comparative Analysis of Mergers and Acquisitions in Indian and International Pharmaceutical Industry with Unique Case-studies*. *International Journal of Business and Globalisation*, 25(1), 112-136.
- Bosis, G., & Herrmann, S. *Value Creation in Pharmaceutical Mergers & Acquisitions An Empirical Study of Stock Price Movements*.
- Bruner, R. F., & Perella, J. R. (2004). *Applied Mergers and Acquisitions* (Vol. 173). John Wiley & Sons.
- Dhingra, K. (2019). *An Analysis of Mergers and Acquisitions in Indian Pharmaceutical Industry*. *Amity Global Business Review*, 72, 72-96.
- Ghosh, A. (2001). *Does Operating Performance Really Improve following Corporate Acquisitions?*. *Journal of Corporate Finance*, 7(2), 151-178.
- Kalotra, A. (2014). *Marketing Strategies of Different Pharmaceutical Companies*. *Journal of Drug Delivery and Therapeutics*, 4(2), 64-71.
- Ku, M. S. (2015). *Recent Trends in Specialty Pharma Business Model*. *Journal of food and drug analysis*, 23(4), 595-608.
- Kumar, V., & Sharma, P. (2019). *An Insight into Mergers and Acquisitions: A Growth Perspective*. Springer.

- Martynova, M., Oosting, S., & Renneboog, L. (2007). *The Long-term Operating Performance in European Mergers and Acquisitions*. In *International Mergers and Acquisitions Activity Since 1990*, 79-116. Academic Press.
- Mishra, P., & Chandra, T. (2010). *Mergers, Acquisitions and Firms Performance: Experience of Indian Pharmaceutical Industry*. *Eurasian Journal of Business and Economics*, 3(5), 111-126.
- Mubeen, S., & Nagaraju, Y. (2018). *Impact of Mergers and Acquisitions on Financial Performance a study of Select Indian Companies*. *Adarsh Journal of Management Research*, 10(2), 46-55.
- Patel, R. (2018). *Pre & Post-merger Financial Performance: An Indian Perspective*. *Journal of Central Banking Theory and Practice*, 7(3), 181-200.
- Ravenscraft, D. J., & Long, W. F. (2000). *Paths to Creating Value in Pharmaceutical Mergers*. In *Mergers and Productivity* (pp. 287-326). University of Chicago Press.
- Rossi, M., Thrassou, A., & Vrontis, D. (2015). *Biotechnological Mergers and Acquisitions: Features, Trends and New Dynamics*. *Journal of Research in Marketing and Entrepreneurship*, 17(1), 91-109.
- Sami, S. (2014). *Mergers and Acquisitions in India's Pharmaceutical Sector*. *Transnational Corporations Review*, 6(1), 86-100.
- Saraswathy, B. (2010). *Cross-border Mergers and Acquisitions in India: Extent, nature and structure*.
- Shah H. (2018). *Mergers and Acquisitions in the Indian Pharmaceutical Sector: Trends, Sample Study, and Financial Analysis of Pre and Post Merge*. *International Journal of Science, Engineering and Management*, 3(2), 55-68.
- Shah S., & Nakum D. (2019). *A Study on Mergers and Acquisitions of selected Pharmaceutical Companies of India*. *GAP GYAN*, 90-97
- Vyas, V., Narayanan, K., & Ramanathan, A. (2012). *Determinants of Mergers and Acquisitions in Indian pharmaceutical Industry*. *Eurasian Journal of Business and Economics*, 5(9), 79-102.

➤ Websites

- <https://economictimes.indiatimes.com/industry/healthcare/biotech/pharmaceuticals/dr-reddys-laboratories-planning-mergers-and-acquisitions-to-climb-up-ladder/articleshow/92421206.cms?from=mdr>
- https://en.wikipedia.org/wiki/Dr._Reddy%27s_Laboratories
- <https://www.fortuneindia.com/fortune-500/company/glenmark-pharmaceuticals?year=2024>
- <https://ipapharma.org/>
- <https://www.investindia.gov.in/sector/pharmaceuticals#:~:text=The%20pharmaceutical%20industry%20in%20India%20is%20currently%20valued%20at%20%2450,all%20medicine%20in%20the%20UK>
- <https://www.pharmaceuticals.gov.in/>

ANNEXURE 1: Liquidity Ratios (Source: ProwessIQ-CMIE Database)										
Sl. No.	Company Name	Cash to Current Liabilities (times)		Cash to Avg. Cost of Sales		Current Ratio (times)		Quick Ratio (times)		
		Pre	Post	Pre	Post	Pre	Post	Pre	Post	
1	Sun Pharmaceutical Industries Ltd.	0.02575	0.06625	9.41275	11.702	0.61225	1.66975	0.38275	1.125	
2	Divis Laboratories Ltd.	0.31621	0.06451	0.78162	1.32542	1.3786	2.1458	1.01475	2.10547	
3	Cipla Ltd.	0.46675	0.116688	4.267	58.839	2.5815	4.17125	1.4365	2.89725	
4	Torrent Pharmaceuticals Ltd.	0.42075	0.0895	9.858	10.34425	1.811	1.35225	1.171	0.7215	
5	Mankind Pharma Ltd.	1.12925	1.1135	9.52325	20.82175	2.417	2.20925	1.4135	1.49775	
6	Dr. Reddy's Laboratories Ltd.	0.085565	0.265534	0.617857	1.125554	2.234493	2.73826	1.777704	2.092458	
7	Lupin Ltd.	0.53825	0.4085	3.59725	11.53275	3.5585	2.37375	2.54125	1.4165	
8	Zydus Lifesciences Ltd.	0.0505	0.0855	10.967	19.533	1.1065	1.4745	0.72375	1.057	
9	Aurobindo Pharma Ltd.	0.031	0.03925	7.64975	9.4865	1.445	1.68	0.87475	1.01725	
10	Alkem Laboratories Ltd.	0.26975	0.51525	25.00875	57.7275	1.43	1.679	0.8375	1.109	
11	Strides Pharma Science Ltd.	0.6355	0.03875	25.0085	14.246	1.54525	1.08475	1.1865	0.767	
12	Hikal Ltd.	0.02225	0.03575	4.7695	7.14625	1.1755	1.1755	0.564	0.779	
13	Sun Pharma Advanced Research Company Ltd.	0.9835	0.7585	12.1915	34.5325	1.196	0.91925	1.1585	0.9105	
14	Unichem Laboratories Ltd.	2.2785	0.711	6.9345	6.68425	4.26625	3.26775	3.3905	1.959	
15	Orchid Pharma Ltd.	0.1755	0.4135	183.119	44.61	0.5995	3.37675	0.36025	1.93525	
16	Sequent Scientific Ltd.	0.38225	0.04075	4.76875	6.0855	2.1495	1.2765	1.6295	0.644	
17	Gufic Biosciences Ltd.	0.043	0.04875	8.60425	9.28125	1.141	1.47275	0.5625	0.86325	
18	Dishman Carbogen Amc Ltd.	0.25675	0.1935	24.93	29.31375	2.1005	0.8755	0.54525	0.49525	
19	Advanced Enzyme Technologies Ltd.	0.01425	1.1595	2.346	21.67125	1.76175	4.89625	0.6595	2.7995	
20	Aarti Drugs Ltd.	0.0085	0.00475	1.4445	0.62575	1.128	1.587	0.694	0.9325	
21	Medicamen Biotech Ltd.	0.19925	0.13675	29.35025	26.65975	1.3075	1.475	0.977	1.00075	
22	Kilich Drugs (India) Ltd.	2.46775	1.0715	38.6845	39.8125	4.518	2.1205	4.2425	2.026	
23	Nectar Lifesciences Ltd.	0.0125	0.02025	3.3785	4.32475	1.19075	1.17725	0.47225	0.4555	
24	Ind-Swift Laboratories Ltd.	0.03175	0.61825	10.0075	24.07625	1.19725	2.97875	0.58425	1.8135	
25	Jenburt Pharmaceuticals Ltd.	2.18825	3.109	138.7928	257.3028	3.5635	4.832	3.03275	4.33375	
26	Zim Laboratories Ltd.	0.00775	0.007	1.52825	1.20825	1.30525	1.20675	0.87275	0.6715	
27	Kerala Ayurveda Ltd.	0.074	0.19075	23.9165	20.706	0.94025	1.048	0.343	0.616	
28	Venus Remedies Ltd.	0.0025	0.78775	0.5945	30.9495	1.111	3.483	0.319	1.93425	
29	Titan Biotech Ltd.	0.192	0.22975	16.6285	18.081	2.10525	2.7485	0.799	1.27175	
30	Lyka Labs Ltd.	0.002	0.03925	2.266	3.75475	0.436	0.6935	0.3335	0.509	
31	Parnax Lab Ltd.	0.01125	0.39375	6.499	98.8265	1.31225	4.281	0.79475	2.34125	
32	Source Natural Foods and Herbal Supplements Ltd.	0.34575	0.86975	12.3465	43.1035	2.688	4.145	1.6895	2.93775	
33	Mangalam Drugs & Organics Ltd.	0.01475	0.00825	0.927	1.263	1.0905	1.11725	0.43325	0.34025	
34	Lasa Supergenics Ltd.	0.00275	0.14175	0.45825	18.17375	0.66625	1.19675	0.3085	0.382	
35	Makers Laboratories Ltd.	0.171	0.007	12.51125	2.2495	1.8685	0.782	1.07975	0.338	
36	Ind-Swift Laboratories Ltd.	0.03175	0.61825	10.0075	24.07625	1.19725	2.97875	0.58425	1.8135	
37	Vivo Bio Tech Ltd.	0.2105	0.047	76.15925	14.3325	1.00225	1.1595	0.613	0.46575	
38	Vista Pharmaceuticals Ltd.	0.107	0.0055	31.183	8.50625	1.59425	1.5935	0.937	0.73625	
39	Zenith Health Care	0.86425	0.58025	48.64575	38.48225	3.714	2.882	2.06075	1.644	
40	Decipher Labs Ltd.	0.204	0.13675	30.6525	26.65975	1.54525	1.475	1.1395	1.00075	

ANNEXURE 2: Cash Flow Component Analysis (Source: ProwessIQ-CMIE Database)							
Sl. No.	Company Name	Net Cash Flow from Operating Activities (Rs. Million)		Net Cash Inflow from Investing Activities (Rs. Million)		Net Cash Flow from Financing Activities (Rs. Million)	
		Pre	Post	Pre	Post	Pre	Post
1	Sun Pharmaceutical Industries Ltd.	-7011.35	18586.28	19614.73	-4453.43	-12154.3	-14130.8
2	Divis Laboratories Ltd.	12,084.71	12610.12	751.3	2,690	10,914.21	7990.15
3	Cipla Ltd.	16300.93	32488.9	-10336.9	-28662.4	-5958.65	-4065.3
4	Torrent Pharmaceuticals Ltd.	13108.38	22178.75	-14243.4	-7744.5	1360.175	-15138.3
5	Mankind Pharma Ltd.	5151.8	13966.95	-3593.78	-13617.9	-1478.38	-129
6	Dr. Reddy's Laboratories Ltd.	20,287	33388.75	-5,624	-25934.8	-14,508	-7,294
7	Lupin Ltd.	21516.18	15048.08	-16817.9	-14368.8	-3563.65	-3290.13
8	Zydus Lifesciences Ltd.	9223.75	16441.75	-10451.8	-14793.8	896.25	-2320.75
9	Aurobindo Pharma Ltd.	12736.68	25630.53	-13050.3	-19130.8	586.775	-6482.88
10	Alkem Laboratories Ltd.	5480.575	14369.5	-1593.15	-8647.2	-3546.33	-6106.7
11	Strides Pharma Science Ltd.	1499.575	515.225	-2846.4	-1251.78	2300.2	801.275
12	Hikal Ltd.	1684.025	2561.65	-1003.43	-2266.6	-667.625	-342.75
13	Sun Pharma Advanced Research Company Ltd.	-1317.35	-2146.65	-566.25	-461.95	2306.525	2620.375
14	Unichem Laboratories Ltd.	-150.4	-770.6	3135.45	571.05	-2554.98	-27.55
15	Orchid Pharma Ltd.	1584.125	645.125	-399.125	-405.9	-1796.18	-458.925
16	Sequent Scientific Ltd.	350.875	54.25	-1248.18	-77.9	867.2	18.8
17	Gufic Biosciences Ltd.	-19.175	398.65	-67.575	-985.975	84.75	579.5
18	Dishman Carbogen Amc Ltd.	1016.95	492.775	-542.775	66.7	-412.825	-615.175
19	Advanced Enzyme Technologies Ltd.	253.35	568.6	-263.35	-333.45	8.4	-238.075
20	Aarti Drugs Ltd.	1272.275	1732.2	-785.275	-1281.55	-482.625	-451.3
21	Medicamen Biotech Ltd.	21.625	35.875	-65.25	-107.1	59.2	102.2
22	Kilitch Drugs (India) Ltd.	61.55	42.5	-114	-63.225	50.225	58.775
23	Nectar Lifesciences Ltd.	1678.9	1186.075	-377.225	57.55	-1333.73	-1247.25
24	Ind-Swift Laboratories Ltd.	424.85	685.475	-200.35	-313.55	-197.95	670.275
25	Jenburkt Pharmaceuticals Ltd.	116.55	134.725	-48.925	-44.85	-62.05	-85.9
26	Zim Laboratories Ltd.	282.225	314.075	-165.7	-318.175	-133.85	2.875
27	Kerala Ayurveda Ltd.	3.675	31.85	-17.625	-21.925	12.5	26.35
28	Venus Remedies Ltd.	412.3	591.925	-94.025	-46.3	-323.85	-427.525
29	Titan Biotech Ltd.	14.8	204.9	-31.975	-154.1	18	-47.95
30	Lyka Labs Ltd.	132.55	230.6	-15.2	-15.1	-121.425	-221.8
31	Parnax Lab Ltd.	19.425	-0.225	1.225	1.1	-22.525	-0.05
32	Source Natural Foods and Herbal Supplements Ltd.	5.1	23.025	-4.625	-3.4	0.05	-0.4
33	Mangalam Drugs & Organics Ltd.	277.2	258.775	-188.85	-246.75	-86.45	-13.6
34	Lasa Supergenics Ltd.	195.025	88.4	-128.425	10.7	-72.35	-106.425
35	Makers Laboratories Ltd.	36.625	7.475	-37.05	-42.55	5.775	33
36	Ind-Swift Laboratories Ltd.	424.85	685.475	-200.35	-313.55	-197.95	670.275
37	Vivo Bio Tech Ltd.	33.5	152.725	-68.025	-214.7	9.45	62.775
38	Vista Pharmaceuticals Ltd.	-3.025	-35.9	-50.275	-5.925	55.2	41.5
39	Zenith Health Care	2.475	1.625	-1.25	-1.35	0.05	2.154
40	Decipher Labs Ltd.	44.725	36.425	-88.35	-106.4	60.65	100.95

ANNEXURE 3: Solvency Analysis (Source: ProwessIQ-CMIE Database)							
Sl. No.	Company Name	Debt to equity ratio (times)		DSCR (times)		Interest Coverage Ratio	
		Pre	Post	Pre	Post	Pre	Post
1	Sun Pharmaceutical Industries Ltd.	0.286	0.32025	0.34675	8.20825	2.476	6.311
2	Divis Laboratories Ltd.	0.35712	0.247165	2.15673	3.15872	12.47156	17.21587
3	Cipla Ltd.	0.033	0.002	40.92075	72.12875	90.69325	129.4733
4	Torrent Pharmaceuticals Ltd.	0.8935	0.62025	1.842	1.1175	5.459	6.4575
5	Mankind Pharma Ltd.	0.04775	0.03475	38.5965	47.272	276.0463	117.2993
6	Dr. Reddy's Laboratories Ltd.	0.059198	0.014432	1.627347	10.51812	37.50814	67.17941
7	Lupin Ltd.	0.0185	0.031	45.02225	10.23475	158.0755	55.80825
8	Zydus Lifesciences Ltd.	0.35925	0.315	1.3285	1.80875	55.1405	16.791
9	Aurobindo Pharma Ltd.	0.435	0.18575	0.55925	0.73525	39.61725	71.34675
10	Alkem Laboratories Ltd.	0.0985	0.166	1.77175	1.2375	31.914	40.1455
11	Strides Pharma Science Ltd.	0.3595	0.38275	0.368	0.17475	3.22425	1.10675
12	Hikal Ltd.	0.9775	0.6585	0.5855	0.6765	2.911	4.22775
13	Sun Pharma Advanced Research Company	0.4795	0.7545	-141.941	-7.37275	0.001547	0.003541
14	Unichem Laboratories Ltd.	0.00225	0.032	8.49975	25.8255	16.65075	12.967
15	Orchid Pharma Ltd.	4.76825	0.54575	0.06475	1.637	0.01675	1.9105
16	Sequent Scientific Ltd.	0.04725	0.02125	2.39125	1.88675	1.0965	5.33575
17	Gufic Biosciences Ltd.	1.3875	0.545	0.383	2.29575	3.70725	16.17575
18	Dishman Carbogen Amc Ltd.	6.88875	0.1295	0.8815	0.12275	2.586	0
19	Advanced Enzyme Technologies Ltd.	0.162	0.00325	1.487	119.2085	15.77875	823.2983
20	Aarti Drugs Ltd.	1.152	0.4525	0.4825	0.89575	3.95575	11.0495
21	Medicamen Biotech Ltd.	0.53325	0.16375	0.7215	0.9505	7.89575	10.59075
22	Kilich Drugs (India) Ltd.	0.01975	0.118	4.79175	0.6955	0	13.99425
23	Nectar Lifesciences Ltd.	0.9	0.7365	0.2775	0.18475	1.52075	0.71925
24	Ind-Swift Laboratories Ltd.	4.7175	1.55975	0.31375	1.56925	0.843	2.40425
25	Jenburkt Pharmaceuticals Ltd.	0.09825	0.03425	4.1415	34.3935	64.87275	100.371
26	Zinn Laboratories Ltd.	0.69675	0.40925	0.53475	0.77575	1.95125	4.2135
27	Kerala Ayurveda Ltd.	4.19275	5.97175	0.183	0.1955	3.053	0.79325
28	Venus Remedies Ltd.	0.80025	0.0905	0.28375	1.08975	0.433	0.416
29	Titan Biotech Ltd.	0.793	0.10125	0.55725	3.491	3.4815	41.32975
30	Lyka Labs Ltd.	1.32975	11.05475	0.13725	0.77625	0.5725	1.3975
31	Parnax Lab Ltd.	1.37475	0.8005	0.222	5.95	0.12575	7.9155
32	Source Natural Foods and Herbal Supplements Ltd.	0.13375	0.01875	9.89975	11.82525	21.194	24.05425
33	Mangalam Drugs & Organics Ltd.	0.77525	0.6105	0.49525	0.4305	3.21325	2.61625
34	Lasa Supergenics Ltd.	0.907	0.1675	0.4915	0.70575	1.54425	26.52225
35	Makers Laboratories Ltd.	0.06975	0.3	4.947	0.02075	13.541	0.304
36	Ind-Swift Laboratories Ltd.	4.7175	1.55975	0.31375	1.56925	0.843	2.40425
37	Vivo Bio Tech Ltd.	1.485	1.13825	1.072	0.69825	2.5375	2.17125
38	Vista Pharmaceuticals Ltd.	0.574	0.287	1.319	-0.4065	2.208	0.0274
39	Zenith Health Care	0.00075	0.00005	5.5	6.157	0.00571	0.015748
40	Decipher Labs Ltd.	0.83475	0.16375	0.78625	0.9505	8.14675	10.59075

ANNEXURE 4: Profitability Analysis (Source: ProwessIQ-CMIE Database)												
Sl. No.	Company Name	AT as % of Total Income			Cash Profit as % of Net Worth			Return on Equity(%)			Basic EPS	
		Pre	Post	Pre	Pre	Post	Pre	Pre	Post	Pre	Pre	Post
1	Sun Pharmaceutical Industries Ltd.	-0.9	6.45	11.15	21.475	-0.025	5.475	0.025	5.5			
2	Davis Laboratories Ltd.	17.845	19.392	19.762	21.374	10.02351	13.05672	47.71	58.257			
3	Cipla Ltd.	11.925	18.05	15.25	15.35	10.55	12.575	18.025	37.25			
4	Torrent Pharmaceuticals Ltd.	17.625	15.2	35.075	31.2	22.925	17.675	56.525	41.925			
5	Mankind Pharma Ltd.	14.875	17.825	22.95	25.575	20.75	19.75	70.125	34.625			
6	Dr. Reddy's Laboratories Ltd.	11.01683	15.79318	12.29445	22.28241	9.61843	16.68772	68	209.095			
7	Lupin Ltd.	18.75	7.225	20.125	7.675	15.65	4.85	49.075	21.025			
8	Zydus Lifesciences Ltd.	20.85	18.45	23.975	18.175	12.8	12.9	17.975				
9	Aurobindo Pharma Ltd.	16.025	13.675	24.975	13.625	18.9	11.175	28.525	33.05			
10	Alkem Laboratories Ltd.	15.5	16.775	19.15	19.35	17.225	17.1	64.825	127.7			
11	Strides Pharma Science Ltd.	11.675	3.775	12.85	3.775	10.025	2.4	34.95	9.125			
12	Hikal Ltd.	5.9	5.925	25.9	20.95	11.45	10.525	7.075	8.95			
13	Sun Pharma Advanced Research Company Ltd.	-81.7	-164.65	-95.5	-48.7	-142.55	-41.05	-5.35	-8.325			
14	Unichem Laboratories Ltd.	18.125	-8.475	40.975	1.975	27.975	-4.175	76.425	-13.975			
15	Orchid Pharma Ltd.	-39.175	-1.65	-12.175	11	12.075	-0.675	-34.425	0.75			
16	Sequent Scientific Ltd.	16.35	3.7	12.75	1.975	11.125	1	4.4	0.425			
17	Gulf Biosciences Ltd.	4.575	10.825	41.225	36.7	26.325	25.05	1.775	7.85			
18	Dishman Carbogen Amc Ltd.	8.225	-31.15	3.6	0.1	50.8	-2.25	10.75	-6.4			
19	Advanced Enzyme Technologies Ltd.	15.95	21.65	16.8	18.15	12.225	14.2	4.775	6.5			
20	Aarti Drugs Ltd.	6.075	8.575	31.025	25.725	18.025	18.975	31.575	20.15			
21	Medicamen Biotech Ltd.	6.325	10.65	21.7	13.25	12.5	8.4	6.2	11.225			
22	Kilitch Drugs (India) Ltd.	4.325	10.875	6.05	8.5	3.225	6.475	3.3	7.975			
23	Nectar Lifesciences Ltd.	2.525	-0.95	11.375	4	9.275	3.65	2.325	-0.75			
24	Ind-Swift Laboratories Ltd.	-1.85	6.925	29.075	40.1	-5.95	12.925	-2.875	19.075			
25	Jenburkt Pharmaceuticals Ltd.	13.425	16.7	32.325	21.85	26.325	18.45	33.225	49.35			
26	Zinn Laboratories Ltd.	5.025	4.1	21.775	18.95	4.25	7.825	12.75	3.675			
27	Kerala Ayurveda Ltd.	4.525	-1.45	20.45	-1.425	11.95	-5.525	1.2	0.075			
28	Venus Remedies Ltd.	-5.325	7.125	4.825	16.625	-5	9.25	-15	31.4			
29	Titan Biotech Ltd.	4.475	17.375	15.3	34.875	9.425	26.75	3.15	28.75			
30	Lyka Labs Ltd.	-3.1	-4.1	2.1	67.625	-0.575	-65.775	-0.375	0.85			
31	Parnax Lab Ltd.	-18.65	-0.225	-12.175	0.3	-13.275	-1.25	-1.45	0.5			
32	Source Natural Foods and Herbal Supplements Ltd.	6.525	10.075	18.475	20.55	12.475	15.525	1.425	3.75			
33	Mangalam Drugs & Organics Ltd.	3.925	2.375	31.175	15.85	16.75	7.225	8.2	6.3			
34	Lasa Supergenics Ltd.	-0.275	-10.725	33	3.2	0.55	-11.075	0.325	-1.925			
35	Makers Laboratories Ltd.	5	-7.925	9.525	-7	8.475	-6.85	5.85	-6.35			
36	Ind-Swift Laboratories Ltd.	-1.85	6.925	-5.3	16.525	-5.95	12.925	-2.875	19.075			
37	Vivo Bio Tech Ltd.	5.225	6.475	53.9	26.85	13.8	7.05	1.6	2.325			
38	Vista Pharmaceuticals Ltd.	5.125	-142.525	17.2	-10.05	6.375	-9.95	0.475	-0.8			
39	Zenith Health Care	-1.75	1.625	5	11.175	-0.3	3.75	0	0.05			
40	Decipher Labs Ltd.	6.325	10.65	21.7	13.25	12.5	8.4	6.2	11.225			

ANNEXURE 5: Efficiency Analysis (Source: ProwessIQ-CMIE Database)														
Sl. No.	Company Name	Raw Material Turnover (in times)		WIP Turnover (in times)		Finished Goods Turnover (in times)		Debtors Turnover (in times)		Creditors Turnover (in times)		P/E Ratio (in times)		
		Pre	Post	Pre	Post	Pre	Post	Pre	Post	Pre	Post	Pre	Post	
1	Sun Pharmaceutical Industries Ltd.	3.3535	3.83025	42.61225	45.702	16.10025	21.8485	8.64925	4.99675	2.98425	4.422	49.1236	67.1458	
2	Divis Laboratories Ltd.	3.4758	5.2147	17.2145	18.9475	14.1584	16.5874	6.21457	4.1251	2.01548	1.4587	37.1587	51.1784	
3	Cipla Ltd.	1.8325	1.127	9.68375	9.9745	8.83525	7.53	5.1695	4.75625	3.97925	3.88575	30.6825	31.9375	
4	Torrent Pharmaceuticals Ltd.	1.87125	1.65925	14.53925	22.232	7.74475	5.71375	4.4375	4.586	2.60175	3.3805	35.38	59.5825	
5	Mankind Pharma Ltd.	4.3595	4.43475	69.39	84.48675	4.89675	5.1765	20.93525	15.6925	3.882	3.80675	37.25	53.16	
6	Dr. Reddy's Laboratories Ltd.	0.542411	0.934011	0.513467	1.028984	1.205905	1.326459	2.304833	4.319572	0.061285	1.662107	40.335	29.85	
7	Lupin Ltd.	3.43725	2.42675	15.405	12.109	9.2885	7.86125	2.7525	3.942	3.762	3.8755	23.41	37.245	
8	Zydus Lifesciences Ltd.	2.91575	2.98775	17.8215	16.13725	10.66525	10.774	4.0545	3.2305	2.48	3.21375	34.3275	29.07	
9	Aurobindo Pharma Ltd.	3.12925	2.71125	8.49725	8.60125	32.925	11.892	2.40475	2.33975	4.35925	2.89675	24.97	29.6775	
10	Alkem Laboratories Ltd.	4.2025	3.58125	71.49125	47.81275	6.0095	5.81825	7.485	5.23675	3.7015	3.72475	27.975	30.7625	
11	Strides Pharma Science Ltd.	3.9485	2.60575	27.84125	51.31125	24.8025	16.7255	3.14025	1.8	2.52525	1.9545	63.405	57.1458	
12	Hikal Ltd.	3.1135	5.98075	19.4685	21.9525	22.545	22.14875	5.62175	4.05	5.3095	4.677	22.375	42.6025	
13	Sun Pharma Advanced Research Company Ltd.	0.0025	0.00254	0.0145	0.001574	0.12546	0.256	8.6495	8.00125	2.27425	1.48975	-61.0325	-26.755	
14	Unichem Laboratories Ltd.	2.7615	1.82425	12.5095	11.321	15.3275	13.379	3.2245	2.7585	2.3465	3.2295	8.39	26.12	
15	Orchid Pharma Ltd.	4.63675	6.872	8.7605	7.747	13.23075	8.991	2.84175	2.65175	1.45325	4.22375	27.1675	49.2075	
16	Sequent Scientific Ltd.	5.05475	10.53225	9.3545	9.01525	24.3745	13.47	2.345	5.407	2.63675	3.21525	722.75	1261.9	
17	Gucic Biosciences Ltd.	3.9355	7.3245	7.83025	12.396	12.3605	11.22975	4.241	4.08175	2.85325	2.992	47.1	33.8875	
18	Dishman Carbogen Amc Ltd.	2.72225	1.3835	4.441	4.534	16.2615	10.46725	4.40225	2.4735	3.058	2.14775	98.53667	116	
19	Advanced Enzyme Technologies Ltd.	3.6755	3.6015	5.07225	7.135	19.5435	14.301	6.20975	5.245	7.4515	7.3915	63.3325	43.7	
20	Aarti Drugs Ltd.	8.86675	7.573	15.6565	13.36375	18.9615	17.263	3.72225	3.51125	4.62425	4.7395	17.93	23.495	
21	Medicamen Biotech Ltd.	8.92775	6.27075	35.493	86.00075	58.331	16.574	3.40025	2.473	3.816	2.60375	86.9575	50.3775	
22	Kilrich Drugs (India) Ltd.	11.77625	20.16525	84.3925	249.8318	59.9485	132.5843	2.2475	2.56375	5.023	2.98625	24.81	23.5225	
23	Nectar Lifesciences Ltd.	15.11475	8.61475	2.54325	2.39275	39.1535	12.88675	4.01475	4.771	3.20875	3.52775	13.1275	32.64	
24	Ind-Swift Laboratories Ltd.	4.71325	6.1415	3.453	5.41925	7.00225	9.60275	1.97625	2.886	3.5935	4.28325	2.34	35.0325	
25	Jenburkt Pharmaceuticals Ltd.	5.15525	3.52875	303.8195	160.8598	9.045	11.42425	11.507	7.61525	7.339	5.43325	16.7375	13.6975	
26	Zim Laboratories Ltd.	4.33375	4.15825	29.66525	37.28975	25.18275	17.9545	2.53875	4.3385	3.199	3.1665	17.1256	29.12	
27	Kerala Ayurveda Ltd.	8.5615	14.46075	12.48125	17.30975	7.855	11.18975	6.64	5.21025	6.4085	4.03425	43.1225	253.84	
28	Venus Remedies Ltd.	2.351	4.62825	11.24275	14.78625	12.22375	28.29475	7.72775	15.711	7.843	7.006	43.275	11.265	
29	Titan Biotech Ltd.	3.65425	3.2515	0	11.921	10.28125	19.1125	8.137	8.19425	27.849	21.035	14.985	13.875	
30	Lyka Labs Ltd.	13.1355	9.53625	16.04375	114.5738	77.6135	90.48275	1.96775	7.08325	0.884	3.38575	50.96	29.88	
31	Parnax Lab Ltd.	8.5615	14.46075	12.48125	17.30975	7.855	11.18975	1.39775	1.3385	3.588	4.2305	69.1278	110.035	
32	Source Natural Foods and Herbal Supplements Ltd.	4.08225	3.04	20.301	20.14175	18.34225	76.40675	8.863	3.41725	8.5795	11.2875	35.785	27.325	
33	Mangalam Drugs & Organics Ltd.	8.5895	8.027	15.18175	11.03275	17.43925	14.9175	7.9955	8.6805	7.29825	5.161	14.29333	13.41	
34	Lasa Supergenics Ltd.	13.6305	11.56425	9.16075	39.095	22.2195	33.66675	5.84275	15.073	4.9405	7.4655	7.99	58.445	
35	Makers Laboratories Ltd.	7.72675	4.424	54.98925	70.328	7.39975	5.0365	5.00175	6.96575	5.76575	5.759	15.2	224.46	
36	Ind-Swift Laboratories Ltd.	4.71325	6.1415	3.453	5.41925	7.00225	9.60275	1.97625	2.886	3.5935	4.28325	2.34	35.0325	
37	Vivo Bio Tech Ltd.	0.61	0.76	0.412	0.587	0.614	0.7715	5.8355	4.79025	1.645	6.89475	28.5875	15.5925	
38	Vista Pharmaceuticals Ltd.	16.7275	6.83825	6.5835	0.59625	34.84475	2.617	2.54325	0.291	2.37625	0.39675	56.2225	72.28143	
39	Zenith Health Care	7.04625	11.05725	72.1455	25.153	8.077	9.334	5.667	7.718	8.067	7.64675	44.145	203.615	
40	Decipher Labs Ltd.	11.13725	6.27075	42.3945	86.00075	64.78775	16.574	4.23225	2.473	4.416	2.60375	27.385	34.825	

THE IMPACT OF BETTER EARNINGS QUALITY AND STRONG CORPORATE GOVERNANCE ON SHAREHOLDER'S WEALTH

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Abstract

Earnings management involves the strategic manipulation of reported earnings by managers within the bounds of legal accounting standards. The practice, driven by incentives such as abnormal market returns and enhancement of executive compensation (e.g., ESOPs), has been extensively studied in academic literature (Bergstresser & Philippon, 2006). The seminal work of Jones (1991) laid the foundation of detecting earnings management through discretionary accruals, while subsequent models by Beneish (1999) and Dechow & Dichev (2002) shifted focus towards measuring the quality of accruals.

Corporate governance refers to the systems and processes by which business organisations are directed and controlled, to ensure accountability, true and fairness, and transparency in a firm (OECD,2015). Better corporate governance mechanisms such as board independence and effective audit committees are linked to better performance of firm and leads to better investor protection (Shleifer & Vishny, 1997). Studies show that robust corporate governance reduces agency conflicts and improves decision making, enhancing shareholder wealth (Claessens & Yurtoglu,2012).

This study explores the impact of better earnings quality, measured using Beneish's M-Score and strong corporate governance (composite CG score calculated) on shareholder's wealth, proxied by EPS (diluted). We have analysed 37 firms (except Banking & Financial organisations) listed in the Nifty 50 index for the financial year 2023-24, applied ordinal regression to examine the relationship. In respect to my hypothesis a limited explanatory result observed. The result shows that the predictor have a weak relationship with dependent variable (EPS). The small sample size and using only two independent variables could be a probable limitation of this study, however the limitation itself can be considered as further scope of study.

Keywords: *Earnings management, Accrual-quality, Beinish's M Score, Corporate Governance.*

1. Introduction

The optimum allocation of savings to better investment opportunity is one of the most critical challenges any economy encounters. In practice, both savers and entrepreneurs are motivated to engage in financial transactions with one another. However, there are two obstacles to effectively linking savings with investment opportunities for businesses. The first reason is the managers and entrepreneurs have better information regarding the business investment opportunities and incentives, thus making an 'information problem' for the savers and investors. This asymmetry in information makes it difficult for investors to make the right choices regarding investment in businesses with high profitability and low profitability. The second is that once the investment is received, the managers or entrepreneurs may manipulate the profitability of the investment opportunity to attract limited available capital and usurp their savings, creating an 'agency problem'. Hence, the information

asymmetry and agency problem between the investors and the internal authority of a company leads to a demand for the reporting and disclosure of financial statements as with the disclosed financial statements, the investors and external stakeholders can not only compare the growth of the business over the years but can also calculate various analytical calculations, like earnings quality, to make a better decision.

The idea of earnings quality was introduced in the year 1934 by 'Benjamin Graham' and 'David Dodd' through their book 'Security Analysis'. They used the term to comprehend the 'Wall Street equity valuation model' by defining earnings per share as a 'coefficient of quality'. Building on this work, a later study by Ray Ball and Philip Brown in 1968 revealed a significant relationship between stock prices and accounting information. Before these studies, academic researchers were focused on the quality of earnings as a theoretical construct or a consistent measurement classification (Dechow et al., 2010). Thus, overall earnings quality can be understood as the extent of the scope to which a firm's actual earnings get reported and can be utilised to predict future earnings (Gissel, 2005).

Subsequent research has indicated that the success of a business is intricately linked to its ability to generate cash receipts that exceed its expenditures (Easton et al., 1992; Dechow, 1994). In addition to the cash flow reporting, evidence of other factors influencing the earnings quality has been found. A study by (Madhumathi & Ranganatham, 2021) has revealed that active monitoring by auditors leads to better management of earnings quality. In contrast, the larger ratio of managers' shares in a firm's business leads to manipulation in the reporting of earnings. Such manipulation can only be checked through the fair activity of the key managerial personnel and audit committees, which is mostly practised in developed nations (Xie, 2003; Gaio & Raposo, 2014). These evolutions in the understanding of earnings quality have had a profound impact on financial analysis and reporting practices.

Corporate governance refers to the set of policies, procedures and practices that guide how a company is run and supervised, aiming to maintain transparency, uphold fairness and hold management accountable to stakeholders. Effective governance mechanisms are designed to align the interests of management with those of shareholders, mitigate agency problems and ensure accountability. Consequently, corporate governance structures – ranging from board composition and audit committee to ownership concentration and executive compensation – can significantly influence managerial decision related to financial disclosure. Within this context, corporate governance emerges as a critical mechanism for oversight and alignment of managerial incentives with shareholder's interests. Agency theory mentioned that without effective governance structure, managers may pursue private benefits at the expense of firm value, reducing transparency and increasing manipulation risks. Mechanisms such as board independence, audit committees, ownership structure and external auditor characteristics are empirically linked to constraints on opportunistic earnings management.

It is important to consider accounting values, particularly when it comes to recording accounts on the balance sheet. While the accrual method is commonly used, research has shown that it can lead to overvaluing the balance sheet. To more accurately assess the quality of earnings, the 'Beneish M-Score Model' has been recognized for its reliability over time. This model takes into account the cash values in the business to provide a more accurate picture of the business's performance (Beneish, 1999). In our study, we have also utilized the 'Beneish M-Score Model' to calculate the level of misconduct done by managers and the business board while disclosing the accounts.

2. Literature Review

2.1 EARNINGS QUALITY

Earnings' quality refers to the extent to which a firm's reported earnings provide a reliable basis for evaluating its present performance and predicting its future financial outcomes. In literature, it is often described as the "Quality of Earnings", emphasizing the ability of disclosed net profit to serve as a

meaningful indicator of future earnings potential (Schipper, 1989). Reported net profit alone may not fully represent a firm's financial health. For instance, a company may disclose a high net profit while simultaneously experiencing negative operating cash flows, which would not reflect a sound liquidity position or sustainable financial performance. This discrepancy arises because profit is calculated using the accrual accounting method, where cash flow presents a more realistic picture of the firm's liquidity position.

Earnings quality therefore considers how closely reported earnings align with firm's true economic performance. Schipper (1989) defines earnings quality as the capacity of reported earnings to forecast future earnings, highlighting the predictive usefulness of accounting information for stakeholders. High earnings quality indicates that a firm's reported earnings are credible representation of its economic fundamentals, while low earnings quality implies potential distortion, manipulation in reported earnings, leading to a misleading view of company's actual financial condition. This concept has gained significant attention in accounting and finance literature due to its potential impact on shareholders' wealth. This literature review explores the relationship between earnings quality and shareholder value, synthesizing key findings from different previous studies.

In this study, we have categorized entire literature review into a number of broad areas to understand different dimensions of earnings quality:

2.1.1. Definition and Concept of Earnings Quality

Earnings quality can be dissected into several dimensions, including the perpetuity of earnings, the degree of earnings manipulation, and the relevance of earnings to firm performance (Dechow & Dichev, 2002). High-quality earnings are typically characterized by persistence, predictability, and verifiability (Francis et al., 2004). Conversely, lower quality of earnings may result by following aggressive accounting practices that obscure a firm's true financial condition, thereby misleading investors.

Entwistle and Phillips (2003) assert that earnings quality must align with the primary objective of financial reporting, which is to deliver relevance and reliability to those who rely on financial statements. Dechow (1994) emphasizes that earnings are vital for a diverse array of stakeholders, offering critical insights into a firm's performance. As Bushman and Smith (2003) noted, investors and managers depend heavily on earnings as a primary instrument for identifying and assessing investment opportunities.

2.1.2. Earnings Quality and Shareholder Value

Different studies have examined the direct relationship of earnings quality on shareholder wealth. Bhattacharya et al. (2003) noticed that firms with higher earnings quality tend to experience lower cost of capital and increased stock prices, suggesting that investors reward transparency and reliability. Higher earnings quality enhances shareholder's confidence by providing credible and transparent information about firm's financial performance. Conversely, low quality earnings create doubts regarding company's ethical practices and its future. Amernic and Robb (2003) mentioned in their research that managerial behaviour is a critical internal factor that can significantly influence the quality of booked earnings. Francis et al. (2005) also identified a positive correlation of market value of shares with earnings quality. They also depict in their research that high quality of earnings can enhance confidence of investors and ultimately increase stock prices.

2.1.3. Market Reactions to Earnings Quality

Li and Zhang (2010) unravelled that firms that showcase higher earnings quality tend to elicit more favourable stock price reactions. This observation suggests that investors have greater trust in the earnings of companies renowned for their transparency, leading to an enhancement of shareholder wealth.

Francis et al. (2005) also highlighted the impact of earnings quality on investors' perceptions. They argued that high quality of earnings not only enhance the investor's confidence but also prompt to increase investment that ultimately navigate stock price increment.

2.1.4. Earnings Management and Shareholder Wealth

Manipulation of financial results to achieve specific goals carries profound implications for shareholders' wealth. Although most researchers mentioned that strategic earnings management can balance reported earnings with investor's expectation. Healy and Wahlen (1999) argued that while this practice may serve to smooth earnings and project an image of stability, it can easily mislead investors. When true financial position of a company disclosed, it often triggers volatility in its stock price.

Manipulation of firm's financial reports to portray a false picture of a company's profitability poses a significant threat to the investors. In this contest, Beneish (1999) introduced the 'Beneish M-score Model', a statistical score designed to find firms that are likely to involve in earnings manipulation or processing false financial reports. He showed in research that companies having lower M-score are likely to have lower earnings quality, often suffer decline in stock price. This emphasizes the damaging impact of earnings manipulation can have on shareholders wealth and question arises on true financial health of those firms.

2.1.5. Long-Term Implications

Quality of earnings has long term impact on firms as well as its stakeholders. Higher quality of earnings, distinguished by transparency and robustness, not only enhance the investors' trust but also contribute to steady growth of the firm. Dechow et al. (2010) emphasises in their research that improved earnings quality is linked to strong long-term performance of the firm, ultimately benefiting shareholders. On the other side, firms engaging in short-term earnings management may experience fleeting boosts in share price but often face significant long-term repercussions including loss of investor trust, decrease in market value of firm, decrease in share price etc. which can raise question on firm's overall success and stability.

2.1.6. Regulatory Implications

The relationship between earnings quality and shareholder wealth has significant implications for regulators and regulatory bodies. Efforts to enhance transparency in financial reporting, such as the implementation of "International Financial Reporting Standards (IFRS)", aim to improve earnings quality (Eilert & Sweeney, 2017). Better regulatory frameworks may lead to better shareholder value through higher earnings reliability.

Earning quality can be influenced by managerial discretion, making it vulnerable to internal manipulation. A strong corporate governance system helps limit such behaviour by ensuring effective oversight and promoting the presentation of true and fair view of firm's position. This reliability is crucial for external stakeholders and investors as transparent reporting strengthens their confidence that their investments are well protected. Gaio and Raposo (2014) argue that when accounting information is weak, firms may be forced to adopt more complex and costly governance mechanism. In contrast, firms that maintain high earnings quality often require fewer investments in such Systems.

Growing interest in Environmental, Social, and Governance (ESG) practices has expanded research on the factors shaping earnings quality. Studies suggest that corporate sustainability initiatives and ESG disclosures may influence both financial performance and the credibility of reported earnings (Ioannou & Serafeim, 2017). Barth (2018) highlights the potential of big data and advanced analytics to improve financial reporting accuracy and transparency, thereby strengthening earnings quality.

Gupta and Bhardwaj (2019) emphasize that insights from behavioural finance can help explain how cognitive biases affect judgement and may lead to distortions in financial reporting. Understanding these psychological influences provides an important complement to traditional governance and regulatory perspectives. Overall, strengthening earnings quality requires attention not only to governance structures but also to broader organizational practices, technological tools, and behavioural factors. These interconnected areas offer promising opportunities for future research and for enhancing the credibility of financial information.

Literature consistently supports the notion that earnings quality significantly affects shareholder wealth. Higher earnings quality is associated with increased market valuation and positive investor reactions, while low-quality earnings may lead to adverse market outcomes and reduced shareholder trust. As such, both practitioners and regulators must prioritize earnings quality to safeguard and enhance shareholder wealth.

2.2. Corporate Governance

The root of corporate governance concept can be traced back to the earliest forms of organised enterprise, when conflicts emerged among owners, managers and shareholders. Each group shouts to maximise its own interests, often at the expense of the collective goals of the organisation. As these tensions increased, the need for mechanism to align interests and ensure accountability became increasingly apparent. Cheffins (2013) notes that the modern conception of corporate governance began to take shape in the United States during the 1970s. The Federal 'Securities and Exchange Commission (SEC)' formally introduced corporate governance as part of its reform agenda in mid 1970s, marking the beginning of an institutionalised approach to overseeing corporate conduct. Over time, additional board committee – such as nomination and compensation committee were introduced. Norway later became the first country to mandate gender representation on boards, requiring that women constitute at least 40 percent of directors, a reform that inspired similar initiatives across other jurisdictions (Singh, 2020).

In India, corporate governance evolved along a different path shaped by historical, political and economic forces. Until the 1980s, India's economy was dominated by state-owned enterprises, where both internal and external controls were largely under government purview. With the liberalisation and globalisation reforms of the 1990s, India witnessed increasing inflows of foreign direct investment (FDI). However, the absence of strong governance structures led to a series of financial scandals, eroding investor confidence. Both domestic and international investors began to demand higher standards of oversight and accountability. In response, the 'Confederation of Indian Industry (CII)' issued India's first voluntary code of corporate governance in 1997, emphasising the formation of audit committees. Subsequent reforms followed. "The Naresh Chandra Committee (2002)" recommended that audit committees comprise independent directors and that statutory auditor be rotated every five years. SEBI, in 2003, strengthened Clause 49 of the listing agreement to reinforce these principles. A McKinsey survey in 2002 revealed that investors were willing to pay a premium of up to 25 percent for companies with strong governance practices (Barton et al., 2004). Although corporate governance is a relatively recent concern in India, substantial reforms – ranging from SEBI regulations to amendments in the Companies Act – have significantly improved transparency, safeguard investor interest and enhanced market credibility. As a result, India has emerged as a growing destination for global investment (Srinivasan & Srinivasan, 2011).

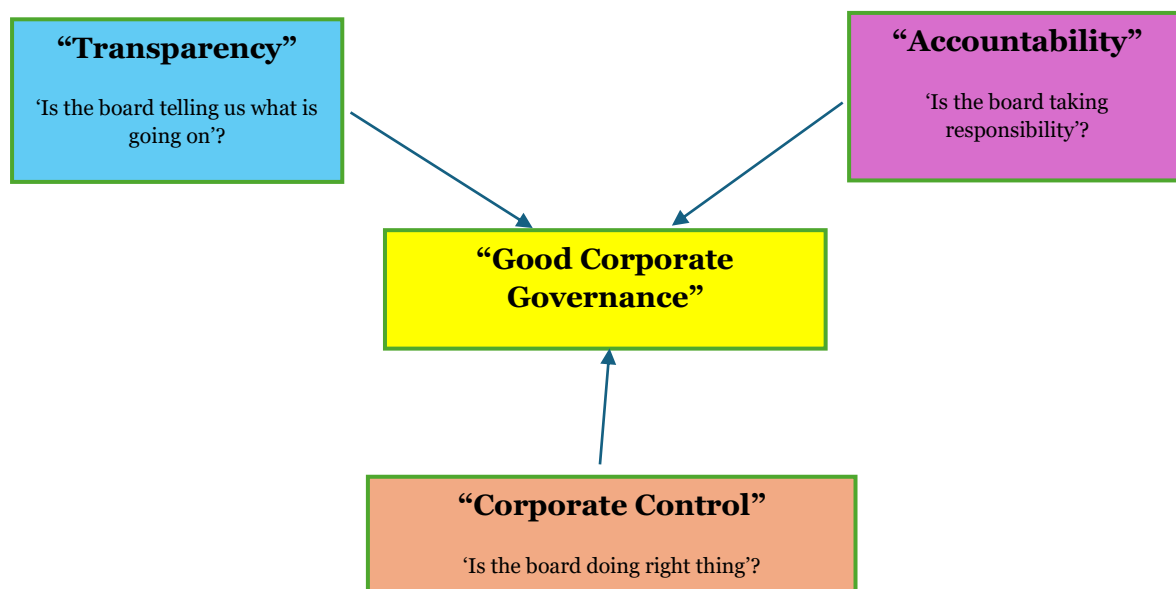
Mohan and Chandramohan (2018) argue that corporate governance has become a critical and evolving focus in India because of its ability to attract both domestic and foreign investment. While CII's initiatives were initially voluntary, the introduction of Clause 49 by SEBI marked the transition toward mandatory compliance. The Ministry of Corporate Affairs further institutionalised governance norms through the companies Act, 2013, particularly Section 149, which formalised requirements related to

independent directors. SEBI subsequently revised Clause 49 to bring it in alignment with the new corporate law, signaling India’s commitment to strengthening governance frameworks.

Corporate governance practices vary considerably across regions and countries, shaped by socio-political structures, legal traditions, and cultural norms (Gregory & Simms, 1999). Despite these variations, the overarching objective remains consistent: to enhance firm performance, strengthen accountability, and align organisational actions with long term value creation. Fung (2014) mentioned that a good corporate governance must have three features –

1. Transparency,
2. Accountability &
3. Corporate Control.

Table 1. “Corporate Governance Framework” (Fung,2014)



(Source: Fung, B. (2014). *The demand and need for transparency and disclosure in corporate governance. Universal Journal of Management*, 2(2), 72-80.)

2.3 Research Gap and Objective

Various researchers have conducted a plethora of research analysing the relationship between stock performances in different global markets and earnings quality (Li, 2014; Saleh et al., 2020). In the Indian market context, while Lyimo (2014) conducted a study comparing various measures of earnings quality in the Indian stock market, there is a lack of research on understanding the correlation between stock returns of the National Stock Exchange (NSE) and earnings quality.

Conversely, our review of existing literature reveals a notable gap: while numerous studies have examined individual governance parameters. The relationship between earnings quality and overall composite score of corporate governance has received comparatively limited attention. Motivated by this ignorance, the present study seeks to explore this broader linkage. Specially, we investigate whether a firm’s aggregate corporate governance score is associated with its level of earnings quality, and further, whether earnings quality and corporate governance together influence shareholder’s wealth (measured by earnings per share). Therefore, our study aims to address this gap by analysing

this aspect to comprehend the impact of earnings quality on the shareholder wealth maximization strategy.

2.4 Hypothesis

Null Hypothesis:

H0 = Better Earnings Quality and Strong Corporate Governance do not affect the EPS of a firm.

Alternative Hypothesis:

H1= Better Earnings Quality and Strong Corporate Governance significantly affect the EPS of a firm

3. Sample And Data

This study focuses on firms listed on NIFTY 50 index, excluding banking and other financial institutions. These entities were excluded because conventional earnings quality models are not directly applicable due to their distinctive financial reporting structures. The final sample comprises 37 Indian non-financial companies for the financial year 2023-24. The sample is non-probabilistic in nature.

Our variables are Beneish's M-Score for all 37 companies and their corporate governance score. We have used PROWESS database to collect all financial data required to calculate Beneish's M-Score (we have measured earnings quality by using Beneish's M-Score Model) and all governance data collected to calculate CG score from published annual report of the company. SPSS is used for all our analysis. Initial descriptive statistics of the sample provided in Table – 2.

Descriptive Statistics					
	N	Minimum	Maximum	Mean	Std. Deviation
Category of M-score	37	0	2	1.51	.837
CG Score	37	4.626693905	7.263869464	5.462677846	.5959963736
EPS (Diluted)	37	8.050000000	431.0800000	74.16324324	87.84446407
Valid N (listwise)	37				

We have used the Prowess Database to collect the financial data; companies publish annual reports to collect CG data and used SPSS for our analysis. We have used SPSS (P-P Plot) to check the normality of the dataset. Results mentioned below:

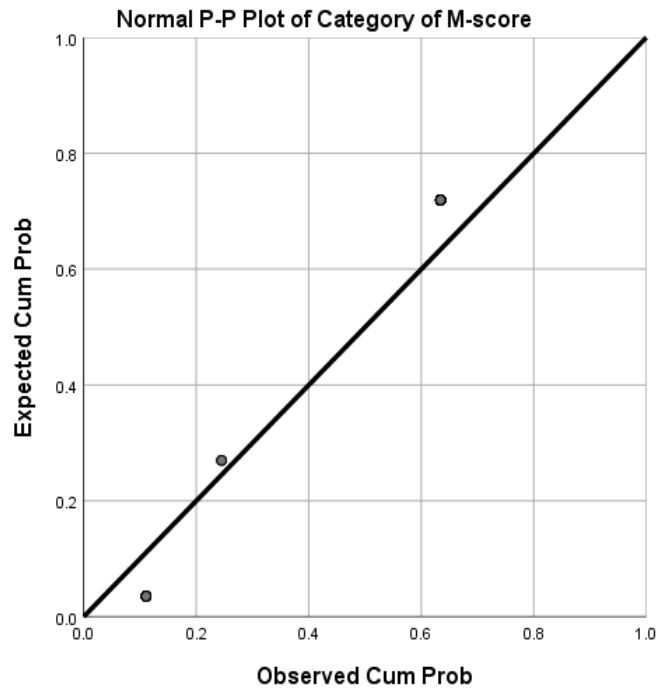


Figure 1. PP Plot of Category of M-Score

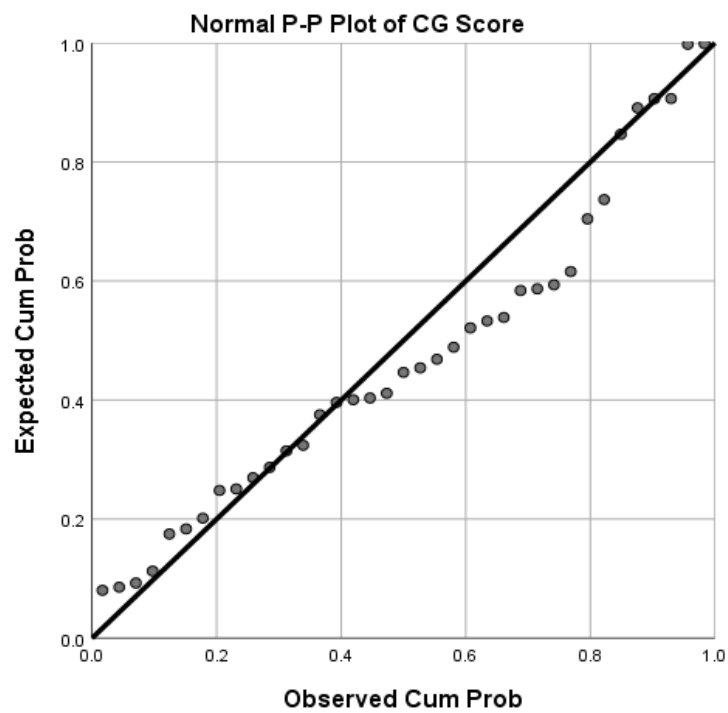


Figure 2. PP Plot of CG Score

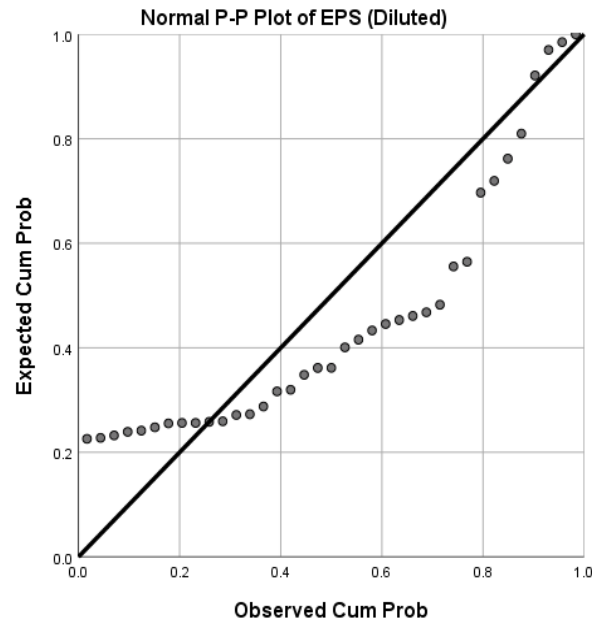


Figure 3. PP Plot of EPS (Diluted)

Source: Output of SPSS

As PP plots show that both the variables are mostly distributed normally, we are now in a position to use parametric tests on the said dataset. Since we have categorised one of the variables (Category M-Score), we have used ordinal regression to analyse the data.

4. Research Methodology

This study has 3 parts-

Part A – Calculation of Composite Score of ‘Corporate Governance’.

Part B – Measuring ‘Earnings Quality’ by using Benish M- Score. M Score categorised based on criteria. Here we have assigned:

“2” for Unlikely Manipulator or No Manipulation (M-Score less than -2.22)

“1” for Possible Manipulator (M-Score between -2.22 and -1.78) and

“0” for Manipulator (M-Score greater than -1.78)

Part C - Ordinal Regression about the relation of ‘Earnings Quality’ and ‘Corporate Governance’.

Here, EPS is the dependent variable, Category of M-Score is factor & CG Composite score is the co-variance.

4.1 Cg Composite Score Calculation

CG Composite Score is calculated using simple average method (equal weightage assigned to all relevant components).

We have considered following 6 components to calculate CG Composite Score (CGCS):

BSS = Board Size Score (Board Size/ Median Value of board Size)

BIS = 'Board Independence' Score (No. of 'Independent Directors' / 'Board Size')
 FRB = Female Ratio in Board (No. of Female Directors / Board Size)
 BMS = Board Meetings Score (Frequency of Board Meeting / Median Value of Board Meeting)
 ACIS = 'Audit Committee Independence Score' (Independent Director in Audit committee / Size of Audit Committee)
 CCD = CEO – Chairman Duality (Yes – 0 & No- 1)

$$CGCS = (BSS+BIS+FRB+BMS+ACIS+CCD) / 6$$

4.2 Measurement And Categorise Eq Score

We have followed Beneish's M-Score Model (1999) to calculate earnings quality score of selected samples. Beneish (1999) M-Score Model' is a statistical model created by the help of different financial ratios to identify manipulation in reported earnings and potential fraud in financial reporting. According to this model, M-Score' is computed with the help of 8 different financial ratios. The formula is:

$$M = "-4.84+.92*DSRI+.528*GMI+.404*AQI+.892*SGI+.115*DEPI-.172*SGAI+ 4.679*TATA-0.327*LVGI"$$

Here, the variables are,

DSRI = 'Days sales in receivable index' (Net Receivables / Sales)

GMI = 'Gross Margin Index' (Gross Profit' / 'Sales')

AQI = 'Assets Quality Index' (Non-Current Assets' / 'Total Assets')

SGI = 'Sales Growth Index' (Salest / Salest-1)

DEPI = 'Depreciation Index' (Depreciation Expenses' / Total Assetst-1)

SGAI = 'Sales, General & Administrative Expenses Index' (SGA Expenses/ Total Assets)

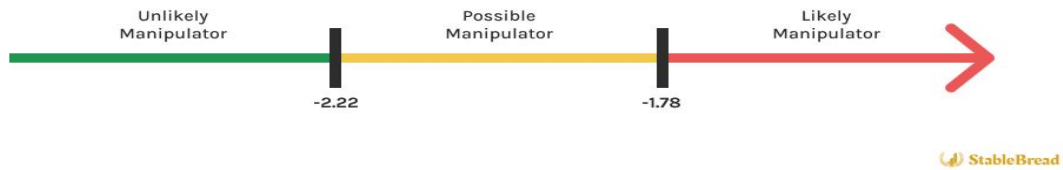
TATA = 'Total Accruals to Total Assets' [(ΔNet Operating Assets-ΔCash)/"Total Assets"]

LVGI = 'Leverage Index' [(Debt t / Total Assets t)' / '(Debt t-1 / Total Assets t-1)']

M-Score is used to determine the earnings manipulation. Here higher M-Score means higher level of manipulation and vice-e-versa.

To measure earnings manipulation, this study uses Beneish M-Score model (1999), a widely recognised model to detect fraudulent practice in reported earnings which is called earnings management. Under this framework, an 'M-Score' more than -1.78 is considered indication of higher probability of manipulation. Firms with 'M- Score' between -2.22 to -1.78 falls within cautionary range, suggesting an elevated risk that warrants further scrutiny. In contrast, an 'M-Score' below -2.22 signals that the firm is unlikely to be manipulating its earnings. This classification enables a systematic evaluation of earnings quality across the sampled companies and provides a robust basis for relationship with 'corporate governance' practices

Beneish M-Score



Ordinal Regression Equation analysis performed by using SPSS. Here EPS was Dependent Variable, category of M score was Factor and CG score was covariate.

5 FINDINGS AND ANALYSIS

The Regression: Ordinal Regression among Category of EQ and CG Composite score with EPS, where EPS is the dependent variable, Category of M-Score is factor & CG Composite score is the covariance, provide us the following results –

Table -3:

Model Fitting Information

Model	-2 Log Likelihood	Chi-Square	df	Sig.
Intercept Only	267.208			
Final	260.446	6.762	3	.080

Link function: Logit.

Table 4:

Pseudo R-Square

Cox and Snell	.167
Nagelkerke	.167
McFadden	.025

Link function: Logit.

Table 5:

Parameter Estimates								
		Estimate	Std. Error	Wald	df	Sig.	95% Confidence Interval	
							Lower Bound	Upper Bound
Threshold	[EPSDiluted 8.050000000000000]	-6.743	3.069	4.827	1	.028	-12.759	-.728

[EPSDiluted 8.550000000000000]	=-5.910	2.955	4.001	1	.045	-11.701	-.119
[EPSDiluted 9.920000000000000]	=-5.358	2.905	3.401	1	.065	-11.052	.336
[EPSDiluted 11.900000000000000]	=-4.993	2.880	3.006	1	.083	-10.638	.651
[EPSDiluted 12.540000000000000]	=-4.664	2.861	2.658	1	.103	-10.271	.943
[EPSDiluted 14.310000000000000]	=-4.353	2.846	2.340	1	.126	-9.930	1.225
[EPSDiluted 16.350000000000000]	=-4.103	2.835	2.095	1	.148	-9.660	1.453
[EPSDiluted 16.620000000000000]	=-3.893	2.827	1.897	1	.168	-9.433	1.648
[EPSDiluted 16.640000000000000]	=-3.708	2.820	1.729	1	.188	-9.236	1.819
[EPSDiluted 17.190000000000000]	=-3.542	2.814	1.584	1	.208	-9.058	1.973
[EPSDiluted 17.470000000000000]	=-3.389	2.809	1.456	1	.228	-8.895	2.116
[EPSDiluted 20.700000000000000]	=-3.246	2.804	1.339	1	.247	-8.742	2.251
[EPSDiluted 21.090000000000000]	=-3.111	2.800	1.234	1	.267	-8.599	2.378
[EPSDiluted 24.950000000000000]	=-2.982	2.796	1.138	1	.286	-8.463	2.498
[EPSDiluted 32.210000000000000]	=-2.858	2.793	1.047	1	.306	-8.331	2.616
[EPSDiluted 33.010000000000000]	=-2.735	2.789	.961	1	.327	-8.202	2.732
[EPSDiluted 39.920000000000000]	=-2.616	2.786	.882	1	.348	-8.077	2.845
[EPSDiluted 43.020000000000001]	=-2.499	2.783	.806	1	.369	-7.954	2.956
[EPSDiluted 43.050000000000000]	=-2.383	2.780	.735	1	.391	-7.833	3.066

	[EPSDiluted 52.09000000000000]	=-2.268	2.778	.667	1	.414	-7.712	3.176
	[EPSDiluted 55.42000000000000]	=-2.152	2.775	.601	1	.438	-7.591	3.287
	[EPSDiluted 59.37000000000000]	=-2.034	2.773	.538	1	.463	-7.469	3.400
	[EPSDiluted 62.14000000000000]	=-1.916	2.771	.478	1	.489	-7.346	3.515
	[EPSDiluted 63.82000000000000]	=-1.794	2.769	.420	1	.517	-7.221	3.633
	[EPSDiluted 65.56000000000000]	=-1.668	2.767	.363	1	.547	-7.092	3.756
	[EPSDiluted 67.08000000000000]	=-1.537	2.766	.309	1	.578	-6.958	3.884
	[EPSDiluted 70.28000000000000]	=-1.398	2.765	.256	1	.613	-6.817	4.021
	[EPSDiluted 86.44000000000000]	=-1.251	2.764	.205	1	.651	-6.669	4.166
	[EPSDiluted 88.45000000000000]	=-1.093	2.764	.156	1	.692	-6.510	4.324
	[EPSDiluted 119.44000000000000]	=-.921	2.765	.111	1	.739	-6.339	4.498
	[EPSDiluted 125.21000000000000]	=-.727	2.766	.069	1	.793	-6.149	4.695
	[EPSDiluted 136.75000000000000]	=-.500	2.770	.033	1	.857	-5.929	4.929
	[EPSDiluted 151.24000000000000]	=-.232	2.777	.007	1	.933	-5.675	5.211
	[EPSDiluted 198.18000000000000]	=.095	2.790	.001	1	.973	-5.373	5.563
	[EPSDiluted 239.40000000000000]	=.534	2.818	.036	1	.850	-4.988	6.057
	[EPSDiluted 264.60000000000000]	=1.259	2.904	.188	1	.665	-4.433	6.951
Location	CGScore	-.428	.504	.720	1	.396	-1.416	.561
	[CategoryofMscore=0]	.180	.702	.066	1	.798	-1.195	1.555

	[CategoryofMscore=1]	-3.466	1.464	5.607	1	.018	-6.334	-.597
	[CategoryofMscore=2]	0 ^a	.	.	0	.	.	.
Link function: Logit.								
a. This parameter is set to zero because it is redundant.								

Based on the above results we understand that there is a positive impact of EQ and CG on shareholders' wealth, however the P value ($p=0.08$) is little higher than 0.05. This model explains a small portion of the variation in the independent variables. In Indian context, earnings quality is not considered value relevant for the said financial years. There may be some other factors available to control earnings quality.

The parametric test also reveals that category 1 (-1.78 to -2.22 = Possible Manipulation) explains the hypothesis, and it has an inverse relationship impact on EPS. However, based on this dataset it is clear that EQ & CG have impact on EPS.

6. Conclusion and Discussion

The result analysis firmly questions the association between earnings quality and earnings per share. This result is in line with the findings of a recent study viz (Clout & Willett, 2016). This seminal work has established that earnings do not have any strong reflection on stock returns. In the Indian context, it is to be understood that the quality of warnings is not value-relevant information. This may be due to the fact that all the representative companies under our focus have a range-bound EPS only one financial year (2023-24). The clustered behaviour of EPS reduces the chances of any well-fit regression with any other variable. The same may have caused an insignificant association of earnings and EPS in the article of Clout & Willett.

The limitation of data volume and the bivariate analysis remain as limitations of our study.

This study opens new avenues of studies related to Earnings quality, Corporate governance & Shareholders wealth. We must try to find other relevant variable(s) that may affect shareholder's wealth.

References :

- Amernic, J. H., & Robb, S. W. (2003). "Quality of earnings" as a framing device and unifying theme in intermediate financial accounting. *Issues in Accounting Education*, 18(1), 1-21.
- An, Y. (2017). Measuring earnings quality over time. *International Journal of Economics and Financial Issues*, 7(3), 82-87.
- Ball, R., & Brown, P. (1968). An empirical evaluation of accounting income numbers.
- Barth, M. E. (2018). Accounting in 2036: A learned profession: Part I: The role of research. *The Accounting Review*, 93(6), 383-385.
- Bhattacharya, U., Daouk, H., & Welker, M. (2003). The world price of earnings opacity. *The accounting review*, 78(3), 641-678.
- Bushman, R. M., & Smith, A. J. (2003). Transparency, financial accounting information, and corporate governance. *Financial accounting information, and corporate governance. Economic Policy Review*, 9(1).

- Clout, V. J., & Willett, R. J. (2016). *Earnings in firm valuation and their value relevance*. *Journal of Contemporary Accounting & Economics*, 12(3), 223-240.
- Easton, P. D., Harris, T. S., & Ohlson, J. A. (1992). *Aggregate accounting earnings can explain most of security returns: The case of long return intervals*. *Journal of Accounting and Economics*, 15(2-3), 119-142.
- Entwistle, G. M., & Phillips, F. (2003). *Relevance, reliability, and the earnings quality debate*. *Issues in accounting education*, 18(1), 79-92.
- Francis, J. R., Khurana, I. K., & Pereira, R. (2005). *Disclosure incentives and effects on cost of capital around the world*. *The accounting review*, 80(4), 1125-1162.
- Francis, J., LaFond, R., Olsson, P. M., & Schipper, K. (2004). *Costs of equity and earnings attributes*. *The accounting review*, 79(4), 967-1010.
- Francis, J., LaFond, R., Olsson, P., & Schipper, K. (2005). *The market pricing of accruals quality*. *Journal of accounting and economics*, 39(2), 295-327.
- Gaio, C., & Raposo, C. (2014). *Corporate governance and earnings quality: International evidence*.
- Gissel, J. L., Giacomino, D., & Akers, M. D. (2005). *Earnings Quality: It's Time to Measure and Report*. *The CPA Journal*.
- Gupta, P., & Bhardwaj, A. (2019). *An extensive literature review on behavioural biases*. *ZENITH International Journal of Multidisciplinary Research*, 9(5), 449-464.
- Healy, P. M., & Wahlen, J. M. (1999). *A review of the earnings management literature and its implications for standard setting*. *Accounting horizons*, 13(4), 365-383.
- Ioannou, I., & Serafeim, G. (2017). *The consequences of mandatory corporate sustainability reporting*. *Harvard Business School research working paper*, (11-100).
- Li, H. (2014). *Top Executives' Ability and Earnings Quality: Evidence from the Chinese Capital Markets*. *International Journal of Financial Research*, 5(2), 79.
- Schipper, K. (1989). *Commentary on earnings management*. *Accounting Horizons*, 3(4), 91-102.
- Beneish, M. D. (1999). *The detection of earnings manipulation*. *Financial Analysts Journal*, 55(5), 24-36.
- Bergstresser, D., & Philippon, T. (2006). *CEO incentives and earnings management*. *Journal of Financial Economics*, 80(3), 511-529.
- Dechow, P. M. (1994). *Accounting earnings and cash flows as measures of firm performance: The role of accounting accruals*. *Journal of accounting and economics*, 18(1), 3-42.
- Dechow, P. M., & Dichev, I. D. (2002). *The quality of accruals and earnings: The role of accrual estimation errors*. *The accounting review*, 77(s-1), 35-59.
- Dechow, P. M., Sloan, R. G., & Sweeney, A. P. (1996). *Causes and consequences of earnings manipulation: An analysis of firms subject to enforcement actions by the SEC*. *Contemporary accounting research*, 13(1), 1-36.
- Dechow, P., Ge, W., & Schrand, C. (2010). *Understanding earnings quality: A review of the proxies, their determinants and their consequences*. *Journal of accounting and economics*, 50(2-3), 344-401.
- Claessens, S., & Yurtoglu, B. B. (2012). *Corporate governance and development: An update*
- Madhumathi, R., & Ranganatham, M. (2011). *Earnings quality, corporate governance and firm performance*. *Corporate Governance and Firm Performance*.
- Shleifer, A., & Vishny, R. W. (1997). *A survey of corporate governance*. *The journal of finance*, 52(2), 737-783.
- Xie, B., Davidson III, W. N., & DaDalt, P. J. (2003). *Earnings management and corporate governance: the role of the board and the audit committee*. *Journal of corporate finance*, 9(3), 295-316.
- Cheffins, B. R. (2013). *The history of corporate governance*.
- Singh, G. (2020). *Corporate governance: An insight into the imposition and implementation of gender diversity on Indian boards*. *Indian Journal of Corporate Governance*, 13(1), 99-110.
- Gregory, H. J., & Simms, M. E. (1999, October). *Corporate governance: what it is and why it matters*. In 9th International Anti-Corruption Conference, Kuala Lumpur (pp. 10-15).

- Mohan, A., & Chandramohan, S. (2018). *Impact of corporate governance on firm performance: Empirical evidence from India*. *IMPACT: International Journal of Research in Humanities, Arts and Literature (IMPACT: IJRHAL)* ISSN (P), 2347-4564.
- Rezaee, Z., Olibe, K. O., & Minnier, G. (2003). *Improving corporate governance: the role of audit committee disclosures*. *Managerial Auditing Journal*, 18(6/7), 530-537.
- Srinivasan, P., & Srinivasan, V. (2011). *Status of corporate governance research on India: An exploratory study*. *IIM Bangalore Research Paper*, (334).
- Yusoff, W.F. and Alhaji.I.A. (2002). *Insight of Corporate Governance Theories*. *Journal of Business and Management*. Vol. 1. Issue 1 pp 52 - 63

A COMPREHENSIVE LITERATURE REVIEW ON THE DETERMINANTS AND THE EFFECTS OF DIVIDEND DECISIONS

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Abstract

Over the years, dividend policy has remained a central topic in the field of corporate finance and has attracted a lot of attention from scholars across diverse domains. This study aims to present a comprehensive literature review using a combination of Systematic Literature Review (SLR) and Bibliometric Analysis on dividend research to identify the key trends, influential contributors, and evolving research themes. Between the years 2000 – 2024, a total of 30 peer reviewed articles were analysed. The bibliometric analysis was conducted using the software VOS Viewer which revealed clusters around dominant themes like dividend sustainability, dividend signaling, behavioral aspects, ESG and Dividend Payout and CSR and Dividend Payout. Major research collaborations were identified using co-authorship and co-citation networks. Literature was classified using the SLR framework based on methodology, geographical focus, and industry context. It highlighted that there was a growing interest in emerging economies, and a strong concentration of research was done in developed markets. It was found that there is a growing interest in the areas of behavioral finance, ESG considerations and firm specific risk. However, gaps remain in longitudinal studies and comparative analyses studies. This paper contributes by identifying underexplored areas, providing a structured roadmap of the dividend literature, and suggesting future research directions.

Keywords: *dividend policy, dividend sustainability, dividend signaling*

Introduction

Dividends are not just payments to shareholders. They reflect the financial health of a company, their strategic priorities and their market expectations. Dividend policy has been one of the most extensive studies being done over the years, yet it has remained unresolved in the field of corporate finance. The process by which firms determine the proportion of profits to be distributed to shareholders as dividends and the amount to be retained for future investments has many implications on the firm's performance, shareholder's wealth and capital market perception. Researchers have long debated why firms pay dividends, what are the factors that affect dividends and how dividend decisions of companies influence firm value. There are numerous theories, ranging from signaling theory to agency cost theory, that have tried to explain this behavior yet a clear conclusion has not yet reached. Some debate that dividend decisions have no effect on firm's value while others give contradictory statement. A structured and comprehensive analysis of the existing areas of research on dividends is provided by this comprehensive literature review by consolidating the past research.

Review of Literature

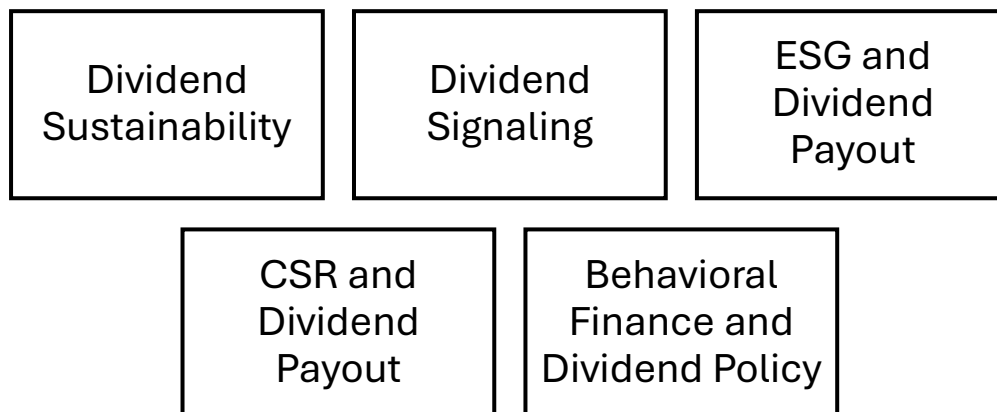


Figure 1: Major areas of research in Dividends

Systematic Literature Review

DIVIDEND SUSTAINABILITY

Hobbs and Schneller (2012) in their paper “Dividend Signalling and Sustainability” addressed five empirical questions. These included stickiness of dividends, relation between sustainability of dividends and future operating profits of the firm, market reactions to different kinds of dividend payers, determination of the type of payers and prediction of long-run operating performance using dividend sustainability. The results of the study showed that there were two reasons for disappearing dividends - less frequency of initiation as well as less likely sustained. It revealed that the future performance (calculated using future operating profits) of the firms increases to certain extent due to dividend sustainability. Also, the markets responded favourably to dividend initiations, but no distinction was made between long run and short run payers. It further stated that dividend sustainability was predictable, and it can be used to predict the performance of the firm as the firms that were predicted to become permanent payers significantly outperformed their counterparts in the subsequent years.

Sarwara et. al (2020) in their paper “Economic policy uncertainty and dividend sustainability: new insights from emerging equity market in China” again addressed five questions. It addressed the relationship between dividend initiations with economic policy uncertainties (EPUs), return on capital, internal finance (I.F.), state owned enterprises and marketised regions during uncertainty periods. The study revealed that even though high EPUs discourage dividend initiation and encourage dividend termination, yet this can be mitigated by firms which have strong I.F., high R.O.I.C. (Return on Invested Capital), state ownership, favourable financial conditions and highly marketised regions.

Sami and Abdallah (2021) in their paper “Assessing the impact of dividend policy on the sustainability of distressed firms” examined the relationship between policy management and the sustainability of the firms along with shareholder’s wealth. It revealed that the distressed firms could maintain sustainability and wealth of the shareholders if they distributed dividends even during the loss period as dividends send a positive signal in the market about the firm, confirming that dividend policy acts as a predictive indicator for the firm’s sustainability.

Siagian and Sinaga (2024) in their paper “The influence of Corporate Sustainability on Tax Distribution and Dividend Distribution” investigates how dividend payout ratios and effective tax rates are

impacted by corporate sustainability from the year 2018 to 2022 of companies listed in the LQ45 index. The study reveals that there is a statistically insignificant negative relation between corporate sustainability and effective tax rates, suggesting that other factors like tax legislation, profitability and tax planning may have a more significant impact on corporate sustainability than effective tax rates. The study also reveals that corporate sustainability and dividend payout ratios have a statistically significant negative relationship between them. This suggested that firms who are focused on sustainability long term value creation and sustainable growth over immediate shareholders return. The study also reveals further area of research where researchers can explore the indirect pathways through which the financial policies of companies are influenced by sustainability.

Eskola (2025) in her paper “Long-Term Sustainability Investments vs. Dividend Payouts: In analysis of firm values in Europe” explores the relationship between sustainability engagement and capital allocation by companies, to specifically examine how long-term environmental investments and dividend payouts influence the firm value in the European markets. The study revealed a positive but weak relation between both environment expenditures and dividends with the market sentiment of sustainability and how the firm value is further impacted by it. The study also proposes a new method of rating, SDG index rating, to measure the sustainability engagement of companies and states that it can give a more effective rating than the traditional ESG ratings.

Dividend Signaling

Gunasekarage and Power (2002) in their paper “The post-announcement performance of dividend-changing companies: the dividend-signalling hypothesis revisited” wanted to examine the performance of UK companies after the disclosure of both dividends and earnings were done on the same day in the capital markets by revisiting the dividend signalling theory. The dividend signalling hypothesis was supported by their results. However, contrary to the earlier results of other researchers, in the long run, companies that increase dividends are outperformed by the bad news companies, i.e., companies that declare a decrease in their dividends and earnings.

Bernhardt et al. (2005) in their paper “Testing Dividend Signalling Model” explored the impact of dividend tax rate on dividend signalling. It proposes that higher is the dividend tax rate in comparison to tax on capital gains, higher is the amount revealed as information during dividend yield and hence, higher is the return. However, it was found that the results contradicted tax-based CAPM arguments. It was also seen that there was no evidence that backed the dividend signalling theory even though dividend announcements contained information.

Hussainey and Aal-Eisa (2009) in their paper “Disclosure and dividend signalling when sustained earnings growth declines” examined the effectiveness of voluntary disclosures and dividend announcements as signals for future earnings of declining earnings growth firms. The results proved the findings of earlier research that future earnings of declining earnings growth firms is not signaled by increasing dividends, but the findings supported disclosure signalling theory, showing that future earnings of declining earnings growth firms are signaled through forward looking information in annual reports.

Fairchild (2010) in his paper “Dividend policy, signalling and free cash flow: an integrated approach” in his paper wants to analyse the intricate connection between firm value, managerial incentives and dividend policy by a theoretical dividend model development that combines dividend signalling with free cash flow motives. It was found that if the managers communicate properly with the investors regarding the reasons for dividend cuts and it is backed by the reputation of the manager then the problem of investors believing that it is bad news if dividend cuts are announced even though done to invest in a new project that creates value could be mitigated.

Suwanna (2012) in her paper “Impacts of Dividend Announcement on Stock Return” investigates how 60 Thai companies listed in the Stock Exchange of Thailand (SET) from the financial industry are impacted by the dividend announcements for the period 2005 - 2010. The research results indicated two major things. Firstly, it was seen that Abnormal return (AR) and Cumulative abnormal return (CAR) are statistically significant. Secondly, it was observed that there is an increase in the stock prices after dividend announcements. This confirms the dividend signalling theory.

Zygula (2017) in his paper “The signalling effect – changes in the current dividend policy and the future results of the companies – theory and practice” proposes to introduce the signalling effect’s theoretical foundations and also to review all the major empirical studies on it. It was found that the literature already studied on this effect confirms that although dividend announcements contain some kind of information yet there is no concrete evidence on what they signal. This suggests that dividend signalling effect may vary depending on firm-specific or market-specific factors.

Mahirun et al. (2023) in their paper “Impact of dividend policy on stock prices” investigated the impact of dividend policy on stock prices by examining its role as an intervening variable between firm value and capital structure. The study worked with LQ45 index companies during the period 2012 - 2021 on the Indonesia Stock Exchange. 177 samples were tested in the study over a period of 10 years. The study revealed that the relationship between funding policy and firm value is not mediated by dividend policy, which is measured by Dividend Payout Ratio, when the stock prices increase. The study discovered that there are four factors that affect stock prices positively: PER (Price Earnings Ratio), DER (Debt to Equity Ratio), ROE (Return on Equity) and DPR (Dividend Payout Ratio), however only DPR and ROE have a significant impact on the stock prices. The study also revealed four factors that affect stock prices negatively: TVA (Trading Volume Activity), PBV (Price to Book Value), DAR (Debt to Assets Ratio), and ROA (Return on Assets) however, only DAR and TVA significantly impact the stock prices. This emphasises the multifaceted nature of the determinants of market performance.

Nworie et al. (2024) in their paper “Signaling Theory in Action: How Dividends Affect Shareholder Investment Decisions in Nigerian Deposit Money Banks” examined how in listed Nigerian deposit banks dividends influence shareholder’s investment decisions. The study took a sample of 13 listed Nigerian deposit banks out of which 10 were selected using purposive sampling. The results revealed that the amount of equity shareholding in listed Nigerian deposit banks significantly increases due to being impacted by announcements of higher dividends, thus proving the dividend signalling theory.

ESG and Dividend Payout

Verga Matos et al. (2020) in their paper “Does ESG Affect the Stability of Dividend Policies in Europe?” analyses the connection between the firm’s dividend policy and the firm’s ESG responsibility performances. They analysed the data between the years 2000 to 2019 of Stoxx Euro 600 firms and Thomson Reuters’ ESG scores. The results revealed that the relationship held particularly strong for the environment and government pillars of ESG. It revealed that higher ESG scores, i.e., a more stable dividend payout, is indicated by more sustainable firms resulting in greater consistency over time with shareholders and other stakeholders.

Bilyay-Erdogan et al. (2023) in their paper “ESG performance and dividend payout: A channel analysis” investigates the influence of ESG performance on corporate dividend policy, aiming to explore the pathways through which ESG influences dividend payouts. The study found that companies that have high ESG performance are likely to pay high dividends. The study has also identified two variables, “earnings” and “risks” as the two possible pathways through which corporate dividends are augmented by ESG performance.

Ananzeh et al. (2024) in their paper “A cross-country examination on the relationship between cash holding, dividend policies, and the moderating role of ESG ratings” investigates how a company’s ESG

policies affects its dividend policies and cash reserves. They analysed cross-country data between the years 2010 and 2020. The study concluded a positive correlation between cash holdings and dividend policy which was significantly moderated by ESG. Companies with moderate ESG practices show a significant positive link between cash holdings and dividend payouts, whereas their relationship reverses in firms with robust ESG implementations.

CSR and Dividend Policy

Ben Salah and Ben Amar (2022) in their paper “Does corporate social responsibility affect dividend policy? Empirical evidence in the French context” investigates the impact of CSR on dividend policy for French companies. They analysed 825 French non-financial firms from the year 2008 to 2018 using panel data analysis and found that dividend policy and CSR showed a positive connection between them. Moreover, the individual components of CSR, such as environmental, social and governance, also show a favourable impact on dividend decisions suggesting that firms that are socially responsible have a higher probability to adopt dividend policies that are friendly towards shareholders.

Seth and Mahenthiran (2022) in their paper “Impact of dividend payouts and corporate social responsibility on firm value – Evidence from India” explored how dividend payouts and CSR disclosures jointly affects firm value of Indian companies. The study highlights that dividends and CSR disclosures provide an alternative yet supportive approach that managers use to signal sustainable future performance and that this relation is highly valued by institutional investors highlighting them as important means to manage stakeholders’ expectations and enhancing firm’s value.

Dewasiri and Abeysekera (2022) in their paper “Corporate Social Responsibility and Dividend Policy in Sri Lankan Firms: A Data Triangulation Approach” used a data triangular approach to examine the relationship between CSR and dividend policy in Sri Lankan firms. Their secondary data analysis revealed a positive connection between environmental and social CSR and dividend pay-out. Primary data analysis revealed a positive connection between ethical and philanthropic CSR and dividend pay-out. The triangulation approach revealed a positive connection between CSR and dividend payout, i.e., they tend to rise together.

Dahiya et al. (2023) in their paper “Corporate Social Responsibility and Dividend Policy in India” investigates the connection between CSR and dividend policy and the impact of regulatory interventions. The results revealed an advantageous association between CSR and dividend payments, likely caused by increased earnings and lower financial constraints. It was seen that mature firms and firms with higher information asymmetry have a stronger positive association but regulatory interventions that make CSR mandatory weaken the relationship between CSR and dividend payments.

Buertey et al. (2024) in their paper “Corporate social responsibility and dividend payout policy in extraordinary time: Empirical study of South Africa” investigate the influence of CSR on dividend payout policy during Covid-19 pandemic in South African firms. The study revealed that Covid-19 negatively impacted both the likelihood and amount of dividend payments whereas CSR performance had an opposite effect. Interestingly, dividend payout, which was negatively impacted by Covid-19, remained consistent across firms irrespective of their CSR performance. However, the combined effect of CSR and Covid-19 significantly varied among firms based on their degree of financial constraints.

Farooq et al. (2025) in their paper “Impact of dividend policy on corporate social responsibility: the role of board governance mechanism” examines the impact of dividend policy on CSR activities of Pakistani firms with special focus on role of board governance mechanisms as a moderating variable. The study revealed a significant positive influence of dividend policy on CSR activities, like donation, employee welfare and research and development, which is strengthened by board governance mechanisms.

Behavioral Finance and Dividend Policy

Bilel and Mondher (2021) in their paper “What Can explain catering of dividend? Environment information and investor sentiment” explored whether investor’s demand for dividend can be influenced by investor’s sentiments and market situations by examining six MENA countries. The study applied multiple proxies to measure catering theory, investor sentiment and marketing environment. The findings of the study revealed a strong impact of investor’s sentiments and market situations on investor’s demand for dividend. The investors have a strong preference for dividends during bear markets and when sentiments are negative, suggesting they prefer secure returns during uncertain times.

Hasan and Islam (2022) in their paper “THE RELATIONSHIP BETWEEN BEHAVIORAL FINANCE AND DIVIDEND POLICY: A LITERATURE REVIEW” conducted a comprehensive literature review to explore the relationship between behavioral finance and dividend policy. This study aims to provide how behavioral elements, such as investor psychology, cognitive biases, etc., influence dividend decisions. The study found no concrete evidence on why firms continue to pay dividends from behavioral finance’s perspective suggesting the need for further empirical research.

Hasan et al. (2023) in their paper “Behavioral Risk Preferences and Dividend Changes: Exploring the Linkages with Prospect Theory Through Empirical Analysis” examined the association between risk and dividend changes using prospect theory across data from 24 countries between the years 2000 and 2021. They introduced a novel reference point based on industry wide dividend changes which were calculated yearly. The study found that firms that increased dividends beyond the benchmark tend to take more risks while those reducing them take less risk. Using pooled, industry, and cross-sectional regressions along with GMM for robustness, the results highlight how dividend decisions reflect behavioral risk preferences influenced by sectoral trends.

Bibliometric Analysis

RESEARCH ON DIVIDENDS

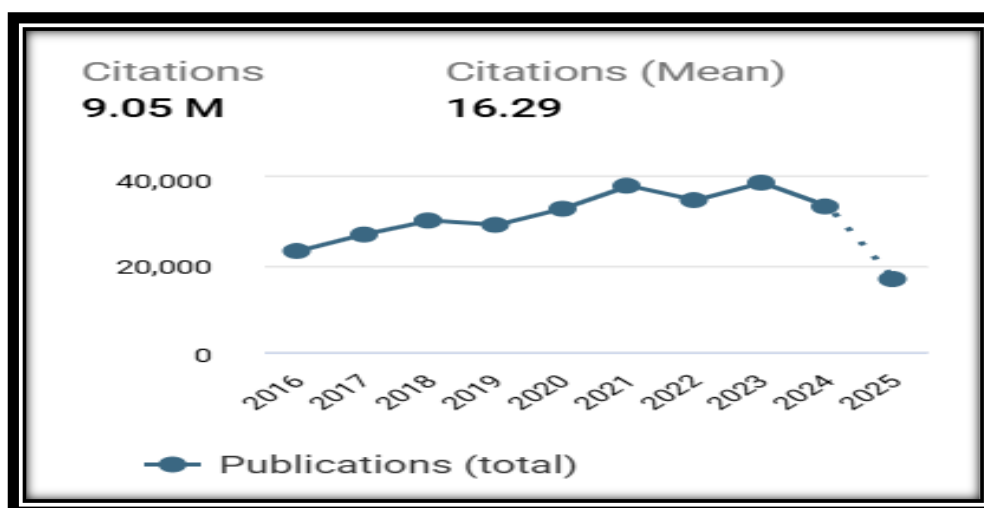


Figure 2: Total number of citations of research works on Dividends

Figure 2 is a graphical representation showing the total number of citations of research works related to dividends between the years 2016-2025. As we can see in earlier years, there were very few numbers of researches being done. However, over the years the researches have increased and in the year 2021

and 2023, highest citations were observed. This must be due to more researches being available attracting the interest of researchers in this particular area.

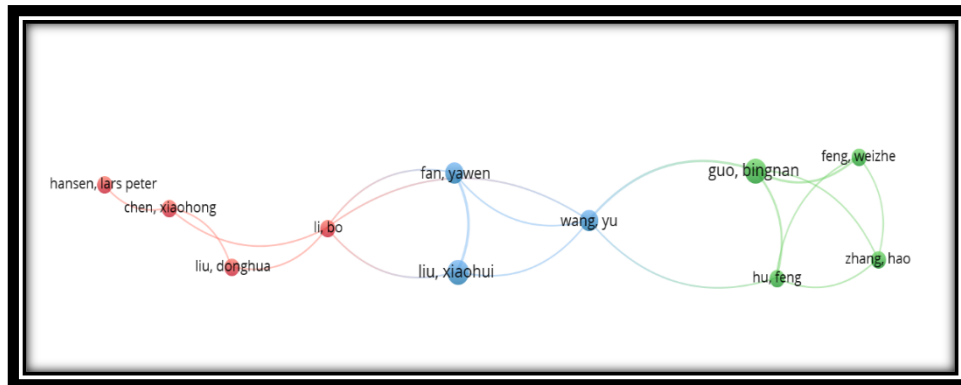


Figure 3: Network Visualization Diagram on Dividends with respect to co-authorship

Figure 3 is a graphical representation showing the amount of collaborative work being done between authors relating to the topic of Dividends between the years 2000-2025. As we can see, each node represents an author, and the lines represent with whom they have collaborated over the years. The thicker the line, the higher is the number of collaborations. Also, the three different colours represent the three cluster of authors who collaborate more often on the topic of dividend representing collaborative subgroups. Here, we should focus on the fact that none of the 11 authors are from India.

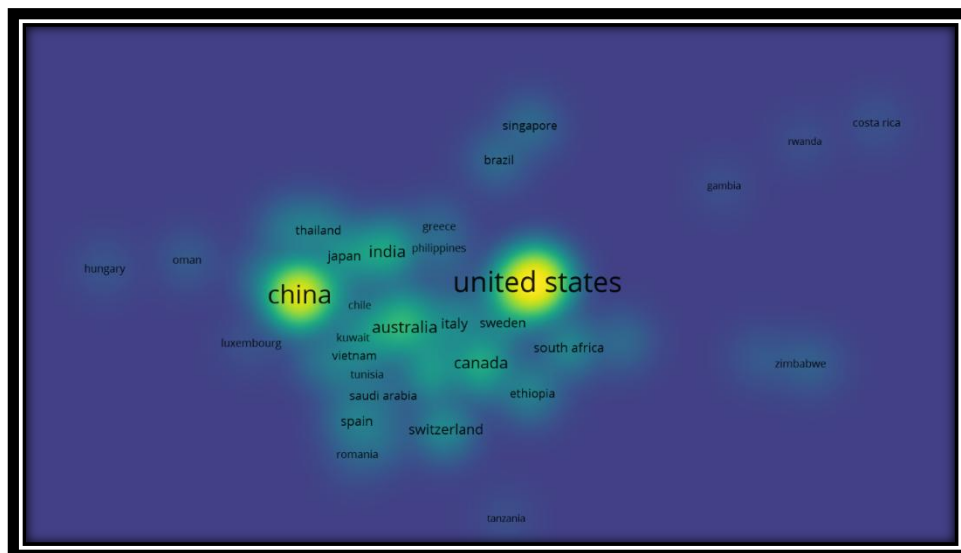


Figure 4: Density Visualization Diagram representing amount of work being done in different countries on Dividends

Figure 4 is a graphical representation showing the amount of work being done on Dividends between the years 2000-2025 in different countries. The countries where more significant work is being done is represented by larger circles as well as the hue yellow. Here, more work is being done in the countries United States and China whereas the amount of work being done in India is comparatively very less.

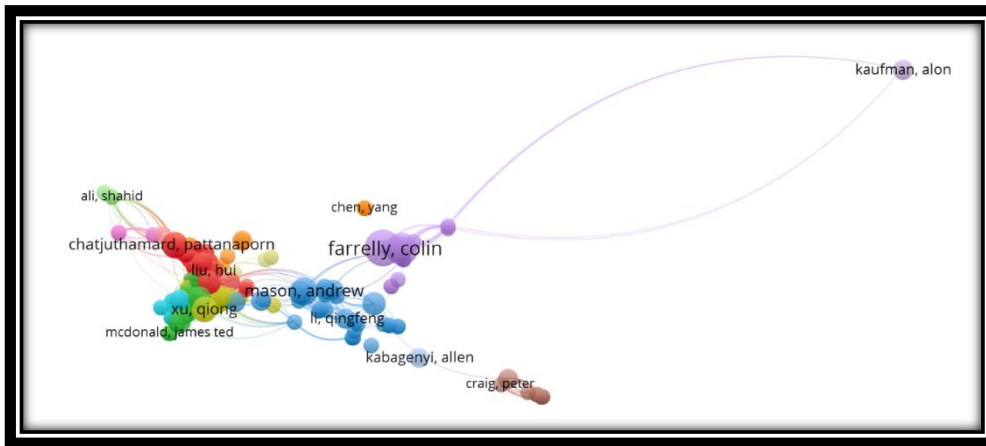


Figure 5: Network Visualization Diagram representing the bibliometric coupling between various authors working on Dividends

Figure 5 is a graphical representation showing how many authors have a strong bibliometric coupling among them during the same time frame. It means how many authors have cited the same publications and how much related their work is during the same time frame. It is seen that most of the authors have a high relativeness in their work on dividends during the year 2000 to 2024 shown by the high cluster of nodes and inter linkage of lines.

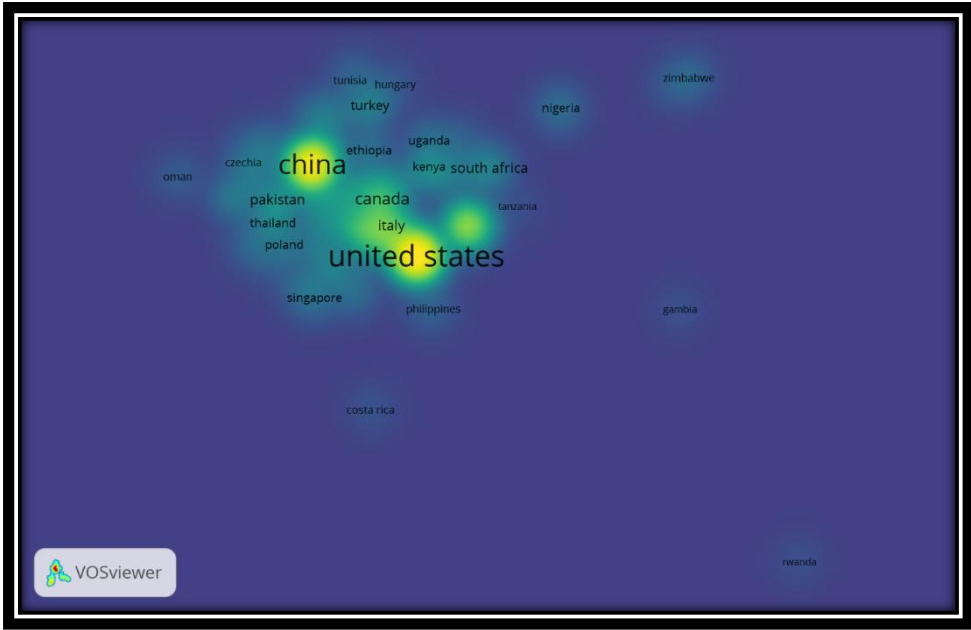


Figure 6: Density Visualization Diagram representing the bibliometric coupling between various countries where work on Dividends is being done

Figure 6 is a graphical representation showing which countries have a strong bibliometric coupling among them during the same time frame. It shows in how many countries similar kind of research was being done and papers with high relativeness were published during the year 2000 to 2024. It is seen that United States and China have the most bibliometric coupling whereas India is nowhere to be found.

Objectives of the Study

1. To provide a comprehensive literature review on the key determinants of dividend decisions and their consequential effects.
2. To highlight the most influential variables that affect dividend decisions and identify research gaps that warrant further study.

Findings and Further Scope of Research

This comprehensive literature review has provided an in-depth examination of the theories and determinants of dividend policy. Even though a lot of work has already been done in this research field yet research in this area has remained inconclusive and divergent. This review on literature has revealed that even though the classical theories remain influential, yet modern theories have challenged their applicability time and again. This clearly shows that there is a need for research that bridges the gap between the classical and modern theories by incorporating the recent developments with the original theories. Through bibliometric analysis it was observed that out of the collaborative work being done between authors, none of the authors are from India. Also, through density visualisation, it is seen that work of dividend is prevalent in other countries like USA and China, yet not much focus is given in India. Moreover, due to network visualisation representing the bibliometric coupling among authors, it is seen that a lot of authors have high representativeness in their work related to dividends. This demonstrates that research on dividends remains highly relevant. Future research should aim to build more unified framework and interdisciplinary approaches to understand the role of dividends in corporate finance in a better manner. This is because it is clear that dividend policy remains a critical aspect of corporate finance given its potential to influence firm's value, investor's behavior and broader market dynamics. This literature review lays the groundwork for future scope of research by consolidating what is already known and proposing new areas of research.

References :

- Ananzeh, H., Al Shbail, M. O., Alshurafat, H., and Al Amosh, H. (2024). A cross-country examination on the relationship between cash holding, dividend policies, and the moderating role of ESG ratings. *Cogent Business and Management*, 11(1), 2300523.
- Bernhardt, D., Douglas, A., and Robertson, F. (2005). Testing dividend signaling models. *Journal of Empirical Finance*, 12(1), 77-98.
- Bilel, H., and Mondher, K. (2021). What can explain catering of dividend? *Environment information and investor sentiment. Journal of Economics and Finance*, 45(3), 428-450.
- Bilyay-Erdogan, S., Danisman, G. O., and Demir, E. (2023). ESG performance and dividend payout: A channel analysis. *Finance Research Letters*, 55, 103827.
- Buertey, S., Ramsawak, R., Dziwornu, R. K., and Lee, Y. S. (2024). Corporate social responsibility and dividend payout policy in extraordinary time: Empirical study of South Africa. *Corporate Social Responsibility and Environmental Management*, 31(1), 514-527.
- Dahiya, M., Singh, S., and Chaudhry, N. (2023). Corporate social responsibility and dividend policy in India. *Management Decision*, 61(10), 3144-3168.
- Dewasiri, N. J., and Abeysekera, N. (2022). Corporate social responsibility and dividend policy in Sri Lankan firms: A data triangulation approach. *Journal of Public Affairs*, 22(1), e2283.
- Eskola, A. A. (2025). Long-Term Sustainability Investments vs. Dividend Payouts; In analysis of firm values in Europe.
- Fairchild, R. (2010). Dividend policy, signalling and free cash flow: an integrated approach. *Managerial Finance*, 36(5), 394-413.
- Farooq, M., Ahmed, A., Khan, I., and Munir, M. (2025). Impact of dividend policy on corporate social responsibility: the role of board governance mechanism. *Journal of Global Responsibility*, 16(1), 52-77.

- Gunasekarage, A., and Power, D. M. (2002). *The post-announcement performance of dividend-changing companies: The dividend-signalling hypothesis revisited*. *Accounting and Finance*, 42(2), 131-151.
- Hasan, F., and Islam, M. R. (2022). *The relationship between behavioral finance and dividend policy: a literature*. *Academy of Accounting and Financial Studies Journal*, 26(5).
- Hasan, F., Kayani, U. N., and Choudhury, T. (2023). *Behavioral risk preferences and dividend changes: exploring the linkages with prospect theory through empirical analysis*. *Global Journal of Flexible Systems Management*, 24(4), 517-535.
- Hobbs, J., and Schneller, M. I. (2012). *Dividend signalling and sustainability*. *Applied Financial Economics*, 22(17), 1395-1408.
- Hussainey, K., and Aal-Eisa, J. (2009). *Disclosure and dividend signalling when sustained earnings growth declines*. *Managerial Auditing Journal*, 24(5), 445-454.
- Mahirun, M., Jannati, A., Kushermanto, A., and Prasetyani, T. R. (2023). *Impact of dividend policy on stock prices*. *Acta Logistica*, 10(2), 199-208.
- Nworie, G. O., Oduche, I. J., and Cyril-Nwuche, O. F. (2024). *Signaling Theory in Action: How Dividends Affect Shareholder Investment Decisions in Nigerian Deposit Money Banks*. *Asian Journal of Economics, Business and Accounting*, 24(7), 506-515.
- Salah, O. B., and Amar, A. B. (2022). *Does corporate social responsibility affect dividend policy? Empirical evidence in the French context*. *Journal of Global Responsibility*, 13(3), 268-289.
- Sami, M., and Abdallah, W. (2021). *Assessing the impact of dividend policy on the sustainability of distressed firms*. *Journal of Modelling in Management*, 16(3), 987-1001.
- Sarwar, B., Ming, X., and Husnain, M. (2020). *Economic policy uncertainty and dividend sustainability: new insight from emerging equity market of China*. *Economic research-Ekonomika istraživanja*, 33(1), 204-223.
- Seth, R., and Mahenthiran, S. (2022). *Impact of dividend payouts and corporate social responsibility on firm value—Evidence from India*. *Journal of Business Research*, 146, 571-581.
- Siagian, V., and Sinaga, N. D. P. (2024). *THE INFLUENCE OF CORPORATE SUSTAINABILITY ON TAX DISTRIBUTION AND DIVIDEND DISTRIBUTION*. *Jurnal Akuntansi Trisakti*, 11(2), 317-328.
- Suwanna, T. (2012). *Impacts of dividend announcement on stock return*. *Procedia-Social and Behavioral Sciences*, 40, 721-725.
- Verga Matos, P., Barros, V., and Miranda Sarmiento, J. (2020). *Does ESG affect the stability of dividend policies in Europe?*. *Sustainability*, 12(21), 8804.
- Zyguła, A. (2017). *The signalling effect—changes in the current dividend policy and the future results of the companies—theory and practice*. *Finanse, Rynki Finansowe, Ubezpieczenia*, (89 (2)), 351-360.

INTANGIBLE ASSETS: A CRITICAL OVERVIEW ACROSS LITERATURES

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Abstract:

As per the shift in the knowledge-led global economy, Intangible Assets (IAs) have reached the decisive position to assess, determine and predict corporate value, strategy, and even financial gains. The entire resource pool of human capital, technical expertise, marketing, and R&D can be considered, however, it is still the intangibles that secure the market position and competitiveness in many sectors' businesses. This review paper delivers an all-inclusive and critical synthesis of literature covering a period of 15 years (2011-2025) with the objective of identifying the gaps that keep on existing, the trends that have emerged, the areas with a conceptual framework, those with sectoral insights, and the methodological orientations linked to intangible assets. The thematic analysis of the already existing body of knowledge based on peer-reviewed journal articles, regulatory reports, and academic databases Scopus and Web of Science has been the means of achieving the aforementioned. Also, five major themes reflect literature in terms of the encouraging and more ambiguous areas, like strategic relevance, the price and difficulties in valuations, the practices in disclosures, and the sectoral dynamics and influence on company performance, among others. The review further reveals the already existing issues with accounting standards that do not capture the true economic worth of intangibles. In light of this, the convergence is suggested more towards recognizing the strategic relevance of intangible assets, the transparency of disclosures, commonality of standards among different jurisdictions, and the evolution of value-based models. In addition, the critique emphasizes the need for a single accounting treatment and urges the establishment of a solid framework capable of identifying the actual economic value of intangibles. Thus, the solid base that this review offers and the opportunities it opens up will guarantee future empirical research and discussions among policymakers in the areas of accounting and finance.

Keywords: *Intangible Assets, Thematic Literature Review, Accounting Standard, Human Capital, Firm Performance.*

Introduction:

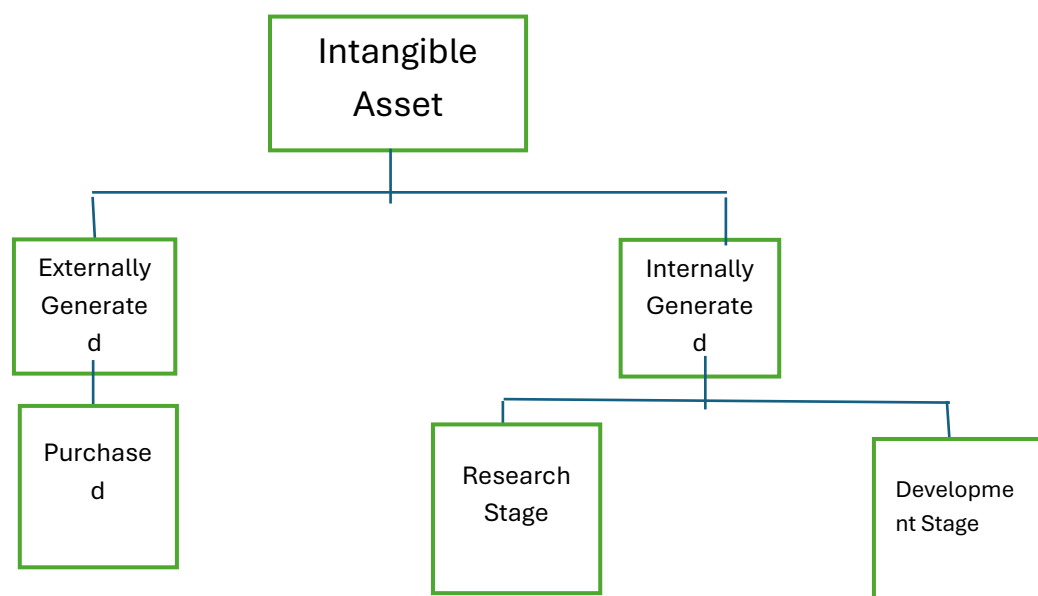
The modern worldwide economy is considerably influenced by the increasing importance of intangible assets, which is a phenomenon that shows a basic change in the value creation from industrial production to knowledge-intensive (Haskel & Westlake, 2018). In this changing atmosphere, intangibles assets have unequivocally come to be the main factors of competitive advantage, essential to the high valuation of the company and the sustained performance of the organization. Their strategic necessity is particularly pronounced in sectors with innovation, technology and services, thus highlighting their wide influence on the contemporary enterprise.

From a regulatory perspective, Indian Accounting Standards (Ind AS) 38 characterizes an intangible asset as “an identifiable non-monetary asset devoid of physical substance” from which the entity can demonstrate the future economic benefits that are expected to be realized (Institute of Chartered Accountants of India [ICAI], 2020). The enumeration above does not exclude other types of assets, and

it covers a very wide range of assets such as intellectual property, brand equity, goodwill, patents, proprietary software, trademarks, and developed customer relationships (Lev, 2001). In a significant manner Ind AS 38 sets out three basic characteristics of an intangible asset as: it can be identified, it is not physically manifested, and it can be measured convincingly that there is a probable inflow of future economic benefits (ICAI, 2020).

The futuristic, digital business models and the related technologies are all on the radar of the Indian accounting standards for the near future and so is the Indian accounting standard for intangibles. Ind AS 38, which has already set the first stones for the proper dealing, revealing, and valuation of the intangible assets has now become the steppingstone for the corporate financial statements upholding which is ultimately going to help the financial reporting to be more transparent, comparable and hence of a higher integrity (ICAI, 2020). The Standard particularly insists that the acceptance of an intangible asset depends entirely on strong proof that interesting the dependable quantification of its future economic benefits.

Intangible assets have been widely recognized as economically important, and several accounting frameworks have been set up around them, but still, the issues of their precise definition, accurate measurement, and full disclosure are hotly debated among researchers and practitioners. The main goal of this research is to comprehend the subtleties, challenges of measuring, and strategic effects of intangible assets via a wide and thorough perspective through a literature review that integrates results from different sources. By systematically scrutinizing varied literature, this study attempts to bring forward the advance scholarly comprehension of intangible assets within the dynamic contours of the modern business world.



Source: Adapted from Ind AS 38, ICAI

Although the intangible resources are highly significant across the board, the intangible assets continue to be rated lower than their actual value. To give in-depth evidence of the diverse areas of intangible assets, the writers plan to answer the following research questions (RQ) in this research work:

RQ1: Define the development and evolution of the known yet evolving topic of intangible assets?

RQ2: What are the major themes and perspectives of the existing literature to intangible assets?

RQ3: Can you explain "The major gaps or under-exploratory areas in the literatures on intangible assets?"

RQ4: The future will highlight research in intangible assets?

RQ5: What avenues will research on intangible assets open up in the future?

Valuation of intangible assets is a process that still lacks clarity and is not straightforward, especially due to the problems related to identification, valuation, and disclosure, this put a constant challenge to financial reporting and regulatory practice (Barth et al., 2001; Wyatt, 2005). As a result, there are no

globally recognized standards for valuation and disclosure. This problem is one of the utmost importance in present-day economies, where a significant part of the value and performance of the firm, as well as the financial statements, is attributed to intangible assets (Lev, 2001).

Evolution and Rising Significance of Intangible Assets in Modern Business Context

The global transition from industrial to knowledge-based economies has positioned intangible assets as fundamental drivers of firm performance and sustained competitive advantage (Lev, 2001; Choong, 2008). Key components such as intellectual property, brand equity, human expertise, and innovation capacity have increasingly influenced organizational efficiency, customer retention, and value creation (Petty & Guthrie, 2000; Kapferer, 2012). Numerous empirical studies prove that there is a steady positive correlation between the intensity of intangible assets and financial results, which also include return on assets (ROA), market cap, and investor returns (Chen, Cheng, & Hwang, 2005; Pulic, 2004; Penman & Yehuda, 2009). By showing the perfect examples like Apple, Google, and Microsoft, the strategic use of patent technologies and the development of human capital led to the creation of strong market positions that would last for a long time (Bontis, 2001; Andriessen, 2004).

Despite the growing importance of intangible assets, their representation in financial statements has not been sufficient. The main reasons for this situation are the difficulties in valuation and the lack of active markets. These factors, in turn, cause the continuing difference in reporting and the existence of informational asymmetries (Lev & Zarowin, 1999; Wyatt, 2008). The fact that certain standards like Ind AS 38 exist might help in prolonging the life of the deficiencies because, besides, they do set rules for the recognition and disclosure of intangible assets, but still, there are problems coming along with their implementation, especially when it comes to situations when assets are not measurable or identifiable enough (ICAI, 2021). Therefore, the impact of intangible assets has transformed from being minor to significant and has hence made it mandatory to incorporate them methodically in financial reporting, valuation models, and long-term corporate strategy (Sveiby, 1997; Stewart, 1997).

The Ascendant Role of Intangible Assets in Contemporary Corporate Strategy

The shifting model of the knowledge economy is capable of changing intangible assets from mere supportive factors to the main ones that will actually develop corporate value and keep a competitive edge over others in the long run. Nevertheless, this conversion will require through the re-examination of their input to performance and strategy of the company.

Core Catalysts for Performance and Competitive Edge:

Intangible assets have developed into the crucial element of the internal operation of the company and the external market perspective. Their influence is not limited to the area of effectiveness but also includes the areas of innovation, brand trustworthiness, and customer and investor relationships.

Key categories underscore this critical role:

* **Intellectual Capital:** The company's key assets are human capital (the employees' abilities and learning), structural capital (the organization's environment, methods, software) and relational capital (the company's clients, brand value) and these are the main contributions to the company being innovative, fast adapting to the market changes and efficient in utilizing its resources.

* **Proprietary Knowledge:** Through the utilization of patents, trademarks, and copyrights, firms can secure a unique market position that not only allows them to charge higher prices but also at the same time prevents competitors from entering the market.

* **Reputational Capital:** A strong brand loyalty to consumers and lessening of the market uncertainties are the main advantages of brand that have a direct impact on the manufacturer's profit over a long period.

Literature Review

THEME 1. Strategic Significance of Intangible Assets in Enhancing Firm Performance and Value Creation

Numerous research papers highlight intangible assets' vital role, which include among others, intellectual property, brand equity, and human capital, in making companies profitable, giving them a competitive edge and creating value in the long run. The shift from industrial to knowledge-based economies has made the strategic value of IAs even more pronounced in the determinants of firm performance and the sustainability of competitive advantage. IAs, unlike tangibles, provide non-replicable value through areas such as knowledge capital, brand, and customer relations. **Sujatha and Shiva Shanker (2024)**, through a qualitative case study on Tata Motors, it was seen that intangible resources are the main factor for value creation, and they are even more important than physical capital in maintaining long-term profitability. The study elucidates the way in which intangible assets propel to the top not only corporate performance but also the tangible assets' supporting role. **Bagna et al. (2024)** using regression analysis across European companies, established that greater presence of intangible assets is positively related to sales growth, ROA, and Tobin's Q. Likewise, **Longa and Sitorus (2024)** Panel data approach was adopted to show that companies having strong intangible assets are implementing more aggressive financial policies but still stable ones, thus increasing their internal confidence and becoming more attractive to investors. **Bagna et al. (2024)** and **Longa and Sitorus (2024)** empirically confirm a positive association between intangible assets and sales growth, ROA, Tobin's Q, and financial policy aggressiveness, respectively.

Qureshi et al. (2020), By employing financial ratio analysis on tech companies in Pakistan, it was also discovered that the accumulation of intangible assets has a direct effect on the earnings paths and the structuring of debt-equity, with the impact becoming stronger as time goes by. **Arianpoor (2021)**, Utilizing a structural equation model, connections between intangible investments and performance indicators of the future were revealed, with a particular emphasis on high-tech industries, as well as the identification of the most significant ones. **Gupta (2018)** and **Vander Pal (2019)**, In knowledge-based economies intangible assets have turned out to be the cornerstones, emphasized, based on cross-sectoral datasets, the performance impact of IAs in innovation-intensive sectors like pharmaceuticals, IT services and FMCG is not only measurable but also decisive. Further, **Kashkinbayev Azamat (2023)**, It is a matter of fact that this study strengthens the FMCG sector in a very specific way by connecting the dots between brand equity, innovation, and human capital on the one hand and corporate value on the other. The research was conducted in the field of Fast-Moving Consumer Goods in Kazakhstan and it used the factor analysis technique to point out that brand equity, human capital quality, and product innovation together are the motorists of firm valuation thus supporting the idea that these intangible dimensions are the strategic enablers.

THEME 2. Recognition, Measurement, and Reporting Challenges of Intangibles

The accounting treatment of intangible assets has always been a matter of debate in the literature as a main theme regardless of their importance. The current accounting standards, mainly IAS 38, are usually considered to be quite harsh in the restrictions they impose on the recognition of intangible assets, especially those created internally. **Hussinki et al. (2024)**, Within the framework of the normative critique of IAS 38, they present a clearer criterion to include internally generated intangibles and a refined treatment of goodwill. It is pointed out that the exclusion of internally generated goodwill and brand equity results in a considerable underestimation of the value of the firm. The authors

recommend taking a standard that incorporates broader valuation dimensions to the market. Likewise, **Nichita (2019) and Barker (2021)** It is highlighted that both IFRS and IAS frameworks display structural shortcomings in the recognition of the developing and frequently nonlinear value of IAs. Through the content analysis of financial statements, they suggest improvements for better disclosure transparency and comparability.

Jain, D. P. (2022) and Jain, M. A. (2015), Longitudinal studies of firms from emerging economies uncovered inconsistencies in human capital and proprietary systems recognition even though they contributed to performance. The researchers suggested the introduction of new impairment models and recognition principles in IFRS. **Kulkarni and Malhotra (2015)**, The research, concentrated on the hospitality sector, showed differing disclosure practices which signaled that there were no common reporting frameworks in the entire industry. Example given, the CFOs' semi-structured interviews pointed out the necessity of aligning industry-specific standards with global ones. Moreover, **Rao Vummenthala (2017) and Zaroung Othman Mohammad (2020)**, The study of SMEs in developing countries, mentioned that the underreporting of Intangible Assets (IAs) is caused not only by lack of proper regulation and auditor's expertise but also by the ignorance of the managers which requires more extensive training and reporting infrastructure.

THEME 3. Valuation Methodologies and the Quest for Robust Frameworks

Intangible assets are still being valued through difficult methods because of their non-physical, often company-specific and future-oriented traits. The whole valuation process is still very complicated and is made even more difficult by the factors of subjectivity, lack of comparable markets, and accounting rules that are not uniform. **Kothari and Mehta (2013)**, By examining the overall picture of the existing techniques for measuring the value of a firm, the authors have classified the different types of valuation models into three groups: cost-based, market-based, and income-based models. Nevertheless, they pointed out that if any of these methods were used by themselves, they wouldn't be able to reflect properly the ever-changing and interacting characteristics of intangibles' value. **Bagna et al. (2024)**, By implementing a combination of both financial modeling and interviews with experts, it was recommended to incorporate the real options and discounted cash flow models to more accurately value the unrecognized intangibles. **Kashkinbayev Azamat (2023)** Further, it accentuated the necessity of integrating scenario-based simulations into the process of determining the value of innovation-related assets in unstable markets.

Gupta (2018), Using data from Indian companies, he proposed that multi-criteria decision analysis (MCDA) tools should consider unique risks associated with the sector, innovation lifecycles, and the accounting norms of different countries. His conclusions highlighted the drawbacks of applying unified global frameworks in different economic scenarios. **Qureshi et al. (2020)** standardized disclosure indices for intellectual capital should be used as a base for valuation methodologies to guarantee likeliness and investor trust. In their empirical research conducted in the tech sector, they found that the companies using fair-value methods for intangibles had a higher market capitalization-to-book value ratio, which is a sign of greater investor trust.

THEME 4. Sectoral and Contextual Influences on Intangible Asset Management

A large number of studies are being conducted now that recognize the different roles and treatments of intangible assets in various industries and different political contexts. Different studies highlight the different impacts and treatments of intangible assets by industry and by region. **Lehenchuk and T.A. (2024)**, A comparative study conducted through the manufacturing and technology sectors pointed out that the effects of intangible assets in different ways are mainly determined by the norms of innovation intensity and capital structure. **Panera Intara (2024)** further emphasized the demand for sector-specific investigations, especially in those areas where rapid product lifecycles and the less tangible innovation are both decisive performance factors. **Gogan and Artene (2016)**, A qualitative research study has

demonstrated the importance of intellectual capital in enhancing service utilities. The researcher presented the intellectual capital management frameworks which were especially designed for industries with no heavy assets. Moreover, the researcher put special emphasis on knowledge transfer as well as on process efficiency instead of on physical infrastructure.

Vander Pal (2019) A meta-analysis of firm performance across sectors indicates that the technology and services sectors are the best uses of intangible investments, as they have more flexible organizational cultures and efficient knowledge transfer processes. The findings, in sum, suggest that the adoption of an all-purpose accounting policy for intangible assets will result in the same consequences that have been already attributed to the industries with different characteristics, which is why the advocates of such policies point out the need for localized frameworks and industry-specific studies.

THEME 5. Broader Implications of Intangible Assets Beyond Financial Returns

The recent literature, indeed, widens the perspective of assessing the intangible values and puts the emphasis on their contribution in the areas of stakeholder engagement, environmental sustainability, and governance standards becoming more relevant. **Hussinki et al. (2024)**, On the basis of a theoretical work, the author associated non-physical resources with eco-friendly and socially responsible practices, positing that companies having an intangible asset focus are more likely to display excellent ESG performance. **Aspal, Singh, and Jeet (2023)**, a panel regression model was employed, and it was found that the firms which had strong IA frameworks were the ones that would mostly see the positive effects of CSR disclosures and initiatives on financial outcomes getting amplified, with such positive effects being more pronounced in the banking and education sectors.

Zaroung Othman Mohammad and M.K. (2020), A research group exploring family-owned businesses in Malaysia, noticed that better recognition of intangible assets leads to better succession planning and more transparency, thus creating organizational continuity and trust. Their study highlights not only the ability of intangible capital to improve governance and resilience of institutions in the long run but also its non-financial benefits.

Gaps Identified:

The current research surrounding intangible assets is greatly affected by the presence of serious theoretical, methodological, empirical, and practical shortcomings. A unifying conceptual framework is not available, by which a comprehensive understanding of the various intangible dimensions and their combined role in the performance of firms is hindered. Methodological drawbacks consist, among others, of the fact that the researchers relied too much on quantitative financial metrics while ignoring qualitative aspects and also underutilizing value-based measures, as well as insufficient comparative and industry-specific research designs. The empirical situation is such that most of the studies are heavily biased towards the developed countries and that the dynamics of the emerging markets are not considered, further, the researchers do not conduct longitudinal or causal analyses, which means that it is hard to convert the metrics into investor models that can be acted upon. On the one hand, the lack of policy frameworks coupled with informal corporate practices and insufficient disclosure systems leads to inconsistencies and poor regulatory alignment, and thus, the strategic integration and effective management of intangible assets is impeded. These overlapping gaps show that there is a widespread ignorance of the stakeholders' role in the consistent categorization and interpretation of the assets.

Publication Trend

Table no.1 – COMPILATION FROM INDEXED DATABASES (2000-2025)

Years	No. of papers reviewed
2025	4
2024	7
2023	5
2022	3
2021	3
2020	4
2019	3
2018	1
2017	3
2016	2
2015	5
2014	1
2013	1
2012	3
2011	1
2010	1
2009	2
2008	2
2007	1
2006	1
2005	1
2004	3
2003	1
2002	1
2001	1
2000	1
Total	61

Publication Trend (2000–2025)

The increase of scholarly interest in intangible assets during the last twenty-five years has shown a very clear positive trend, which is a reflection of the growing role of non-tangible value drivers in the economy based on knowledge. From 2000 to 2010, the academic production on intangible assets was quite limited, with only a small number of studies published each year—one or two being the usual case. The whole period was mainly about building conceptual frameworks and conducting exploratory research.

The decade 2011 to 2020 is marked by a remarkable increase in the interaction of the academia with the subject matter, especially due to technology and digital transformation besides the growing intellectual capital as a strategic resource. Throughout this decade, the research was spread over and across the fields of finance, management, and innovation studies, showing a transition from basic definitions to performance-oriented evaluations of intangible resources.

The time period after 2020 was marked by a phenomenal rise in the number of publications particularly, during the years 2021 to 2025. The rise in publications occurred concurrently with the worldwide discussions regarding ESG (Environmental, Social, and Governance), stakeholder value, and

digitalization—these have all increased interest in the role of intangibles in the context of firms' valuation, sustainability, and governance practices. The increasing impact of such literature in premier journals and across various domains is also an indicator that the research area has been advanced to a more complex and multi-dimensional level.

Table no 2.- Journal wise publication trend

Journal name	Publisher
The Accounting Review	American Accounting Association
The Accounting Review	American Accounting Association
The American Economic Review	American Economic Association
Strategic Management Journal	Wiley
Management International Review	Springer
Journal of Research and Management	Verlag C.H..Beck
Pakistan Economic and Social Review	Department of Economics, University of the Punjab
Pakistan Economic and Social Review	Department of Economics, University of the Punjab
Pakistan Economic and Social Review	Department of Economics, University of the Punjab
The Academy of Management Journal	Academy of Management
The Academy of Management Executive	Academy of Management
Emerging Markets Finance & Trade	Taylor & Francis, Ltd
Journal of International Business Studies	Academy of International Business.
Journal of Business Ethics	Springer
Small Business Economics	Springer
Risk Management: An International Journal	Palgrave Macmillan Journals
Journal of Business Ethics	Springer
Journal of Political Economy	The University of Chicago Press
Organization Science	INFORMS
The Academy of Management Journal	Academy of Management
Journal of East European Management Studies	Nomos
Strategic Management Journal	Wiley

Strategic Management Journal	Wiley
Managerial and Decision Economics	Wiley
Journal of Marketing Research	Sage Publications, Inc.
The Journal of Finance	Wiley for the American Finance Association
The Academy of Management Journal	Academy of Management

Small Business Economics	Springer
Review of Industrial Organization	Springer
Southern Economic Journal	Southern Economic Association
Managerial and Decision Economics	Wiley
Strategic Management Journal	Wiley
MIS Quarterly	Management Information Systems Research Centre University of Minnesota
Management Science	INFORMS
Journal of Accounting Research	Wiley on behalf of Accounting Research Centre, University of Chicago
Management Science	Informa
Strategic Management Journal	Wiley
Journal of East European Management Studies	Nomos
Organization Science	Informa

Source: JSTOR and author's compilation

Research on intangible assets has received a lot of attention from management, finance, and organizational journals that have a high impact. This indicates that the theme has a multidisciplinary appeal that goes beyond corporate finance and includes strategic management, accounting, and public policy.

The founding of top journals in the fields like Strategic Management Journal, The Academy of Management Journal, and The Accounting Review.

The participation of sector-specific and policy-oriented journals (e.g., Journal of Business Ethics, MIS Quarterly, Southern Economic Journal).

Table no.3 – Journal-wise publication trend

Journal name	Publisher	ABDC ranking
Journal of Knowledge Economy	Springer Science and Business Media LLC	C
Global Business Review	Sage Publication India	C
Journal of the knowledge economy	Springer Science and Business Media LLC	C
International Journal of Sustainable Development and Planning	International Institute for Engineering Technology and Applied Sciences	C
Management and Labor Studies	Sage Publication	C
European Financial Management	Wiley publishing	A
Journal of Managerial Finance	Emerald group publishing	A
Journal of Intellectual capital	Emerald	B
International Journal of Law and Management	Emerald Insight	B
International Journal of Production Economics	Elsevier	A
Journal of Economics Letters	Elsevier	A
Sustainability	Multidisciplinary Digital Publishing Institute	C
Environment and Planning A: Economy and Space	Sage Publication	A

Source: Scopus database and author's compilation

Multiple A and B ranked journals including European Financial Management, Journal of Intellectual Capital, and Environment and Planning A.

Predominantly Springer, Sage, Emerald, Elsevier and other reputed publishers. Journals cover a wide range of business disciplines—sustainability, knowledge economy, and governance.

Findings

The literature demonstrates that the longevity of business activities is a firm's performance ability which largely relies on the application of intangible assets such as knowledge capital, brand equity, potential for innovation, skilled labor, and customer loyalty. The majority of empirical research studies are backing up this relationship with reliable evidence. These assets are increasingly crucial for obtaining competitive advantage in economies based on knowledge.

Recognition, disclosure, and valuation of intangible assets at the same time present difficulties. One of the reasons is the stringent accounting regulations like IAS 38 and Ind AS 38 which put certain

restrictions on companies and eventually allow them to write off their intangibles. This results in the assets being undervalued, and a lack of transparency in the financial reports. On the methodological side, the current valuation models are unable to match the constantly changing nature of the intangible assets, hence the suggestion of the researchers to use hybrid methods that combine real options analysis with simulation-based scenarios. Moreover, the segmentation of the capitalist world into different sectors and geographic areas also influences the use of intangibles—technology and service sectors are becoming more interdependent while the traditional manufacturing sector is gradually losing its advantage. The presence of a systematic bias against developing countries is one of the major reasons and thus the need for more extensive, inclusive research in these areas cannot be stressed enough.

On top of their financial impact, intangible assets are also being more frequently associated with other organizational outcomes, such as the company's ability to perform better in the Environmental, Social, and Governance (ESG) aspects, stronger stakeholder engagement, and having a better governance capacity. This is particularly true in the case of family-owned businesses and socially responsible companies, where the strategic enhancement and disclosure of intangible capital are seen to help in building institutional trust, succession, and passing on the family business.

Results and Discussions:

The insights from the reviewed literature have been thematically integrated and the conclusion is that the importance of intangible assets in influencing company performance and strategic direction is getting more and more pronounced. The literature has shown that, in different industries and markets, the higher the amount of intangible assets, more so the intellectual capital, innovation capacity, brand strength, and human resource capabilities, the better the financial outcomes such as return on assets (ROA), market capitalization, and investor returns. The findings, which have been arrived at through empirical research, support the increasingly accepted notion that intangible capital has not only become a central issue but also an element of the corporate world that cannot be ignored any longer.

The situation has become more convoluted owing to the uninterrupted application of the traditional and outdated asset valuation methods. Despite the fact that cost-based, market-based, and income-based methods are most extensively used, they are unable to reflect the subtlety, persistence, and complexity of characteristics that make up the value of intangible assets. Some academics, while acknowledging these limitations, are advocating the use of more reliable and integrated models that would combine real options analysis, discounted cash flow projections, scenario-based simulations, and multi-criteria decision-making tools. The aforementioned methods can be applied in a more flexible manner and become more appropriate to the context, especially in those industries that are marked by high volatility, rapid innovation, and unique risk profiles.

Intangible assets, predominantly in the technological and service areas, are among the key factors that affect a company's performance, ESG output, and governance. Their proper management not only drives CSR but also wins the confidence of the parties involved and keeps the company alive indefinitely. Thus, it indicates that there is a demand for specific frameworks and comprehensive valuation models in each industry.

Future Avenues of Research on Intangible Assets

The slow recognition of the strategic importance of intangible assets in both the global and domestic markets has become a significant factor for various research opportunities in the future. The creation of valuation models that reflect the different sectors' dynamism, changing regulations, and innovation life cycles has become the main focus, especially in the case of developing markets like India. Another research area that should be considered is the connection between intangible assets and non-financial

performance, particularly in the fields of ESG outcomes, stakeholder engagement, and long-term sustainability.

The analysis will have to come up with concepts that are not only very general but also very flexible and the intangibles that are growing inside the company like the digital infrastructure, proprietary knowledge, and organizational culture would be thus absorbed. The scenario of digital transformation has a scholarly investigation in the area of the intangibles' value and strategic management, mostly the technologically driven ones like data assets, AI capabilities, and platform-based innovations.

In order to discover the best practices and differences between institutions regarding the recognition and influence of intangible assets, it will be required to carry out comparative studies not only among diverse sectors but also in various nations. Moreover, the role of intangibles during a pandemic as a factor that amplifies the resilience and agility of organizations is a point that deserves attention and should be subjected to proper empirical research. Last but not least, the establishment of systems for the assurance of intangible assets, together with the comprehension of managerial cognition and behavioral styles towards intangible capital, represent valuable opportunities for both theory and practice to gain further insights into this fast-growing area.

Conclusion:

The literature supports the view that intangible assets are the cornerstone of firm competitiveness, innovation, and long-term value not only in India but also in international markets. Nevertheless, the recognition, measurement, and reporting of these assets still have to confront the major hurdles posed by the limitations of existing frameworks such as Ind AS 38 and IAS 38. These standards usually do not recognize the intangibles generated in-house, such as employees, brand equity and know-how, which are very much involved in the process of making companies profitable.

In India, the accounting of intangible assets is still not very clear, even though the country is becoming more and more knowledge based. Differences in disclosure, absence of guidelines pertaining to particular sectors, and the inability of the management to cope include the reasons for the lack of transparency and comparability. Same hindrances experienced in India can also be seen in the global market where methodical gaps and varying methods of valuation lead to wrong decision-making and wasting of resources. Scholars are now recommending integrative valuation approaches, consisting of ESG-linked as well as hybrid models, to better match the ever-changing character of intangible value. The main idea of the study is that localized, stakeholder-inclusive frameworks are needed to unleash the full potential of intangible assets so that not only does corporate performance increase, but also economic growth becomes inclusive and sustainable.

References :

- Richard Barker, A. L. (2021). *Accounting for Intangible Assets: Suggested Solutions*. *Accounting and Business Research*, 52(6), 630. <https://doi.org/10.1080/00014788.2021.1938963>
- Kashkinbayev Azamat, J. G. (2023, January). *The impact of intangible assets on the value of FMCG companies worldwide*. *Journal of Innovation and Knowledge*, 8(1), 7. <https://doi.org/10.1016/j.jik.2023.100330>
- Gupta, S. K., & N., S. (2018, June). *Intangible Assets: An exploratory study on the Nature, Approaches and Methods of Valuation*. *Chartered Secretary*, 48.
- Qureshi, M. J., & D. D. (2020, June 1). *The effect of Intangible assets on financial performance, financial policies, and marketing value of technology firms: A global comparative analysis*. *Asian Journal of Finance and Accounting*, 12(1). <https://doi.org/10.5296/ajfa.v12i1.16655>
- Mohammad, Z. O., & M. K. (2020, September 2). *The effect of intangible assets, financial performance, and financial policies on the firm value: Evidence from Omani industrial sector*. *Contemporary Economics*, 14(3), 379-391. <https://doi.org/10.5709/ce.1897-9254.411>

- Lehenchuk, S. F., & T. A. (2024, December). The impact of intangible asset on the financial performance of Slovak ICT companies: A panel data regression analysis. Ministry of Culture of the Slovak Republic & Slovak Academy of Sciences, 3465.
- Intara, P., & S., N. (2024, July 10). Intangible assets, firm value and performance: does intangible-intensive matter? Taylor & Francis, 12(1). <https://doi.org/10.1080/23322039.2024.2375341>
- Nichita, E.-M. (2019). Intangible assets-insights from literature review. Accounting and Management Information System, 18(2), 224-261. <http://dx.doi.org/10.24818/jamis.2019.02004>
- Gogan, L. M., & Artene, A. A. (2016). The impact of intellectual capital on organisational performance. Procedia- Social and Behavioural Sciences, 221, 194-202. <https://doi.org/10.1016/j.sbspro.2016.05.121>
- Kothari, M., & Mehta (Ranka), N. L. (2013). Intangible assets: A study of valuation models. Research Journal of Management Sciences, 2(2), 9–13.
- Aspal, P. K., Singh, M., & Jeet, V. (2023). Empirical relationship between corporate social responsibility disclosures and financial performance: The impact of firm's intangible resources [Special issue]. Journal of Governance & Regulation, 12(4), 369–378. <https://doi.org/10.22495/jgrv12i4siart17>
- Hussinki, H., King, T., Dumay, J., & Steinhöfel, E. (2024). Accounting for intangibles: A critical review. Journal of Accounting Literature, 47(5), 27–51. <https://doi.org/10.1108/JAL-05-2022-0060>
- Jain, D. P. (2022, September). Impact of intangible assets on valuation of companies. International Journal of Innovation and Research Analysis, 2(03(ii)), 134-140. <https://www.inspirajournals.com/uploads/issues/501889158.pdf>
- Jain, M. A. (2015, October). A comparative study on National and International Accounting Standards (With reference to intangible assets). International Journal of Emerging Market Research, 5(10). <https://ijemr.in/wp-content/uploads/2018/01/A-Comparative-Study-on-National-and-International-Accounting-Standards-with-Reference-to-Intangible-Assets.pdf>
- Pratama, B. C., & W., H. (2019, September). Intellectual capital and firm performance in ASEAN: The Role of Research & Development. Journal of Accounting and Investment, 20(3). <https://doi.org/10.18196/jai.2003126>
- Sharma, M., & N. (2014, February). Accounting of Intangible assets Indian AS-26. IOSR Journal of Business and Management, 16(2), 40-45. www.iosrjournals.org
- Chander, S., & M., V. (2011). A study on Intangible assets disclosures: An evidence from Indian companies. Intangible Capital, 7(1), 1-30. <https://doi.org/10.3926/ic.2011.v7n1.pt-30>
- Vummenthala, C. S. A. R., & K., P. (2017, December). Valuation of Intangible Assets and Capital Markets- An Indian Perspective. Indian Journal of Accounting, 10(2), 19-32.
- Shengunshi, M., V. (2022). Impact of Intangible assets on Profitability and capital structure of listed IT and pharma companies in India. (Thesis).
- VanderPal, G. (2019). How intangible assets affect the corporate financial performances and how it varies from sector-to-sector? Journal of Accounting and Finance, 19(8), 189-208. <https://ssrn.com/abstract=3521962>
- Bagna, E., & C., E. (2024). Intangible assets and firm performance: The relative effects of recognized and unrecognized assets. Journal of Open Innovation: Technology, Market, and Complexity. www.sciencedirect.com/journal/journal-of-open-innovation-technology-market-and-complexity
- Longa, B., & Sitorus, R. R. (2024, March 3). The effect of intangible assets on the financial performance, Financial Policy & Corporate value of LQ 45 companies listed on the IDX in 2018-2022. Syntex Transformation, 5(3), 624-641. <https://doi.org/10.46799/jst.v5i3.920>
- Arianpoor, A. (2021). The impact of intangible assets on firm performance: Evidence from an emerging economy. Iranian Journal of Accounting, Auditing & Finance, 5(2), 61–77.
- Sujatha, S., & Shanker, K. S. (2024). A study on impact of intangible resources on a company profitability with reference of Tata Motors. International Journal of Scientific Research in Engineering and Management (IJSREM).
- Kulkarni, M. S., & Malhotra, V. (2015). A study on disclosure of intangible assets in five-star hotels in Bangalore. Atna Journal of Tourism Studies, 10(2), 17–31. <https://doi.org/10.12727/ajts.14.2>

- Andriessen, D. (2004). *Making sense of intellectual capital: Designing a method for the valuation of intangibles*. Routledge.
- Bontis, N. (2001). Assessing knowledge assets: A review of the models used to measure intellectual capital. *International Journal of Management Reviews*, 3(1), 41–60.
- Chen, M. C., Cheng, S. J., & Hwang, Y. (2005). An empirical investigation of the relationship between intellectual capital and firms' market value and financial performance. *Journal of Intellectual Capital*, 6(2), 159–176.
- Choong, K. K. (2008). Intellectual capital: Definitions, categorization and reporting models. *Journal of Intellectual Capital*, 9(4), 609–638. ICAI. (2021).
- Kapferer, J. N. (2012). *The new strategic brand management: Advanced insights and strategic thinking*. Kogan Page Publishers.
- Lev, B. (2001). *Intangibles: Management, measurement, and reporting*. Brookings Institution Press.
- Lev, B., & Zarowin, P. (1999). The boundaries of financial reporting and how to extend them. *Journal of Accounting Research*, 37(2), 353–385.
- Penman, S. H., & Yehuda, N. (2009). The pricing of earnings and cash flows and an affirmation of accrual accounting. *Review of Accounting Studies*, 14(4), 453–479.
- Petty, R., & Guthrie, J. (2000). Intellectual capital literature review: Measurement, reporting and management. *Journal of Intellectual Capital*, 1(2), 155–176.
- Pulic, A. (2004). Intellectual capital—does it create or destroy value? *Measuring Business Excellence*, 8(1), 62–68.
- Stewart, T. A. (1997). *Intellectual capital: The new wealth of organizations*. Nicholas Brealey Publishing.
- Sveiby, K. E. (1997). *The new organizational wealth: Managing and measuring knowledge-based assets*. Berrett-Koehler Publishers.
- Wyatt, A. (2008). What financial and non-financial information on intangibles is value-relevant? A review of the evidence. *Accounting and Business Research*, 38(3), 217–256.
- Barth, M. E., Kasznik, R., & McNichols, M. F. (2001). Analyst coverage and intangible assets. *Journal of Accounting Research*, 39(1), 1–34. <https://doi.org/10.1111/1475-679X.00001>
- Haskel, J., & Westlake, S. (2018). *Capitalism without capital: The rise of the intangible economy*. Princeton University Press.
- Institute of Chartered Accountants of India. (2020). Indian Accounting Standard (Ind AS) 38 – Intangible assets. <https://www.icai.org>
- Lev, B. (2001). *Intangibles: Management, measurement, and reporting*. Brookings Institution Press.
- Wyatt, A. (2005). Accounting recognition of intangible assets: Theory and evidence on economic determinants. *The Accounting Review*, 80(3), 967–1003. <https://doi.org/10.2308/accr.2005.80.3.967>

FROM CASH TO CLICKS: STATISTICAL EVIDENCE OF UPI'S INFLUENCE ON INDIA'S DIGITAL BANKING ECOSYSTEM

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Abstract

In India, Unified Payment Interface has played a catalytic role in transforming the process of conducting economic activities. This paper is an empirical study providing a statistical analysis of datasets of digital transactions in India from financial year 2011-12 to financial year 2023-24. Single ANOVA was used to examine the effect of UPI on digital banking transactions. Regression analysis using datasets of digital transactions and quantum of UPI transactions. Such analysis reveals a strong positive correlation between UPI and digital banking. This study gives statistical proof about the importance of UPI for advancement and expansion of digital banking in India.

Keywords: *UPI, Digital Banking, India, Financial Inclusion, Regression Analysis, ANOVA, Microsoft Excel, Digital Transactions, Financial year*

Literature Review

Since early 2000, Digital banking has undergone a huge transformation. The Digital India initiative in 2015 created a favorable environment for a digital innovation like UPI (RBI, 2017). Before 2016, IMPS and NEFT were considered as tools of digital banking, but they lacked interoperability and convenience. (Kumar & Mohan, 2018).

UPI was introduced by National Payment Corporation of India (NPCI) in April 2016. It provided seamless, real-time payment mechanisms directly linked with banks via mobile platform. From August 2016, UPI transactions increased from 0.92 million to over 14 billion transactions in May 2024 which indicates massive user adoption. (RBI, 2024)

A positive correlation was observed between UPI adoption and digital transactions volume in urban and semi urban areas. (Jain and Rajput, 2020). UPI saw an average increase of 18% in digital transactions and 27% in fund transfer within 2 years across 10 Indian Banks. (Mishra, 2022)

Over 70% of new digital users post 2020 in rural regions prefer UPI for small value transactions. (MeitY, 2022). UPI enabled micro merchants, and small businesses accept digital payments without POS terminals. (Sengupta and Roy, 2023). UPI has contributed to digitalization of daily spending, savings pattern among youth and gig economy workers. (Arora and Das, 2023).

Digital Banking in India

In 1991 India became a liberalised economy opening its gate to the outside world for conducting economic activities. As a result, the amount of activities also increased which made the banking sector busier than ever. CBS (Core Banking Solutions) was introduced in mid-1990 to centralize banking operations and provide digital services such as balance enquiry and fund transfer. The Information and Technology Act 2000 (IT Act) gave a legal foundation to electronic transactions and digital signature. This was followed by expansion of Internet banking, mobile banking and ATM networks.

In 2008, the National Payment Corporation of India (NPCI) laid the necessary digital infrastructure which is required for enhancing digital payments such as IMPS (Immediate Payment Service) in 2010 for retail payments and RuPay card services in 2012.

However, the real transformation took place in 2016, when UPI was launched in 2016. UPI enabled real-time, interbank peer-to-peer and merchant transactions using smartphones, simplifying the digital payment process significantly. The demonetization policy of November 2016 further accelerated the adoption of digital payments, pushing banks and consumers toward mobile and online platforms.

Government supported initiatives like Jan Dhan Yojna, Aadhar integration and Digital India Mission created a strong base for digital banking in India.

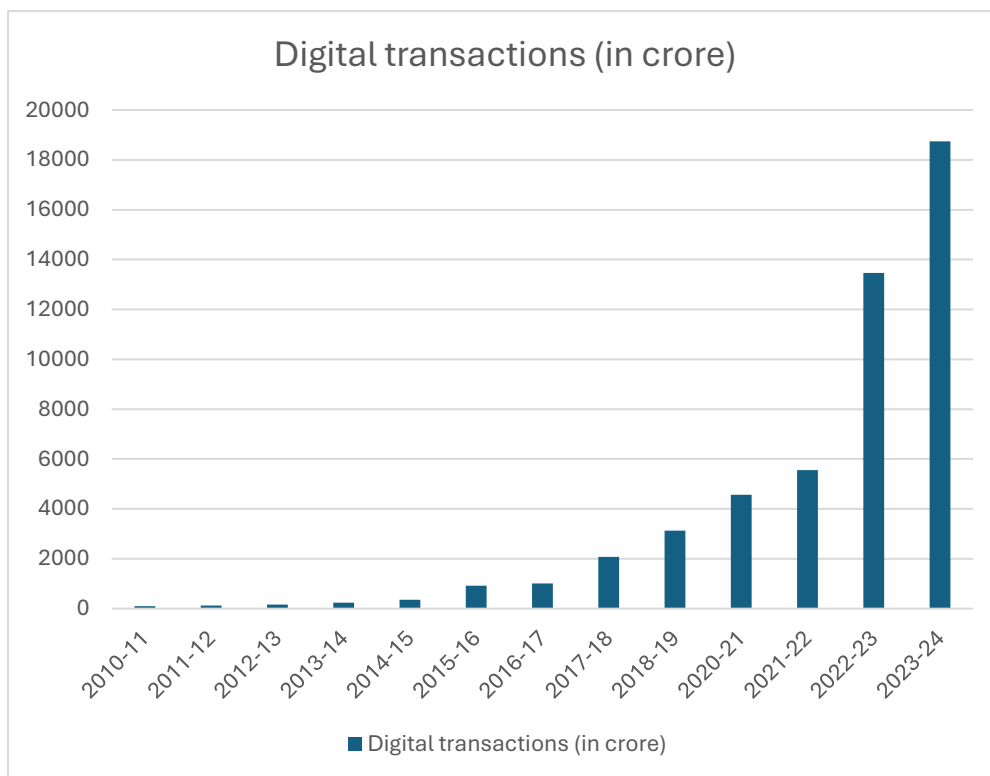
Today, India stands as one of the world's leading digital banking ecosystems, with UPI at the centre of its growth, supported by a vast infrastructure of interoperable platforms and policies promoting cashless, secure, and real-time financial services.

Timeline analysis of Digital Banking in India

- **Introduction of NEFT and IMPS for accelerating digital banking during 2008-10. It increased digital payments but lacked real time settlement issues**
- **National Payment Corporation of India (NPCI) was established in 2010 to provide a unified infrastructure for digital banking transactions**
- *NPCI launches UPI in April 2016 for real time money transfer and 24x7 availability*
- *Demonetization of ₹500 and ₹1000 notes in 2016 created cash shortage which pushed up the digital payments from 0.1 million in October 2016 to 2 million in December 2016.*
- *In 2017, major apps like BHIM, PhonePay, Paytm and Google pay integrated with UPI which provided enhanced user access. As a result, UPI transactions crossed 20 million by the middle of 2017.*

Financial year	Digital transactions (in crore)
2010-11	96
2011-12	125
2012-13	169
2013-14	245
2014-15	352
2015-16	920.38
2016-17	1012
2017-18	2071
2018-19	3134
2019-20	4572
2020-21	5554
2021-22	8840
2022-23	13462
2023-24	18737

Source : NPCI data



Source : NPCI data

Data Analysis and Interpretation

Single factor ANOVA test was done to validate whether UPI has significant effect over Digital Banking Transactions in India or not. We took the amount of digital banking transactions from financial year 2010-11 up to financial year 2015-16 i.e. the era before UPI was officially launched by NPCI and then we took the amount of digital transactions from financial year 2016-17 upto financial year 2023-24 i.e. the time period of Post UPI

Financial Year	digital transactions (in crore) (Pre UPI)
2010-11	96
2011-12	125
2012-13	169
2013-14	245
2014-15	352
2015-16	920.38

Source : NPCI

Financial Year	digital transactions (in crore) (Post UPI)
2016-17	1012
2017-18	2071
2018-19	3134
2019-20	4572
2020-21	5554
2021-22	8840
2022-23	13462
2023-24	18737

Source : NPCI

Interpretation:

Anova: Single Factor						
SUMMARY						
Groups	Count	Sum	Average	Variance		
digital transactions (in crore) (Pre UPI)	6	6541	1090.167	4790693		
digital transactions (in crore) (Post UPI)	8	65210	8151.25	31844271		
ANOVA						
Source of Variation	SS	df	MS	F	P-value	F crit
Between Groups	1.71E+08	1	1.71E+08	8.309607	0.013763	4.747225
Within Groups	2.47E+08	12	20571947			
Total	4.18E+08	13				

Analysis: MS Excel

- ☉ **F-value = 8.31** is **greater than** the **F critical = 4.747**, and
- ☉ **P-value = 0.0138** is **less than** 0.05 (common significance level)
- ☉ There is a substantial **increase in average digital transactions** after the introduction of UPI (from ~1090 crore to ~8151 crore).
- ☉ The **variance** is also higher in the post-UPI period, indicating greater fluctuations.

There is a **statistically significant difference** between the digital transaction volumes **before and after the introduction of UPI**.

This means the increase in digital transactions post-UPI is **not due to random variation**—UPI likely had a **real impact** on digital transaction growth.

Relationship between UPI and Digital Banking:

Regression analysis was made by taking the amount of digital transactions in Crore from financial year 2016-17 upto financial year 2023-24 and the UPI transaction volume for the same period.

Year	Digital transactions (in crore)	UPI volume (in crore)
2016-17	1012	0.18
2017-18	2071	9.05
2018-19	3134	53.92
2019-20	4572	125.19
2020-21	5554	223.31
2021-22	8840	459.68
2022-23	13462	837.51
2023-24	18737	1311.65

Source: NPCI

Independent variable: UPI transaction volume

Dependent variable: Digital transaction volume

SUMMARY OUTPUT								
Regression Statistics								
Multiple R	0.928472							
R Square	0.862059							
Adjusted R Square	0.839069							
Standard Error	2263.785							
Observations	8							
ANOVA								
	df	SS	MS	F	Significance F			
Regression	1	192161570.3	192161570.3	37.49698036	0.000866527			
Residual	6	30748327.21	5124721.202					
Total	7	222909897.5						
	Coefficients	Standard Error	t Stat	P-value	Lower 95%	Upper 95%	Lower 95.0%	Upper 95.0%
Intercept	4224.478	1025.5783	4.119118449	0.00622239	1714.978804	6733.978185	1714.978804	6733.978185
UPI volume (in crore)	0.1131	0.018469968	6.1234778	0.000866527	0.067906054	0.158294818	0.067906054	0.158294818

Analysis: MS Excel

The data analysis reveals the following :

- Very strong **positive correlation** between UPI volume and Digital transactions in India (Multiple R = 0.928)
- **86.2%** of the variation in the Digital transactions is explained by UPI volume. Very strong explanatory power. (R square = 0.862)
- **From Anova table we can observe that F value is 37.5 and F Significance is 0.00087 (far less than 0.05) which confirms that UPI is a meaningful predictor.**
- For **every 1 crore increase in UPI volume**, the Digital transactions increase by **0.1131 units**. (Coefficient is 0.1131)
- There is a **strong and statistically significant** positive relationship between **UPI transaction volume** and Digital banking transactions
- The p-values (< 0.01) indicate the results are **highly significant**.
- UPI volume clearly has a **positive impact** on the growth or behavior of digital banking in India

Conclusion:

This study empirically examined the impact of the Unified Payments Interface (UPI) on the expansion of digital banking in India using both ANOVA and regression analysis. The findings from the **one-way ANOVA** revealed a **statistically significant difference** in the volume of digital banking transactions between the pre-UPI and post-UPI periods (F = 8.31, p = 0.0137). This clearly indicates that the introduction of UPI has brought about a substantial shift in digital banking activity.

The regression analysis between UPI transaction volume and overall digital banking usage confirms a strong positive relationship. R square value of 0.862 indicates that almost 86% of variations in digital banking can be explained by UPI volume. The coefficient of UPI volume is 0.1131 which states that expansion of digital banking is directly proportional to UPI usage.

The statistical evidence prove that UPI has emerged as a major tool for advancing digital banking in India. Even though it is still in booming stage and its acceptance among masses is facing barriers from technological and trust issues, UPI has been contributing handsomely for the advancement of digital banking in India.

References

- Arora, P., & Das, M. (2023). Digital Payment Behavior in India Post-UPI: A User-Centric Study. *Journal of FinTech and Society*, 4(2), 51–67.
- Chakraborty, A. (2022). Policy Impact of Zero-MDR on Payment Ecosystems. *Indian Journal of Digital Economy*, 3(1), 12–25.
- Deshmukh, R. (2021). Spending Patterns and UPI: Evidence from Urban Millennials. *Journal of Behavioral Finance in India*, 6(4), 101–113.
- Ghosh, I., & Mehta, T. (2024). India's UPI: Lessons for the Global Digital Payments Space. *Global Digital Finance Review*, 9(1), 23–39.
- Gupta, A., & Sen, R. (2021). Banking Without Branches: The Role of UPI in Customer Acquisition. *International Journal of Bank Strategy*, 7(3), 112–129.
- Jain, M., & Rajput, S. (2020). UPI and Digital Transaction Growth: An Econometric Analysis. *Indian Economic Review*, 55(1), 89–108.
- Kumar, N., & Mohan, R. (2018). From NEFT to UPI: A Historical Perspective on Indian Digital Payments. *RBI Working Papers*, WP/18/12.
- Mishra, P. (2022). UPI as a Predictor of Digital Transaction Growth in Indian Banks: A Panel Data Study. *Journal of Financial Technology*, 5(2), 65–84.
- NPCI (2020). UPI Product Overview. Retrieved from: <https://www.npci.org.in/>
- RBI (2017–2024). RBI Annual Reports & Bulletin Data.
- Ramakrishnan, K., Bose, D., & Tiwari, H. (2021). Digital Infrastructure and Payment Failures: The Indian Experience. *Digital Systems Journal*, 3(4), 77–93.
- Sengupta, R., & Roy, S. (2023). Small Merchants and UPI: Adoption Barriers and Enablers. *Development Finance Quarterly*, 9(1), 44–56.
- Shah, V., & Kumar, P. (2021). UPI and the Rise of Fintech in India. *Asia Pacific Journal of Digital Transformation*, 2(1), 14–33.
- Verma, A. (2022). User Experience of UPI in Indian Tier-2 Cities: A Qualitative Study. *Journal of Consumer Technology Use*, 3(1), 33–45.

UNDERSTANDING TAX LITERACY ACROSS SOCIOECONOMIC GROUPS: DISPARITIES, COMPLIANCE, AND POLICY IMPLICATIONS

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Abstract

Tax awareness and compliance are contributing more for a nation's fiscal stability, even disparities persist across different socioeconomic groups. This study explores the relationship among age, occupation, income level and tax literacy and identifying barriers to tax compliance and accessibility. Results indicate that salaried employees and high-income earners display higher tax engagement due to structured payroll deductions and access to professional assistance, whereas self-employed individuals and retirees exhibit lower familiarity with tax systems. While digital tax filing is increasingly preferred, reliance on tax consultants suggests complexity in tax procedures. Challenges such as unclear exemptions and technical difficulties hinder whole compliance. Policy recommendations focus on simplifying tax filing interfaces, increasing tax awareness campaigns and improving digital accessibility to ensure equitable taxpayer participation. Addressing these disparities can enhance financial inclusion and strengthen tax governance.

Keywords: *Tax awareness, Compliance behaviour, Digital taxation, Socioeconomic disparities, Financial literacy, Tax filing simplification, Policy interventions.*

1. Introduction:

In India, tax awareness and compliance are essential for the efficient functioning of the fiscal system, which will directly influence revenue generation and economic stability (Kusuma & Azzakhusna, 2019). Tax awareness promotes to understand tax laws and rights, so that citizen will obey to tax regulations, optimize exemptions and deductions and contribute effectively to national development. The tax literacy differs from the tax awareness, which is the knowledge of the taxpayer who can take independent decisions on tax paying. This literacy varies widely across different socioeconomic groups, with disparities in income, education, occupation and accessibility to tax-related information including behaviour (Kumawat, 2024). For instance, according to Gaikwad (2025) points out that lower-income individuals often face challenges in understanding exemptions, deductions and filing procedures, whereas higher-income earners benefit from structured financial guidance and advisory services. This is because high income earners often have to pay taxes and those with income below the income level set by the country do not have to pay any taxes.

Identifying tax knowledge gaps across different income and occupational groups is the relevance of this study, which allowing policymakers to develop targeted tax education initiatives. With increasing emphasis on financial inclusion and digital taxation, Kumawat (2024) states that understanding the barriers to compliance and accessibility can help rationalize tax policies and improve taxpayer participation. Simplifying tax filing systems, ensuring marginalized and lower-income groups receive adequate support in navigating tax regulations.

While extensive research has examined tax compliance behavior, but there is limited empirical investigation on tax awareness disparities across socioeconomic groups, particularly in developing economies like India. Existing studies focus primarily on general tax compliance trends but very few (for instance, Kusuma & Azzakhusna, 2019) comprehensively address how tax knowledge is influenced by factors such as employment type, education, digital accessibility, and information sources. Therefore, present study bridges the gap by providing a structured cross-tabulation analysis, offering insights into tax knowledge deficiencies and accessibility barriers across different demographic segments. In this way the objective of this study is, to assess tax awareness across socioeconomic groups, identifying disparities in knowledge, compliance behavior and accessibility to tax-related information. Specifically, the study aims to analyze the relationship among income, education, occupation and tax literacy; examine tax filing preferences across age groups and employment types; identify barriers to accessing tax-related information and professional advisory services; and recommend policy implications to improving tax education and digital accessibility.

The scope of the study is limited to individual taxpayers within various income groups and employment categories, focusing on their awareness levels, filing behaviors and sources of tax information. The study does not investigate macro level tax policy reforms but rather aims to enhance individual tax education and accessibility interventions. The research is organized into five sections, beginning with the introduction, which outlines the significance of tax literacy, the relevance of the study, existing literature gaps, objectives and scope. The second section presents a detailed literature review, examining previous studies on tax awareness and compliance. The third section explains the data and methodology, describing the sampling strategy, questionnaire design and analytical framework. The fourth section focuses on results and analysis, using cross-tabulations to highlight disparities in tax literacy and accessibility, and the fifth and final section discusses policy implications, offering recommendations for improving tax education and simplifying filing processes, followed by a conclusion summarizing findings and areas for future research.

2. Literature Review:

The literature on tax awareness and compliance behavior highlights the influence of socioeconomic factors on taxpayer knowledge and filing preferences. Many studies (for example, Alm, 2019; Torgler, 2007) show that income level and education significantly impact tax literacy with higher income earners demonstrating has more tax awareness due to their access to financial advisors and structured tax planning. On the other hand, James & Alley, (2002) supports that comparatively lower income earners face challenges in understanding exemptions and deductions, so that they missed financial benefits and lower compliance rates. Few studies emphasize that level of education is an influential factor that brings tax knowledge, then individuals with lower education backgrounds (Richardson & Sawyer, 2001).

Employment type is another key determinant factor that of tax compliance, as Kirchler *et al.*, (2008) argued that salaried employees generally obey tax regulations due to payroll deductions, whereas self-employed individuals and business owners struggle with complex tax filing requirements. In the same way, Murphy (2004) and Andreoni *et al.*, (1998) highlight that self-employed individuals often exhibit irregular compliance due to challenges in understanding documentation, deductions and tax incentives. On the other hand, age-based differences in tax filing preferences also emerge, as Hallsworth *et al.*, (2017) studied, younger taxpayers opting for digital platforms, while older taxpayers rely more on tax professionals for assistance.

The accessibility of tax information plays a crucial role in shaping tax compliance. Some studies indicate that higher-income taxpayers consult professionals for tax-related advice, while lower-income groups depend on informal networks such as family and friends, increasing misinformation risks (Torgler, 2011; Saad, 2014). Government-led tax education initiatives have proven useful, but studies like Braithwaite (2009) argue that simplified, user-friendly outreach programs are necessary to improve tax awareness among marginalized groups.

Some studies (James & Alley, 2002; Richardson & Sawyer, 2001) advocate policy recommendations for targeted tax literacy programs, digital accessibility improvements for tax filing and structured employer friendly initiatives to enhance taxpayer knowledge, but these studies less focused on micro level studies and age wise, income wise opinions.

3. Data and Methodology:

3.1. Data:

The present study using primary data collected via a structured questionnaire survey. The data comprises responses from 150 individuals including salaried employees, self-employed individuals, business owners and retirees, ensuring representation across age groups, income brackets, occupations and level of education. A stratified random sampling approach was employed to maintain diversity among respondents. The questionnaire consisted of closed-ended, multiple-choice, and Likert-scale questions, designed to measure key aspects such as tax awareness, preferred filing methods, sources of tax information, and perceptions of tax complexity.

3.2. Tools and techniques:

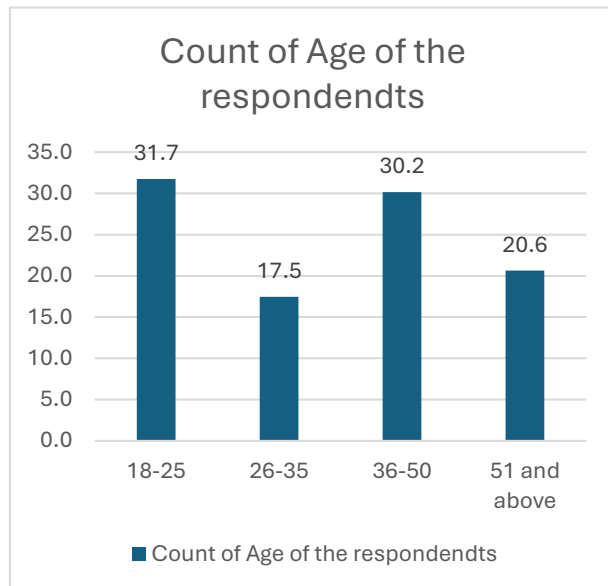
The methodology centers around cross-tabulation analysis, which enables a systematic comparison of demographic attributes with tax literacy and compliance behavior. Data collection was conducted through online surveys distributed via email and social media, as well as physical questionnaires administered in offices, tax advisory centers and community hubs to ensure broader participation. The responses were screened for inconsistencies and missing information, with follow-ups conducted where necessary to enhance data accuracy.

Cross-tabulations were employed for data analysis to compare variables such as income level, occupation and filing preferences, to find out disparities in tax knowledge and accessibility. Descriptive statistics were used to summarize key trends, while policy interpretation focused on the effectiveness of tax education, accessibility of filing systems, and barriers to compliance. Ethical considerations were carefully observed, with all responses anonymized to ensure privacy and informed consent obtained from all participants.

4. Result and Analysis:

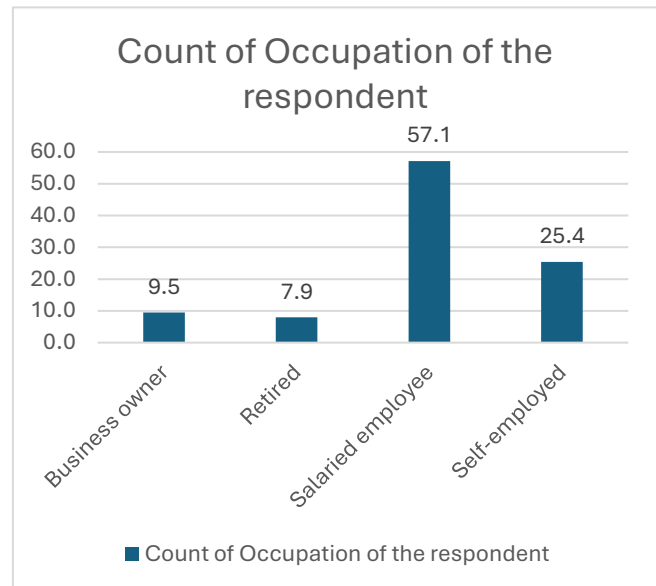
4.1. Descriptive Statistics:

Figure 1: Age composition of the respondents



Source: Author's compilation

Figure 2: Occupation of the respondents

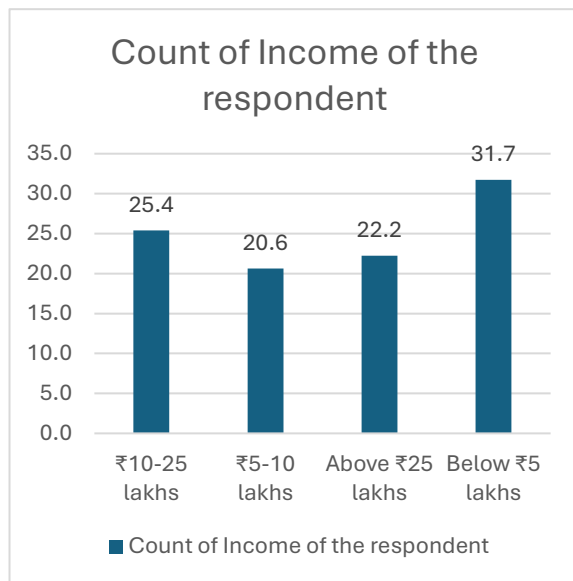


Source: Author's compilation

Figure 1 illustrates the distribution of respondents across different age groups. The more respondents (31.7 percent) belong to the 18–25 years category, closely followed by individuals aged 36–50 (30.2 percent). The respondents aged 51 and above account for the proportion at 20.6 percent, while the 26–35 age group comprises smallest proportion at 17.5 percent. The notable presence of younger taxpayers less their engagement in financial and taxation matters, due to less experience and income level even they have digital literacy and early exposure to financial education initiatives (for aged group of 26–35). However, the higher representation of senior citizens indicates experience related to accessibility or familiarity with evolving tax policies.

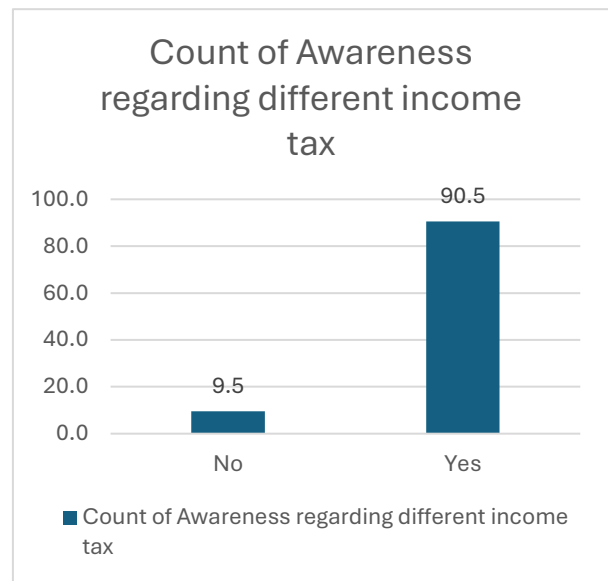
Figure 2 highlights the economic engagement of different groups in tax-related matters. Salaried employees form the majority (57.1 percent), followed by self-employed individuals (25.4 percent). Business owners (9.5 percent) and retirees (7.9 percent) make up the remaining workforce participation. Salaried employees generally benefit from structured tax deductions via payroll systems, while self-employed and business owners face greater complexity in tax calculations. The lower proportion of retired individuals suggests the need for better post-retirement tax literacy initiatives, ensuring they remain informed about exemptions and deductions available to them.

Figure 3: Income group of Respondents



Source: Author's Compilation

Figure 4: Awareness regarding income tax



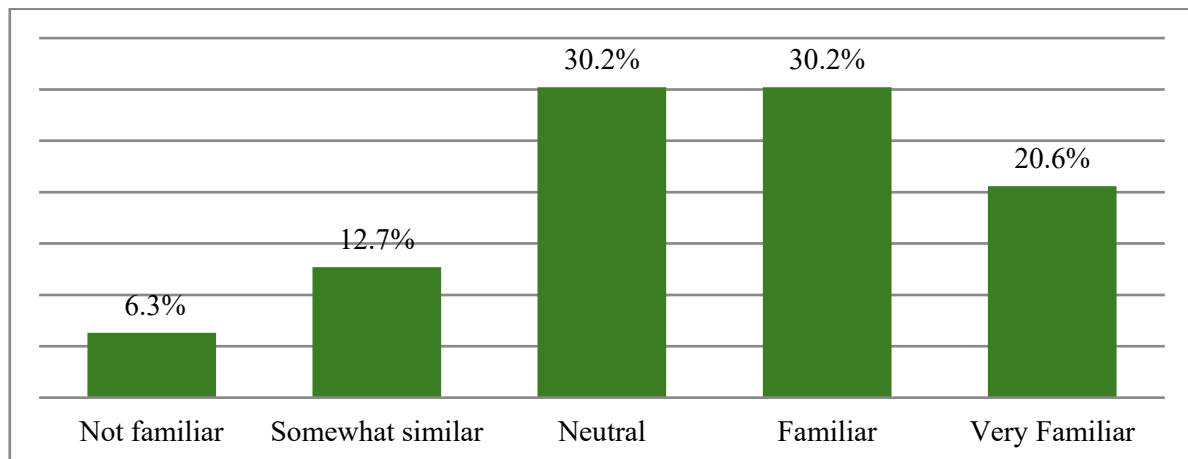
Source: Author's Compilation

The income distribution (Figure 3) reflects the financial diversity of respondents. A significant portion (31.7 percent) falls within the lowest bracket (below ₹5 lakh), followed by mid-income groups earning ₹10–25 lakh (25.4 percent) and ₹5–10 lakh (20.6 percent). Higher-income individuals (above ₹25 lakh) constitute 22.2 percent of the sample. It indicates a wide range of tax literacy levels, as lower-income earners may struggle with complexities surrounding deductions and exemptions, while higher-income groups often have access to financial advisors who assist in tax optimization strategies.

Figure 4 reflects tax awareness is high among respondents, with 90.5 percent reporting familiarity with different tax regimes, while only 9.5 percent lack knowledge. This proves a generally strong engagement with tax regulations, possibly due to increased digital access to tax-related information. However, the presence of uninformed individuals underscores the need for targeted awareness campaigns, particularly among lower-income and elderly taxpayers who may not actively seek tax-related updates.

Figure 5 showcases varied familiarity levels with tax filing. A more of respondent's (30.2 percent) report being familiar with the tax filing process, while an equal proportion remains neutral, indicating uncertainty or reliance on external assistance. 20.6 percent of respondents classify themselves as very familiar, actively engaging with tax filing procedures, whereas 12.7 percent report partial familiarity and 6.3 percent admit to being completely unfamiliar. These results find out that while a majority demonstrate confidence in tax filing, a portion of respondents still require guidance whether through simplified digital tools or professional advisory services.

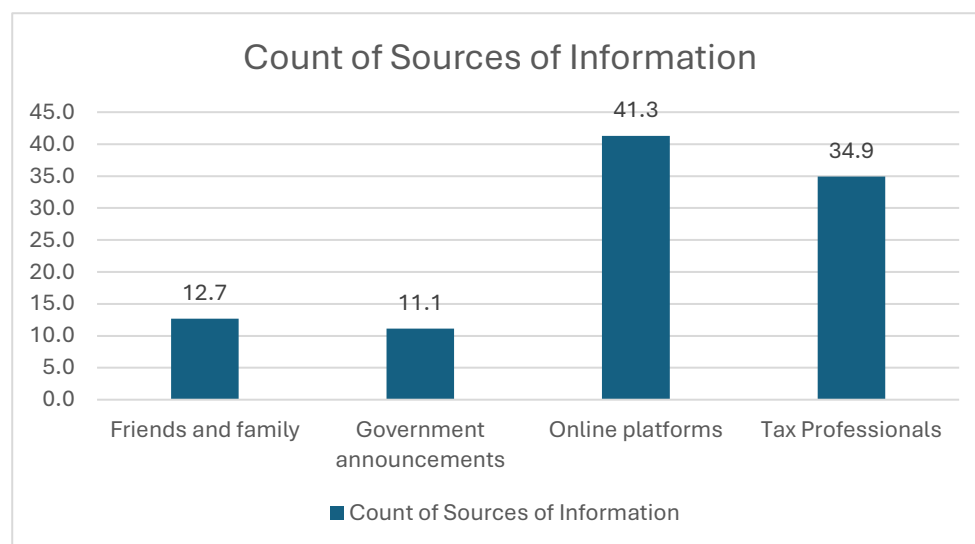
Figure 5: Familiarisation with the tax filling process of the respondents



Source: Author's Compilation

On the other hand, figure 6 demonstrates that the respondents primarily rely on online platforms (41.3 percent) and tax consultants (34.9 percent) for tax-related guidance. Government announcements and official advertisements contribute to 11.1 percent, while informal sources such as friends and family account for 12.7 percent. This highlights a growing preference for self-research via digital platforms but also emphasizes reliance on professionals. The relatively low percentage of respondents depending on government-provided resources indicates that official outreach efforts need to be strengthened, making tax information more accessible to all income brackets.

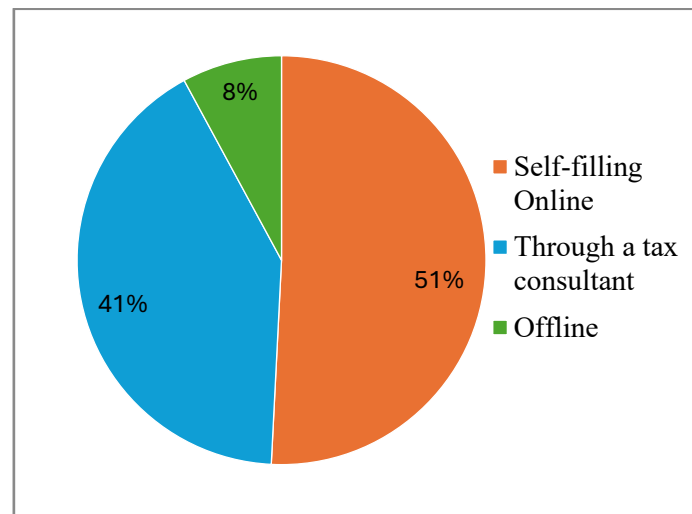
Figure 6: Source of information regarding income tax rule



Source: Author's compilation

The tax filing preferences show (in the figure 7) more respondents relying on online self-filing (50.8 percent), followed by tax consultants (41.3 percent). Offline filing is the least preferred method (7.9 percent), portraying that technological advancements and digital accessibility have encouraged more taxpayers to handle filings independently. However, the reliance on tax consultants among a notable segment suggests that complexities in tax filing still drive many to seek professional assistance rather than navigating the process themselves.

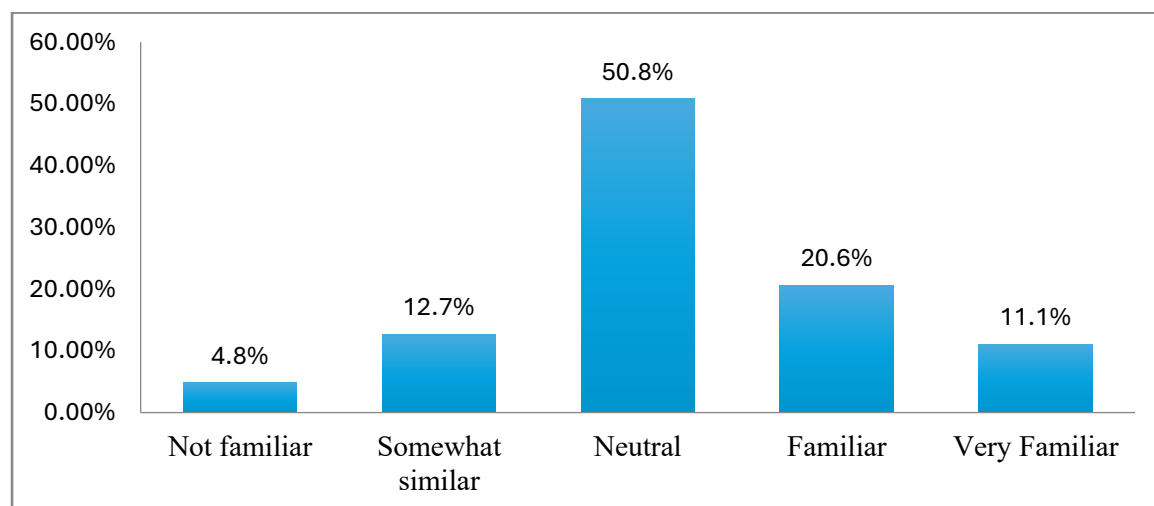
Figure 7: Way of filling of income tax returns of the respondents



Source: Author's Compilation

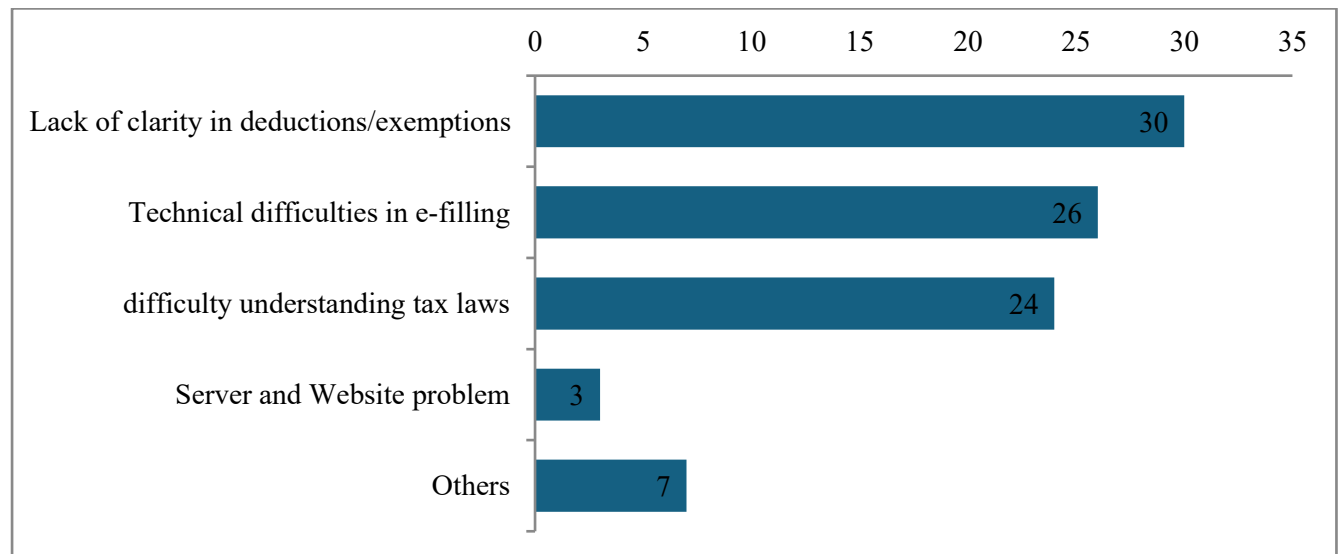
Figure 8 shows mixed sentiments regarding tax filing ease. About half of the respondents (50.8 percent) remain neutral, indicating uncertainty or an average experience with existing tax systems, while 20.6 percent find the process familiar and manageable. Only 11.1 percent consider tax filing more user-friendly, while 12.7 percent find it somewhat complicated, and 4.8 percent reporting difficulty in tax filing ease. This reflects the need for enhanced digital interfaces, transparent guidelines, and better support for those struggling with tax submission.

Figure 8: Ease of filling of income tax return in India



Source: Author's compilation

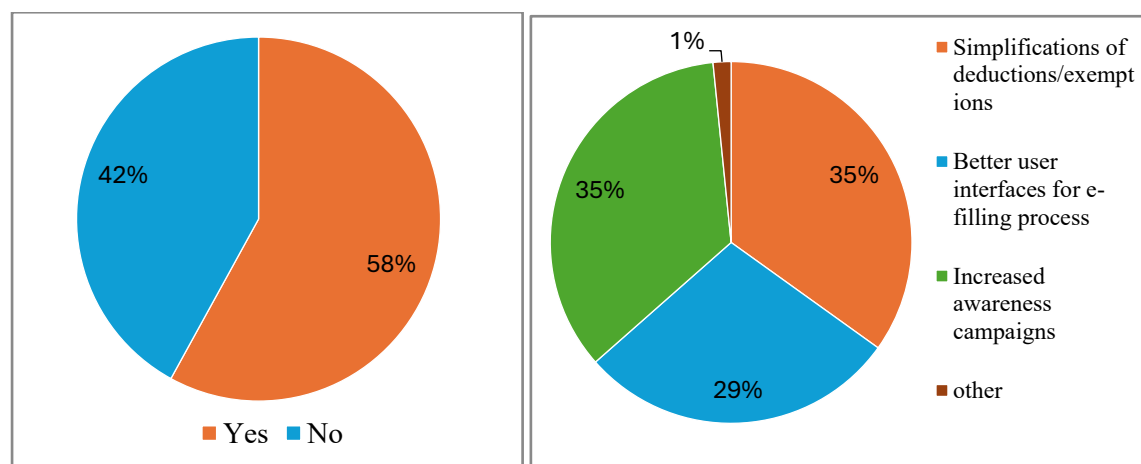
Figure 9: Challenges faced during filling tax returns



Source: Author's compilation

Figure 9 highlights the major challenges faced by respondents while filing tax returns. The echoed problem is the lack of clarity regarding deductions and exemptions, reported by 30 respondents, indicating gaps in tax awareness and guidance. Technical difficulties in e-filing (26 respondents) and difficulty in understanding tax laws (24 respondents) are also prominent, reflecting complexity of procedures and digital barriers. In contrast, server and website problems are reported by only 3 respondents, suggesting system stability is a relatively minor issue. Overall, the findings show that conceptual and knowledge-related challenges outweigh infrastructural or technical issues in tax return filing.

Figure 10: Perception regarding simplification of tax filling process



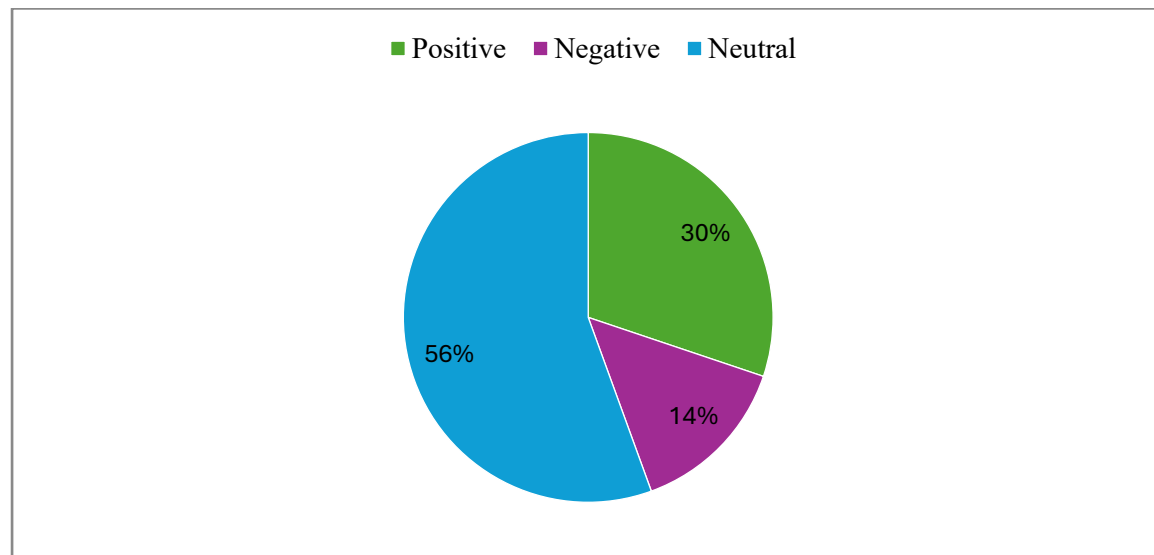
Source: Author's Compilation

Source: Author's Compilation

Figure 10 demonstrates perception regarding simplification of tax filling process. A majority (58 percent) acknowledge improvements in tax filing processes, while 42 percent remain skeptical. This suggests that while reforms have streamlined compliance mechanisms, gaps in accessibility or clarity persist, requiring continuous efforts toward simplification.

Within this 58 percent respondent's opinion, respondents prioritize simplification of deductions/exemptions (34.9 percent) and increased awareness campaigns as primary areas of improvement. On the other side, better e-filing user interfaces (28.6 percent), Only 1.6 percent call for other interventions, reinforcing the need for focused policy efforts addressing existing inefficiencies.

Figure 12: Perception regarding overall filling of income tax in India



Source: Author's compilation

Perception of overall filing of income tax (figure 12) shows that public perception remains mostly neutral (55.6 percent), with 30.2 percent holding a positive view, and 14.3 percent perceiving tax filing negatively. This reflects a moderate level of satisfaction but highlights scope for enhancements in accessibility, usability and clarity within the taxation framework.

Overall, these findings indicate that tax engagement is highest among salaried employees, younger individuals, and high-income earners, while self-employed and retired taxpayers exhibit lower familiarity. Despite the growing preference for digital tax filing (50.8 percent), professional reliance remains significant (41.3 percent), emphasizing the need for more user-friendly platforms. Challenges such as unclear exemptions (30 percent) and technical barriers (26 percent) hinder compliance, highlighting gaps in financial literacy and infrastructure. Perceptions of tax simplification remain divided, with 58 percent acknowledging improvements and 42 percent unconvinced. While online platforms (41.3 percent) serve as a primary source of tax information, weak government outreach (11.1 percent) and reliance on informal networks (12.7 percent) highlight gaps in structured dissemination. Addressing these differences through targeted awareness initiatives, improved digital accessibility and simplified tax procedures can ensure equitable taxpayer participation.

4.1. Tax Awareness vs. Socioeconomic Indicators:

Cross tabulation assesses the patterns of tax awareness and compliance across diverse socioeconomic groups, a series of cross-tabulations were conducted, examining key demographic variables, occupational status, and accessibility to tax-related information. These statistical relationships provide nuanced insights into how age, income, education, and employment structures influence familiarity with tax systems, preferred compliance behaviours and perceptions of complexity laying the groundwork for targeted policy interventions.

Table 1: Cross-tabulation: Age vs. Income vs. Tax Awareness Level

Age Group	Income Bracket	Highly Aware (%)	Somewhat Aware (%)	Not Aware (%)
18-25	Below ₹5 Lakhs	60 percent	35 percent	5 percent
	₹5-10 Lakhs	55 percent	40 percent	5 percent
	₹10-25 Lakhs	50 percent	45 percent	5 percent
	Above ₹25 Lakhs	70 percent	30 percent	0 percent
26-35	Below ₹5 Lakhs	50 percent	40 percent	10 percent
	₹5-10 Lakhs	55 percent	40 percent	5 percent
	₹10-25 Lakhs	60 percent	35 percent	5 percent
	Above ₹25 Lakhs	75 percent	25 percent	0 percent
36-50	Below ₹5 Lakhs	40 percent	50 percent	10 percent
	₹5-10 Lakhs	50 percent	45 percent	5 percent
	₹10-25 Lakhs	55 percent	40 percent	5 percent
	Above ₹25 Lakhs	70 percent	30 percent	0 percent
51+	Below ₹5 Lakhs	35 percent	50 percent	15 percent
	₹5-10 Lakhs	40 percent	50 percent	10 percent
	₹10-25 Lakhs	50 percent	45 percent	5 percent
	Above ₹25 Lakhs	65 percent	35 percent	0 percent

Source: Author's compilation

The analysis of tax awareness across socioeconomic groups reveals several critical insights. Firstly, income level appears to be a strong determinant of tax literacy, with higher-income earners (above ₹25 lakhs) consistently demonstrating greater awareness of tax regulations, exemptions, and filing procedures. This trend holds across all age groups, suggesting that access to financial advisory services and tax professionals may play a key role in improving tax awareness among wealthier individuals.

On the other hand, lower-income earners (below ₹5 lakhs), particularly older respondents (51+), exhibit limited tax awareness, which raises concerns about accessibility to reliable tax information and educational resources. Younger individuals (18-25) in this income bracket fare somewhat better, due to their engagement with online platforms, digital tax filing methods and exposure to financial literacy initiatives.

Among middle-income earners (₹5-10 lakhs and ₹10-25 lakhs), awareness levels vary based on occupation and access to professional tax assistance. Salaried employees in these brackets tend to show moderate familiarity with tax regulations, while self-employed individuals and business owners often encounter knowledge gaps, leading to reliance on informal sources such as friends and family. Table 2 suggests that occupational differences contribute to tax literacy disparities, with formal employment providing more structured exposure to taxation compared to informal or entrepreneurial work.

Additionally, the reliance on digital tools and online tax filing platforms correlates with higher awareness. Younger respondents and those with mid-level incomes increasingly prefer self-filing

online, reinforcing the role of technology in bridging knowledge gaps. However, offline filing remains prevalent among older and lower-income respondents, who may face barriers to digital accessibility or prefer traditional methods.

Table 2: Cross-tabulation of Tax Awareness vs. Occupation and Income

Occupation	Income Bracket	Highly Aware (%)	Neutral/Unaware (%)
Salaried Employee	Above ₹25 Lakhs	80 percent	20 percent
	₹10-25 Lakhs	75 percent	25 percent
	₹5-10 Lakhs	60 percent	40 percent
	Below ₹5 Lakhs	55 percent	45 percent
Self-Employed	Above ₹25 Lakhs	70 percent	30 percent
	₹10-25 Lakhs	65 percent	35 percent
	₹5-10 Lakhs	50 percent	50 percent
	Below ₹5 Lakhs	45 percent	55 percent
Business Owner	Above ₹25 Lakhs	75 percent	25 percent
	₹10-25 Lakhs	60 percent	40 percent
Retired	₹5-10 Lakhs	50 percent	50 percent
	Below ₹5 Lakhs	55 percent	45 percent

Source: Author's compilation

Table 3: Employment Type vs. Familiarity with Tax Filing

Employment Type	Very Familiar (%)	Somewhat Familiar (%)	Not Familiar (%)
Salaried Employee	70 percent	25 percent	5 percent
Self-Employed	50 percent	40 percent	10 percent
Business Owner	65 percent	30 percent	5 percent
Retired	40 percent	45 percent	15 percent

Source: Author's compilation

The analysis (table 3) highlights a clear correlation between employment type and familiarity with tax filing, reinforcing the role of structured financial exposure in tax literacy. Salaried employees exhibit more familiarity levels (70 percent), largely due to their exposure to automated payroll tax deductions, employer-provided tax information, and professional assistance with compliance. Their structured earnings and tax withholding systems make it easier for them to navigate tax requirements.

Business owners, in the same way, show tax awareness at 65 percent, as many engage with financial professionals for managing tax obligations related to business operations, deductions, and GST compliance. However, self-employed individuals display better variability, with only 50 percent being very familiar and a significant portion (40 percent). This indicates that independent earners may

struggle with tax complexities due to the absence of employer-provided guidance, relying instead on personal research or informal networks.

Among retired individuals, tax familiarity declines significantly, with 40 percent reporting high familiarity, while nearly 45 percent remain only somewhat familiar. This trend results from reduced engagement with tax systems post-retirement, leading to gaps in knowledge about evolving tax policies and potential benefits. Retired respondents of 15 percent report being completely unfamiliar with tax filing, stress the need for simplified tax education to retirees, ensuring they understand the exemptions and deductions that apply to their financial situation.

Table 4: Cross-tabulation: Income Level vs. Knowledge of Deductions/Exemptions

Income Bracket	Highly Knowledgeable (%)	Somewhat Knowledgeable (%)	Not Knowledgeable (%)
Below ₹5 Lakhs	40 percent	45 percent	15 percent
₹5-10 Lakhs	50 percent	40 percent	10 percent
₹10-25 Lakhs	60 percent	35 percent	5 percent
Above ₹25 Lakhs	75 percent	25 percent	0 percent

Source: Author's compilation

On the other hand, the analysis of income level and knowledge of tax deductions/exemptions (table 4) highlights a clear correlation between financial stability and tax literacy. Higher-income individuals (above ₹25 lakhs) exhibit the more understanding of tax benefits, with a majority reporting high familiarity. This is likely due to their access to financial advisors, tax consultants, and structured tax planning strategies, which enable them to take advantage of deductions and exemptions effectively. Their tax literacy ensures compliance while optimizing savings through various tax provisions.

Middle-income earners (₹5-10 lakh and ₹10-25 lakh) exhibit moderate awareness, with a significant portion of them falling into the somewhat knowledgeable category. Many in this group may have basic familiarity with deductions but lack a deeper understanding of how to maximize tax benefits. The reliance on professional tax services appears to be lower in this segment, suggesting a possible gap in accessible financial education.

At the lower end of the income spectrum, individuals earning below ₹5 lakhs shows the wide gap in tax knowledge, with 15 percent reporting no awareness of deductions/exemptions. This highlights a systemic issue where lower-income taxpayers may either be unaware of potential tax savings or struggle with complex filing procedures. The lack of tax literacy in this group could lead to missed financial opportunities and potential overpayment of taxes. Addressing this knowledge gap through accessible tax education programs, simplified filing processes and targeted awareness campaigns would significantly improve tax compliance and financial stability among lower-income taxpayers.

4.2. Tax Compliance Behaviour vs. Socioeconomic Factors

Table 5: Cross-tabulation: Age vs. Income vs. Filing Method

Age Group	Income Bracket	Self-Filing Online (%)	Tax Consultant (%)	Offline (%)
18-25	Below ₹5 Lakhs	65 percent	20 percent	15 percent

	₹5-10 Lakhs	60 percent	30 percent	10 percent
	₹10-25 Lakhs	55 percent	40 percent	5 percent
	Above ₹25 Lakhs	50 percent	50 percent	0 percent
26-35	Below ₹5 Lakhs	60 percent	25 percent	15 percent
	₹5-10 Lakhs	55 percent	35 percent	10 percent
	₹10-25 Lakhs	50 percent	45 percent	5 percent
	Above ₹25 Lakhs	35 percent	65 percent	0 percent
36-50	Below ₹5 Lakhs	50 percent	30 percent	20 percent
	₹5-10 Lakhs	45 percent	40 percent	15 percent
	₹10-25 Lakhs	40 percent	50 percent	10 percent
	Above ₹25 Lakhs	30 percent	70 percent	0 percent
51+	Below ₹5 Lakhs	40 percent	30 percent	30 percent
	₹5-10 Lakhs	35 percent	40 percent	25 percent
	₹10-25 Lakhs	30 percent	50 percent	20 percent
	Above ₹25 Lakhs	25 percent	65 percent	10 percent

Source: Author's compilation

The cross-tabulation table 5 highlights clear age and income-based trends in tax filing preferences. Younger individuals (18-25), particularly those in lower-income brackets (below ₹5 lakhs and ₹5-10 lakhs), mostly prefer self-filing online, likely due to digital literacy and ease of access. This preference declines as income increases, with higher-income earners relying more on tax consultants for structured advisory services.

Among middle-aged individuals (26-50), self-filing remains prevalent but decreases with rising income levels, as those in higher tax brackets choose for tax professionals to manage complex tax strategies. The trust on offline filing remains low, except in lower-income groups where digital accessibility may be a barrier. Older taxpayers (51+) show the most varied filing methods, with higher reliance on tax consultants in higher income brackets, and significant offline filing among lower-income retirees (below ₹10 lakhs). This suggests that accessibility, digital familiarity, and financial security play key roles in shaping tax filing behaviour.

Table 6: Cross-tabulation: Employment Type vs. Compliance Likelihood

Employment Type	High Compliance (%)	Moderate Compliance (%)	Low Compliance (%)
Salaried Employee	75 percent	20 percent	5 percent
Self-Employed	55 percent	35 percent	10 percent
Business Owner	60 percent	30 percent	10 percent
Retired	45 percent	40 percent	15 percent

Source: Author's compilation

Tax compliance likelihood (table 6) varies significantly across employment types, with salaried employees showing the more compliance rates (75 percent). This trend is likely due to automatic payroll tax deductions, employer-provided guidance and structured tax filing processes, ensuring followed to tax regulations. Business owners and self-employed individuals show moderate compliance (60 percent and 55 percent respectively), with a higher proportion reporting uncertainty or irregular filing behaviour. Self-employed individuals, in particular, face challenges in navigating tax complexities, leading to lower compliance compared to salaried employees. Limited access to formal tax advisory services and difficulties in managing deductions contribute to these disparities.

Retired individuals exhibit the lowest compliance rates, with only 45 percent reporting high compliance. The transition away from structured earnings reduces engagement with tax processes, leading to increased reliance on informal tax knowledge or assistance from family members. Simplified tax filing options and educational programs fit to retirees could improve their compliance rates.

Table 7: Cross-tabulation: Income Bracket vs. Perception of Tax Complexity

Income Bracket	Perceived as Complex (%)	Neutral (%)	Perceived as Simple (%)
Below ₹5 Lakhs	60 percent	30 percent	10 percent
₹5-10 Lakhs	50 percent	35 percent	15 percent
₹10-25 Lakhs	40 percent	40 percent	20 percent
Above ₹25 Lakhs	30 percent	40 percent	30 percent

Source: Author's compilation

The perception of tax complexity (table 7) is strongly influenced by income levels, with lower-income groups (Below ₹5 Lakhs) finding taxation more difficult (60 percent), because due to limited access to tax consultants, unfamiliarity with tax deductions/exemptions, and complicated filing processes. Many individuals in this bracket rely on informal knowledge sources, leading to higher uncertainty and difficulty navigating tax regulations.

As income levels rise, perceptions of complexity gradually decrease, with middle-income earners (₹5-10 Lakhs & ₹10-25 Lakhs) reporting more balanced perspectives, where some still find tax filing challenging but a growing portion considers it manageable. This suggests that employment type, education, and access to professional tax guidance play key roles in reducing complexity.

Among higher-income earners (Above ₹25 Lakhs), only 30 percent perceive taxation as complex, while 30 percent find it simple, reflecting more reliance on tax professionals and better financial literacy. Individuals in this group have structured tax planning strategies that mitigate confusion, making the filing process more seamless.

Table 8: Cross-tabulation: Sources of Information vs. Filing Method vs. Satisfaction Levels

Sources of Information	Filing Method	High Satisfaction (%)	Neutral (%)	Low Satisfaction (%)
Tax Professionals	Through Tax Consultant	75 percent	20 percent	5 percent
Online Platforms	Self-Filing Online	60 percent	30 percent	10 percent
Friends & Family	Self-Filing Online	45 percent	40 percent	15 percent

Government Announcements	Self-Filing Online or Offline	50 percent	35 percent	15 percent
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Source: Author's compilation

The analysis of sources of tax information, filing methods, and satisfaction levels (in table 8) reveals clear trends in how individuals approach tax compliance and their overall satisfaction with the process. Reliance on tax professionals leads to the more satisfaction rates (75 percent), as these individuals benefit from expert guidance, ensuring accurate filings and optimized tax benefits. This method is particularly favoured by higher-income earners and business owners who require structured support for complex tax calculations and compliance. On the other hand, self-filers using online platforms report mixed satisfaction levels (60 percent high satisfaction, 30 percent neutral). While digital tax platforms have improved accessibility, some users still meet challenges with usability, tax exemptions, and procedural clarity. Younger taxpayers and those with moderate income brackets tend to prefer online filing due to its convenience, though a portion remains indifferent or dissatisfied, suggesting a need for better user education and simplification of tax filing interfaces.

For individuals relying on friends and family as tax knowledge sources, satisfaction is lower (45 percent), reflecting the risks associated with informal guidance. Misinformation or incomplete tax knowledge can lead to filing errors, financial losses or missed exemptions. Ensuring more access to verified tax resources, such as simplified government portals and advisory workshops, could bridge knowledge gaps and improve overall satisfaction. Government announcements rank mid-tier in terms of satisfaction (50 percent high satisfaction, 35 percent neutral and 15 percent dissatisfied). While official communications provide essential tax updates, their complexity and lack of accessibility may discourage taxpayers from engaging with them effectively. A large portion of respondents remain neutral or dissatisfied, indicating the need for clearer and more widely disseminated tax information through multiple channels.

Filing methods and tax knowledge sources significantly impact user satisfaction, with professional assistance yielding positive outcomes. Enhancing digital accessibility, improving tax advisory outreach, and streamlining official communication strategies could improve filing experiences across all income groups. Policymakers may benefit from expanding user-friendly tax education initiatives to different demographics, ensuring equitable access to tax knowledge and compliance tools.

Here are the cross-tabulations for Tax Knowledge vs. Accessibility & Information Sources, each followed by concise insights.

Table 9: Education Level vs. Tax Awareness vs. Source of Information

Education Level	High Tax Awareness (%)	Moderate Tax Awareness (%)	Low Tax Awareness (%)	Primary Source of Information
Below Graduation	40 percent	45 percent	15 percent	Friends & Family
Graduate/Postgraduate	70 percent	25 percent	5 percent	Tax Professionals & Online Platforms

Source: Author's compilation

Higher education strongly correlates with tax awareness (see in table 9), as graduates and postgraduates display significantly higher familiarity with taxation compared to those with lower education levels. Less-educated individuals rely more on informal sources like friends and family,

which may lead to incomplete or inaccurate tax knowledge. But higher-educated groups prefer tax professionals or online resources, ensuring more structured tax guidance.

Table 10: Income Level vs. Preferred Source of Tax Information

Income Level	Preferred Source of Information
Below ₹5 Lakhs	Friends & Family
₹5-10 Lakhs	Online Platforms & Government Announcements
₹10-25 Lakhs	Tax Professionals & Online Platforms
Above ₹25 Lakhs	Tax Professionals

Source: Author's compilation

Income (table 10) directly influences where individuals seek tax information, with lower-income groups relying more on informal networks and higher-income earners favoring tax professionals for structured advice. Middle-income individuals (₹5-10 lakhs) engage with online platforms, showing a shift toward digital tax literacy, though government announcements still play a role. The findings highlight the need for better accessibility to formal tax resources for lower-income earners to prevent misinformation.

Table 11: Occupation vs. Source of Information (Tax Professionals, Online Platforms, Friends and Family, Government Announcements)

Occupation	Primary Source of Tax Information
Salaried Employee	Tax Professionals & Online Platforms
Self-Employed	Online Platforms & Friends & Family
Business Owner	Tax Professionals & Online Platforms
Retired	Government Announcements & Friends & Family

Source: Author's compilation

Occupation plays a key role in shaping tax knowledge, with salaried employees and business owners predominantly consulting tax professionals for structured financial guidance (in table 11). Self-employed individuals rely on online platforms but also informal networks, indicating a need for targeted tax education initiatives. Retired individuals favour government announcements and personal networks, suggesting that more accessible senior-focused tax literacy programs could enhance understanding.

Table 12: Age Group vs. Perception of User-Friendliness in Filing Portals

Age Group	Easy to Use (%)	Neutral (%)	Difficult to Use (%)
18-25	65 percent	25 percent	10 percent
26-35	55 percent	30 percent	15 percent
36-50	45 percent	35 percent	20 percent
51+	35 percent	40 percent	25 percent

Source: Author's compilation

The perception of user-friendliness in tax filing portals varies significantly across age groups (table 12). Younger taxpayers (18-25) show the more satisfaction with online filing platforms, with 65 percent finding them easy to use. This suggests that tech-savviness plays a crucial role in how individuals interact with digital tax services. Their preference for self-filing methods through online portals aligns with their familiarity with digital tools, reducing the need for external tax assistance. As age increases, the ease-of-use perception declines, with only 35 percent of older individuals (51+) considering tax portals user-friendly, while 25 percent find them difficult to navigate. Many older taxpayers struggle with digital accessibility, complex filing steps, and technical issues that may discourage independent filing. The neutral response (40 percent) among this age group exposes that a portion may use online tools with assistance but remain hesitant about fully managing tax filing themselves.

This trend emphasizes the need for age-friendly tax filing interfaces, simplified processes, and targeted digital literacy programs for older taxpayers to improve accessibility and ensure greater ease of use.

Table 13: Income Bracket vs. Opinion on Simplification Efforts

Income Bracket	Effective (%)	Neutral (%)	Needs Improvement (%)
Below ₹5 Lakhs	35 percent	40 percent	25 percent
₹5-10 Lakhs	45 percent	35 percent	20 percent
₹10-25 Lakhs	55 percent	30 percent	15 percent
Above ₹25 Lakhs	65 percent	25 percent	10 percent

Source: Author's compilation

Opinions on tax simplification efforts (table 13) correlate with income levels, as individuals with higher income brackets (Above ₹25 Lakhs) find simplification efforts most effective (65 percent). Their access to professional tax consultants and familiarity with structured tax planning likely contribute to a smoother filing experience. But lower-income earners (Below ₹5 Lakhs) report more difficulty, with only 35 percent finding tax simplification effective while 25 percent believe significant improvements are needed. Many individuals in this category lack access to professional tax assistance and complex filing requirements may create additional barriers to compliance.

The neutral responses are more among lower and middle-income groups, suggesting mixed experience with tax simplification efforts. While some may benefit from improved filing tools, others still find the process burdensome. This highlights the importance of customizing tax education and filing support for different income brackets, ensuring that lower-income earners can navigate taxation more effectively.

Table 14: Occupation vs. Suggestions for Improving Tax Awareness

Occupation	Primary Suggestion for Tax Awareness Improvement
Salaried Employee	More employer-led tax education programs
Self-Employed	Simplified filing guides & advisory services
Business Owner	Enhanced access to professional tax consultants
Retired	Senior-focused tax literacy initiatives

Source: Author's compilation

Different occupations require tax education interventions based on their distinct filing experiences and challenges (see in table 14). Salaried employees advocate for more employer-led tax education programs, as structured tax guidance within workplaces could help them navigate deductions and compliance with greater confidence.

Self-employed individuals, who often face complex tax obligations without institutional support, request simplified filing guides and advisory services, indicating a strong need for accessible tax education to independent earners. A lack of formal training in tax documentation and eligibility for exemptions may lead to missed opportunities for optimized filings.

Business owners emphasize the need for better professional tax consultants, reflecting their greater engagement with complex tax structures, GST compliance, and financial management. Providing more structured tax advisory programs for entrepreneurs and small business owners would enhance tax literacy and compliance efficiency. Overall, retired individuals suggest senior-focused tax literacy initiatives, highlighting gaps in post-retirement tax education and accessibility to simplified tax documentation. Many struggles with evolving tax laws, exemptions, and eligibility criteria, making it essential to develop government-led awareness campaigns and digital resources tailored to senior taxpayers.

5. Summary and Conclusion:

The analysis of tax awareness, compliance behaviour, and information accessibility across socioeconomic groups reveals disparities shaped by income, education, occupation, and digital engagement. Higher-income individuals and those with postgraduate education exhibit consistently higher levels of tax literacy, familiarity with deductions and exemptions, and confidence in filing procedures. Salaried employees particularly benefit from structured exposure to taxation through payroll systems and employer-led initiatives, fostering a more systematic understanding of tax obligations. But lower-income groups, especially older adults, self-employed individuals, and retirees face multiple barriers. These include limited access to reliable information, low digital literacy, and reduced institutional support, leading to fragmented knowledge and lower compliance rates. Educational attainment plays a pivotal role across all occupational strata, suggesting that foundational financial education significantly improves tax behaviours. The preference for offline filing methods and reliance on informal information networks among disadvantaged groups further reinforces the digital and informational divide.

From a policy perspective, the findings underscore the importance of targeted outreach initiatives tailored to income, age, and occupation. Simplifying filing portals, promoting vernacular content, and embedding tax education into grassroots financial literacy programs could play a transformational role in improving compliance and promoting equity in fiscal participation.

However, the study is not without its limitations. First, while the cross-tabulations provide valuable descriptive insights, the absence of inferential statistical testing limits the ability to establish causality. Future analyses could benefit from regression modelling to control for interacting variables. Second, the dataset may reflect sample constraints, such as urban-centric responses or overrepresentation of certain occupational categories, which could affect generalizability. Third, attitudinal variables, such as trust in tax institutions or perceived fairness of the tax system were not captured, though they likely influence compliance behaviours significantly. Finally, while digital access was discussed, the role of linguistic and cultural shades in shaping tax awareness could be explored more deeply through qualitative methods or mixed-methods research designs.

The findings present both diagnostic clarity and actionable direction. Addressing the systemic disparities in tax literacy requires policy frameworks that are as diverse and adaptive as the

socioeconomic realities they aim to serve. Bridging these knowledge gaps is not only a matter of compliance but of social equity and inclusive governance.

References:

- Alm, J. (2019). What motivates tax compliance? *Journal of Economic Surveys*, 33(2), 353–388. <https://doi.org/10.1111/joes.12353>
- Andreoni, J., Erard, B., & Feinstein, J. (1998). Tax compliance. *Journal of Economic Literature*, 36(2), 818–860. <https://doi.org/10.1257/jel.36.2.818>
- Braithwaite, V. (2009). *Defiance in taxation and governance: Resisting and dismissing authority in a democracy*. Edward Elgar Publishing.
- Gaikwad, R. (2025). *The muddle of the progressive taxation system in India: Its impacts on poor socio-economic groups, and middle class*. SSRN.
- Hallsworth, M., List, J. A., Metcalfe, R. D., & Vlaev, I. (2017). Behavioralist as tax collector: Using natural field experiments to enhance tax compliance. *Journal of Public Economics*, 148, 14–31. <https://doi.org/10.1016/j.jpubeco.2017.02.003>
- James, S., & Alley, C. (2002). Tax compliance, self-assessment, and tax administration. *Journal of Finance and Management in Public Services*, 2(2), 27–42.
- Kirchler, E., Hoelzl, E., & Wahl, I. (2008). Enforced versus voluntary tax compliance: The slippery slope framework. *Journal of Economic Psychology*, 29(2), 210–225. <https://doi.org/10.1016/j.joep.2007.05.004>
- Kumawat, M. (2024). *Taxation policies and economic inequality: Strategies for a more equitable society*. IIP Series.
- Kusuma, H., & Azzakhusna, F. (2019). Tax awareness and compliance: An empirical study on small and medium-sized enterprises (SMEs). *International Journal of Managerial Studies and Research*, 7(10), 8–17.
- Murphy, K. (2004). The role of trust in tax compliance. *Law and Human Behavior*, 28(2), 187–209. <https://doi.org/10.1023/B:LAHU.0000022313.90776.50>
- Richardson, G., & Sawyer, A. (2001). A review of tax compliance research. *Journal of Tax Research*, 3(2), 141–178.
- Saad, N. (2014). Tax knowledge, tax complexity, and tax compliance: Taxpayers' view. *Procedia - Social and Behavioral Sciences*, 109, 1069–1075. <https://doi.org/10.1016/j.sbspro.2013.12.591>
- Torgler, B. (2007). *Tax compliance and tax morale: A theoretical and empirical analysis*. Edward Elgar Publishing.
- Torgler, B. (2011). *Tax morale and compliance: Review of evidence and policy implications*. World Bank Policy Research Working Paper. <https://doi.org/10.1596/1813-9450-5936>

GST AND E-GOVERNANCE: EVALUATING INDIA'S E- INVOICING SYSTEM AND ITS EFFICACY

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Abstract

In fast changing dynamic world, E-invoicing through the GST framework in India has evolved into a major component in improving tax administration, as well as increasing compliance, transparency, efficiency, and accountability. This paper aims to assess the effectiveness of India's E-invoicing System including numerous tools and evaluate the significant accomplishments achieved through e-governance particularly in terms of reducing tax evasion, encouraging digitalization, simplifying the process of submitting GST returns and creating comprehensive systems for resolving grievances. The paper will also investigate how the flow of real-time data, prepopulating form fields, and using Artificial Intelligence-based tools are contributing to the success of the E-invoicing System while continuing to face obstacles such as technological divides in rural areas and the increased cost of compliance for small and micro-enterprises. The results emphasize that although e-invoicing has transformed GST administration, its complete potential will be achieved only by addressing digital disparities, enhancing infrastructure in underserved regions, and promoting policy support for MSMEs.

Keywords: *E-Governance, Tax Administration Efficacy, G.S.T, India.*

Introduction

India's Goods and Service Tax Regime that came into effect on July 1, 2017 onwards. The increasing institutionalization of digital compliance requirements throughout the Indian business ecosystem is reflected in the progressive expansion of e-invoicing requirements, which were first implemented for companies with turnovers exceeding ₹500 crore applicable from 1st October 2020 (CBIC Notification No. 61/2020-Central), then reduced to ₹100 crore effective January 1, 2021 (CBIC Notification No. 88/2020-Central Tax,) further reduced to ₹50 crore from 1st April 2021(CBIC Notification No.01/2022 –Central Tax) followed by ₹10 crore (CBIC Notification No.17/2022 –Central Tax) and presently ₹5 crore starting in August 2023(CBIC Notification No.10/2023 –Central Tax), and then extended to ₹10 lakh effective April 2025. The said specifies limit is based upon Aggregate Annual Turnover which is to say it would encompass turnover of all the GSTINs registered under single PAN all throughout the territory of India. The need for preventing tax evasion by encompassing more commercial activities is reflected in this approach of the government and the same acknowledges the limits of implementing capabilities within the cohorts of smaller enterprises. This initiative represents a paradigmatic example of not only a procedural reform, but rather, embodies the ideological tenets of India's e-Government initiatives The critical role of technology integration, specifically, E-invoicing, has been to support the collection, reconciling and analyzing of billions of individual monthly transactions as India sets record-breaking GST revenues

Literature Review

E-invoicing is transforming compliance, generating transparency and accountability in tax administration and supporting in limiting tax evasion. Solutions to digital invoicing have fundamentally changed the organization of compliance temporally; transitioning from retroactive

verification methodologies to real time monitoring methodologies of individual transactions¹. India's E-invoicing Framework utilizes advanced technologies in its operation: the Invoice Registration Portal (IRP), which serves as the validation mechanism; the Goods and Services Tax Network (GSTN), which provides the transactional linkage between the parties involved; and, the decentralized Invoice Service Provider, which enables technical interoperability among the parties². Simultaneously, methods for automatically populating GSTR returns based on inputs from the IRP validated by the taxpayer, thus eliminating errors associated with manual data entry³. The data given by Parliament corroborates with the fact of system's capability to detect where in ₹7.08 lakh crore in tax evasion instances were found between FY 2020–2021 and FY 2024–2025 in about 91,370 cases which also encompassed for about ₹1.79 lakh crore in ITC fraud.⁴ However, universal effectiveness is limited by human capital asymmetries and infrastructural deficiencies in peripheral regions, especially Micro and Small Enterprises necessitating and a comprehensive examination of socioeconomic accessibility methods, distributional fairness implications, and technology architecture across diverse taxpayer groups⁵.

Research Methodology

Mixed approaches along with analytical framework have been used where in the quantitative analysis of publicly available governmental data on GST revenue collection, tax evasion detection, e-invoicing adoption rates, and compliance metrics.

Qualitative analysis involves examination of policy documents, circular communications, and legislative instruments establishing e-invoicing regulatory frameworks; synthesis of peer-reviewed academic literature investigating digital tax administration effectiveness; and institutional analysis of technological infrastructure, grievance redressal mechanisms, and implementation barriers documented through governmental and industry reports.

Primary data sources include official documentation from the Central Board of Indirect Taxes & Customs (CBIC), Lok Sabha responses to questions regarding GST administration effectiveness, GST Council meeting minutes, and GSTN technical documentation. Secondary sources encompass published research from academic institutions, and international research organizations investigating tax administration digitalization, tax reports etc.

Transformational Impact of E-Invoicing under G.S.T and E-Governance

Firstly, under E-invoicing, after the completion of B2B transactions that exceed predetermined turnover thresholds, registered taxpayers electronically send transaction details to the IRP. The IRP verifies these submissions against predetermined statutory criteria and creates a unique Invoice Reference Number (IRN), a cryptographically secure identification string that allows for future transaction tracking. Real-time data transmission protocols that enable the automatic population of GSTR-1 return forms (seller return) and GSTR-2B forms (auto-drafted buyer input tax credit claims) through direct data flows from IRP systems are a contemporary technological innovation integrated into e-invoicing frameworks. This

¹ Nagaraja, G. (2025). E-Invoicing and Its Impact On Gst Compliance in India. *International Journal of Research and Analytical Reviews*, 12(1), 908–909. <https://ijrar.org/papers/IJRAR25A3613.pdf>

² Iris Business Services Limited. (2023, October 17). E-invoicing mandate under GST | Invoice Registration Portal (IRP). IRIS IRP. <https://einvoice6.gst.gov.in/content/einvoice-mandate/>

³ Nagaraja, G. (2025). E-Invoicing and Its Impact On Gst Compliance in India. *International Journal of Research and Analytical Reviews*, 12(1), 908–909. <https://ijrar.org/papers/IJRAR25A3613.pdf>

⁴ Pti. (2025, August 4). *GST evasion of ₹7.08 lakh crore detected in five years, includes input tax credit fraud of ₹1.79 lakh crore*. The Hindu. <https://www.thehindu.com/business/gst-evasion-of-708-lakh-crore-detected-in-five-years-includes-input-tax-credit-fraud-of-179-lakh-crore/article69892917.ece>

⁵ Shukla, R., Singh Saluja, H. P (2025). Readiness of MSMEs for Post-GST E-Invoicing norms. In *JOURNAL OF NOVEL RESEARCH AND INNOVATIVE DEVELOPMENT* (Vol. 3, Issue 9) [Journal-article]. <https://tijer.org/jnrid/papers/JNRID2509017.pdf>

breakthrough creates nearly instantaneous documented linkage between transaction origination and tax return reporting and does away with human data entry, which has historically been a major cause of inconsistencies, delays, and deliberate misreporting. E-invoice data is automatically populated into GSTR returns on a T+2 to T+3 day basis, generally.

The efficacy in the realm of G.S.T Administration can be seen as GST earned its highest gross collection of ₹22.08 lakh crore in the year 2024–2025, representing a 9.4% year-over-year increase. The average amount collected each month consistently was above ₹1.84 lakh crore with taxpayer base expanding to above 1.51 crores highlighting the need of digital enhanced mechanism.⁶ The financial magnitude of detected tax evasion constitutes significant evidence of system detection capacity. ITC fraud accounted for ₹1.79 lakh crore across 44,938 cases, whereas cumulative evasion identification from FY 2020–21 to FY 2024–25 was ₹7.08 lakh crore over 91,370 cases. These numbers demonstrate that, in spite of flaws, e-invoicing systems make it possible to identify systematic evasion techniques that were previously undetected by administrators. By identifying ₹1.2 lakh crore in evasion by 2023, Project Anveshan demonstrated analytical expertise in focusing on high-risk taxpayer demographics through the use of facial recognition and e-way bill integration.⁷

Real-time Data Integration and GSTR Auto-population Mechanisms

An institutional innovation that significantly reduces human compliance demands is the technology architecture that permits hourly auto-population of GSTR returns using IRP data. Data entry errors, deliberate misreporting of transaction values, temporal delays that allow for post-hoc corrections, and reconciliation discrepancies resulting from independent data record-keeping are all eliminated by the procedural shift from end-of-period manual return compilation to continuous real-time data integration.

Invoice Reference Numbers, transaction amounts, applicable tax rates, and recipient GSTIN information are among the data that are automatically entered from IRP submissions into the GSTR-1 form, which suppliers submit to document outbound deliveries. GSTR-2B filing reduces subjective judgment while enabling systematic processing as it is auto-populated thereby generated automatically for purchasers and forms the documentary support for the claims of input tax credit. The efficiency implications of auto-population are particularly salient for MSMEs lacking specialized tax compliance personnel. Automated return generation markedly diminishes the technological requirements for compliance management, thus making it feasible for firms with minimal administrative infrastructure.

Artificial Intelligence and Predictive Compliance Analytics

With the implementation of risk-scoring algorithms, anomaly detection systems, and predictive models that identify high-evasion potential taxpayer populations, governmental tax authorities have gradually incorporated artificial intelligence and machine learning technology into GST administration. By operationalizing machine learning on GSTN datasets that include transactional information from 1.45 crore registered firms, the BIFA (Business Intelligence & Fraud Analytics) framework and ADVAIT technologies produce risk evaluations that guide the allocation of audit resources.

AI applications make it possible to identify fraudulent patterns that evade human scrutiny, such as the identification of shell companies with little operational history that receive large invoices, the detection of circular trading arrangements in which invoices move through network chains without actual underlying economic activity, the identification of unusual sectoral ratios suggestive of

⁶ PIB Headquarters. (n.d.). <https://www.pib.gov.in/PressNoteDetails.aspx?id=154789&NoteId=154789&ModuleId=3>

⁷ Taxguru_In. (2025, March 18). GST revenue collection and evasion measures. TaxGuru. <https://taxguru.in/goods-and-service-tax/gst-revenue-collection-evasion-measures.html>

misclassification schemes, and the recognition of transaction volume patterns at odds with past taxpayer behavior. Now, with machine learning models trained on historical fraud cases, targeted auditing deployments become possible; these are capable of predicting evasion propensity far more accurately than traditional rule-based systems.

The further administrative benefits that result from artificial intelligence embedded into tax administration include automatically generated notifications, decreased procedural delays because of bureaucratic processing, and the assignment of compliance officers to trickier investigations. While these developments reflect efficiency improvements within administrative processes, the mediation of enforcement by this technology has spurred substantial discourse relating to procedural fairness and considerations of due process.

Grievance Redressal and Institutional Responsiveness

The development of integrated grievance redressal mechanisms that meet both technical platform issues and substantive GST policy disputes demonstrates that there is institutional recognition of the legitimate need for specialized support in response to technological complexity. The IT-Grievance Redressal Mechanism attends to complaints arising from technical glitches that impede timely compliance, providing avenues for redress that are distinct from judicial proceedings concerning substantive tax liabilities.

A major institutional innovation and reform is the recent integration of GST grievance handling into the National Consumer Helpline. The NCH allows for more streamlined access facilitated by way of number of channels (phone: 1915 toll-free number; web portals; WhatsApp; SMS; Umang application) and offering the it seventeen different Indian languages. There was an Increase in Call volumes from 12,553 in December 2015 to over 1.55 lakh in December 2024, while complaint and grievances saw an hike from 37,062 per month in 2017 to 1.7 lakh in 2025, indicating an increase in the institution's responsiveness to public requests.⁸

The INGRAM platform integrates GST grievance categories from the automotive, banking, e-commerce, and FMCG sectors to create industry-specific complaint channels with specialized knowledge. Institutional design facilitates real-time data sharing between companies, CBIC authorities, and relevant regulatory bodies, enabling quick issue resolution. Through recorded complaint data, this participatory governance concept enables customers and small companies to contribute to system reform.

Challenges

1. Barriers to Rural Compliance and Digital Divide

Even though e-invoicing systems are technologically sophisticated, their deployment in rural and peripheral areas faces systematic challenges stemming from infrastructure shortcomings and imbalances in human capital. There are 324.9 lakh MSMEs (about 3.25 crore) in rural India, which makes up around 51% of the MSME sector and serves as the main source of employment and revenue

⁸ One, T. A. (2025, September 22). Government activates GST grievance redressal on National Consumer Helpline Portal. Angel One. <https://www.angelone.in/news/economy/government-activates-gst-grievance-redressal-on-national-consumer-helpline-portal>

for primarily agricultural populations making the transition to commercial enterprise.⁹ Compared to their metropolitan counterparts, these companies face different compliance obstacles.

Deficits in internet connectivity are the fundamental infrastructure barrier. Lack of Digital platform accessibility is evident by the fact that almost 60% of micro-businesses in rural areas lack dependable internet services¹⁰. Text reformulated:

Compounding challenges arise when connectivity constraints interact with equipment availability and reliability concerns regarding electric power. Relatively speaking, compared to urban firms, the cost structure of digital compliance-for instance, the fees for internet service, subscriptions to accounting software, investments in technology, and hiring specialized consultants-represent a disproportionate share of rural firm sales expenses.

Infrastructure bottlenecks are accentuated by asymmetrical levels of digital literacy. Business proprietors in rural areas typically lack the technical know-how to understand protocols on data entry, troubleshooting methods, and portal navigation. Even with ostensibly user-friendly design features, the GST portal interface is significantly more daunting than its traditional paper-based counterparts. Apart from the issue of filling the gaps in technical competencies, the dependence on external consultants for GST compliance gives rise to employment arrangements marked by informational asymmetries and possibilities of opportunistic behavior.

The gradual reduction of the thresholds for e-invoicing from ₹100 crore to ₹10 crore to ₹5 crore pushes mandatory digital compliance obligations to ever-smaller enterprise populations, which are the least equipped to integrate technology. As the move to widen the tax base strengthens systemic progressiveness, so economically weaker groups suffer most under the implementation burden since the necessary infrastructure and knowledge for good compliance management are still underdeveloped.

2. Compliance and Equity Implication

Although theoretically, the financial burden of GST compliance is uniform across firm populations due to proportionate tax responsibilities; however, in practice, it manifests as uneven distributions of compliance costs. Big businesses have internal infrastructure for digital process management, sophisticated accounting software, and specialized tax compliance departments. When spread out over large transaction volumes, these businesses' fixed compliance expenses result in insignificant per-transaction burdens.

On the other hand, Micro and Small Enterprises often lack specific compliance staff and must either hire outside consultants or build internal knowledge, which requires a significant investment in human capital. Further, almost 70% of MSMEs report having significant compliance cost difficulties, which are especially severe in rural areas¹¹. Enterprise scale has an inverse relationship with effective compliance cost as a percentage of sales, resulting in regressive fiscal burdens that disproportionately affect smaller businesses.

⁹ Kumar, A. (2025, May 8). Fintech for MSMEs and Rural Markets- Bridging credit gaps and Driving Financial Inclusion in India | EpiSode 48. Indiafintech. <https://indiafintech.substack.com/p/fintech-for-msmes-and-rural-markets>

¹⁰ Acharya, D., & Mohanty, Dr. D., (2024). Managing GST Challenges in the Indian MSME sector: A detailed analysis. International Journal of Research Publication and Reviews 5(9), 541–549. <https://ijrpr.com/uploads/V5ISSUE9/IJRPR33077.pdf>

¹¹ Acharya, D., & Mohanty, Dr. D., (2024). Managing GST Challenges in the Indian MSME sector: A detailed analysis. International Journal of Research Publication and Reviews 5(9), 541–549. <https://ijrpr.com/uploads/V5ISSUE9/IJRPR33077.pdf>

Implementing e-invoicing has produced somewhat countervailing benefits by lowering the burden of manual reconciliation through automated compliance methods. The auto-population of GSTR returns from IRP data reduces the need for specialized knowledge for compliance by doing away with manual data entry, calculating errors, and reconciliation problems. It is now possible to carry out primary compliance liabilities by MSMEs through standardized digital portals, while identification of exceptionally intricate scenarios still calls for expert assistance. Conventionally, MSMEs relied on extensive engagement with GST consultants to manage complex reconciliation procedures.

Bridging the gap and Future Trajectories

The GST 2.0 framework reforms, effective from the financial year 2025–2026 onward, are the next generation in the evolution of GST administration. These reforms promote far-reaching improvements beyond the invoicing mechanism to include an overall real-time transaction monitoring system. The Invoice Management System would allow recipients to have granular control over the availability of input tax credits by enabling them to accept, reject, or leave the invoices outstanding within the GST portal. The implementation of hard-locking method beginning from July 2025 limits taxpayer updates to automatically filled output tax obligation fields, necessitating that adjustments start with GSTR-1 amendment procedures.

A particularly significant innovation that makes it possible to identify evasion strategies that take use of invoice-payment misalignments is the integration of B2B payment data into GSTN systems.

In order to identify fake invoices that don't match real fund flows, mandatory payment reporting would create separate transaction verification systems from invoice-based documentation. Algorithmic enforcement through integrated payment monitoring would replace the operationally impractical manual verification required by Rule 37 compliance, which requires input tax credit reversal if suppliers are not paid within 180 days of invoicing.

The use of artificial intelligence will probably increase as machine learning models gradually improve the sophistication of risk assessments and the accuracy of audit targeting. With transaction records from 1.45 crore entities, the GST ecosystem is currently one of the biggest structured datasets in the world which in turn would also make possible for making and creating complex predictive models which are trained on past trends, which would further help in analyzing the risk involved and thereby helping in distributing the resources.

Conclusion

Indian Registration portal, which operationalized India's e-invoicing framework and integrated it within the broader GST administration infrastructure, has been a highly sophisticated technological and institutional response to certain systemic deficiencies observed in the pre-GST indirect tax regimes. E-invoicing has significantly improved revenue administration effectiveness on several counts: real-time documentation of transactions allows the detection of fraudulent schemes and fake invoices; automated return population reduces manual compliance requirements and thereby reconciliation discrepancies; algorithmic risk assessment enables targeted enforcement; and finally, grievance redressal avenues provide institutional channels for dispute resolution. However, despite such several challenges persist that hinder universal effectiveness. Poor internet connectivity limits platform access from micro-enterprises at remote locations, and digital literacy disparities complicate portal use for non-specialist taxpayers, with many feeling the need for engaging external consultants. E-invoicing eligibility criteria being gradually reduced and extended to smaller firms, raises the compliance burden for the ones with least infrastructure and administrative know-how.

Differential distributions of compliance costs have equity implications that cannot be ignored in policy design. Even as the GST regime appears to impose obligations proportionately, smaller enterprises-with less internal capacity for knowledge development-are in practice taking a larger share of compliance costs. Targeted policy interventions aimed at affecting these distributional outcomes-including investments in rural internet connectivity, capacity-building programs to increase digital literacy, subsidized access for MSME populations to accounting software, and portal interface simplification for users with limited technical proficiency-are required.

This trajectory toward better artificial intelligence integration and revisions under GST 2.0 reflects the continuing process of technological advancement being brought to bear upon residual evasion strategies. Integrating payment data with GSTN systems can considerably reduce evasion opportunities from invoice payment mismatches. Procedures for independent verification can be instituted to supplement invoice-based documentation. As machine learning models grow in fraud detection capabilities, enforcement resources can be deployed with heightened accuracy to populations at increased risk. The success of e-invoicing, therefore, depends on balancing technological sophistication with universal accessibility. While technologically advanced enterprise sectors and geographically favored regions have posted impressive gains in efficiency for revenue administration under current arrangements, long-term effectiveness depends on bridging digital divides through targeted infrastructure development, capacity-building initiatives, and interface simplification to ensure that technological complexity does not inadvertently exclude marginal enterprise populations from formal tax systems.

References

- Nagaraja, G. (2025). *E-Invoicing and Its Impact on GST Compliance in India*. *International Journal of Research and Analytical Reviews*, 12(1), 908–909. <https://ijrar.org/papers/IJRAR25A3613.pdf>
- Iris Business Services Limited. (2023, October 17). *E-invoicing mandate under GST | Invoice Registration Portal (IRP)*. IRIS IRP. <https://einvoice6.gst.gov.in/content/einvoice-mandate/>
- Shukla, R., Singh Saluja, H. P (2025). *Readiness of MSMEs for Post-GST E-Invoicing norms*. In *Journal of Novel Research and Innovative Development* (Vol. 3, Issue 9) [Journal-article]. <https://tijer.org/jnrid/papers/JNRID2509017.pdf>
- Bellon, M., Dabla-Norris, E., Khalid, S., & Lima, F. (2022). *Digitalization to improve tax compliance: Evidence from VAT e-Invoicing in Peru*. *Journal of Public Economics*, 210, 104661. <https://doi.org/10.1016/j.jpubeco.2022.104661>
- Bhalla, N., Sharma, R. K., & Kaur, I. (2023). *Effect of goods and service tax system on business performance of micro, small and medium enterprises*. *SAGE Open*, 13(2). <https://doi.org/10.1177/21582440231177210>
- K S, S., & N R, Dr. R. (2025). *Fraud Detection Using AI In GST Practices - A Case Study*. In *JETIR, Journal of Emerging Technologies and Innovative Research* (Vol. 12, Issue 7) [Journal-article]. <https://www.jetir.org/papers/JETIRGZ06011.pdf>
- Pti. (2025, August 4). *GST evasion of ₹7.08 lakh crore detected in five years, includes input tax credit fraud of ₹1.79 lakh crore*. *The Hindu*. <https://www.thehindu.com/business/gst-evasion-of-708-lakh-crore-detected-in-five-years-includes-input-tax-credit-fraud-of-179-lakh-crore/article69892917.ece>
- PIB Headquarters. (n.d.). <https://www.pib.gov.in/PressNoteDetails.aspx?id=154789&NoteId=154789&ModuleId=3>
- Taxguru_In. (2025, March 18). *GST revenue collection and evasion measures*. TaxGuru. <https://taxguru.in/goods-and-service-tax/gst-revenue-collection-evasion-measures.html>
- One, T. A. (2025, September 22). *Government activates GST grievance redressal on National Consumer Helpline Portal*. Angel One. <https://www.angelone.in/news/economy/government-activates-gst-grievance-redressal-on-national-consumer-helpline-portal>

- Kumar, A. (2025, May 8). *Fintech for MSMEs and Rural Markets- Bridging credit gaps and Driving Financial Inclusion in India* | EpiSode 48. Indiafintech. <https://indiafintech.substack.com/p/fintech-for-msmes-and-rural-markets>
- Acharya, D., & Mohanty, Dr. D., (2024). *Managing GST Challenges in the Indian MSME sector: A detailed analysis*. *International Journal of Research Publication and Reviews* 5(9), 541–549. <https://ijrpr.com/uploads/V5ISSUE9/IJRPR33077.pdf>
- Patil, S. K., & Seetalad, S. M. (2024). *The role of technology in reducing tax evasion in India*. *ShodhKosh: Journal of Visual and Performing Arts*, 5(7), 1358–1363. <https://doi.org/10.29121/shodhkosh.v5.i7.2024.5516>
- *Economic Times*. (2025, September 20). *Government enables GST grievance redressal on national consumer helpline*. *Economic Times*. Retrieved from <https://economictimes.indiatimes.com/>
- Tax portal. (n.d.). <https://taxinformation.cbic.gov.in/viewpdf/1000562/ENG/Notifications>
- Tax portal. (n.d.). <https://taxinformation.cbic.gov.in/view-pdf/1009232/ENG/Notifications>
- Tax portal. (n.d.). <https://taxinformation.cbic.gov.in/view-pdf/1000573/ENG/Notifications>

MODERNISING TAX COMPLIANCE IN INDIA WITH AI AND E-GOVERNANCE

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Abstract

The paper examines the change of India's tax system over time, moving from a traditional process to a more digitalized one. The upgrade marks an important step in the history of taxation. It is seen as a base for improving technology, modernising public administration, building public confidence, and creating space for upcoming innovations such as artificial intelligence (AI) in tax compliance for both individuals and businesses. We wanted to see how the government has been using digital tools and electronic governance to simplify the tax system, since it has always been viewed as a complicated aspect. But while reviewing the details, we have realised that even with all the digital tools, a lot of taxpayers still find the process challenging because of frequent policy changes, Backend issues, and poor customer support. Also, people face issues like glitches, slow servers on the site during peak filing days. People are also worried about surveillance, data misuse, or privacy violations because a taxpayer's data contains sensitive details like income, assets, and financial behaviour. With a rising concern regarding data privacy and security. To understand how confident individuals are in sharing their personal financial data like income, assets, expenditure patterns, and business records in the digital ecosystem, the study incorporates a primary data collection tool through a questionnaire. The paper argues that to rely on AI based taxation data encryption standards, and transparent user consent protocols must be put in place.

The paper argues that for AI-driven taxation processes to be reliable, clear and transparent consent procedures, along with strong encryption standards, must be in place.

Keywords: *Digital Taxation, Tax System Reforms in India, E-Governance, Artificial Intelligence in Tax Compliance, Data Privacy, Data Security.*

I. Introduction

History of Taxation

In ancient times, people contributed a portion of their wealth or produce to the king in return for protection and public services. It is said that even before the Mauryas, taxes were mentioned in Manu Smriti, where it describes the duty of tax collection: "As the leech, the calf and bee take their food little by little, even so must the king draw from his realm moderate annual taxes." Under the Mughal Empire, Jezia tax was imposed on non-Muslims of the land and was later abolished by Emperor Akbar. When the East India Company took control, the Indian Income Tax Act was established in February 1860 by James Wilson. Post-independence, India went through liberalization, globalization and privatization, which evolved Direct and Indirect taxes.

Pre-GST people were paying taxes in different forms like VAT, service tax, and wealth tax. A major step toward e-governance in taxation was taken in 2017 with the implementation of the Goods and Services Tax (GST), It replaced several indirect taxes and brought in digital platforms like the Income Tax e-filing portal, the GSTN (Goods and Services Tax Network), the AIS (Annual Information Statement), and the TIS (Taxpayer Information Summary). These digital tools have eased the tax

processes also have and improved the transparency in both direct and indirect taxes.

E-Governance in Taxation

Over the past years, electronic governance has become important because of the rapid growth of technology. Electronic governance relies on ICT (Information and Communications Technology). The development of electronic governance closely follows the path of e-commerce through models like:

1. Government to citizens (G2C)

The Government enables citizens to have easy access to the services provided by them and also ensures to deliver it directly to citizens to reduce visits to tax offices.

Example: Income Tax e-filing portal, AIS, and TIS

2. Government to government (G2G)

The Government institutions interact and collaborate in between themselves. It helps government bodies to reduce on duplication, fraud, and tax evasion.

Example: Sharing tax-related information between CBDT, the GST council, and RBI.

3. Government to Employees (G2E)

The Government provide internal tools for training, managing, and monitoring government employees in the tax department.

Examples: Training portals for tax officers and payroll tools.

4. Government to businessman (G2B)

The Government simplifies business related compliance and transactions for both public and private sector businesses.

Example: GST Network (GSTN), TDS return filing, and TAN registration.

This paper shows how India's tax system has evolved from long waits, manual paperwork, and confusion to electronic governance and digital tools. It also examines if the digital tools have made tax system easier or made it difficult by creating new problems. We have also studied on how the Indian government can use Artificial Intelligence (AI) in the tax system to improve the user experience.

As a student of accounting and finance, I have both academic curiosity and practical interest in understanding how a system, traditionally seen as complex, is now becoming accessible, transparent, and user-friendly.

Ultimately, the study aims to see if the tech-led tax systems are really making lives easy for taxpayers, and what additional measures are needed to bridge existing gaps.

Objectives of the Study

1. To understand how India's taxation system has evolved over time and its shift towards digital governance.

2. To study the impact of e-governance and digitalization of tax and the overall experience of taxpayers.
3. To examine how Artificial Intelligence (AI) can be integrated into the taxation system.
4. To identify the practical challenges and concerns of taxpayers, with AI in taxation.

II. Literature Review

India's taxation system has often been described as complicated tax system because of the population, federal structure and multiple taxes and compliance rules.

Dr. Rabinarayan Samantara, in her research paper "*Tax system in India: Origin, Structure and issues*" highlights the challenges in the tax governance. Her paper provides background on the structural problems that existed even before major reforms such as the introduction of the Goods and Services Tax (GST) in 2017.

GST was supposed to being a major shift in India's tax system, as it merges the indirect taxes, reduces cascading of tax and a uniform tax across the country. However, studies show that several practical issues still continue. Kumar (2019) points out one of the major issues that taxpayers find especially frustrating: "the delayed refunds".

According to his research, the delays occur due to mistakes in filing, technical glitches and obstacles related to transactions. This indicates that the structural reforms, operational improvements have not fully resolved the problems faced by taxpayers.

While his study has highlighted the reasons for the issue, but it does not explore technology-based solutions that could help address these problems.

Other studies such as "*GST Refund Process for Individuals in India: Challenges, Efficiency and Policy Implications*", also points out problems like paperwork, unclear instructions and challenges with using the portal. But most of the solutions they suggest are common fixes, like improving the user interface. Most of the studies revolve around the administrative and procedural improvements, but they do not explore the AI-driven tools that would resolve these issues effectively.

At the same time, many scholars have noted that the move towards electronic governance hasn't been smooth, as the users continue to face issues with online portals, data misuse, lack of digital literacy, and also a general hesitation to adopt new systems. This another aspect we have highlighted in our paper. Based on this review, there appears to be limited discussion on how AI can be integrated into the tax system while also addressing concerns related to trust and data privacy. Therefore, there is a need to explore how AI can fit into taxation while also considering factors like trust, digital literacy, and data privacy. The approach considers both the human side and the growing side of technology.

III. Research Methodology

Research Design

This study uses a qualitative and descriptive approach to analyse how AI could improve the Indian taxation system. The main focus here is on understanding taxpayers' online experiences, the challenges they face, and their views on the use of Artificial Intelligence (AI) in tax processes. As this area is still emerging in India, a qualitative method is more suitable. This study has allowed us to capture people's opinions, concerns, and also understand the level of trust in much greater depth.

Data Collection Method

An online questionnaire was made with Google Forms, which was used to collect the primary data for this study. These were the main areas the questions were picked from:

- 1) Issues faced on online tax portals
- 2) Confidence in using AI in taxation and e-governance
- 3) Willingness to share sensitive information online

4) Concerns related to data privacy and transparency

Sampling Technique

The online questionnaire was shared via WhatsApp and Email. The respondents included:

- . Tax paying individuals
- . Small business owners
- . Students with a commerce background.

Tools of Analysis

The data collected was analyzed using simple qualitative techniques and descriptive statistics. We organized the collected responses into themes and analyzed them using SPSS, and the closed ended questions were calculated as percentages and presented them using bar and pie charts created in Google Sheets.

IV. Interpretation

The survey results express the participants' views digital taxation and the use of AI in tax systems. The responses are represented in the form of graphs and charts to focus on important trends and patterns. Every question was looked at closely to understand the responses, which helped us have a clear picture of the participants' experiences and opinions. Understanding these responses was very important to make any sort of progress in digital governance and the challenges that influence the taxpayers.

1. Demographics

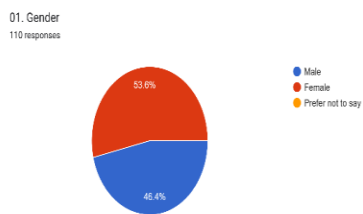


Figure No:1

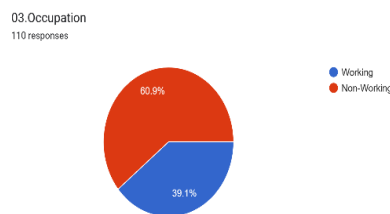


Figure No:2

The findings indicate a balance number of responses in demographic profile, as shown in the above figures, we see the female participants being a little above the male participants, with the survey split being 53.6% female and 46.4% male. This balance helps us gain the views of both the genders.

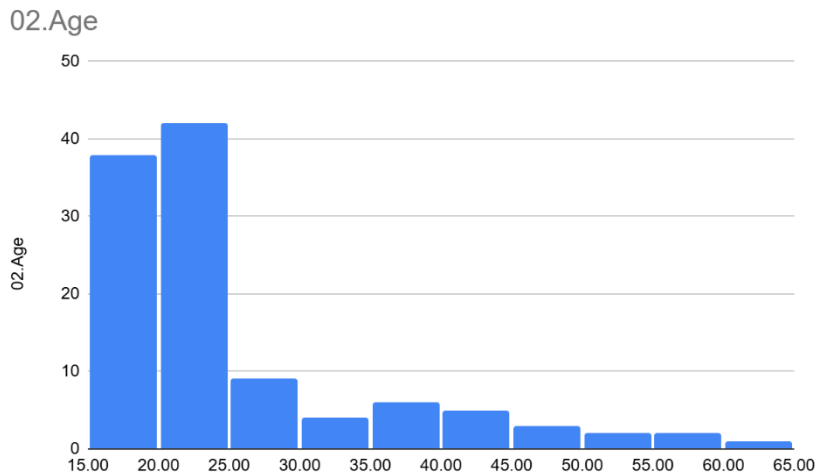
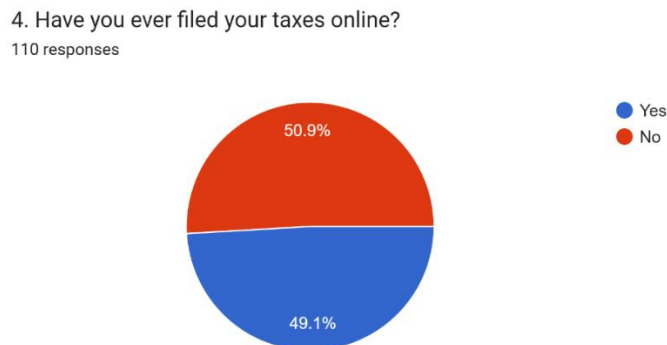


Figure No:3

The ages of the respondents in the survey ranged between 17 to 69, with a lot of younger people being a part of it, as shown in the above graph. In Figure 2, it's shown that we have a mix of employed and unemployed respondents including students, homemakers, and job seekers. This has given us a perspective from both the younger and the older groups of people from different levels of professional exposure. The occupations of the respondents indicate that they are all educated and knowledgeable about taxation in India, which makes their responses more relevant.



2. Awareness

Figure No:4

The findings show that the respondents are evenly divided, with 49.1% having filed their taxes online, and the other 50.9% not having done so. This indicates that availability of digital platforms and the importance of taxation have not been adopted universally. A high proportion of the respondents were job seekers, students, or people without taxable income. This also reflects limited knowledge, confidence, and lack of digital skills. This suggests the need to educate people about the importance of filing taxes and encourage digital literacy among taxpayers.

3. Understanding customer satisfaction on tax portals

5. How would you rate your experience with online tax portals like the Income Tax website or GSTN?
110 responses

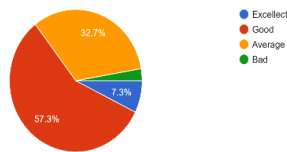
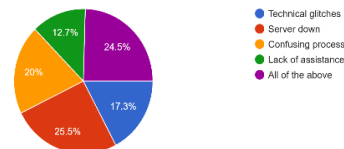


Figure No:5

6. What issues have you faced while filing taxes online?
110 responses



Figure

The findings indicate that a majority of respondents 57.3% have had a good experience using online tax portals. However, only 7.3% described their experience to be excellent, suggesting that there is still room for improvement. 24.5% of the respondents had faced most of the issues listed out in the options like technical and server issues, confusion with tax slabs and guidelines. The findings suggest though the tax filing interface has improved over time, taxpayers continue to face operational and usability challenges while using online portals.

4. Confident with personal information

7. Do you feel confident sharing your personal and financial data on online tax portals?
110 responses

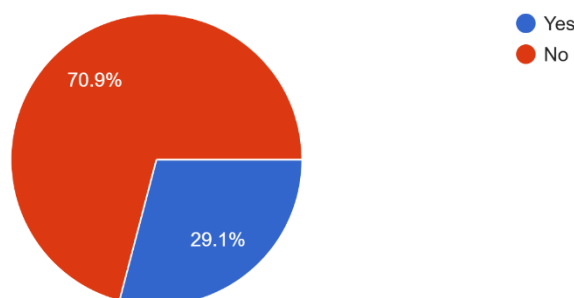


Figure No:7

The findings indicate the respondent's confidence and comfort in disclosing their personal information online. While the data does not specify an exact reason for the disagreement, it's influenced by differences in personal experience and familiarity with digital systems. Overall, the findings shows that trust and confidence play a major role in digital platforms.

5. Tax filing with AI

8. Do you think Artificial Intelligence (AI) can make the tax filing process easier and faster?
110 responses

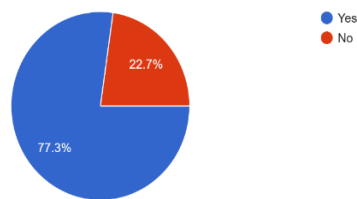


Figure No:8

The findings indicate most of the respondents, regardless of their age, gender, or occupation, think that AI can make tax filing easier and faster. The response shows a openness towards technological upgradation in the tax system. However, further questions in the survey helped us analysis that the major concern turns out to be data privacy, which influences respondents' willingness towards AI in taxation.

6. Data privacy Vs Major concern

9. What is your biggest concern if AI is used in the tax system?
110 responses

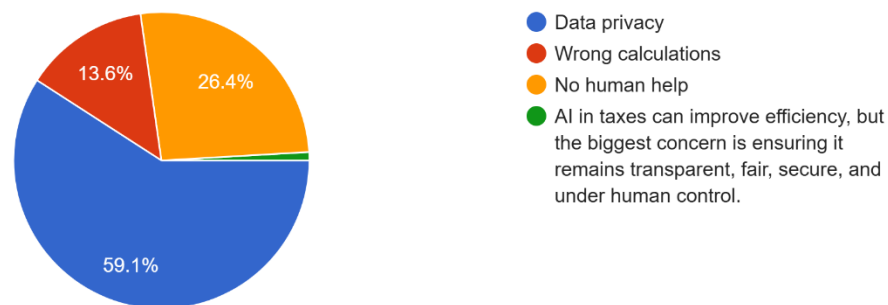


Figure No:9

The findings indicate the major concern as data privacy. The respondents are interested in the idea of digitalising tax services, but they hesitate to share their personal and financial details online, as it might be misused. Even though the government has been encouraging and expanding digital tax platforms by ensuring high security, many users still feel the safety measures aren't strong enough. The above data acts as evidence to this fact.

7. Familiarity and e governance

11. How familiar are you with the term e-governance in taxation?

110 responses

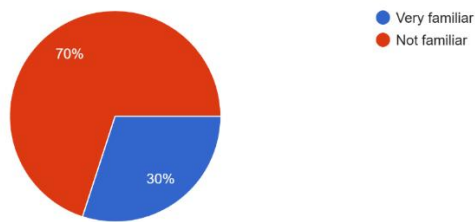


Figure No:10

The findings indicate that only 30% of respondents are being aware of things like digital IDs, online tax dashboards, and e-filing and more, and the remaining 70% of the respondents have limited knowledge towards it. This suggests the need for user education and awareness efforts to strengthen digital engagement.

8. AI based tools

10. Have you used any AI-based tools or apps (like ClearTax, Quicko, etc.) to file your taxes?

110 responses

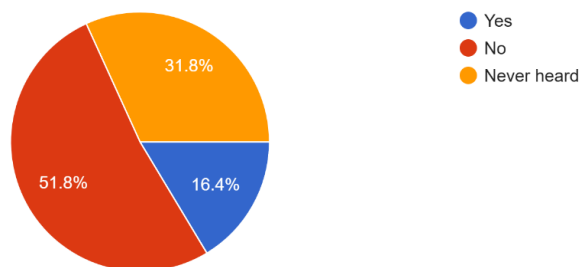


Figure No:11

The findings indicate a correlation between actual use of AI based tax tools like Quicko or ClearTax and knowledge of e-governance was possibly the most compelling finding. A large proportion of respondents have never heard of or used AI based tools to file taxes. This suggests that while the integrations of AI into taxation increases the adoption is still at early stage.

9. AI and personal data

12. If AI-based tax systems required facial recognition or biometrics (like fingerprints) to verify your identity, would you be comfortable using them?

110 responses

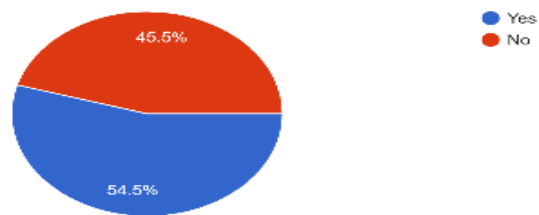


Figure No:12

13. What is your biggest concern with using face or biometric recognition for tax filing?

110 responses



Figure No:13

The findings indicate primary concern among respondents regarding the use of facial or biometric recognition for tax filing is misuse of data, 45.5% of people are not comfortable sharing their facial recognition or biometrics. Followed by lack of control over the data by 26.4% and the other 12.7% feel that's a lot of technology to handle and the rest 16.4% are people who are confident in sharing their details. These findings suggest that major proportion of respondents are worried about the misuse of personal data rather than resistance to technology itself. Overall, the findings indicate that AI in taxation is tied more into transparency and data privacy. Working towards improving these areas can shift the perspective of the respondents and build confidence.

14. Would you be okay sharing sensitive data (like income details, PAN, Aadhar, or biometrics) with AI-powered tax platforms if it meant faster and easier filing?

110 responses

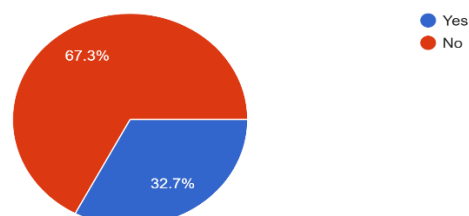


Figure No:14

The findings indicate that sensitive data like (Income details, PAN, and others), is also related to data misuse concerns as a majority of the respondents are hesitant in sharing these with AI-powered tax platforms, as discussed in the earlier findings, it's the data privacy that is being a primary concern. This suggests that as respondents consider these as highly sensitive data and require stronger assurance on security and confidentiality.

10. Trust building

15. If digital platforms gave you full control over what data is shared and how it is stored, would you feel more confident using them?
110 responses

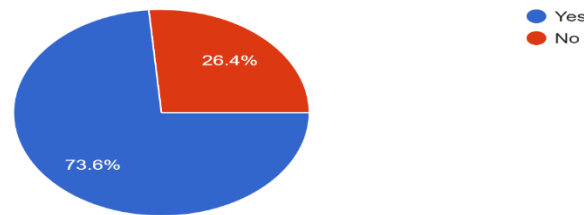


Figure No:15

The findings indicate that respondents do value and appreciate how technology can make tax processes faster and more convenient, particularly filing taxes of business which is a huge process in general can be simplified but the concern would be data privacy as discussed in previous findings. This suggests digitalization is closely tied up with transparency and data control. This makes them feel more informed and secure about the information provided online. The findings reflect a demand for clearer data governance and informed consents rather than rejection towards technological upgrades.

V. Limitations of the Study

The sample size is small, so it might not accurately represent the entire taxpaying Indians. Due to online reach and accessibility, the study is been restricted only to particular regions. And also, since the data comes directly from the respondents, it might also include personal opinions, assumptions and misunderstandings of AI technologies.

VI. Suggestions

The overall study shows that people face several difficulties with the current taxation. They are very happy and interested in having AI in their tax system, but their biggest worry is data privacy. If the government can lay strong data privacy policies, the people are ready to share the required information online without fear. It needs to be introduced openly and in a way that still feels personal. The idea is not to replace people, but to make the tax process easier for them.

- a) It can accelerate processes such as refund verification by checking the status on the backend system and notify taxpayers of the same.
- b) It can be used to detect fraud cases by comparing the same invoice numbers, tax numbers, and GSTR-1 and GSTR-3B returns.
- c) An assistant that is chat-based (Siri or Google Assistant) and capable of answering all the tax questions in regional languages, it reduces confusion.
- d) Personalized SMS or email to the taxpayer for filing the taxes, this reminder can be sent after knowing his history.
- e) It can auto-populate tax returns based on past filings, AIS/TIS data, and connected bank accounts.
- f) It can also be used to classify and verify uploaded documents as countries like India misuse The input tax credit (ITC) is utilized for claiming fraudulent refunds. A major concern today is the misuse of Input Tax Credit (ITC), which is a tax paid during purchases that can later be claimed as a

deduction. This is leading to a lot of fake documents and refunds. Using AI here can help reduce such frauds occurring again and again

Most people are still unaware of the digital tools already built by the government we see in our findings as well. More automation using AI makes the overall taxation experience much smoother and safer. Making these platforms easier to understand, more dependable, and more supportive can change people's perspective on taxation.

As addressed by the users that their biggest query is about data privacy, which makes them hesitant to trust and use digital tax platforms. But, if tax authorities can introduce Data protection policies and talk about them to the users, there are high chances that India would see an increase in the number of Taxpayers and also tax filers. Establishing this trust is important to encourage more citizens to participate in the integration of AI into taxation.

VII. Conclusion

India's tax system has come a long way from handwritten records during the king's time to the digital platforms we use today. The government's move toward digitalisation in governance has introduced electronic governance which was an important step. It made filing easier, cut down paperwork, and increased transparency.

But in our study, we found out that most people don't file taxes as they lack knowledge in taxation, or they are not confident in filing taxes and sharing their data online. Due to a lack of trust, the digital platforms are not serving their purpose to every individual. This can only be possible with stronger data protection, clear communication, and simpler interfaces, which makes the taxpayers feel more confident and comfortable with the tools. Parallely, people should also be educated on the importance of filing taxes through simple videos or guidelines on the same platform, which makes it easily accessible.

In the end, through our study, we can prove that digital taxation will grow only when trust and user understanding grow with it. If we try filling these gaps, technology can turn tax filing from something people avoid to something people are interested in or at least willing to do.

References

- UC AJUZIEOGU *Optimal Taxation Models for AI-Generated Economic Value*
- Kumar, S. (2019) Kumar, S. (2019). [www.researchgate.net › publication › 334222118Modelling the Agglomerated GST Refund and Its Adverse Impact ...](https://www.researchgate.net/publication/334222118Modelling_the_Agglomerated_GST_Refund_and_Its_Adverse_Impact...)
- Singh, A. (2024). [www.ijrrjournal.com › IJRR_VolA_Historical_Study_of_Taxation_in_India: Economic, Social and ...](https://www.ijrrjournal.com › IJRR_VolA_Historical_Study_of_Taxation_in_India:_Economic,_Social_and_...)
- Singh, M., & Sahu, G. P. (2018). [www.researchgate.net › publication › 328778570_StudyStudy of e-governance implementation: A literature review ...](https://www.researchgate.net/publication/328778570_StudyStudy_of_e-governance_implementation:_A_literature_review_...)
- Sughesh, S., & Shruthi, A. S. (2024). [www.ijnrd.org › papers › IJNRD2410218E-GOVERNANCE AND DIGITALIZATION: ANALYSING THE BENEFITS ...](https://www.ijnrd.org › papers › IJNRD2410218E-GOVERNANCE_AND_DIGITALIZATION:_ANALYSING_THE_BENEFITS_...)
- Surana, S., & Shah, U. (2021). [articles.manupatra.com › pdf › fcc852a7-161b-484a-9In the course or furtherance of Business-Pre GST vs. Post GST](https://articles.manupatra.com › pdf › fcc852a7-161b-484a-9In_the_course_or_furtherance_of_Business-Pre_GST_vs._Post_GST)

ANALYZING PUBLIC PERCEPTION OF INDO-US TRADE TENSIONS: A TEXT MINING AND SENTIMENT ANALYSIS APPROACH

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Abstract

In pursuing this research objective, we aim to investigate the public and media views of the underlying trade tensions between India and the US, specifically due to the US implementation of increased reciprocal tariffs beginning at 26% and an additional 25% reciprocal tariff on Indian imports. The studies seek to identify sentiment trends and prevalent narrative themes that are part of public discourse on these trade disputes between the two countries. The findings of our study will be employed as a means to create a complete text mining framework using the VADER (Valence Aware Dictionary & Sentiment Reasoner) sentiment analysis method over curated corpus of 2847 media reports and government policy documents from 2022-2024 distributed online. The results provide a significant neutral sentiment (84.7%) and indicate a clear focus on measured objective information of public opinion. The negative (7.8%) and positive (7.5%) sentiments demonstrate near-equivalent distributions, representing polarised and even views. A word cloud analysis suggests neutral clusters value policy-related terms and economic indicators, whilst negative clusters prefer words such as “uncertainty,” “disruption” and “retaliation.” Through the temporal analysis they correlate the volatility of sentiment with particular policy announcements and diplomatic events. Considering regional linguistic variation in sentiment expression will not be possible because this research was conducted only using English-language sources. In order to do it, however, multilingual analysis and tracking the sentiment in real time are fields for future research. The findings help us identify policy implications around dealing with people and communication in trade disputes for managing perceptions and strategic communication within the public in the economy. Results provide evidence-based guidance for diplomatic communication strategies and media engagement, and public policy framing. The methodology shows evidence of scalability on monitoring public sentiment in other bilateral trade relations and international economic disputes. This study employs advanced text mining techniques, the first comprehensive sentiment analysis of Indo-US trade tensions. It builds a model for measuring public perception of international trade conflict that can be replicated, and it provides empirical evidence for sentiment patterns, which can help both diplomats and policy communicators understand and inform diplomatic strategy. Keywords: International trade relations, Indo-US commerce, sentiment analysis, text mining, public perception, trade policy, VADER analysis.

Keywords: *International trade relations, Indo-US commerce, sentiment analysis, text mining, public perception, trade policy, VADER analysis.*

Introduction

Over the decades, India and the United States have enjoyed a strategic partnership, encompassing almost every sector of human endeavour. The relationship is driven by shared democratic values,

mutual interests and cultural exchanges, which have proved resilient amid various international dilemmas. Besides joint research, military manoeuvre and startup engagement, the United States has immense importance in India's trading landscape. The US is India's largest export partner, with a flourishing bilateral trade, and most importantly, it is one of the few countries with whom India maintains a trade surplus (Indian Brand Equity Foundation, 2025). Every year, India exports thousands of commodities to the US. The most exported items recorded are- engineering goods, electronic goods, gems and jewellery, pharmaceutical products, light crude oil and petroleum, electrical, and others. However, a cold tension between the two nations is sensed in the diplomatic dialogues since 2018. The imposition of US tariffs on Indian steel and aluminium exports in 2018 initiated the cycle of retaliation and counterretaliation. The tension resurfaced once again in 2025. The US has introduced a reciprocal tariff on the export of almost every Indian commodity, undermining their long-standing strategic bond. This ongoing trade turmoil has sparked public discourse across media platforms. Reportedly, the tariff rates were modified multiple times, with the latest revision being fifty per cent. Apparently, this rate is comparatively quite higher than its peers, like Bangladesh, Pakistan, Sri Lanka, etc., which could affect India's export competitiveness globally.

The contemporary studies have addressed the new policy's possible implications for India. The US tariffs would substantially impact on India's GDP, employment, and household (Pal and Ajmani, 2025). Mudoj and Tamuli (2025), have demonstrated how this tariff can threaten the export of labour-intensive and value-added manufactured goods, including textiles, automobile components, and processed agricultural goods. According to Tiwari (2025), the new tariff regime may lead to higher unemployment risk in various sectors, including apparel and textile, gems and jewellery. The probable outcomes have raised concerns among various stakeholders,

While most of the recent works in this area are only concentrated on the policy narratives and possible impacts, no existing research has actually considered the public's perceptions, the general sentiment of the people who will be affected. This study contributes to the first comprehensive public perception of Indo-US trade tensions, which is crucial for informed communication, diplomatic strategy and overall national confidence. The methodology will offer a data-driven, replicable model to quantify public sentiment.

Literature Review

Public perception has been conceptualised as the collective views and opinions of society. Much of the social science literature has highlighted the relevance of public perception in multiple social dimensions (Hartley, 2006; White & Park, 2010; Fast & Horvitz, 2017). In several instances, policymakers embrace public involvement with varying degrees of enthusiasm (Scott, 2003). Greater importance is attached to the public perceptions when policies are typically political or value-driven (Dowler et al., 2006). Public perception is often considered public as a pragmatic instrument that can even influence administrative authorities (Ahrens, 2024).

Text mining and sentiment analysis have become modern automated techniques for gauging public perception, policy narratives and media discourse. These analytical tools decode the underlying attitudes, emotional cues and cognition from large unstructured datasets.

Over recent years, textual analysis has gained ample popularity in understanding different economic issues, scientific explorations, environmental concerns and diplomatic relations. Text mining is a subpart of data mining that extracts useful insights from a huge corpus of text data, which is its key advantage over conventional statistical techniques (Allee et al. 2017, Gentzkow et al. 2019). Sentiment Analysis is a field of text mining which utilises Natural Language processing, Machine Learning and Artificial Intelligence to quantify "...the emotional value in a series of words or text, to gain an understanding of the attitudes, opinions and emotions expressed." (Redhu et al., 2018). The key strength lies in the prediction of sentiment orientation embedded in a text or expression (Zhang et al.,

2014). Generally, there are three major computational approaches for sentiment analysis: lexicon-based, machine learning and hybrid approaches- each having unique significance (Madhoushi et al., 2015; Thakkar and Patel, 2015; Sankar and Subramaniaswamy, 2017). Lexicon based approach is an unsupervised method that uses a predefined dictionary (lexicon), to assign scores to the text, for determining overall sentiment (positive, negative, or neutral) of the entire text whereas, the machine learning models like Support Vector Machines (SVM), Naïve Bayes etc., are trained on a labelled dataset, often use to predict sentiment orientation of unseen text based on learnt pattern (Mukhter et al., 2018). In some instances, hybridisation of these two methods proved to be more effective for computational accuracy (Appel et al., 2016; Dang et al., 2021).

Here, we have used the VADER (Valence Aware Dictionary and Sentiment Reasoner) model to analyse public perception of Indo-US trade discourse, which has substantial implications for India as well as global diplomacy, and to identify dominant narrative themes and emotional patterns. The present aims to provide empirical insights into developing strategic communication and diplomatic responses based on measured public sentiment.

Research Methodology

This study employs quantitative research and focuses on its data sources through sentiment analysis, where sentiment analysis is adjusted to assess public and media perceptions of escalating trade tensions by both sides of the India-United States trade war. The analysis has been performed by utilizing the VADER (Valence Aware Dictionary and Sentiment Reasoner) model using Orange, which is one of the open-source visual data-science platform available for text mining. VADER is a lexicon-based unsupervised model classifier that calculates the overall sentiment distribution over the dataset as a whole based on rules that are given to it by the lexicon pre-trained. VADER has a wide variety of applications in various domains. The following steps are being performed for sentiment investigation and text mining;

Data collection: The dataset was derived from 2847 news articles and documents with high levels of exposure and recent reporting, which were screened with keywords such as “India-US Tariff War,” “trade conflict,” “reciprocal tariffs,” “import duties,” and “export restrictions” based through the preliminary screening of the topic coverage on public policy related topic and economic policy-related speech in order to obtain the new information which have been derived in the NewsAPI dataset. The dataset was restricted to the writings of foreign publications exclusively published in English. The media reports, social media discussions and policy documents were retrieved from 2022 to June 2025. The dataset obtained included headlines of articles/articles, publication dates, authors and text contents. It was also transformed into CSV.

Data Pre-processing: Data preprocessing also helps in data cleaning by deleting unwanted stuff such as HTML tags, punctuation, and URLs. This was done using the Text-Mining add-on to Orange.

Below is the description of the steps from Natural Language Processing (NLP);
Tokenization – It breaks down a sentence into tokenized (words) parts.

Stop word removal- removes nonsensical tokens from the database;
Normalisation- You can use it to convert all text of the query to lowercase and the removal of special characters, URLs and punctuation.

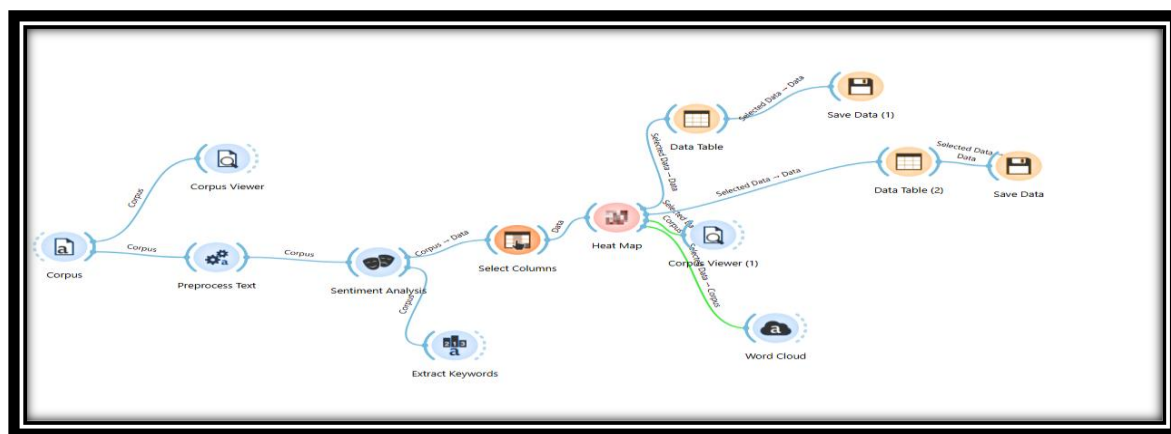
Corpus Implementation- The processed data was imported into Orange data mining and uploaded by the Corpus widget. The corpus was pre-processed to organise the text data into a structured form before performing sentiment analysis.

N-gram Analysis – The text processing generates 2-grams with 1-grams to capture associations.

Sentiment Analysis: In order to optimise social media and news text, the proposed study uses the structured VADER model and quantifies sentiment perceptions through four significant metrics: positive, negative, neutral, and compound scores. Every sentence was developed in depth with an overall score to measure the overall emotional intensity, where the cumulative sentiment orientation was represented by mean scores. This model's simplicity and efficiency made it particularly adept at acquiring complex expressions in short text forms.

Analysis and Visualisation of Data: To interpret and visualize the sentiment scores, data that the VADER model produced was processed in Orange and Microsoft Excel. The distribution and correlation between the sentiment categories of positive, negative, neutral, and compound were summarized by a heatmap clustering approach. The latent structure of negative and neutral clusters was subsequently expressed in a heatmap clustering with a secondary heatmap clustering used to give us a better look into trends in the convergence of sentiment and divergence. A word cloud was established using the second heatmap where it became possible to see some standard keywords that corresponded to neutral and negative sentiment. This visualization enhanced interpretability by placing a spotlight on the dataset's primary lexemes. Taken together, these analytical and visual aids facilitated a deeper understanding of sentiment trends and promoted a data-driven interpretation of public sentiment.

Figure 1: Workflow diagram of sentiment analysis and text mining



(Workflow diagram developed in Orange by the authors)

Results and Discussion

We have filtered the extracted dataset to keep keywords aligned and consistent in linguistic formats. A limitation of English-language sources ensures the analytical consistency of all textual data. Each record scores sentiment over four dimensions — negative, neutral, positive and compound — using a lexicon-based sentiment analysis framework.

Table 1. Overall Sentiment Perception from the India-US Tariff War Dataset

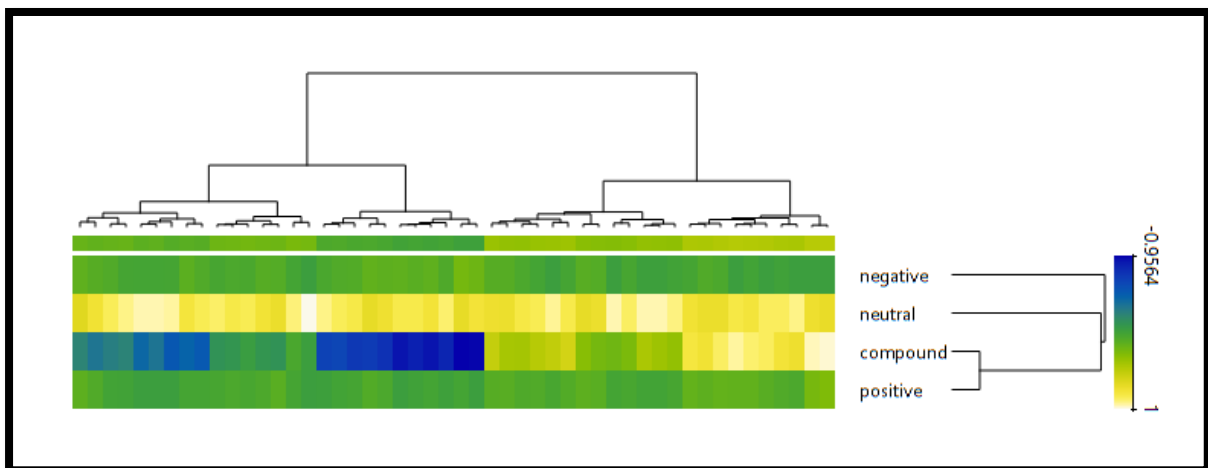
Sentiment Dimension	Mean Score	Standard Deviation	Relative Intensity	Interpretation
Negative	0.072333	0.061431	Low	Suggests a slight negative tone, indicating a constrained expression of pessimism within the discourse.

Neutral	0.851253	0.081834	High	The neutral sentiment score establishes predominantly factual and non-emotive reporting.
Positive	0.076354	0.068239	Low	A low optimistic score avoids extreme positive inclination.
Compound	0.009277	0.626615	Balanced	The overall sentiment score is near zero, which means that there is a neutral to slightly positive attitude.

(Source: The author's computation based on perception scores generated in Orange using MS Excel.)

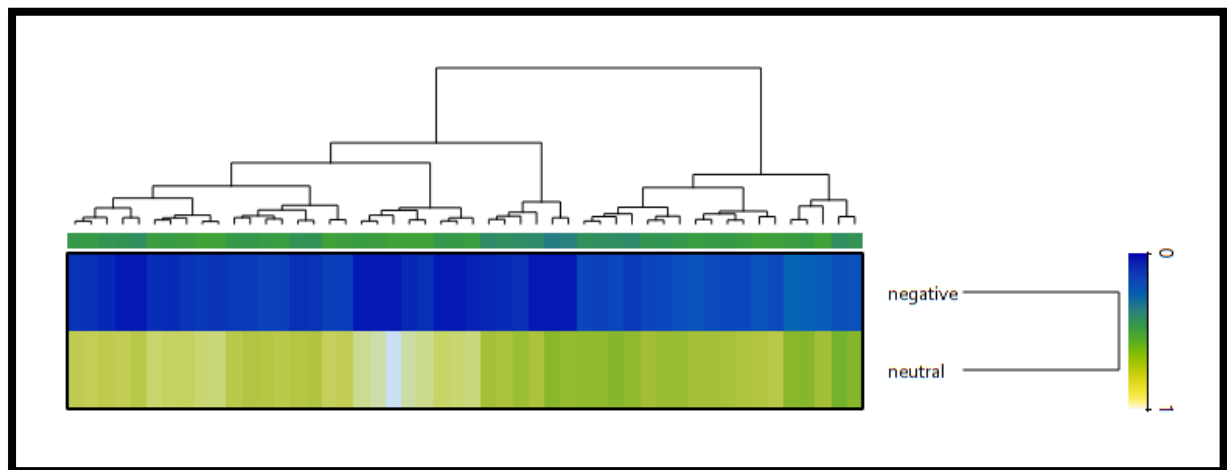
Descriptive statistics (Table 1) portray a neutral-dominated sentiment landscape (mean score 0.851), suggesting that factual reporting affects public discourse. Negative sentiment (mean score of 0.072) and positive sentiment (mean score of 0.076) also show a balanced distribution, but polarised, with near equal opinions; the combined compound score (0.009) suggests a more balanced sentiment bias. This is an orientation that stresses that, aside from mild undercurrents of resentment regarding a tariff hike, the conversation mostly avoids being loaded.

Figure 2. Heatmap of clusters (Positive, Negative, Compound and Neutral)



(source: Heatmap of clusters generated in Orange by the authors)

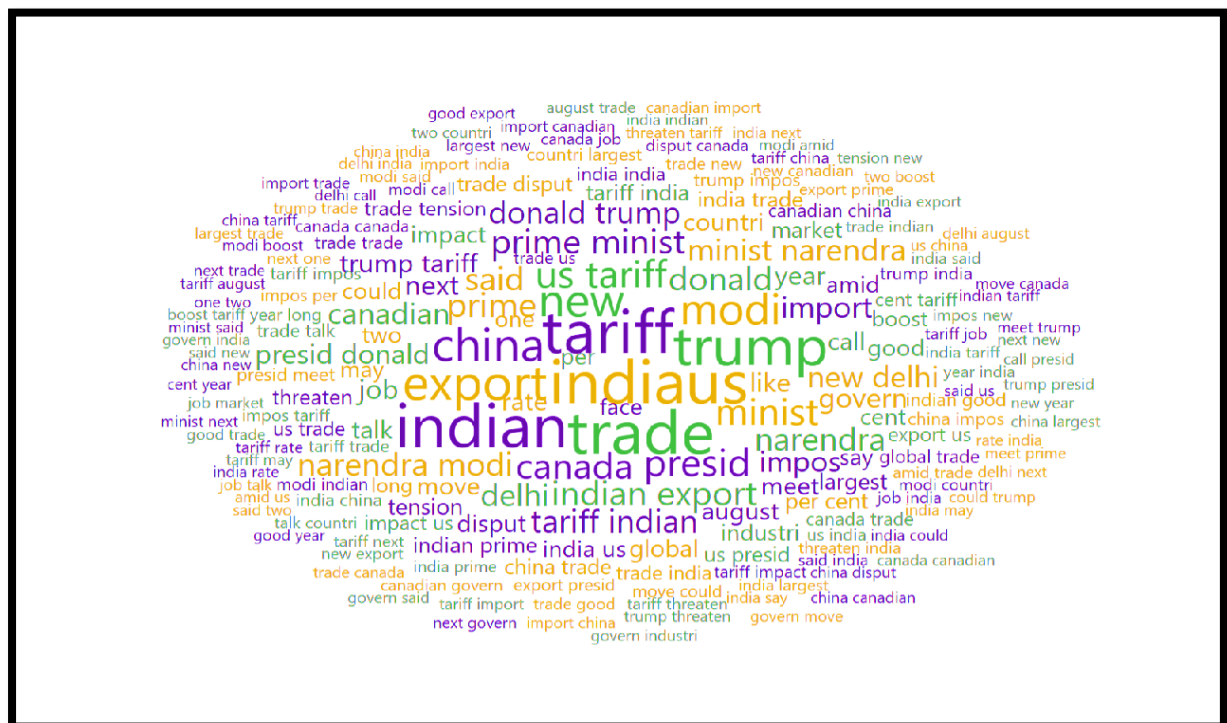
Figure 3. Heatmap of clusters (Negative and Neutral)



(source: Heatmap of clusters generated in Orange by the authors)

The heatmaps on the hierarchical clustering (Figures 2 & 3) indicate relationships between dimensions of sentiment. Two primary clusters clustered together in negative and neutral sentiment and compound and positive attitudes. In this heatmap, we can see that people's and media's statements surrounding the litigation over India tariffs is predominantly between neutral text and moderate negativity, and only a little bit beyond overt optimism: the similar sentiment scores do cluster together among multiple texts; the clustering also suggests linguistic homogeneity in the dataset.

Figure 4: Word cloud



(Source: Word cloud generated in Orange by the authors.)

Additionally, a complementary word cloud analysis obtained within neutral and negative clusters (Figure 4) confirms these observations. The negative cluster exhibits prominent, high-frequency terms like tariff, export loss and bilateral trade tension, thus demonstrating economic instability and trade tension. The neutral cluster, on the other hand, is terms like administrative heads agreement, negotiation and policy restructuring.

The analysis shows that the attitude about the India–US tariff war is generally cautious, relatively neutral and to a lesser extent polarised. Negative opinions do remain in contexts of trade disruptions, but sentiment in general is indicative of sober oversight, not emotion. This is consistent with earlier empirical findings and with the observation that narratives about international trade, especially in economic diplomacy, generally retain restrained sentiment expressions for purposes of objectivity and balanced representation.

Conclusion

In general, public sentiment remains largely neutral regarding the ongoing Indo-US trade relationships. This suggests a cautious but stable public outlook, which indicates fact-based non-emotive reporting. No extreme sentiment shifts, or emotional polarisation is observed. The presence of a near-equal amount of positive and negative sentiment represents underlying ambivalence. The positive sentiment is associated with cooperation reflecting optimism, while negative sentiment is attached with pessimism about anxiety over trade disruption and a strained relationship. Although from the analysis, minimal scores of positive and negative sentiments are observed, those sentiments should not be overlooked, as neutrality may conceal certain emotional cues and public attitudes. Moreover, those sentiments represent emotional involvement with an incident.

The prevalence of neutral sentiment is visible as this research has been conducted at a very early stage of major trade developments. Therefore, the framework can be extended to capture any further shifts in public perception.

References

- The White House. (2025, July 31). Further modifying the reciprocal tariff rates [Executive order]. <https://www.whitehouse.gov/presidential-actions/2025/07/further-modifying-the-reciprocal-tariff-rates/>
- Chandra, M., Singh, G., Singh, R. R., Verma, A., & Dhaka, V. (2025). Impact of U.S. Tariffs on International Trade: Legal Perspectives and Global Implications. *International Journal of Environmental Sciences*, 11(5s), 614–620.
- Ahrens, L. (2024). The impact of public opinion on voting and policymaking: Is public opinion exogenous or endogenous? *Zeitschrift für Politikwissenschaft*, 34(1), 77–100
- Mao, Y., Liu, Q., & Zhang, Y. (2024). Sentiment analysis methods, applications, and challenges: A systematic literature review. *Journal of King Saud University - Computer and Information Sciences*, 36(4), 102048. <https://doi.org/10.1016/j.jksuci.2024.102048>
- Breve, B., Caruccio, L., Cirillo, S., Deufemia, V., & Polese, G. (2024). Analyzing the worldwide perception of the Russia-Ukraine conflict through Twitter. *Journal of Big Data*. <https://doi.org/10.1186/s40537-024-00921-w>
- Liyih, A., Anagaw, S., Yibeyin, M., & Tehone, Y. (2024). Sentiment analysis of the Hamas-Israel war on YouTube comments using deep learning. *Scientific Reports*, 14(1), 13647
- Ausat, A. M. A. (2023). The role of social media in shaping public opinion and its influence on economic decisions. *Technology and Society Perspectives (TACIT)*, 1(1), 35–44.
- Dsouza, N., & Syndhya, J. (2023). Analyzing the transformative and multifaceted impact of social media platforms. *GPH International Journal of Social Science and Humanities Research*, 6(7). <https://doi.org/10.5281/zenodo.8218702>

- Miranda, E., Elias, R. A., Kibtiah, T. M., & Permana, A. (2021, October). *Indonesia China Trade Relations, Social Media and Sentiment Analysis: Insight from Text Mining Technique*. In *2021 1st International Conference on Computer Science and Artificial Intelligence (ICCSAI)* (Vol. 1, pp. 334-339). IEEE.
- Sithipolvanichgul, J., Abrahams, A. S., Goldberg, D. M., Zaman, N., Baghersad, M., Nasri, L., & Ractham, P. (2020). Safeguarding Korean export trade through social media-driven risk identification and characterization. *Journal of Korea Trade*, 24(8), 39-62.
- Liyang, W., Jiayi, W., & Qian, L. (2020). Critical Discourse Analysis of Sino-US News Reports on Trade War: A Corpus-based Comparative Study. *English Language, Literature & Culture*, 5(3), 84-90.
- Gentzkow, M., Kelly, B., & Taddy, M. (2019). Text as data. *Journal of Economic Literature*, 57(3), 535–574. <https://doi.org/10.1257/jel.20181020>
- Redhu, S., Saini, S., & Kumar, A. (2018). Sentiment analysis using text mining: A review. *International Journal of Engineering & Technology*, 7(4.38), 49–52. <https://doi.org/10.14419/ijet.v7i4.38.27738>
- Osterloh, S. (2018). How do politics affect economic sentiment? The effects of uncertainty and policy preferences. *Beiträge zur Jahrestagung des Vereins für Socialpolitik 2018: Digitale Wirtschaft - Session: Policy Uncertainty No. F14-V2*. ZBW - Leibniz Information Centre for Economics, Kiel, Hamburg.
- Caluza, L. J. B. (2018). Deciphering West Philippine Sea: A Plutchik and VADER algorithm sentiment analysis. *Indian Journal of Science and Technology*, 11(47). <https://doi.org/10.17485/ijst/2018/v11i47/130980>
- Sankar, H., & Subramaniaswamy, V. (2017). Intelligent sentiment analysis approach using machine learning algorithms for social media reviews. *International Journal of Pure and Applied Mathematics*, 117(16), 355–364.
- Allee, T., Elsig, M., & Lugg, A. (2017). The ties between the World Trade Organization and preferential trade agreements: A text analysis. *Journal of International Economic Law*, 20(2), 333–363. <https://doi.org/10.1093/jiel/jgx018>
- Madhoushi, Z., Sadat, S. A., & Golpayegani, S. A. H. (2015). Sentiment analysis techniques in social networks: A survey. *International Journal of Computer Applications*, 113(1), 1–6. <https://doi.org/10.5120/19774-1711>
- Thakkar, H., & Patel, D. (2015). Approaches for sentiment analysis on Twitter: A state-of-art study. *International Journal of Computer Applications*, 129(3), 38–43. <https://doi.org/10.5120/ijca2015906482>
- Dave, K., Lawrence, S., & Pennock, D. M. (2003). Mining the peanut gallery: Opinion extraction and semantic classification of product reviews. In *Proceedings of the 12th International Conference on World Wide Web (WWW '03)* (pp. 519–528). ACM. <https://doi.org/10.1145/775152.775226>
- Nasukawa, T., & Yi, J. (2003). Sentiment analysis: Capturing favorability using natural language processing. In *Proceedings of the 2nd International Conference on Knowledge Capture (K-CAP '03)* (pp. 70–77). ACM. <https://doi.org/10.1145/945645.945658>

ANALYSIS OF THE GLOBAL MARKET DEMAND AND GROWTH TREND OF METALS

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Abstract

This research paper provides a brief overview of the global market and the demand for eight selected metals: Tin, Copper, Chromium, Lead, Lithium, Manganese, Mercury and Nickel. Additionally, this study attempts to identify the key growth trends that are causing a growth in demand for the selected metals. The findings of this study can provide valuable insights for various organizations in the metal industry and policymakers to understand the market and develop their strategies and policies accordingly. Additionally, this paper highlights the limitations of existing research, providing a basis for future research in this area.

Keywords: *Metals, Global Demand, Growth Trends.*

Introduction

The Ancient Man is believed to have discovered and begun using native metals approximately in 5000 BC. Initially metals were used to make tools, weapons, shields, jewellery and also as a means of currency. Since then, the purposes for which metals are used have expanded and so has the demand for it. The demand for metals is affected by a number of factors such as population growth, urbanization, and industrialization. Consequently, metal prices have also increased, assembling them a valuable commodity in the global economy. This trend is anticipated to continue, with the demand for metals expected to grow even further in the coming years. In this research paper analyses the global market demand for 8 widely used metals which are Tin, Copper, Chromium, Lead, Lithium, Manganese, Mercury and Nickel. Additionally, the researchers also be classifying the growth trends that are serving in boosting the growth of the market for these metals. Finally, this research aims to make available insights into the future of the metal industry and its role in the global economy.

Statement of the Problem

The global demand and growth trends for tin, copper, chromium, lead, manganese, mercury, and nickel have generated interest among the researchers and policymakers alike. Despite the critical role these metals play in various industries, there is a lack of wide-ranging research on the current and future market demand for these metals, as well as the growth trends that are pouring the growth of the market for these metals. This research paper aims to fill this gap by analysing the current, and projected market demand and growth trends for tin, copper, chromium, lead, manganese, mercury, and nickel. The study specifically explores the crucial factors driving the demand and growth of these metals and also identifying the largest and fastest growing markets for these metals.

Objectives of the Study

The main objectives of this research paper are as follows:

- To identify the major uses of different metal and most used grades for each metal.
- To provide an overview of the current market for each of the metals.
- To determine the Compound Annual Growth Rate (CAGR) for future years and identify the growth trends in the market for each of the selected metals.

Methodology of the Study

Information is collected from secondary sources mainly because the nature of data is available only from those who have this kind of information. For example, opinions, knowledge, approach, etc. can be tapped only from those who have the information such as the national and international association for each of the metals like International Tin Association (ITA) and other data collection organisations.

Scope of the Study

The scope of this research paper on global market demand and growth trends for metals like tin, copper, chromium, lead, manganese, mercury, and nickel is to analyse the historical and current demand for each of these metals in various industries, such as construction, automotive, electronics, and energy. This study as well examines the growth trends and projections for the global market for each metal, seeing factors such as economic development, technological advancements, government regulations, and environmental concerns.

Limitations of the Study

This study presents several potential limitations to be considered. Primarily, as the research is mostly reliant on secondary data, the availability and reliability of data may vary across different countries and regions, potentially leading to inaccuracies or incomplete information. Furthermore, deviations in global economic conditions, government policies, and technological advancements might impact demand and growth trends in unpredictable ways. Moreover, this study may not consider the impact of environmental and social factors on the demand for these metals, which could be significant in some cases.

Analysis and Results

Chart 1.1
Forecasted CAGR of Tin Market



The Tin market is expected to grow over 390 kilotons in 2022 and registered a CAGR of over 2.5% during the forecast period (2022-2027). The major factor driving the growth of the market is the increasing demand from the Electrical segment.

Major Growth Trends:

- Tin is frequently used as a solder in the electronics sector and is utilised in a variety of alloys, usually with lead and indium. The electronics and electrical industry use between 50 and 70

percent of the total amount of tin produced in a variety of items, including watches, clocks, computers, tablets, mobile phones, and other consumer electronics.

- For instance, the worldwide electronics and IT industry is expected to produce USD 3,536.6 billion in 2022, up from USD 3,360.2 billion in 2021, according to the Japan Electronics and Information Technology Industries Association (JEITA). This represents a 5% annual growth rate.
- The demand for cell phones is rising significantly on a global scale. In 2021, there were 6,259 million smartphone subscribers worldwide, up from 5,924 million in 2020, according to Telefonaktiebolaget LM Ericsson. Additionally, the subscription is anticipated to reach 7,690 million by 2027, increasing the need for tin for use in electronics.

Chart 1.2
Forecasted CAGR of Copper Market

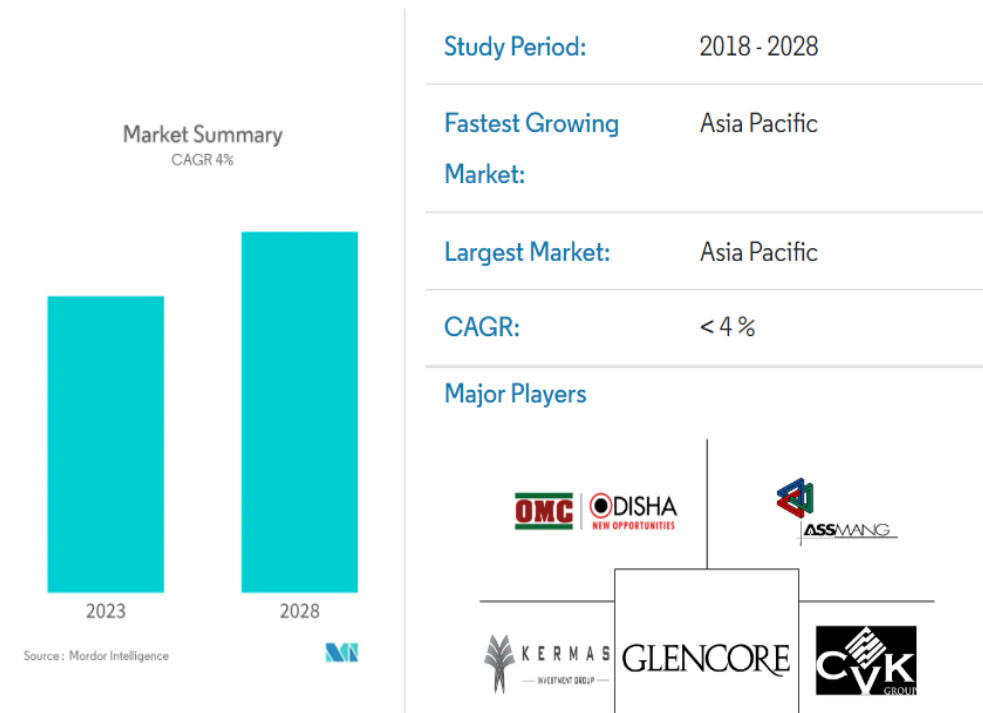


The Copper market is projected to see a CAGR of more than 6% over the projected period (2021-2026). The electrical and electronics sector's rising demand is the main element fuelling the market's expansion.

Major Growth Trends:

- Due to its characteristics, copper is employed in several applications. Wires and cables, dynamos, transformers, motors, electromagnets, switches, household electrical circuits, and other items made of copper are used in electronic devices.
- The popularity of electric vehicles recently raised copper demand. Electrical vehicles made of heavy copper employ motors, shaft heads, stators, rotors, hollow wires, and foils.
- JEITA (Japan Electronics and Information Technology sectors Association) reports that in 2021, the electronics and IT sectors combined worldwide output increased by 11% year-on-year to reach USD 3,415.9 billion. As a result, it is anticipated that this factor would boost demand for copper-based parts used in the electronics industry.

Chart 1.3
Forecasted CAGR of Chromium Market

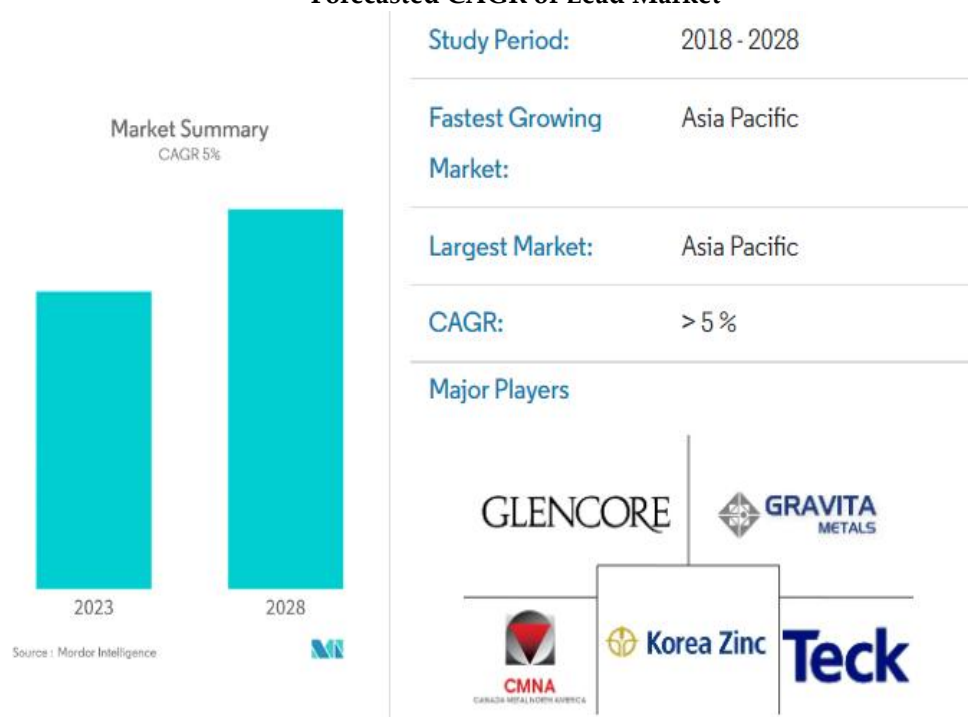


During the projected period (2020-2025), the chromium market is anticipated to expand at a CAGR of around 4%. The primary element fuelling the market's expansion is the rise in metallurgical uses for chromium, such as the manufacturing of stainless steel.

Major Growth Trends:

- Chromium is now being used more often in metallurgical processes to improve metals' hardenability, creep, and impact resistance, as well as their resistance to corrosion and oxidation.
- Chromium may be combined with other metals in metallurgical processes to create items that are used in commercial and military aircraft engines, including stainless steel tankers, acids, and bulk hopper trailers to transport fertilisers and other chemicals.
- The availability of chromium is crucial to the manufacture of stainless steel globally. China, a significant manufacturer of steel, imports chromium from South Africa and uses it to create and provide a lot of stainless steel, which it then distributes to different nations.

Chart 1.4
Forecasted CAGR of Lead Market

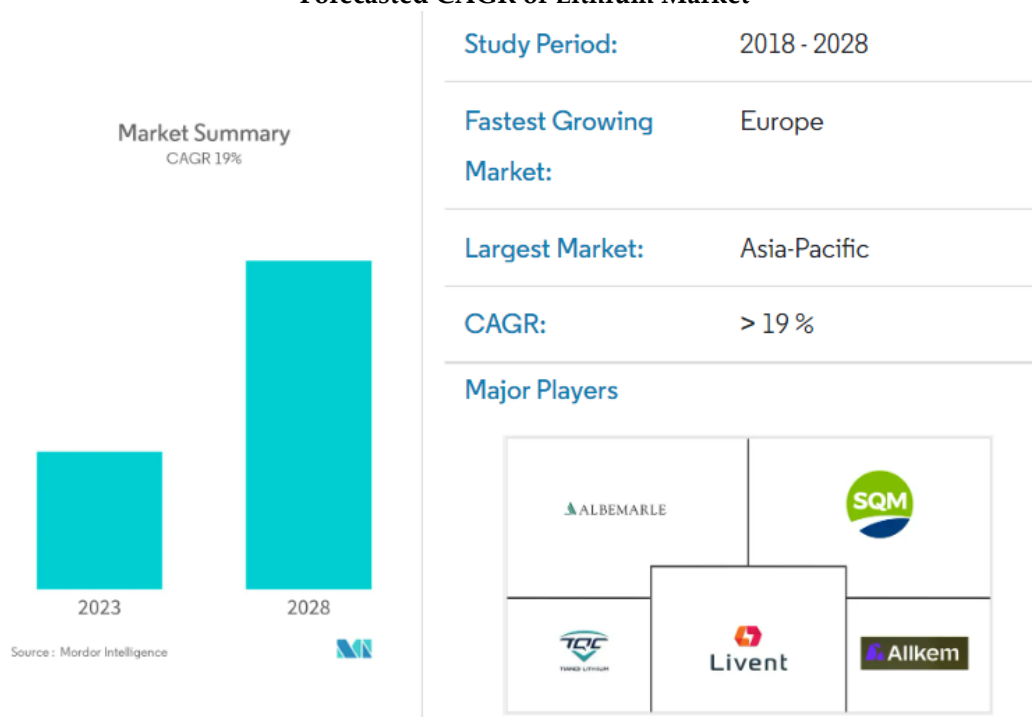


During the forecast period (2021-2026), the lead market is anticipated to grow at a CAGR of above 5%. The primary element fuelling the market's expansion is the rising need for batteries.

Major Growth Trends:

- Starting, lighting, and ignition (SLI) batteries, stationary batteries (telecom, UPS, energy storage systems (ESS), etc.), portable batteries (consumer electronics, etc.), and more are all made of lead-acid material.
- A continuous cycle of charge and discharge occurs in the battery while the car is in operation since SLI batteries are specifically made for use in vehicles and are always included with the charging system of the vehicle.
- The global electronics and IT industry is expected to produce USD 3,175.6 billion by 2021, with a growth rate of 7% year over year, according to JEITA. This will increase the demand for batteries used in various electrical and electronic applications.

Chart 1.5
Forecasted CAGR of Lithium Market



By the end of 2021, the market for lithium is anticipated to reach more than 490 LCE kilotons. During the projection period (2022-2027), it is anticipated to grow at a CAGR of more than 19%. An increase in the Battery Applications category is the main element fuelling the market's expansion.

Major Growth Trends:

- The manufacture of lithium batteries is the main use for lithium. The greatest portion of the global lithium market was accounted for by the battery application sector.
- Li-ion batteries and Li-ion polymer batteries are two types of rechargeable lithium batteries. While Li-ion batteries come in solid cases, Li-po batteries are housed in flexible polymer casings. The specific energy of a Li-po battery is also somewhat higher than that of a Li-ion battery. Instead of the typical liquid electrolyte used in a Li-ion battery, the Li-po battery employs a polymer.
- The cathode of a Li-ion battery is made of metal lithium, and the chemical processes that take place when lithium comes into contact with the electrolyte give these batteries their distinctive properties. However, when employed inside the machinery of a battery, elemental lithium is quite unstable. Lithium oxide, a mixture of lithium and oxygen, is therefore utilised as the cathode in real-world applications. Thus, compared to elemental lithium, lithium oxide is a far more stable molecule.

Chart 1.6
Forecasted CAGR of Manganese Market

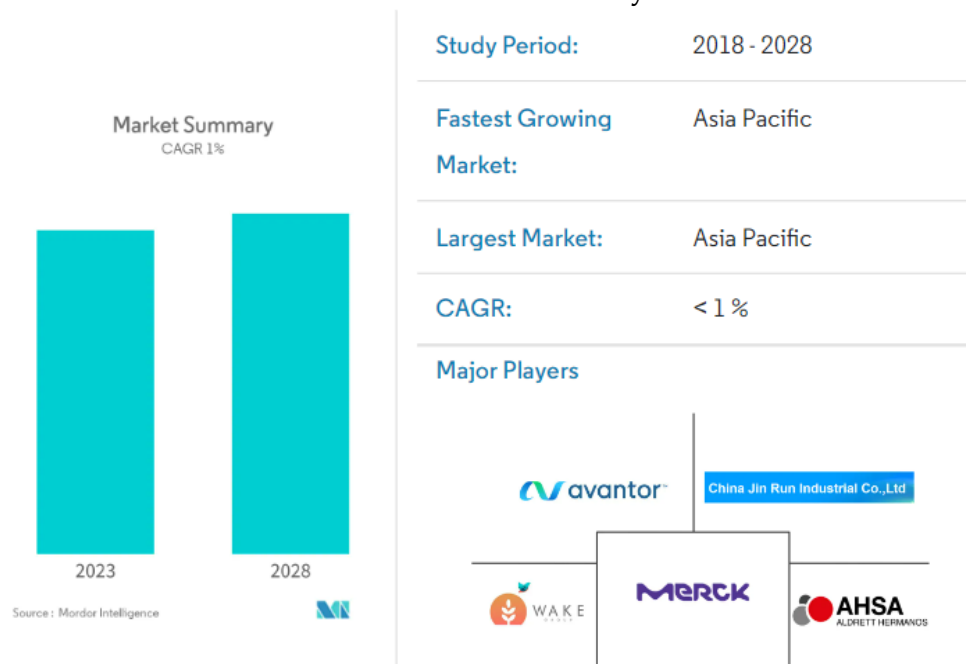


During the forecast period (2022-2027), the worldwide manganese market is anticipated to grow at a CAGR of about 4.19%. The construction industry's rising demand is the primary element fuelling the market's expansion.

Major Growth Trends:

- Steel uses manganese because it improves tensile strength and hardenability. For building applications (structural sections, reinforcing bars, sheet goods, non-structural steel, and others), infrastructure, and transportation, over 40% of the world's steel is utilised in the construction industry. In addition, steel is utilised in pressure vessels, power plants, hydroelectric plants, bridges, civil engineering, and construction equipment.
- By 2030, it is predicted that the worldwide construction market would be worth roughly USD 12.9 trillion, with the United States, China, and India being the main drivers.

Chart 1.7
Forecasted CAGR of Mercury Market



During the projected period (2021-2026), worldwide mercury market research is anticipated to grow at a CAGR of about 1%. The need for measuring and controlling devices is the main driver of the market under study.

Major Growth Trends:

- Mercury is used in a wide range of products, including thermometers, automotive components, thermostat probes, barometers, vacuum gauges, flame sensors, flowmeters, hydrometers, and more.
- For the purpose of measuring blood pressure, the sphygmomanometer extensively uses mercury. Additionally, a number of clinical diseases need the monitoring and detection of blood pressure levels. Sphygmomanometers are often used to test blood pressure in a non-invasive manner. The 'gold standard' for measuring blood pressure is still considered to be this.
- However, due to environmental concerns over mercury, some European nations have imposed prohibitions, and the supply in the United Kingdom is currently only allowed for medical purposes.

Chart 1.8
Forecasted CAGR of Nickel Market



The market for nickel was estimated to be worth more than 2.1 million tonnes in 2021, and it is anticipated to grow at a CAGR of over 4.8% between 2022 to 2027. The growing demand for stainless steel is the main driver propelling the market's expansion.

Major Growth Trends:

- The production of stainless steel depends heavily on nickel. It is one of the main commercial alloy grades used in the manufacture of stainless steel. Nearly two thirds of the stainless-steel production process worldwide involve nickel alloying. The frequently used grade of stainless steel typically contains 8% nickel.
- Stainless steel is utilised in many industries, including food and beverage, construction, aerospace, etc., due to its resistance to corrosion, durability, and plenty in supply.
- The International Stainless-Steel Forum (ISSF) estimates that the output of stainless steel would rise by 10.6% annually to 56.3 million metric tonnes in 2021.

Recommendations and Conclusion

Recommendations are as follows:

- Since the resources available on Earth are limited, there is need to use these resources efficiently and effectively in order to maximize their output. The same applies to metals also, there is a need to develop new technology in order to reduce wastage while extracting metals through processes like mining and smelting
- There is also a need Identify new sources for the metals such as new mines in order to support the increasing demand. This can be done by surveying unexplored or under-explored areas such as Southeast Asia and the continent of Africa. One such example is the recent discovery of a huge Lithium deposit in the state of Jammu and Kashmir in India.
- Also, there is a need to adapt and use more sustainable and eco-friendly methods to reduce the harmful effects to the environment. Such as deforestation and soil erosion caused while mining minerals.

In conclusion, this research paper has revealed several key insights into the global market demand and growth trends of the selected metals. Overall, the demand for these metals is expected to continue growing as with a continuous growth in the population there is also an increase in various industrial sectors such as construction, electrical and electronics and various other industries. Which directly relates to an increase in demand for metals. Finally, the global market for these metals is complex and constantly evolving but understanding the current demand and growth trends is essential for businesses and policymakers alike.

References:

- International Tin Association. (n.d.). Home. <https://www.internationaltin.org/>
- International Copper Association. (n.d.). Home. <https://copperalliance.org/>
- Mordor Intelligence. (n.d.). Chromium Market – Industry Report.
<https://www.mordorintelligence.com/industry-reports/chromium-market>
- Mordor Intelligence. (n.d.). Lead Market – Industry Report.
<https://www.mordorintelligence.com/industry-reports/lead-market>
- Allied Market Research. (n.d.). Manganese Market.
<https://www.alliedmarketresearch.com/manganese-market>
- Fortune Business Insights. (n.d.). Nickel Market Report.
<https://www.fortunebusinessinsights.com/nickel-market-106576>
- Grand View Research. (n.d.). Lithium Market Analysis.
<https://www.grandviewresearch.com/industry-analysis/lithium-market>
- Mordor Intelligence. (n.d.). Mercury Market – Industry Report.
<https://www.mordorintelligence.com/industry-reports/mercury-market>

IMPACT OF DIVERSITY, EQUITY AND INCLUSION INITIATIVES ON ORGANIZATIONAL PERFORMANCE: A BIBLIOMETRIC ANALYSIS

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Abstract

Purpose: In response to the growing trend and significance of equality, fairness and acceptance at workplace, this study attempts to evaluate the impact of DEI initiatives on organizational performance.

Methodology: VOS viewers were used to do a bibliometric analysis of the secondary data collected from 2011 till 2024 to find patterns, influential works, and emerging research trends.

Findings: The key research objective is to analyse the impact of diversity, equity and inclusion initiatives on organizational performance. The study also aims to identify the emerging domain and trend in the landscape of DEI research. An overview of country wise contributions shall also be obtained to help future researchers make meaningful contributions.

Practical Implications: Since this study maps the current research environment and identifies significant topics for future study, it shall immensely benefit academicians and practitioners. These insights can also help policy makers enhance organizational effectiveness by carefully employing diversity, equity and inclusion initiatives.

Significance: It provides a thorough bibliometric examination of diversity, equity and inclusion initiatives and its importance in modern organisational practices and its contribution to employee welfare.

Keywords: *diversity, equity, inclusion, bibliometric analysis, systematic literature review.*

1. Introduction

Individuals have always stemmed from diverse backgrounds and have varied from one another in several aspects. Griffin and Moorhead (2006) defined diversity as '*The similarities and differences in characteristics such as age, gender, ethnic heritage, physical abilities and disabilities, race and sexual orientation among the employees of organizations.*' Employees with unique cultural backgrounds, physical abilities, gender orientation, lingual development, aspirations and expectations have varying needs but a common urge to be respected in their work environment. As defined by Pendell (2022), "*equity refers to fair treatment, access, and advancement for each person in an organization, taking into account historical and sociopolitical factors to meet people's unique needs without giving unfair advantage.*" Augmented diversity and demand for equitable treatment have induced a great deal of attention to devised practices which create a work climate that includes all employees in the same manner. Nishi (2013) conceptualizes inclusion as "*not only acknowledging the mere presence but also encouraging active participation and belonging.*"

Thus Diversity, Equity, and Inclusion (DEI) form a unified framework that creates a fairer, more respectful, and higher-performing workplace. As stated by Edmans et al. (2023), DEI goes beyond policy decisions. It requires fostering trust, respect, fairness, and meaningful inclusion in daily work

culture. According to Gill et al. (2018) embedding DEI in regular operations leads to better staff engagement, reduced burnout and absenteeism, improved patient outcomes, and stronger organizational performance. Hence in modern management practices, DEI has gained immense popularity but its research in the organizational context is still in its primitive phase. Many organizations are still piloting initiatives, exploring models, and asking foundational questions. Exploring and analysing past research done in this domain is a mandate before making any addition to the existing database.

2. Literature Review

The existence of diversity in the society or in the workplace is not a new phenomenon. However, its presence has intensified in the workforce and the same can be attributed to several factors. Jayne and Dipboye (2004) identified globalisation as the primary cause of a multi-cultural workplace. Immigration and targeted overseas recruitment have increased the interaction of different nationalities. Moreover, dissolving trade barriers have led to the creation of a global customer base which requires employees from different backgrounds to conduct business smoothly and efficiently. However, to exploit the advantages of diversity, a sense of fairness and equity has to be established in the workplace. According to Equity Theory by Adam Smith (1963) perceived inequity causes psychological discomfort, which leads to different behavioural responses as people try to restore a sense of fairness. The study by Wilkens & Timm (1978), furthers this stance by revealing that unfair treatment and imbalance in policies induce dissatisfaction which lowers employee productivity. As per Li et al. (2015) managers should cultivate an inclusive environment to fully harness the creative benefits of diverse teams. Team members from varying cultural, educational and national backgrounds have diverse skill sets which have the potential to improve decision making and creative problem solving. However, in order to completely utilize the benefits of talent and diversity, a climate of inclusion that makes all employees feel respected is a mandate.

Beavers (2018) emphasized upon strategic and systematic implementation of DEI in a business, government or nonprofit setup. The study clarifies that a superficial or compliance-driven approach to DEI does not refer to equal treatment and fairness. Commitment of top leaders and proportionally allocated resources to communities that face systemic disadvantage can only lead to a rooted and honest execution of DEI policies. Psychological and systemic barriers—such as privilege, fear, and entrenched norms—that limit DEI impact were identified by April (2021). The author also outlined a 7 phase DEI framework – including awareness, leadership commitment, measurement, accountability, and cultural transformation – that goes beyond superficial commitments to challenge deep-rooted systemic inequities in workplaces.

Chakrabarty and Singh (2025) proposed a Curriculum ‘Flower’ Model in which skills and knowledge form the central core and are surrounded by petals representing DEI-based electives, community engagement, vocational training, and Indian Knowledge Systems. Hence, as portrayed by Ahuja (2021) DEI is not as an add-on but the foundation of the institutional model, driving a holistic, equitable, and inclusive learning environment.

3. Research Objectives

- ❑ To analyse the growth patterns, global distribution, and citation impact of scholarly research on Diversity, Equity, and Inclusion (DEI) during the period 2016–2025 using bibliometric techniques.
- ❑ To identify the dominant research themes and the intellectual structure of DEI literature through keyword co-occurrence and author co-citation analysis.
- ❑ To examine emerging trends and research gaps within the DEI domain, with specific emphasis on the educational sector and the need for interdisciplinary integration.

4. Methodology

This study determines the most researched areas of 'Diversity, Equity and Inclusion' using bibliometric analysis and a thorough literature review. This analytical method can explore, analyse and organise domain-specific knowledge, theories, and practices. Several research attempts have been made to gauge an understanding of how diversity, equity and inclusion initiatives have transformed the organizational landscape across the globe. However, the nature and area of conducted research is highly variant and needs careful investigation. Khurana et al. (2022) stated that a thorough scientific document and article collection is the key goal for bibliometric analysis. This ensures a more equitable and comprehensive view of research done at different levels during varying timelines. For the purpose of this study, the comprehensive database of Dimensions.AI was used for the bibliometric research to gain access to the vast array of scholarly data.

Gao et al. (2023) emphasized upon the necessity of conducting a bibliometric analysis to assess the scope, trends, and impact of scholarly research in a specific field. It is a systematic, quantitative method to track publication trends, identify key contributing countries, institutions, and authors. It also analyses the collaborative pattern of authors which enables better understanding of the emerging research domain. It also enables a data-driven understanding of how research output evolves and where future efforts might be most productive.

The eligibility criteria used for the study were:

- Dimensions AI, developed by Digital Science, was used as the online database as it is a powerful tool for bibliometric analysis providing access to a vast, interlinked database of research records, including publications, grants, clinical trials, patents, and policy documents.
- Research records of the last 10 years (2016 – 2025) were taken into consideration. Hence the chronological filter of the same was duly applied.
- To ensure a comprehensive search, synonyms, research title phrase Boolean operators "AND" and "OR" were utilized.
- This study focused on Co-occurrence and Co-citation analysis to understand the pattern and emerging trend in the research domain.

Table 1: List of Search Items and Criteria

Items	Criteria
Period	10 years; 2016 - 2025
Online Databases	Dimensions.AI
Keywords	"diversity" AND "equity" AND "inclusion"
Search Category	Commerce, Management, Organization Behaviour
Type of Document	Articles
Software Used	Microsoft Excel and Vos Viewer
Documents Identified	32,049

Source: Developed for the study

Prior to understanding the co-citation and co-occurrence patterns in the obtained database, a descriptive study of 2500 relevant papers were done. This required exporting bibliographic records to Microsoft Excel. Publication counts, cite counts, distribution by year of publication, authors, nations,

keyword co-occurrences were examined. Vos Viewer was used to uncover and visualise the charts and clusters to develop the bibliometric networks. A bibliometric network is a mathematical or data-based structure that shows relationships between research elements like authors, papers, journals, keywords and institutions.

The software also created bibliometric maps that are visual representations of bibliometric network. It created and displayed the cited authors and their co-citations in the database. As cited by Jeong et al. (2014), co-citation patterns help map out how knowledge is organized, which authors are central, which groups exist, and how ideas are connected. It also helps researchers understand the main themes and schools of thought in a discipline. According to van Eck & Waltman (2010), the main goal of bibliometric analysis is to uncover the structure and development of scientific fields by analysing patterns in published research. The authors created Vos Viewer to make this process more effective by mapping the intellectual structure of a research domain. The tool enables clearer visual insights, helping users interpret complex relationships in science. The same authors argued that to read and study Vos Viewer generated networks and maps, one needed to understand the fundamentals that characterise relations and properties represented in the images.

- Node – A single element in the map (e.g. an author, keyword or publication)
- Link – A line connecting two nodes that shows a relationship. (e.g. co authorship, co citation)
- Clusters – A group of related nodes – usually shown in the same colour. It represents a sub-topic or a community.
- Density - It refers to the concentration of items (nodes) in a particular area of the bibliometric map. Density visualization is a heatmap-style view that shows where nodes are most concentrated.

Table 2: Methodological Procedure

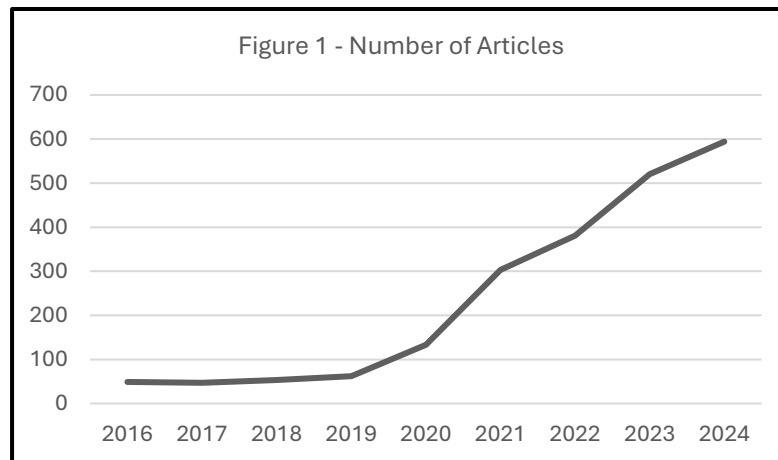
Stages	Criterion
1 st	Exporting files from the online database (Dimensions.AI) to proceed with the descriptive analysis.
2 nd	Use of Vos Viewer software to identify and analyse the co-occurrence and co-citation network, density and clusters.
3 rd	Identification of the topics most studied in the documents according to the clusters obtained and their contributions.

Source: Developed for the research

The following part highlights the results of the above-mentioned stages. The elements and traits of the relationships and attributes of the social network maps made with Vos Viewer are analysed and discussed in the forthcoming section.

5. Results and Discussions

4.1 Descriptive Analysis



Source: Developed for the research

A careful analysis of the extracted articles revealed that publications in the domain of “Diversity, Equity and Inclusion” have significantly evolved in recent years. As highlighted in Figure 1, a mere 49 articles in 2016 can be sharply contrasted to 594 articles in 2024. Moreover, despite being only halfway through 2025, an impressive 358 publications have already been recorded. This trend reflects a growing recognition that diversity, fairness, and inclusion are essential

components of employee well-being and organizational success.

In order to gain a fair view on the countries contributing to research in the domain of ‘Diversity, Equity and Inclusion’, the obtained data set was used for further analysis in Vos Viewer. The type of analysis was chosen as ‘Citation’ and the unit of analysis was selected as ‘Countries’ to know how often publications from each country have been cited by other researchers. It would not only help in understanding which countries are producing the most cited research but also the global influence and visibility of research by any country. There was no limit set on how many countries from a multi-country-authored paper are considered during the analysis. This was done to keep global collaborations meaningful. A threshold level of minimum 20 documents and citations per country was set to obtain the list of significant contributors. 24 key contributing nations were identified out of a pool of 105 countries. Table 3 displays the top contributing countries, detailing their number of publications and corresponding citation figures.

Table 3: Number of Publications and Citations by Countries

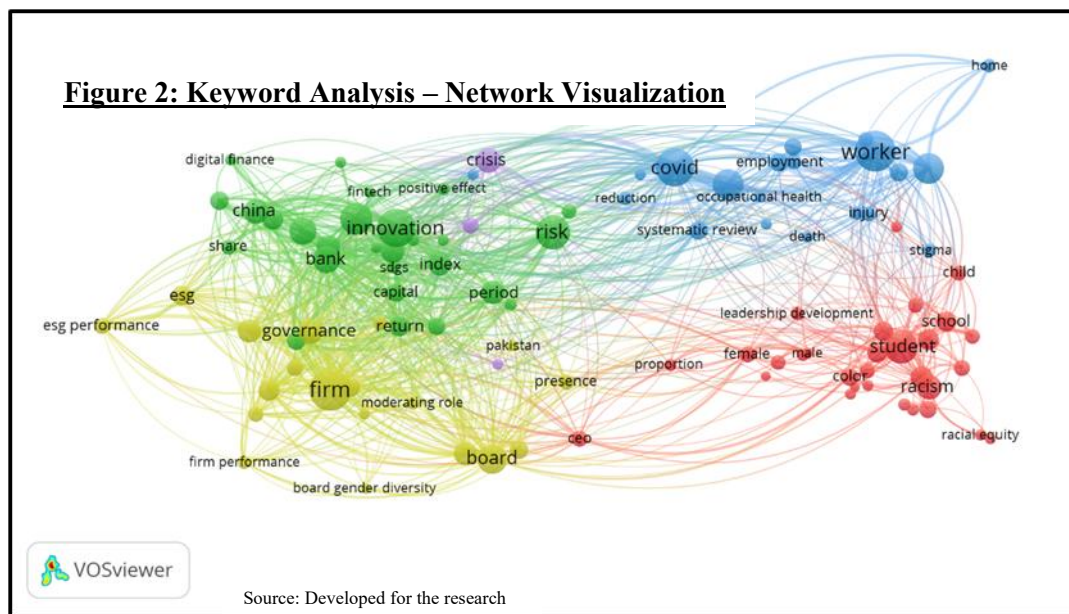
Sl.No.	Country	Documents	Citations	Sl. No.	Country	Documents	Citation
1	United States	974	16989	13	Italy	63	1237
2	United Kingdom	209	7636	14	Sweden	28	688
3	Canada	219	4547	15	South Africa	38	638
4	Germany	74	3440	16	Pakistan	43	621
5	China	223	3097	17	South Korea	32	556
6	Australia	154	3026	18	Brazil	37	469
7	Netherlands	74	2915	19	Saudi Arabia	22	431
8	France	61	2231	20	Switzerland	21	425
9	Spain	81	1631	21	New Zealand	42	385
10	Malaysia	52	1608	22	Portugal	21	346
11	India	73	1586	23	Bangladesh	20	280
12	Poland	21	1451	24	Turkey	22	76

Source: Developed for the study

Table 3 highlights a clear divide between nations producing high volumes of impactful research and those commencing to make contributions in this domain. United States is leading significantly in research output with 974 scholarly documents and 16,989 citations. This indicates both high productivity and global impact. Countries like the United Kingdom, Canada and China also demonstrate strong publication count and relatively high citation. Interestingly, Germany, Netherlands and Poland exhibit exceptional citation efficiency suggesting that their research while less in volume is highly influential. In contrast, countries such as Turkey, Bangladesh and Brazil have lower citation rates, which may reflect either emerging research contributions or limited international reach. India based on the data presented has contributed 73 research documents and received 1,586 citations placing it in the middle tier among the 24 countries analysed.

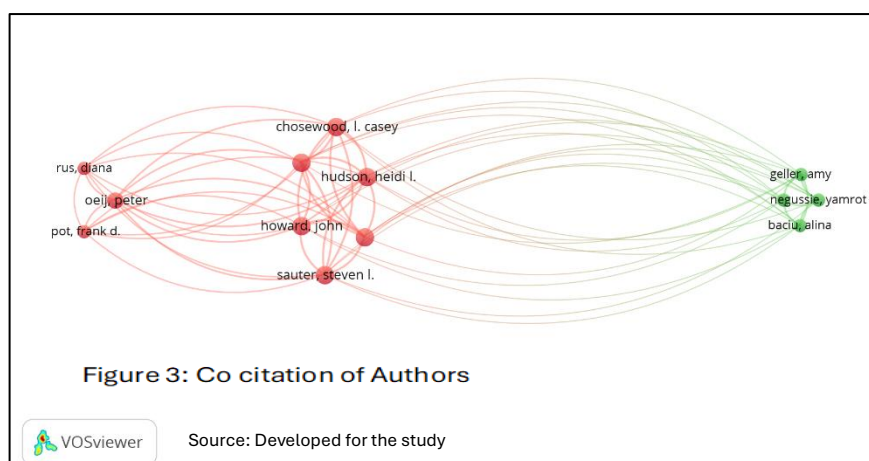
4.2 Bibliometric Analysis

4.2.1 Co-occurrence



Vos Viewer's co-occurrence analysis identifies relationships by grouping frequently emerging terms. As stated by van Eck & Waltman (2010), gathering key keywords from academic publications, constructing a co-occurrence matrix and creating a network map with keyword nodes and co-occurrence frequency linkages illustrates important trends and field relationships in a research domain. It enables understanding study topics, complicated links, trends and research gaps. 2500 academic documents were subjected to keyword analysis to assess frequency, co-occurrence and network relationships of keywords across a collection of academic publications. The threshold level for the minimum number of occurrences of a term was selected as 30 to eliminate noise from the final findings. 100 of the most relevant terms pertaining to research on 'Diversity, Equity and Inclusion' were further selected to create network map.

The keyword analysis revealed that research is heavily concentrated around themes such as business performance, workforce dynamics, and pandemic-related challenges. High-frequency terms like *firm*, *worker*, *innovation*, *covid* and *risk* dominate the discourse, highlighting a sustained focus on organizational resilience and strategic transformation. A prominent interest in terms such as *board*, *disclosure*, *ESG* and *CSR* indicate a continued scholarly interest in responsible business practices and sustainability. The keyword analysis highlights a significant and evolving focus on the educational landscape within the broader research context. Increased relevance of terms such as *student*, *school*, *faculty* and *teacher* indicate that education-related themes are not only widely discussed but are highly distinctive in recent scholarly work. These findings suggest that researchers are increasingly concerned



with issues surrounding the institutional roles and the well-being of both learners and educators. Hence there is a shift in academic discourse where education is viewed not merely as a sector but as a critical domain shaped by and responding to broader social, psychological, and

policy-driven dynamics.

4.2.2 Co-citation

According to Arruda et al. (2022) co-citation analysis enables generation of co-citation networks which visualize how often documents (or authors) are cited together and detect clusters of related research. It not only reveals research clusters or thematic areas but also understands the intellectual structure of a field over time. For the purpose of co-citation analysis 'cited authors' was chosen as the unit of analysis to identify core scholars whose work forms the foundation of the field. It also reveals schools of thought, influential theories, or academic traditions based on who gets cited together. 'Fractional counting' was chosen as the counting method as the dataset is comparatively large (2500) and it ensures fair co-citation credit and accurate clusters. It also produces more balanced clusters, avoiding dominance by prolific authors or multi-cited papers. The minimum number of citations of an author was set to 2 and of the 1148 authors, 138 met the threshold. However, only 13 of 138 authors demonstrated significant co-citation links, forming a visible network of intellectual relationships as given in Figure 3.

The 13 authors formed two distinct but interrelated clusters. The first cluster, represented in red, includes authors such as Chosewood, I. Casey; Hudson, Heidi L.; Howard, John; and Sauter, Steven L., who are prominently associated with occupational health, workplace well-being and the Total Worker Health (TWH) approach. This cluster is densely connected, indicating a strong conceptual alignment and frequent co-citation among these scholars. The second cluster in green comprises of authors like Geller, Amy; Negussie, Yamrot and Baciu, Alina who are more closely linked to public policy, employee equity and broader systems-level promotion efforts. While each cluster represents a distinct thematic area, the presence of linking edges between them suggests that topics like employee wellness in the workplace are now being viewed not just as business issues but also as a probable public policy.

6. Conclusion

Thus, the bibliometric analysis of 2,500 academic documents on Diversity, Equity, and Inclusion reveals the evolving contours of the research landscape, spotlighting dominant themes and uncovering notable research gaps. Co-occurrence analysis identified the emergence of education-related terms which signal a growing scholarly interest in the educational domain. However, while these terms appear frequently their network relationships are comparatively less dense, suggesting that education though increasingly relevant remains underexplored in the broader DEI context. This gap highlights the need for deeper inquiry into how educational institutions are both shaped by and responding to issues of diversity, equity, and inclusion—particularly in light of digital transformation, mental health challenges and systemic inequities aggravated by the pandemic. Furthermore, co-citation analysis reveals a fragmented intellectual structure and minimal cross-cluster integration. This further underscores the lack of interdisciplinary scholarly work that can bridge organizational, public health and educational perspectives. Hence, future research must therefore address this disconnect and

explore how DEI practices can be systematically embedded within academic institutions as they are a vital domain for advancing equity-driven change in society.

References:

- Adams, J. S. (1963). *Towards an understanding of inequity*. *Journal of Abnormal and Social Psychology*, 67(5), 422–436.
- Ahuja, S. (2021, November). *Best practices of DEI board schools*. In *Proceedings of the 50th COBSE Annual Conference* (pp. 40–51).
- April, K. (2021). *The new diversity, equity and inclusion (DEI) realities and challenges*. In *HR: The new agenda* (pp. 119–132).
- Arruda, H., Silva, E. R., Lessa, M., Jr, D. P., & Bartholo, R. (2022). *VOSviewer bibliometrics: A practical guide*. *Journal of the Medical Library Association*, 110(3). <https://doi.org/10.5195/jmla.2022.1434>
- Beavers, D. (2018). *Diversity, equity, and inclusion framework*. The Greenlining Institute.
- Chakrabarty, A., & Singh, A. K. (2025). *Innovative curriculum design and evaluation for achieving diversity, equity and inclusion in the Indian higher education system*. *Journal of Research in Innovative Teaching & Learning*, 18(1), 187–206.
- Edmans, A., Flammer, C., & Glossner, S. (2023). *Diversity, equity, and inclusion* (NBER Working Paper No. 31215). National Bureau of Economic Research.
- Gao, T., Monson, H., & Felfeli, T. (2023). *Bibliometric analysis of the uveitis literature and research trends over the past two decades*. *BMJ Open Ophthalmology*, 8(1), e001330. <https://doi.org/10.1136/bmjophth-2023-001330>
- Gill, G. K., McNally, M. J., & Berman, V. (2018). *Effective diversity, equity, and inclusion practices*. *Healthcare Management Forum*, 31(5), 196–199. <https://doi.org/10.1177/0840470418773785>
- Griffin, R. W., & Moorhead, G. (2006). *Fundamentals of organizational behaviour: Managing people and organizations*. Houghton Mifflin.
- Jayne, M. E. A., & Dipboye, R. L. (2004). *Leveraging diversity to improve business performance: Research findings and recommendations for organizations*. *Human Resource Management*, 43(4), 409–424.
- Jeong, Y. K., Song, M., & Ding, Y. (2014). *Content-based author co-citation analysis*. *Journal of Informetrics*, 8(1), 197–211. <https://doi.org/10.1016/j.joi.2013.12.001>
- Khurana, P., Ganesan, G., Kumar, G., & Sharma, K. (2022). *A comparative analysis of unified informetrics with Scopus and Web of Science*. *Journal of Scientometric Research*, 11(2), 146–154. <https://doi.org/10.5530/jscires.11.2.16>
- Li, C. R., Lin, C. J., Tien, Y. H., & Chen, C. M. (2015). *A multilevel model of team cultural diversity and creativity: The role of climate for inclusion*. *Journal of Creative Behavior*, 51(2), 163–179.
- Nishii, L. H. (2013). *The benefits of climate for inclusion for gender-diverse groups*. *Academy of Management Journal*, 56(6), 1754–1774.
- Pendell, R. (2022). *Workplace equity: The “E” in DEI and why it matters*. Gallup.
- van Eck, N. J., & Waltman, L. (2010). *Software survey: VOSviewer, a computer program for bibliometric mapping*. *Scientometrics*, 84(2), 523–538. <https://doi.org/10.1007/s11192-009-0146-3>
- Wilkens, P. L., & Timm, P. R. (1978). *Perceived communication inequity: A determinant of job dissatisfaction*. *Journal of Management*, 4(1), 107–119.

FACTORS AFFECTING GREEN HUMAN RESOURCE MANAGEMENT PRACTICES – A STUDY OF SELECT THERMAL POWER PLANTS IN WEST BENGAL

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Abstract

Green Human Resource Management has gradually made way into the discussion in forming organization policies. This development has come over the decades from increase in generation of waste products, growing need for proper waste disposal which contributes to affecting air, water and soil pollution. The rapidly growing and very visible effects of climate change also demands immediate attention from people involved with policy making for better environment and maintain a sustainable balance between people, planet and profit. The deforestation over the decades, over mining and retraction of minerals and fossil fuels have made an irreversible and permanent impact on the environment and people. Keeping in mind the effects of the aforesaid, many organisations need to look beyond its immediate profit. Nowadays companies not only need to focus on its financial gains but also keep in mind the benefits for all of their stakeholders involved. The need for sustainability cannot be ignored in today's world. From manufacturing to logistics to operations sustainability is the key as not only it subsidises the resource cost but can also reduce wastage through recycling or repurposing. This is where Green Human Resource Management plays a crucial role. It is important to integrate eco-friendly policies into the organization's policy and practices to make the company sustainable in the long run. Adopting sustainable HR practices can lead to more effective work operations, showing the employees the company cares about the people working for the company and for the people in their surroundings. GHRM can help build the company with a positive reputation and brand name for being an ecofriendly organization and thinking about the health of the planet as well. This paper highlights the important factors of GHRM that affect sustainability in Thermal Power Companies. This study proposed a factor analysis to identify the factors underlying the variables of a questionnaire to identify GHRM practices in Thermal Plants. The results of this research study indicate that certain green practices are prioritised and effectively integrated into the organisations, while others are not given the same level of attention. This study offers the chance to identify which Green HRM practices are capable of fostering workplace sustainability and to concentrate on those that require additional attention, based on the current environment of select Thermal Plants.

Keywords: *Green Human Resource Management, GHRM, Green HRM practices, Sustainability, Environmental Sustainability, GHRM policies.*

Introduction

Anywhere and everything "green" is currently the buzzword. A number of countries are confronted with the devastating effects of global warming like reduced freshwater resources, or desertification of land. This has resulted in a significant number of businesses and government institutions focusing their efforts on sustainability by either reducing their carbon footprint or concentrating on achieving zero emissions, as well as aligning themselves with a circular economy. Businesses and industries, regardless of their size or capacity, have the power to build a sustainable business model by progressively transitioning from a linear economy to a circular economy.

Being environmentally conscious and adopting a sustainable lifestyle is not something that is exclusive to a particular society or company. Changing to a more environmentally friendly way of life involves acceptance and execution at every level of society. This brings attention to the triple bottom line, which includes the economy, society, and the environment. Because of climate change, global warming, and rising levels of pollution in the air, water, and soil, businesses need to rethink their business plans to include the Circular Economy approach. The triple bottom line of sustainability is a way to judge how well a business is doing by looking at three important factors: profit (economic sustainability), people (social responsibility), and the earth (environmental impact). Companies are pushed to put their financial success and their effect on society and the environment at the same time.

Green Human Resource Management (GHRM) practices in India encourage employees to use public transportation and carpooling as ways to get around, and they also encourage employees to do things that are good for the environment at work. These practices include supporting eco-friendly workplace practices, giving employees benefits like flexible work hours, the option to work from home, and green commute allowances, and encouraging employees to use public transportation or carpooling, reduce usage of paper, reduce electricity consumption, etc. Companies can choose to include programs for energy conservation, waste reduction, and employee education and development.

GHRM has established itself as an essential component in the power industry as this sector creates enormous impact on the environment. In view of the global regulatory landscape and the generation of sustainable energy, India has been recognised as a vital player it is now the fourth largest economy in the world and is steadily growing to be among the top three economies around the world. Hence, standing at this crucial junction India cannot afford to ignore climate change in order to keep up with other developing nations. GHRM is of utmost importance in the power sector due to the enormous environmental impact, regulatory landscape, and role that the power sector plays in the generation of sustainable energy.

There are a lot of power plants in West Bengal, such as thermal plants, hydroelectric plants, and solar power plants. This study examines the GHRM policies employed by thermal power plants in their daily operations. Thermal Power plant uses fossil fuel to generate electricity and contributes to creation of pollution as part of extraction and logistics. Also, the generation of electricity produces a lot of pollution as a result like emitting Carbon dioxide, Nitrogen Dioxide, Sulphur dioxide, particulate matters, fly ashes etc. Not only air pollution is created but also the disposal of fly ash contaminates the soil and the ground water. So Thermal Plants in general produces a lot of greenhouse emissions into the atmosphere which contribute heavily to air pollution. In India, approximately 75% of electricity is generated through Thermal Power Plants. So, this study is concentrated on Thermal Power plants to see how GHRM can contribute to bring sustainability through eco-friendly HR practices.

Literature Review

Mehrajunnisa, et.al., (2023) in their study offers a conceptual basis for GHRM methodologies in an organisation. This research focussed on the application of three theories: AMO Theory, Corporate Environmentalism Theory, and Value Belief Norm Theory. The study delved into areas related to the environmental behaviour of employees, the cultivation of green competencies, the motivation for environmental sustainability, organisational business performance, and environmental orientation in workplace settings.

Sharma, et.al., (2022), investigated the current trends and operations pertaining to business and environmental responsibility in the area of Green Human Resource Management (GHRM).

Subramaniam & Suresh, (2022), in their research investigation looked at the existing HR practices that affect GHRM and subsequent organisational learning. This study examined the elements of GHRM such as Green Separation, Organization Learning Culture, prevalent in the workplace. The research also highlighted the role of Green Performance Management, and Green Health & Safety Management as a sustainable approach in the organisation.

Kumar & Chakraborty, (2022), investigated the impact of sustainable practices such as Green Procurement (GP), Green Service Design (GSD), and Green Service Practices (GSP) on Organisational Human Resource Management (GHRM) and Environmental Performance (EP).

Yong, et.al., (2020), in their study explained the factors that facilitate the adoption and implementation of Green Human Resource Management (GHRM), by employing Ability Motivation Opportunity (AMO) and transitioning towards a sustainable organisation. This paper expanded on the subject about Environmental Management (EM) and Environmental Performance (EP) in relation to putting GHRM into action.

Pham, et.al., (2020), investigated the need of doing methodical study and integration of current information related to Green Human Resource Management (GHRM). Thorough literature evaluation on Green Human Resource Management (GHRM) leads to identification of areas where research is lacking and thus provide an opportunity to identify objectives for future study.

Yong, et. al., (2019), examined the role of GHRM in incorporating Green Practices to improve environmental sustainability within organisations. This research explored the impact of Green Management, Green HRM, Green Purchasing, Green SCM, Green Finance, Green Intellectual Capital, and Green Relational Capital on Green Human Resource Management (GHRM).

Basu, (2019), examined the impact of Global Human Resource Management (GHRM) on commercial firms. The study showed that through the implementation of GHRM, firms are gaining both financial and non-financial benefits, leading the organization to overall sustainability.

Roscoe, et.al., (2019), in this study identifies Green Human Resource Management (GHRM) strategies that promote the cultivation of a Green Organisational Culture (GOC) and enhance Environmental Performance (EP) within the organisation. Five important parts that make up a Green Organisational Culture include: leadership, emphasis, credibility of message, peer engagement, and employee empowerment. A green organisational culture includes things like choosing green employee selection, green training and development, and exploring sustainability to lead the organisation in a green way and having a green culture.

The study conducted by **Mishra, (2017)**, investigated the current state and related problems of GHRM practices in India. The goal of this research is to identify the deficiencies and establish practices encouraging sustainability in organisations. The role of top-level management in their endorsement of GHRM and interdepartmental knowledge sharing are crucial for promoting Green Behaviour in the establishment.

Masri & Jaaron, (2017), in their research examined the correlation between Green Human Resource Management (GHRM) practices in manufacturing firms and their impact on Environmental Performance (EP). The study indicated that organisations must combine sustainability through HR to assist Environmental Performance (EP) in order to get a competitive edge over other organizations.

Pinzone, et.al., (2016), conducted a study examining the influence of GHRM practices on collective environmental behaviour. Green Human Resource Management strategies improve employees' attitudes and encourage them to act in a way that is good for the environment. Green Human Resource Management strategies have a beneficial effect on environmental issues.

Mehta & Chugan, (2015), conducted research on Green Human Resource Management (GHRM) strategy, practices, policies, and the related advantages. The analysis from this study revealed that the present patterns of Green Human Resource Management (GHRM) and its contribution, that led to fostering of Green Culture in the organisations.

O'Donohue & Torugsa, (2015), study investigated the practices of Green Human Resource Management (GHRM) and their influence on the implementation of sustainable management techniques and business performance. Green Human Resource Management (GHRM) and the resulting sustainable policies help businesses save money, find new ways to make money, avoid problems and future challenges.

Cherian & Jacob, (2012), explored that Green Human Resource Management (GHRM) may provide a Green Competitive Advantage within an organisation. In this research it has been examined how

contemporary organisations develop sustainable policies about Human Resource Management (HRM) to promote Environmental Management Objectives.

Objective of the Study

The research aims to comprehensively identify and analyse the pivotal internal organisational elements that affect the adoption and successful execution of GHRM practices within the Thermal Power Sector. It is crucial to comprehend how internal factors can promote or obstruct the implementation of environmentally sustainable HRM practices. In an industry that has big environmental problems, it's important to make both workers and businesses more competitive and productive. The primary aim of this study is to discern the critical internal factors that affect the adoption and implementation of Green HRM within the Thermal Power Sector.

Methodology

Research Design

The study used a quantitative research design to investigate the factors influencing GHRM practices in selected thermal power plants in West Bengal.

Data Collection

Primary data was procured through a structured questionnaire developed precisely for this study. The questionnaire included multiple items designed to measure various aspects of GHRM practices, such as green recruitment, training, performance appraisal, and employee involvement.

Sample and Sampling Technique

In this research study, a total of 104 respondents from various thermal power plants in West Bengal participated in the process. The respondents were selected using a purposive sampling method, ensuring they held roles related to HR, administration, or environmental compliance.

Instrument Design

The questionnaire was created using the most current literature on research on GHRM and was adapted to fit the thermal power industry. A Likert scale was used to gauge responses, spanning from strongly disagree to strongly agree.

Data Analysis Technique

For this research the data which was collected were analysed using SPSS26 software. Factor Analysis with Principal Component Analysis method was used to identify the underlying factors influencing GHRM practices. The Factor Analysis helped in grouping the observed variables into meaningful constructs, thus reducing data complexity and enhancing interpretability of the variables.

Research Analysis

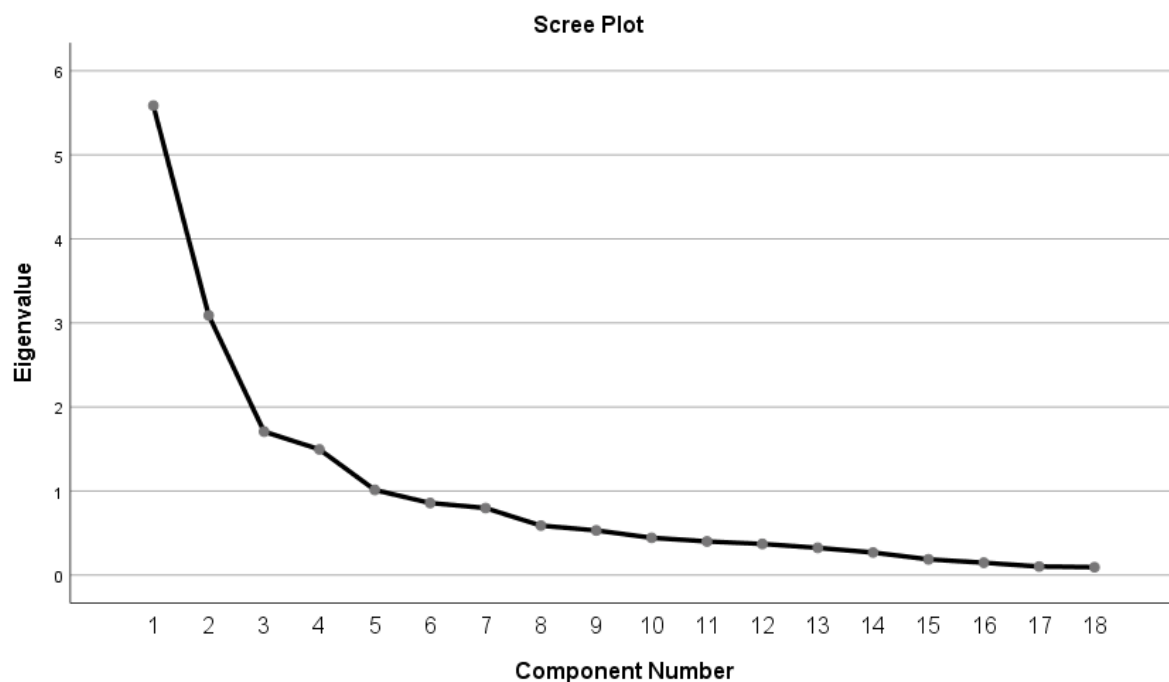
The reliability statistics for the questionnaire show Cronbach's Alpha value of 0.868, which means that the survey items are very consistent with each other. This means that the 18 questions or statements used in the test are very similar and accurately measure the same basic idea. A Cronbach's Alpha value of 0.70 is usually seen as acceptable in reliability testing, but values over 0.80 show good dependability. The derived value of 0.868 shows that the scale used in this study is very reliable, which means that the answers given by all 18 questions were consistent.

Reliability Statistics	
Cronbach's Alpha	N of Items
.868	18

The outcome of the sampling adequacy and sphericity tests explained the suitability of the dataset for factor analysis. The Kaiser-Meyer-Olkin (KMO) measure of sampling adequacy was found to be 0.731, which means it falls within the "good" range. This measure of 0.731 indicates that the sample is appropriate for conducting further factor analysis. So, the value obtained shows that the variables have enough common variance to make factor analysis useful. The significance value is much lower than 0.05, which means that there are significant correlations between the variables. This makes it even clearer that factor analysis is the right method for this dataset.

KMO and Bartlett's Test		
Kaiser-Meyer-Olkin Measure of Sampling Adequacy.		.731
Bartlett's Test of Sphericity	Approx. Chi-Square	1073.617
	Df	153
	Sig.	.000

The scree plot shows a steep drop from Component 1 to Component 3. The eigenvalues start to go down slowly after Component 4 and level off after Component 5. The line flattens after Component 5, which means that adding more components doesn't change the variance much. Around Component 3 is the "elbow point," which is where the curve levels off. The Kaiser criterion (keep factors with Eigenvalue > 1) and the elbow rule both say to keep five components for more study.



The Component Matrix displayed each measured variable that contributed to main five underlying components. Here 18 variables were selected that were linked to the organisation and their HRM practices. These variables were related to recruitment and selection, training, performance evaluation, policies regarding leave and attendance, promotion policies, data maintenance and storage and liaison with finance. In Component 1 we find high loadings of 9 variables including Online Display of Promotional Policy (ODPP), Scope of Online Application for Internal Promotion (SOAIP), Online Training for Mid-level Management (OTMM), Online Training for Front-line Management (OTFM), Online Feedback of Training Programmes (OFTP), Paperless Evaluation of Performance (PEP), Online Display of Appraisal Score (ODAS), Frequent Campaign for Creating Awareness of GHRM (FCCAGHRM), and Policy regarding Reduced Usage of Paper Documentation (PRUPD). These showed that there's high loadings of variable regarding training, promotion, performance appraisal and minimal use of paper. In Component 2, we see strong loadings of variables including Online Display of Attendance (ODA), Online Display of Leave Policy (ODLP), Online Display of Leave Balance through ERP (ODLBERP), and Leave Application through ERP (LAERP). This component showed there's higher loadings of variables related to leave policy, display of leave balance, online leave application, and online display of attendance. Component 3 has positive loadings of variables that include Liaison with Finance via ERP (LSNFNERP). This shows it is a vital aspect of online liaisons with finance department for smooth and fast functioning between departments. Component 4 shows high loadings of variables Online Job Application System (OJAS), and Electronic Storage of CV (ESCV). This component showed Green HR recruitment and selection component using digital job application system and online storage of Cvs. Component 5 showed higher loadings for the variable Electronic Storage of Personal Files (ESPF) showing importance of online personal data management to reduce resources required for physical maintenance of personal data.

Component Matrix^a					
	Component				
	1	2	3	4	5
OJAS	.387	.150	-.377	.713	-.254
ESCV	.517	.042	-.095	.781	-.072
ESPF	.460	-.451	.264	.216	.505
ODPP	.699	.013	-.141	.078	.470
SOAIP	.730	.015	-.096	-.169	.149
LSNFNERP	.493	.156	.618	.064	-.048
OTMM	.701	-.331	.283	-.099	-.083
OTFM	.689	-.459	.165	-.021	.018
OFTP	.793	-.139	-.032	-.112	-.044
PEP	.748	-.246	.087	-.104	-.034
ODAS	.626	-.376	-.148	-.157	-.343
ODA	.276	.689	-.183	-.025	.154
ODLP	.372	.664	.306	.130	-.162
ODLBERP	.242	.779	.328	-.057	.073
LAERP	.228	.765	.266	-.107	.052
FCCAGHRM	.638	.050	-.086	-.340	-.384
PRUPD	.546	.364	-.456	-.191	-.113
GHRMABWS	.343	.229	-.645	-.220	.309
Extraction Method: Principal Component Analysis.					
a. 5 components extracted.					

Factor Loadings

- OJAS – Online Job Application System
- ESCV – Electronic Storage of CV
- ESPF – Electronic Storage of Personal Files
- ODPP – Online Display of Promotional Policy
- SOAIP – Scope of Online Application for Internal Promotion
- LSNFNERP – Liaison with Finance via ERP
- OTMM – Online Training for Mid-level Management
- OTFM – Online Training for Front-line Management
- OFTP – Online Feedback of Training Programmes
- PEP – Paperless Evaluation of Performance
- ODAS – Online Display of Appraisal Score
- ODA – Online Display of Attendance
- ODLP – Online Display of Leave Policy
- ODLBERP – Online Display of Leave Balance through ERP
- LAERP – Leave Application through ERP
- FCCAGHRM – Frequent Campaign for Creating Awareness of GHRM
- PRUPD – Policy regarding Reduced Usage of Paper Documentation
- GHRMABWS – GHRM Awareness Brings Work Sustainability

Findings

The factor analysis showed that 5 Component have been extracted from the data based on their loadings of the variables. There were 18 variables which were identified and used for the survey questionnaire to find out the sustainable variables of GHRM which were used in day-to-day operations in the Thermal Power Plants in West Bengal. The 1st Component included 9 variables Online Display of Promotional Policy (ODPP - .699), Scope of Online Application for Internal Promotion (SOAIP - .730), Online Training for Mid-level Management (OTMM - .701), Online Training for Front-line Management (OTFM - .689), Online Feedback of Training Programmes (OFTP - .793), Paperless Evaluation of Performance (PEP - .748), Online Display of Appraisal Score (ODAS - .626), Frequent Campaign for Creating Awareness of GHRM (FCCAGHRM - .638), and Policy regarding Reduced Usage of Paper Documentation (PRUPD - .546). These components showed the variables which are closely related to each other depicting they are measuring the same operational components of GHRM practices.

The 2nd Component included the variables Online Display of Attendance (ODA - .689), Online Display of Leave Policy (ODLP - .664), Online Display of Leave Balance through ERP (ODLBERP - .779), and Leave Application through ERP (LAERP - .765). This dimension of the component showed that online display of attendance, online display of leave balance, leave police and online leave application using ERP constitute another vital aspect of GHRM.

The 3rd Component includes one factor: LSNFNERP (.618). This forms another factor (possibly strategic planning with finance department).

The 4th Component includes two factors: OJAS (.713) and ESCV (.781). These two items form a separate, strong factor (like specific programs for hiring and recruiting).

The 5th Component includes one factor ESPF (.505). These two items form a separate, strong factor (likely specific initiatives for storing HR records and files).

<i>Component</i>	<i>Items Loaded</i>	<i>Interpretation</i>	<i>Nomenclature</i>
1	ODPP, SOAIP, OTMM, OTFM, OFTP, PEP, ODAS, FCCAGHRM, PRUPD	Training, appraisal, promotion policies, reduce paper usage	Green (Online) Policy Disclosure & Performance Management
2	ODA, ODLP, ODLBERP, LAERP	ERP systems for leave and attendance	Green (Online) Attendance & Leave Policy
3	LSNFNERP	Digitised HR system for smooth operation with Finance Department	Green Finance and Operations
4	OJAS, ESCV	Paper reduction, online, paperless, technology enabled system	Green Recruitment & Selection
5	ESPF	Integrate digital HR tools designed around GHRM principles	Green (Online) Data Management

The Principal Component Analysis conducted on the 18 assertions yielded five distinct components, which together described the facets of GHRM practices in the selected thermal power plants of West Bengal. Those five components include: Green (Online) Policy Disclosure & Performance Management, Green (Online) Attendance & Leave Policy, Green Finance and Operations, Green (Online) Recruitment & Selection and Green (Online) Data Management. All of these traits together show the main areas where GHRM is used and put into practice in the sector. Green (Online) Policy Disclosure & Performance Management emphasises the incorporation of sustainability metrics into employee training policy, performance appraisal system, promotion policy, and policy regarding reducing paper usage. Green (Online) Attendance & Leave Policy Support shows that the leaders of an organisation are committed to making sustainable and productive choices regarding employee attendance and leave and there are policies in place to support these choices. Green Finance and Operations stress the importance of liaison with the finance department for smooth operations and efficient running of business. Green Recruitment & Selection focusses on efforts to create eco-friendly workplaces by incorporating sustainability factors in hiring by reduction in paperwork and reduce cost of resource usage through online job posting online interviews and digital onboarding support for sustainable practices. Green (Online) Data Management focused on integrating digital HR tools designed to store and manage HR data and personnel files. It is important to note that the conclusions of this study are based on a small sample size. A larger and more varied dataset might show more parts, giving us a better understanding of how complicated GHRM practices are in the thermal power sector.

Conclusion

This study examined the internal factors influencing the adoption and implementation of Green Human Resource Management (GHRM) practices at specific thermal power plants in West Bengal. Principal Component Analysis found five key components that together describe how GHRM is used in the sector: Green (Online) Policy Disclosure & Performance Management, Green (Online) Attendance & Leave Policy, Green Finance and Operations, Green (Online) Recruitment & Selection and Green (Online) Data Management. The above traits highlight the importance of these GHRM measures for workplace sustainability, motivating innovation and building efficiency. The findings showed that some processes like digitalisation of HR processes like data management through personal file management, Green HR recruitment and selection processes, are well integrated into the policies, while other HR processes involving green finance and operations, policy disclosure and green finance operations need more attention in order to fully integrate into Organisation policy. GHRM can help the organisation to achieve sustainability through integrated eco-friendly HR policies.

The research showcased the current GHRM scenario in selected Thermal Plants of West Bengal. This study showed how Organisation Policy and organisational culture can help to assimilate Green Human resource Management practices in daily operations. The findings can also guide HR professionals to develop plans and suggest policy adoption to Top Management and policy makers which can support green initiatives and make the organisation more sustainable. In the area of energy intensive organisations which are heavily dependent on fossil fuels as their primary raw material like Thermal Plants, every initiative towards achieving sustainable goals is a positive step forward. This study can be furthered with a bigger sample size so that its impact can be used towards environment and organisational sustainability. Green Human Resource Management is not an option anymore or a choice, but it is strategically essential in today's evolving economy.

References :

- Mehrajunnisa, M., Jabeen, F., Faisal, M. N., & Lange, T. (2023). *The influence of green human resource management practices and employee green behavior on business performance in sustainability-focused organizations*. *Journal of Environmental Planning and Management*, 66(12), 2603–2622. doi:10.1080/09640568.2022.2074824
- Sharma, C., Sakhuja, S., & Nijjer, S. (2022). *Recent trends of green human resource management: Text mining and network analysis*. *Environmental Science and Pollution Research International*, 29(56), 84916–84935. doi:10.1007/s11356-022-21471-9
- Subramanian, N., & Suresh, M. (2022). *The contribution of organizational learning and green human resource management practices to the circular economy: a relational analysis – evidence from manufacturing SMEs (part II)*. *Learning Organization*, 29(5), 443–462. doi:10.1108/tlo-06-2022-0068
- Kumar, P., & Chakraborty, S. (2022). *Green service production and environmental performance in healthcare emergencies: role of big-data management and green HRM practices*. *International Journal of Logistics Management*, 33(4), 1524–1548. doi:10.1108/ijlm-02-2021-0075
- Yong, J. Y., Yusliza, M.-Y., Ramayah, T., & Fawehinmi, O. (2019). *Nexus between green intellectual capital and green human resource management*. *Journal of Cleaner Production*, 215, 364–374. doi:10.1016/j.jclepro.2018.12.306
- Pham, N. T., Hoang, H. T., & Phan, Q. P. T. (2019). *Green human resource management: a comprehensive review and future research agenda*. *International Journal of Manpower*, 41(7), 845–878. doi:10.1108/ijm-07-2019-0350
- Yong, J. Y., Yusliza, M.-Y., Jabbour, C. J. C., & Ahmad, N. H. (2019). *Exploratory cases on the interplay between green human resource management and advanced green manufacturing in light of the Ability-Motivation-Opportunity theory*. *Journal of Management Development*, 39(1), 31–49. doi:10.1108/jmd-12-2018-0355

- Basu, M. (2019). *Green HRM: A study on the New Era global management practices*. SSRN Electronic Journal. doi:10.2139/ssrn.3641465
- Roscoe, S., Subramanian, N., Jabbour, C. J. C., & Chong, T. (2019). *Green human resource management and the enablers of green organisational culture: Enhancing a firm's environmental performance for sustainable development*. *Business Strategy and the Environment*, 28(5), 737–749. doi:10.1002/bse.2277
- Mishra, P. (2017). *Green human resource management*. *International Journal of Organizational Analysis*, 25(5), 762–788. doi:10.1108/ijoa-11-2016-1079
- Masri, H. A., & Jaaron, A. A. M. (2017). *Assessing green human resources management practices in Palestinian manufacturing context: An empirical study*. *Journal of Cleaner Production*, 143, 474–489. doi:10.1016/j.jclepro.2016.12.087
- Pinzone, M., Guerci, M., Lettieri, E., & Redman, T. (2016). *Progressing in the change journey towards sustainability in healthcare: the role of 'Green' HRM*. *Journal of Cleaner Production*, 122, 201–211. doi:10.1016/j.jclepro.2016.02.031
- Mehta, K., & Chugan, P. K. (2015). *Green HRM in pursuit of environmentally sustainable business*. *Universal Journal of Industrial and Business Management*, 3(3), 74–81. Horizon Research Publishing Corporation. Available at SSRN: <https://ssrn.com/abstract=2627211>
- O'Donohue, W., & Torugsa, N. (ann). (2016). *The moderating effect of 'Green' HRM on the association between proactive environmental management and financial performance in small firms*. *The International Journal of Human Resource Management*, 27(2), 239–261. doi:10.1080/09585192.2015.1063078
- Cherian, J., & Jacob, J. (2012). *A study of green HR practices and its effective implementation in the organization: A review*. *International Journal of Business and Management*, 7(21), 25–33. [https://doi.org/10.5539/ijbm.v7n21p25​;contentReference\[oaicite:0\]{index=0}​;contentReference\[oaicite:1\]{index=1}](https://doi.org/10.5539/ijbm.v7n21p25​;contentReference[oaicite:0]{index=0}​;contentReference[oaicite:1]{index=1}).

OPTIMIZING VERTICAL NETWORK OPTIMIZATION FOR DISTRIBUTED DECISION-MAKING USING VISUALIZATION APPROACHES

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Abstract

Multi-dimensional decision making is not only complex but difficult to interpret in business decision making, given the nature of dynamicity of interacting variables in the environment. The proposed cognitive modeling framework integrates cross-vertical intelligent network systems and reinforcement learning to capture complex inter-domain dependencies. Results from analysis of five domains of Energy, Health, Traffic, Infrastructure and Market using heatmaps, correlation matrices, radar charts, and t-SNE indicate signals at domain-specific activations using heatmaps, minimal inter-domain redundancy using correlation matrix (~ 0.02), elevated activity observed in Traffic and Industrial sectors using radar chart and oscillatory reward patterns with a positive upward trend with proximal policy optimization. The framework with high-dimensional GNN representations enables comprehensive robust, scalable, and adaptive method for decision making with refined policies for reward-stress patterns and managing dependencies among different domains to enable better informed business decision making.

Keywords: *Cognitive Graph Modeling, Cross-Sectoral Policy Decision-Making, Graph Neural Networks (GNNs), Reinforcement Learning Optimization, Multi-Domain Adaptive Systems, Systemic Risk and Resilience.*

1. Introduction

1.1 What are Verticals-enabling Intelligent Network Systems

The future of communication is built on the intertwining of 6G networks with other technologies, including the advancement of machine-type communication (MTC) and intelligent network paradigms. We use six main features for MTC, including ultra-low latency, ultra-reliability, massive connectivity, energy efficiency, and ubiquitous coverage, which helps for autonomous systems and large-scale industrial IoT (Mahmood et al., 2020). 5G network slicing is used on Software Defined Networking (SDN) and Network Function Virtualization (NFV) that enables resource allocation, dynamic service provisioning, and network adaptability, which creates dynamic requirements of 6G MTC (Barakabitze et al., 2020). Empirical research on end-to-end 5G helps in case trials for real-world situations that provide details for scalable deployment scenarios (Mahmood et al., 2019). Such developments act as a part of intelligent networks that create dynamic service creation, adaptive resource management, and intelligent control mechanisms (Magedanz et al., 1998). These intelligent systems include both theoretical and architectural frameworks (Wilamowski and Irwin, 2018), Grosan et al., 2011 and Abraham, 2003) discussed computational intelligence for decision making, self-organization and context aware adaptation for complex telecommunication infrastructures.

Artificial neural networks and intelligent approximation methods can also be combined for enhancement of adaptive and predictive capabilities of intelligent networks (Robrock, 2002 and Anastassiou, 2011). These studies exhibit the backbone of intelligent systems and networked intelligence as next-generation MTC in 6G emerging for meeting technical challenges and emergent application demands.

1.2 Example of VINES

The Vertical intelligent Network Systems are the result of merging intelligent systems, telecommunications, and distributed infrastructures for development of highly adaptive, resilient, and highly autonomous networks. Modern power systems have undergone transformation through adaptive intelligent networks using active distribution frameworks (McDonald, 2008) while the domain of networked systems, user-centric services and neural network models influence network responsiveness and location-based service optimization (Gelenbe, 2006) and Battiti et al., 2002). Likewise, real-time traffic control is managed by the transformative potential of deep learning (Fadlullah et al., 2017) whilst naturally inspired intelligent systems (Caudill & Butler, 1990) and complex systems thinking (Mitchell, 2006) is also supported by non-linearity, adaptability, and self-organization among these complex infrastructures. The growth of artificial intelligence (AI), Internet of Things (IoT), and machine learning domains provides energy sector with intelligent power systems and smart grids for adaptive control, neural networks, and hybrid systems optimize resource distribution and resilience (McDonald, 2008; Strasser et al., 2014; Kalogirou, 2001; Byun et al., 2011). Also, Smart energy meters and distribution systems are actively supported by real-time monitoring, predictive load management, enhancing efficiency and sustainability (Sun et al., 2015). Integration of biosensors and intelligent platforms has improved efficiency for real-time patient monitoring and personalized interventions for healthcare systems (Manickam et al., 2022; Yang et al., 2014). Transportation systems are now supported by intelligent transportation systems (ITS) that use machine learning, dynamic modeling, and resilient network design for optimization of traffic flow, safety, and infrastructure management under complex, dynamic conditions (Dimitrakopoulos & Demestichas, 2010; Ran & Boyce, 2012; Ganin et al., 2019). In addition, improvements in telecommunications and network control systems with addition of neural networks, deep learning, and soft computing methodologies have resulted in traffic optimization, fault prediction, and network resource allocation (Battiti et al., 2002; Fadlullah et al., 2017; Zilouchian & Jamshidi, 2001).

1.3 Cognitive Graphs in Vertical Intelligent Network Systems

Cognitive intelligence along with intelligent networking includes joint influence of adaptive learning, distributed intelligence, and autonomous decision-making capabilities for different domains. Cognition-based networks have developed dynamic resource allocation and self-organizing capabilities by optimizing complex network infrastructures (Zorzi et al., 2015 and Fortuna and Mohorcic ,2009). Industrial IoT integrating smart transportation, energy, manufacturing systems (Wu et al.,2022), visual computing and cyber-physical architectures (Posada et al. ,2015) and Jiang, 2018) act as critical enablers of Industry 4.0 transformation. In addition, factors such as socio-political dimensions of artificial intelligence (Sudmann , 2019), synergistic convergence of blockchain and cognitive networking for metaverse systems (Fu et al. (2022), multilayer cognitive architectures for autonomous UAV control (Emel'yanov et al. , 2016) have also been emerged in past years. Challenges in development include spectrum management challenges inherent to cognitive radio networks (Cesana et al., 2011; Tragos et al., 2013; Akyildiz et al., 2006; Ahmad et al. 2020; and Ding et al. 2017). The introduction of cloud cognitive models has also enriched computational intelligence frameworks by efficient representation of uncertainty factors (Li et al., 2009).

Other studies such as Intelligent tutoring (Anderson et al., 1985), cognitive mapping (Meilinger, 2008; Kuipers, 2000; Tversky, 2013), and flexible neural networks for low cognitive behaviors (Beer, 1996, 2000) are some of the most common human-centric cognitive systems. Extended work involves graph-based federated learning (Fedstn) for real-time urban traffic forecasting, together with big data integration for analysis in systems using cognitive computing (Yuan et al.,2022).

Developments related to cognitive systems in healthcare domain were related to full-skin bionics (Niu et al., 2022), and neurocognitive modeling for clinical applications (Baggio et al., 2014; Pinker, 2014). Other improvements include adaptive user-centric services within intelligent network infrastructures as an

instance of multidisciplinary convergence of AI, communications, and complex systems theory (Gelenbe, 2006).

1.4 Motivation

The development of the model is primarily motivated by the need to collate fragmented infrastructure systems (energy, healthcare, transport, etc.) into cohesive, intelligent ecosystems. With the advancement of 6G and IoT, static networks need to be transformed to handle dynamic, multi-domain demands. This study embarks on the concept of Cognitive graphs, inspired by federated learning (Yuan et al., 2022), industrial IoT slicing (Wu et al., 2022), and neurocognitive adaptability (Gelenbe, 2006) that aims to create a paradigm linking verticals through distributed intelligence. These graphs focus on critical gaps in scalability (Mahmood et al., 2020), resilience (Fadlullah et al., 2017), and interoperability (Zorzi et al., 2015), by allowing real-time learning and autonomous reconfiguration, linking AI theory with infrastructural adjustments.

1.5 Research Objectives

- a. To develop a **self-adaptive cognitive graph** framework for cross-vertical optimization in 6G/IoT networks.
- b. To design **federated learning** for secure, low latency distributed intelligence.
- c. To implement **cognitive network slicing** for IIoT reliability and energy efficiency.

1.6 Contributions:

The proposed model contributes with respect to (1) developing a novel cognitive graph framework for real-time cross-vertical optimization in 6G/IoT networks to reduce gaps in smart infrastructures operations, (2) creating a privacy-preserving approach for combined learning using distributed decision-making from different domains. (3) developing a network slicing algorithm for industrial IoT that improves reliability and energy efficiency. (4) developing resilience metrics for failure forecasting in interconnected systems. These advancements provide integrated solutions that unite AI theory and practical deployment for self-adaptive, secure, and robust multi-vertical network systems, for sustainable smart cities and Industry 4.0 ecosystems.

2. Materials and Methods

2.1 Alternatives

The model oversees use of precision driven analytical tools, such as heatmaps, correlation matrices, radar charts, and t-SNE (van der Maaten & Hinton, 2008; Bengio et al., 2013), to exhibit effective representation learning. Bayesian Networks (Koller & Friedman, 2009; Heckerman, 1995; Murphy, 2002), Dynamic Causal Modeling (Friston et al., 2003), Temporal Fusion Transformers (Lim et al., 2021), Soft Actor-Critic (Haarnoja et al., 2018), and hybrid-neuro-symbolic systems (Garcez et al., 2019) are some of the alternative methods to CVINS framework. While domain knowledge with quantified uncertainty is important for Bayesian Networks, Dynamic Causal Modeling focuses on strong prior structural knowledge system. Similarly, long range temporal dependencies with complex features can be captured using Temporal Fusion Transformers. Policy for Stochasticity in volatile environment can be managed by Soft Actor-Critic algorithm, in contrast to domain knowledge with learned representations dealt by hybrid-neuro-symbolic systems.

2.2 Criteria description

The cognitive framework integrates edge computing ("Gogh Stracur Edge Index") and policy-driven optimization ("Fasem Peking (TO Policy Nowack)"), to create hybrid nodes like "Spinkie Dua (Straw + Media)" and "Nok Fasem (Snake + Stream)" to initiate development of representative adaptive data-processing units (raw inputs with contextual streams) equivalent to cognitive radio networks (Akyildiz et al., 2006). Closed-loop control interface, "CZoneGUI (ON Targeted Loop)" for real time adjustments

aligning with the principles of autonomous network slicing principles (Wu et al., 2022). The framework combines "Dalatata Mieto (Roverd Summary)" as graph-based fault tolerance (Ganin et al., 2019), federated learning architectures (Fadlullah et al., 2017), beside SDN/NFV-driven resource allocation (Barakabitze et al., 2020), its symbolic labels ("Stein Roverd," "Coggheliu") for empirical validation of generated result maps. Besides, the future of 6G networks is based on frameworks of associated edge intelligence, dynamic policy engines, and human-AI collaboration ("CZoneGUI"), for retorting critical challenges of scalability and ethical governance (Zorzi et al., 2015; Sudmann, 2019) and needs more refinement to enhance measurable network functionalities (See Figure 1).

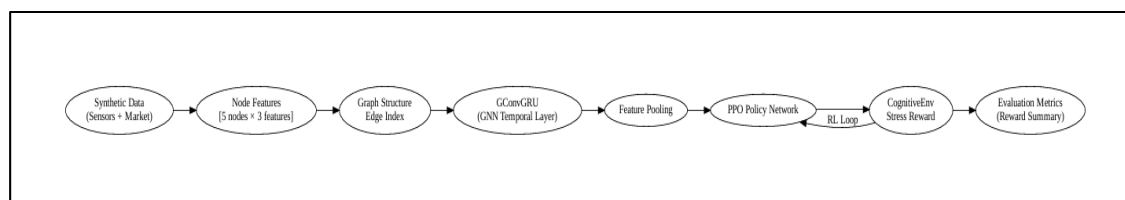


Figure 1. Multi-steps in Cross-Vertical Intelligent Network Systems (CVINS)
(Source: Author analysis)

2.3 Suggested methods

The purpose of the proposed model is to capture complex inter-sectoral dependencies using advanced graphical methods using Cross-Vertical Intelligent Network Systems (CVINS) with reinforcement learning-based optimization methods. The former is composed of Cognitive Vertical Graph (CVG) and the GNN Cognitive Domain Graph (GCDG) which creates maps for hierarchical domain-specific causal pathways for vertical interdependencies among economic sectors such as healthcare, logistics, energy, and supply chains, like cognitive graph structures (Zhou et al., 2020; Zorzi et al., 2015) and abstraction of high dimension features based interaction using Graph Neural Networks (GNNs) to learn systemic complexity (Wu et al., 2021).

Proximal Policy Optimization (PPO) helps in the refinement of decision policies in using interactive learning from evolving multi-domain environments (Schulman et al., 2017). The PPO agent is managed by a robust reinforcement learning algorithm that controls state transitions and forecasts actions with continuous updation of its policies. It also provides cumulative rewards, which ensures stability through different objective functions. Analytical tools such as Heatmap analyses highlight heterogeneity in time-based feature activation while correlation matrices assess inter-domain independence (Bengio et al., 2013). Domain-sensitive variations can be visualized using radar charts for identifying clustering patterns for learned cross-domain generalization using t-SNE embeddings of the GNN latent space (van der Maaten & Hinton, 2008) and analyzing model performances through model resilience assessment for cognitive loads.

2.4 Results

The proposed cognitive modeling framework is the integration of Cross-Vertical Intelligent Network Systems (CVINS) and Proximal Policy Optimization (PPO) reinforcement learning yields different levels of cognitive representation analysis, learning dynamics, and system behavior underscoring varying domain complexities.

Cognitive Graph Construction and Systemic Representation

The Cross-Vertical Intelligent Network Systems model comprise of Cognitive Vertical Graph (CVG) and GNN Cognitive Domain Graph (GCDG), extracts sectoral dependencies to structured graph representations. CVG creates causal pathways for critical domains that include healthcare, logistics, energy, and industrial supply chains. Mutual interdependence can exist among economic activities that influence supply chain dynamics and healthcare logistics. Such architecture represents high-dimensional

graph-based representation learning for capturing inter-domain causal interdependencies essential for adaptive systemic analysis. The proposed system supports previous cognitive modeling efforts with graph representations for uncovering domain complexities (Zhou et al., 2020; Wu et al., 2021).

Feature Activation Analysis

Feature extraction through heatmap visualization provides valuable insights for domain related feature heterogeneous activation pattern. Certain domains show prominent reflection of specific features in driving system behavior such as Domain 0 with Feature 0 recording an activation value of 0.99 while other domains indicate marginal activations owing to limited contributions to certain cognitive states. The model proves to be successful in underscoring focus for domain features based on contextual significance, decisive for crucial decision making. Dynamic activation of the proposed model seems consistent with the principles of sparse and adaptive representation learning (Bengio et al., 2013). The model's selective focus enhances efficiency by minimizing irrelevant or redundant feature activations, making space for more effective learning from high-dimensional cognitive inputs.

Inter-Domain Correlation Structure

Systemic characteristics of statistical independence across sectors such as near zero off diagonal values indicating inter-domain linear dependencies were highlighted by the correlation matrix. An efficient intra-domain correlation represents diagonal unity supporting stable feature consistency within individual domains. While the presence of orthogonality assures cognitive model scalability demonstrating minimal redundancy in multi-domain decision systems (Glielmo et al., 2021), overfitting risks due to cross domain noise can also be mitigated by low inter-correlation structures occurring signifying generalization capacity of the existing model. The model's architectural design thus ensures detection of distinct sector specific dynamics beside maintaining controlled interaction when necessary.

Sector Sensitivity Patterns: Radar Chart Insights

Systemic granularity for sectoral domain such as stronger engagement in Traffic and Industrial domain in contrast to lower activation for Financial and Healthcare sectors and other variations represent temporal sensitivity and differential domain prioritization based on real time system demands. Thus, systemic behavior also reflects diversity in domain sensitivity with certain nodes of radar chart (spider plot) representing critical sectors based on contextual stimulus (Casti, 2012). A common condition can propel differential responses such as logistics and energy sectors receive high cognitive attention while financial systems exhibit subdued activity during peaks of industrial activity. Therefore, radar chart acts as interpretable feedback support system, an essential for cognitive decision support systems for complex multi-sectoral environments.

GNN Embedding Distribution: Representation Learning Capacity

The representational capacity of the model's learned cognitive features is emphasized by overlapping and distinguishable clusters across domains, signifying effective learning for both domain-specific characteristics and cross-domain relational structures. This feature aligns with the concept of integration of diverse cognitive states represented by partially separable clusters representing sufficient differentiation between sector-specific contexts (van der Maaten & Hinton, 2008). Prior successes of graph-based neural architectures in capturing systemic complexity (Wu et al., 2021) are sufficed by this capability of the existing model.

PPO Reinforcement Learning Performance: Reward Dynamics

Proximal Policy Optimization (PPO) offered by the model highlights inherent variability of the learning process of peaks and declines with flexible policy for refinement and categorization to optimally represent cognitive state representations across domains. Although the model suffers from initial reward variability but shows convergent progressive improvement towards optimization. The model's learning

rate aligns with the known strengths of PPO in handling high-dimensional, partially observable environments while maintaining stability through its clipped objective (Schulman et al., 2017).

Cognitive Stress vs. Reward Phase Diagram: System Resilience

Discrete nonlinear correlation between cognitive stress loads and reward performance represents operational flexibility while maintaining reward outcomes, signifies resilience and robustness of the cognitive framework and aligns with real-world deployment of cognitive loads facing dynamic sectoral stress loads (Cummings et al., 2013).

Integrated Systemic Behavior

Together, the integrated cognitive modeling framework offers:

1. CVG graphs illustrate hierarchical sectoral dependency.
2. GNN embeddings represent high-dimensional cross-domain representation.
3. Domain factors prioritization using dynamic feature activation modulation.
4. Ensure scalability structured through statistically independent inter-domain feature.
5. PPO reinforcement learning ensures effective adaptive policy optimization
6. Examine systemic resilience subject to cognitive stress conditions.

The proposed system architecture can manage multi-sectoral dynamic systems effectively by balancing complexity, adaptability, and transparency, supporting cognitive decision support platform.

3 Discussions

3.1 The model architecture

- Cross-Vertical intelligent Network Systems model

Two cognitive graphs include Cognitive Vertical Graph and GNN Cognitive Domain Graph highlight dependencies among domains. Cognitive Vertical Graph outlines hierarchical sectoral dependencies charting domain-specific causal pathways such as economic activity influencing supply chains, healthcare logistics, and energy demand. These relations are abstracted into higher dimensions allowing graph-based representation learning for capturing complex interdependencies and support robust systemic analysis for adaptive decision-making in dynamic environments (See Figure 2).

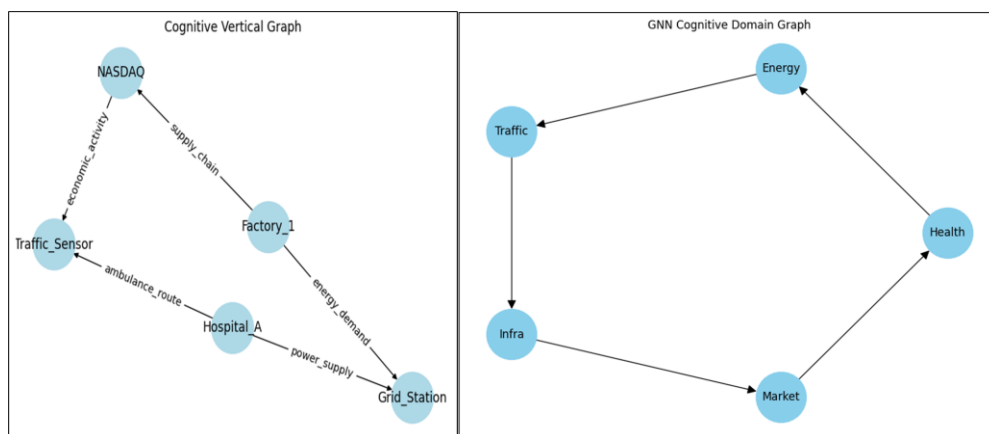


Figure 2. Cross-Vertical intelligent Network Systems model
(Source : Author)

- Pipeline for PPO optimization (done)

The Proximal Policy Optimization (PPO) reinforcement learning training pipeline process initiates with environment resetting, followed by state observation. Using the observed state, the PPO agent predicts action that can be applied in the environment, generating corresponding rewards. These rewards can be

stored in buffer for PPO optimization, with the probability of completed training, if conditions are sufficed. This PPO cycle includes interaction, reward accumulation, and policy refinement till termination criteria are satisfied, under a converged and optimal policy (See Figure 3).



Figure 3. Working pipeline for PPO optimization
(Source : Author)

3.2 Data Analysis & Cognitive State Representation

- Heatmap

The heatmap at timestamp 100 envision aims to highlight heterogeneous importance patterns using feature activations across domains, such that dominant features are represented by higher activations (Domain 0: Feature 0 at 0.99) while marginal contributions are indicated by lower activations. These temporal domain feature interactions ensure the model’s dynamic representation learning apprehending specific inter-domain dependencies required for adaptive decision-making (See Figure 4).

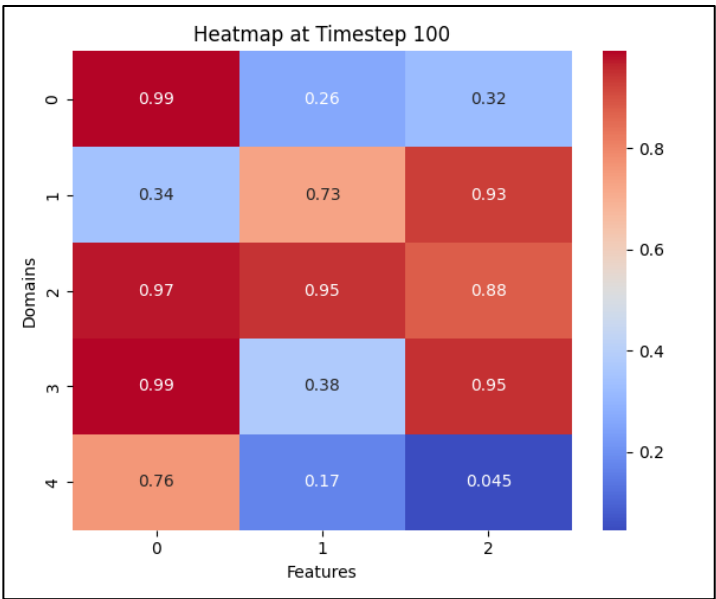


Figure 4. Heatmap at timestep 100
(Source : Author)

- Correlation matrix

The correlation heatmap with near-zero off-diagonal values reveals minimal inter-domain dependencies, stating statistical independence among domains while diagonal unity represents perfect correlation. Model robustness is emphasized by the presence of low inter-correlation structure with minimum redundancy, preserving orthogonality in feature representations important for scaling multi-domain cognitive modeling risk across domains (See Figure 5).

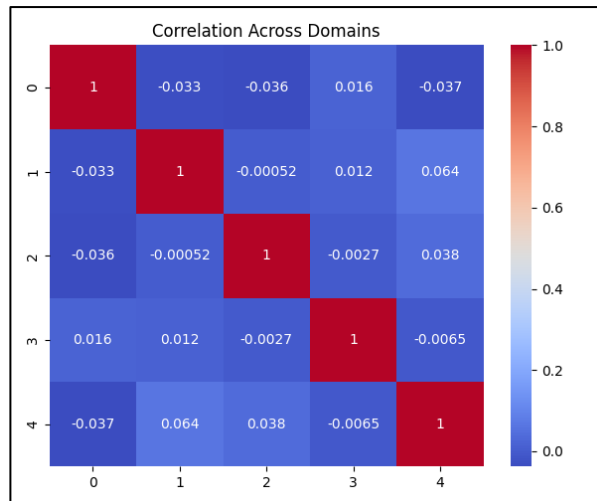


Figure 5. Correlation matrix across domains
(Source : Author)

- Radar Chart (Spider plot)

While Traffic and Industrial sectors reflect noticeable activity in contrast to lower engagement in Financial and Health sector indicated by domain-wise activation levels in radar chart. The diversity in distribution reflects sensitivities of different domains at evaluated timestep is a part of dynamic system behavior in context of decision support in multi-domain environments (Figure 6). Traffic and Industrial environment impact on the other domains Grid, health and finance respectively.

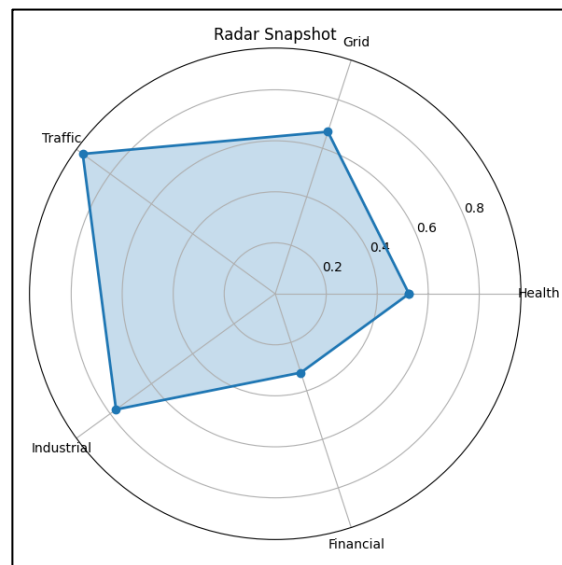


Figure 6. Radar chart for domains
(Source : Author)

3.3 Representation Learning Evaluation

- GNN Feature Space

The t-SNE visualization exhibits distributed and partially overlapping clusters as learnings from GNN based cognitive embeddings across domains. Further, the diagrammatical distribution indicates the latent structures through representational features of the domains, reflecting inter-domain

generalization. With such embedding separability and overlapping, the model reflects the capacity to integrate both domain-specific nuances and cross-domain relational patterns (See Figure 7).

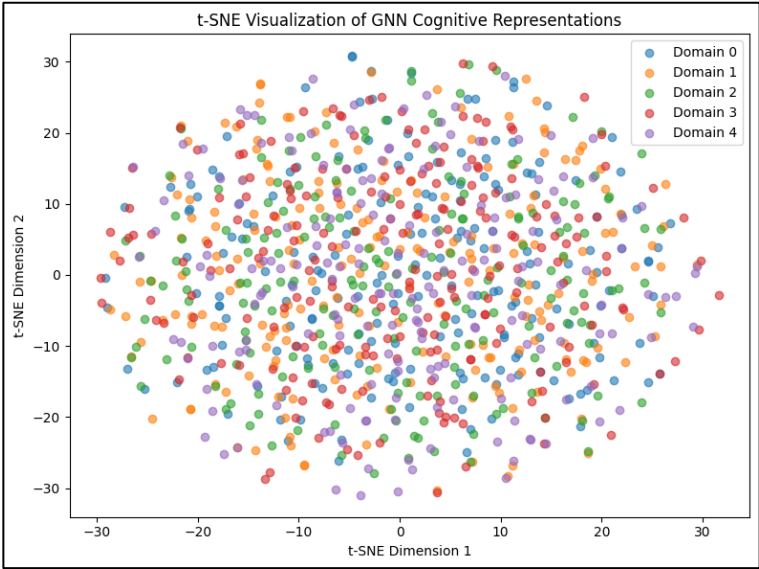


Figure 7. t-SNE visualization of GNN cognitive representations
(Source : Author)

3.4 Training Performance & Cognitive Optimization

- PPO Training Reward Curve

The intrinsic variability in the agent’s interaction dynamics indicates oscillations with high peak rewards, as observed during fluctuations in PPO training curve. It also explains the need for ongoing exploration, policy refinement, and adaptation for a complex learning environment (See figure 8).

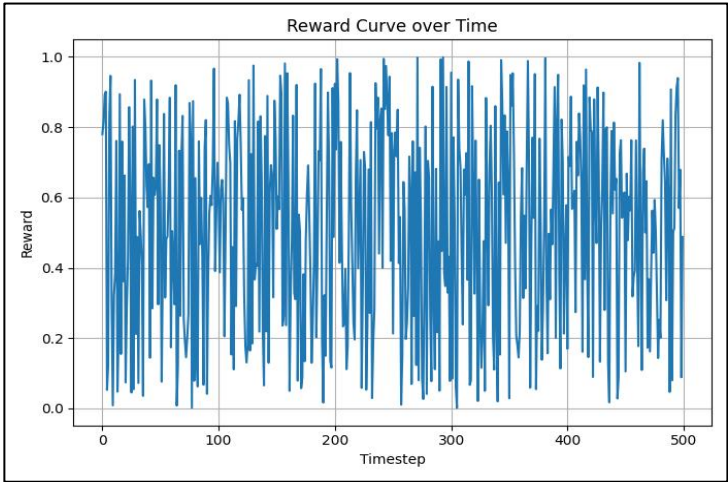


Figure 8. Reward curve over time
(Source : Author)

- Cognitive Stress vs Reward Phase Diagram

The relationship between cognitive stress and reward exhibits a nonlinear discrete pattern without any strong linear correlation, suggesting reward levels independence from cognitive stress. The model

reflects emerging optimal performance across a range of stress levels, suggesting adaptive system flexibility and resilience (See Figure 9).

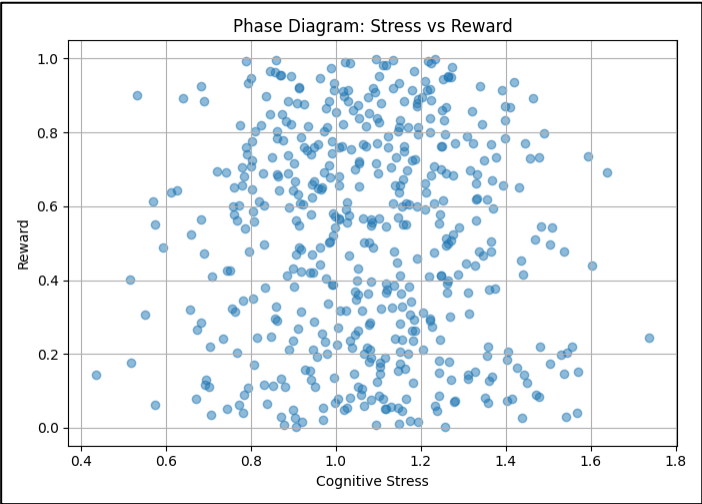


Figure 9. Stress vs. Reward
(Source : Author)

3. Findings

The results of cognitive graph architecture highlight hierarchical sectoral dependencies, Cognitive Vertical Graphs and GNN Cognitive Domain Graphs, domain-specific activations using heatmap analysis at timestep 100, minimal inter-domain redundancy with statistical independence (highest activation-0.99), elevated activity observed in Traffic and Industrial sectors, overlapping but distinguishable clusters, oscillatory reward patterns with a positive upward trend. Results suggest systemic resilience, ensuring a nonlinear, discrete distribution in a complex decision-making environment. Further validation of the model can help in the creation of a robust, scalable, and adaptive decision-making for multi-domain environments (See Table 1).

Table 1: Summary of Cognitive Model Results			
Analysis Component	Metric / Observation	Key Result / Value	Interpretation
Cognitive Graph Modeling	Hierarchical Sectoral Dependencies	Captured via CVG & GNN Cognitive Domain Graph	Effective high-dimensional sectoral modeling
Heatmap Activation	Max Activation at Timestep 100 (Domain 0, Feature 0)	0.99	Dominant domain-specific activation
Correlation Matrix	Off-Diagonal Correlation Coefficients	Near zero (~0.02)	Minimal inter-domain dependencies

Radar Chart Analysis	Domain Sensitivity Levels	Traffic & Industry: High; Finance & Health: Low	Heterogeneous domain engagement
GNN Representation (t-SNE)	Cluster Overlap Pattern	Partially overlapping clusters	Balanced domain-specific & general learning
PPO Reward Dynamics	Reward Fluctuation Pattern	Oscillatory with upward trend	Ongoing adaptive policy refinement
Cognitive Stress vs Reward	Correlation Pattern	Nonlinear, discrete distribution	Resilience across stress levels
System Robustness	Stability across cognitive loads	Maintained	Flexible and scalable system performance

4. Conclusion

While cognitive graphs effectively capture hierarchical sectoral dependencies into high-dimensional representations, PPO reinforcement learning can undergo continuous adaptive policy refinement. The heatmap diagram indicates activations of heterogeneous domain-specific features. The correlation matrix reveals low inter-domain dependencies, which ensures robustness and scalability. Another visualization approach, such as Radar charts highlight domain sensitivity variation across sectors. Similarly, GNN-based t-SNE embeddings exhibit balanced domain-specific and generalized cognitive learning. Use of reward curves suggests adaptive learning dynamics with oscillatory improvements. Also, stress-reward phase diagrams focus on system flexibility and resilience across cognitive stress levels.

Implications for business

- Finance & Taxation:

Operations, including systemic risk, tax policies, and financial stability, can be improved by considering cross-domain interactions between economic activity, capital flows, and regulatory compliance for regulators and financial institutions.

- Supply Chain & Logistics:

Interdependencies in supply networks, energy demand, and industrial production can be analyzed, enabling businesses to optimize inventory, resource allocation, and develop disruption response strategies under uncertain conditions.

- Healthcare:

In healthcare systems, the model can predict resource utilization and logistics needs by examining interactions between healthcare demand, supply chains, and economic shifts, to improve responses during public health crises.

- **Energy Sector:**

In the energy sector, the proposed model can be used for dynamic adjustment of production, distribution, and pricing strategies by considering demand fluctuations linked to industrial, transportation, and economic activities.

- **Regulatory Policy & Governance:**

The need for a strong, adaptable regulatory framework for policymakers can help improve policy decisions in several sectors.

- **Technology & AI Systems:**

In the technology domain, the concept may be used for developing a scalable framework for technology management across various sectors. AI-powered decision-support tools can learn from various domains while offering cognitive ability for complex business decision-making.

References

- Abraham, A. (2003). *Intelligent systems: Architectures and perspectives. Recent advances in intelligent paradigms and applications*, 1-35.
- Alam, M., Ferreira, J., & Fonseca, J. (2016). Introduction to intelligent transportation systems. *Intelligent transportation systems: Dependable vehicular communications for improved road safety*, 1-17.
- Anastassiou, G. A. (2011). *Intelligent systems: approximation by artificial neural networks* (Vol. 19). Heidelberg: Springer.
- Anderson, J. R., Boyle, C. F., & Reiser, B. J. (1985). Intelligent tutoring systems. *Science*, 228(4698), 456-462.
- Bahrammirzaee, A. (2010). A comparative survey of artificial intelligence applications in finance: artificial neural networks, expert system and hybrid intelligent systems. *Neural Computing and Applications*, 19(8), 1165-1195.
- Barakabitze, A. A., Ahmad, A., Mijumbi, R., & Hines, A. (2020). 5G network slicing using SDN and NFV: A survey of taxonomy, architectures and future challenges. *Computer Networks*, 167, 106984.
- Battiti, R., Villani, A., & Le Nhat, T. (2002). Neural network models for intelligent networks: deriving the location from signal patterns. *Proceedings of AINS*.
- Beer, R. D. (1996). Toward the evolution of dynamical neural networks for minimally cognitive behavior. *From animals to animats*, 4, 421-429.
- Bleser, G., Damen, D., Behera, A., Hendebay, G., Mura, K., Miezal, M., ... & Stricker, D. (2015). Cognitive learning, monitoring and assistance of industrial workflows using egocentric sensor networks. *PloS one*, 10(6), e0127769.
- Byun, J., Hong, I., Kang, B., & Park, S. (2011). A smart energy distribution and management system for renewable energy distribution and context-aware services based on user patterns and load forecasting. *IEEE Transactions on Consumer Electronics*, 57(2), 436-444.
- Caudill, M., & Butler, C. T. (1990). *Naturally intelligent systems*. MIT press.
- Cavalcante, R. C., Brasileiro, R. C., Souza, V. L., Nobrega, J. P., & Oliveira, A. L. (2016). Computational intelligence and financial markets: A survey and future directions. *Expert Systems with Applications*, 55, 194-211.
- Cesana, M., Cuomo, F., & Ekici, E. (2011). Routing in cognitive radio networks: Challenges and solutions. *Ad Hoc Networks*, 9(3), 228-248.
- Li, D., Liu, C., & Gan, W. (2009). A new cognitive model: Cloud model. *International journal of intelligent systems*, 24(3), 357-375.
- Chen, M., Tian, Y., Fortino, G., Zhang, J., & Humar, I. (2018). Cognitive internet of vehicles. *Computer Communications*, 120, 58-70.
- Chen, M., Tian, Y., Fortino, G., Zhang, J., & Humar, I. (2018). Cognitive internet of vehicles. *Computer Communications*, 120, 58-70.
- Cheng, H., Lu, Y. C., & Sheu, C. (2009). An ontology-based business intelligence application in a financial knowledge management system. *Expert Systems with Applications*, 36(2), 3614-3622.

- Dimitrakopoulos, G., & Demestichas, P. (2010). *Intelligent transportation systems*. *IEEE Vehicular Technology Magazine*, 5(1), 77-84.
- Emel'yanov, S., Makarov, D., Panov, A. I., & Yakovlev, K. (2016). Multilayer cognitive architecture for UAV control. *Cognitive Systems Research*, 39, 58-72.
- Fadlullah, Z. M., Tang, F., Mao, B., Kato, N., Akashi, O., Inoue, T., & Mizutani, K. (2017). State-of-the-art deep learning: Evolving machine intelligence toward tomorrow's intelligent network traffic control systems. *IEEE Communications Surveys & Tutorials*, 19(4), 2432-2455.
- Fortuna, C., & Mohorcic, M. (2009). Trends in the development of communication networks: Cognitive networks. *Computer networks*, 53(9), 1354-1376.
- Fu, Y., Li, C., Yu, F. R., Luan, T. H., Zhao, P., & Liu, S. (2022). A survey of blockchain and intelligent networking for the metaverse. *IEEE Internet of Things Journal*, 10(4), 3587-3610.
- Ganin, A. A., Mersky, A. C., Jin, A. S., Kitsak, M., Keisler, J. M., & Linkov, I. (2019). Resilience in intelligent transportation systems (ITS). *Transportation Research Part C: Emerging Technologies*, 100, 318-329.
- Gelenbe, E. (2006, September). Users and services in intelligent networks. In *IEE Proceedings-Intelligent Transport Systems* (Vol. 153, No. 3, pp. 213-220). IET.
- Grosan, C., Abraham, A., Jain, L. C., & Kacprzyk, J. (2011). *Intelligent systems* (Vol. 17, pp. 261-268). Berlin: Springer.
- Hopgood, A. A. (2021). *Intelligent systems for engineers and scientists: a practical guide to artificial intelligence*. CRC press.
- Hurwitz, J., Kaufman, M., Bowles, A., Nugent, A., Kobielus, J. G., & Kowolenko, M. D. (2015). *Cognitive computing and big data analytics* (Vol. 288). Indianapolis: Wiley.
- Kalogirou, S. A. (2001). Artificial neural networks in renewable energy systems applications: a review. *Renewable and sustainable energy reviews*, 5(4), 373-401.
- Kingdon, J. (2012). *Intelligent systems and financial forecasting*. Springer Science & Business Media.
- Knapp, E. D. (2024). *Industrial Network Security: Securing critical infrastructure networks for smart grid, SCADA, and other Industrial Control Systems*. Elsevier.
- Kolokotsa, D. E. K. D., Rovas, D., Kosmatopoulos, E. A., & Kalaitzakis, K. (2011). A roadmap towards intelligent net zero-and positive-energy buildings. *Solar energy*, 85(12), 3067-3084.
- Magedanz, T., Popescu-Zeletin, R., & Thörner, J. (1998). *Intelligent networks*. International Thompson Computer Press. —1966.—312 p.
- Mahmood, K., Grønsund, P., Gavras, A., Weiss, M. B., Warren, D., Tranoris, C., ... & Muschamp, P. (2019, September). Design of 5G end-to-end facility for performance evaluation and use case trials. In *2019 IEEE 2nd 5G World Forum (5GWF)* (pp. 341-346). IEEE.
- Mahmood, N. H., Alves, H., López, O. A., Shehab, M., Osorio, D. P. M., & Latva-Aho, M. (2020, March). Six key features of machine type communication in 6G. In *2020 2nd 6G Wireless Summit (6G SUMMIT)* (pp. 1-5). IEEE.
- Manickam, P., Mariappan, S. A., Murugesan, S. M., Hansda, S., Kaushik, A., Shinde, R., & Thipperudraswamy, S. P. (2022). Artificial intelligence (AI) and internet of medical things (IoMT) assisted biomedical systems for intelligent healthcare. *Biosensors*, 12(8), 562.
- McDonald, J. (2008). Adaptive intelligent power systems: Active distribution networks. *Energy Policy*, 36(12), 4346-4351.
- Medsker, L. R. (2012). *Hybrid intelligent systems*. Springer Science & Business Media.
- Meilinger, T. (2008). The network of reference frames theory: A synthesis of graphs and cognitive maps. In *Spatial Cognition VI. Learning, Reasoning, and Talking about Space: International Conference Spatial Cognition 2008, Freiburg, Germany, September 15-19, 2008. Proceedings 6* (pp. 344-360). Springer Berlin Heidelberg.
- Mitchell, M. (2006). Complex systems: Network thinking. *Artificial intelligence*, 170(18), 1194-1212.
- Niu, H., Li, H., Gao, S., Li, Y., Wei, X., Chen, Y., ... & Shen, G. (2022). Perception-to-cognition tactile sensing based on artificial-intelligence-motivated human full-skin bionic electronic skin. *Advanced Materials*, 34(31), 2202622.
- Ormond, O., Murphy, J., & Muntean, G. M. (2006, June). Utility-based intelligent network selection in beyond 3G systems. In *2006 IEEE international conference on communications* (Vol. 4, pp. 1831-1836). IEEE.
- Pearl, Judea. *Probabilistic reasoning in intelligent systems: networks of plausible inference*. Elsevier, 2014.

- Posada, J., Toro, C., Barandiaran, I., Oyarzun, D., Stricker, D., De Amicis, R., ... & Vallarino, I. (2015). Visual computing as a key enabling technology for industrie 4.0 and industrial internet. *IEEE computer graphics and applications*, 35(2), 26-40.
- Qureshi, K. N., & Abdullah, A. H. (2013). A survey on intelligent transportation systems. *Middle-East Journal of Scientific Research*, 15(5), 629-642.
- Ran, B., & Boyce, D. (2012). *Modeling dynamic transportation networks: an intelligent transportation system oriented approach*. Springer Science & Business Media.
- Robrock, R. B. (2002). The intelligent network-Changing the face of telecommunications. *Proceedings of the IEEE*, 79(1), 7-20.
- Sinha, N. K. (1996). *Intelligent control system*. M. M. Gupta (Ed.). New York: IEEE press.
- Strasser, T., Andrén, F., Kathan, J., Cecati, C., Buccella, C., Siano, P., ... & Mařík, V. (2014). A review of architectures and concepts for intelligence in future electric energy systems. *IEEE Transactions on Industrial Electronics*, 62(4), 2424-2438.
- Sudmann, A. (2019). *The Democratization of Artificial Intelligence: Net Politics in the Era of Learning Algorithms (Edition 1)*. transcript Verlag.
- Sun, Q., Li, H., Ma, Z., Wang, C., Campillo, J., Zhang, Q., ... & Guo, J. (2015). A comprehensive review of smart energy meters in intelligent energy networks. *IEEE Internet of Things Journal*, 3(4), 464-479.
- Tragos, E. Z., Zeadally, S., Fragkiadakis, A. G., & Siris, V. A. (2013). Spectrum assignment in cognitive radio networks: A comprehensive survey. *IEEE Communications Surveys & Tutorials*, 15(3), 1108-1135.
- Wilamowski, B. M., & Irwin, J. D. (Eds.). (2018). *Intelligent systems*. CRC press.
- Wu, Y., Dai, H. N., Wang, H., Xiong, Z., & Guo, S. (2022). A survey of intelligent network slicing management for industrial IoT: Integrated approaches for smart transportation, smart energy, and smart factory. *IEEE Communications Surveys & Tutorials*, 24(2), 1175-1211.
- Yang, G., Xie, L., Mäntysalo, M., Zhou, X., Pang, Z., Da Xu, L., ... & Zheng, L. R. (2014). A health-IoT platform based on the integration of intelligent packaging, unobtrusive bio-sensor, and intelligent medicine box. *IEEE transactions on industrial informatics*, 10(4), 2180-2191.
- Yuan, X., Chen, J., Yang, J., Zhang, N., Yang, T., Han, T., & Taherkordi, A. (2022). Fedstn: Graph representation driven federated learning for edge computing enabled urban traffic flow prediction. *IEEE Transactions on Intelligent Transportation Systems*, 24(8), 8738-8748.
- Zilouchian, A., & Jamshidi, M. (Eds.). (2001). *Intelligent control systems using soft computing methodologies*. CRC press.
- Zorzi, M., Zanella, A., Testolin, A., De Grazia, M. D. F., & Zorzi, M. (2015). Cognition-based networks: A new perspective on network optimization using learning and distributed intelligence. *IEEE Access*, 3, 1512-1530.

USE OF CHATBOTS FOR CUSTOMER SERVICE IN THE CONSULTANCY SECTOR OF INDIA: A LITERATURE-BASED REVIEW

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Abstract

Service delivery across different sectors of the Indian economy have been transformed by the application of Artificial Intelligence, particularly chatbots. This paper examines the adoption of chatbots in the Indian consultancy sector, makes strategic recommendations and points out areas of further research. The paper is a literature-based review. Five critical areas of chatbot adoption are lead generation and pre-sales communication, client onboarding, real-time query resolution, knowledge management and internal efficiency, and client engagement and relationship management. The advantages of chatbots are 24/7 accessibility, cost efficiency, scalability, consistency of service delivery and improvement of client experience. Challenges are caused by the complexity and contextual nature of consulting services, issues of trust and credibility, data security and privacy risks, India's linguistic diversity, integration challenges, and regulatory constraints. There are variations in the adoption of chatbots among the various sub-sectors of the consultancy sector. IT consulting has the fastest adoption followed by HR. Management and Strategy consulting firms have been slow to adopt due to need for strategic diagnosis. Legal advisory services have the slowest rate of adoption due to regulatory frameworks. Financial advisory firms have been slow but steady in their adoption though primarily dependent on human expertise. What has been the most effective path to adoption is a hybrid model where automation of routine tasks, documentations and interactions are complemented by human expertise in complex advisory roles. There is need for advancements in NLP technology, establishment of strong data governance framework, education of clients in the use of chatbots, and upskilling of the workforce. The need of future research lie in areas such as NLP technology, the study of ethical and regulatory issues, empirical research into customer perception regarding the advantages of chatbot usage, dynamics of human-bot collaboration, and the development of performance measurement frameworks.

Keywords: *Artificial Intelligence (AI), Chatbots, Indian Consultancy Sector, Digital Transformation, Lead Generation, Client Onboarding, Real-Time Query Resolution, Knowledge Management.*

1. Introduction

With rapid strides being made in digital technology, it is only natural that these developments will be reflected in the application of AI by organizations. One of the increasing areas of such application is in the use of AI for increasing customer engagement. Chatbots, which are conversational AI tools, are being used in customer service. As pointed out by scholars, this is leading to quicker and more consistent service and is allowing for larger volume of customer service to be handled (Adam et al.,

2020). Industries across different sectors of the economy such as banking and financial services, ecommerce and retail, healthcare, hospitality and tourism, education to name a few, are increasing using chatbots for customer service to handle routine enquiries and improve the experience from the customer's point of view.

Despite the increasing use of chatbots for customer service, their use in the consultancy sector remains limited as of now. Consultancy is a service largely dependent on expertise, credibility, trust and relationship building (KPMG, 2020). Human judgement, tacit knowledge and an understanding of the context are the pillars of consultancy services (Schein, 2016). However, the rapidly changing technological environment is compelling organizations providing consultancy services to increasingly employ chatbots for customer service to improve productivity and give an edge over competitors. Chatbots are helping in handling routine tasks, giving greater accessibility, doing initial screenings and improving the response time in interactions with clients (Grewal et al., 2020).

This paper is a literature-based review of the application of chatbots in customer service in the consultancy sector of India. The paper examines existing literature, examines the challenges facing the application of chatbots in this sector, explores the opportunities ahead and identifies gaps which can be met by further research.

The authors have accessed articles in peer reviewed journals, conference proceedings, working papers, technology reports, white papers and case studies of the Indian industries published between 2015 and 2024. Although there is a large volume of literature on the application of chatbots in customer service in the global context, studies on the Indian scenario are rare.

2. Objectives

The objectives of this paper, based on literature review, are as follows:

- To study how chatbots are being used by Indian consultancy organizations for customer service activities.
- To examine how the workflows in consultancy firms are being impacted by the application of chatbots.
- To identify the limitations in the application of chatbots in this area and also the potential risks.
- To examine the application of chatbots in different consultancy areas including HR, IT, Management, Legal and Financial consultancy services.
- To make strategic recommendations for the future use of chatbots in these sectors.
- To identify the areas of future research in this area based on the gaps in existing literature.

3. Methodology

This paper is a literature-based review. The academic sources have been accessed through Scopus, EBSCO, Google Scholar, IEEE Explore, Research Gate and SSRN. Apart from academic sources, industry reports have also been studied from NASSCOM, Deloitte, PwC, Accenture and KPMG. Case studies from Indian industries have been studied from company websites and business magazines.

The inclusion criteria were as follows:

- Publications dated 2015–2024.
- Focus on chatbots, conversational AI, customer service automation, or consultancy.
- Indian or Asian-context studies, or global studies relevant to consultancy.
- English language literature.

The exclusions included the following:

- Duplicate studies.
- Purely technical engineering papers not relevant to customer service.
- Studies not relevant to consultancy services.

4. The conceptual understanding of chatbots

One of the components of digital communication is the chatbot which is becoming more and more important with the evolution of technology. They act as conversational agents linking the customer to the organization through text-based or voice-based interfaces. The chatbots seek to understand inputs, create appropriate responses, guide the user through tasks of flow of information (Shawar & Atwell, 2007) and ultimately simulate human-like conversations. As Natural Language technologies develop at a rapid rate, chatbots become more and more powerful and sophisticated in their understanding of and responses to human language. In consultancy services, they help in engaging the customer, improving service efficiency and providing easier access to information.

There are two main types of chatbots based on their basic architecture – Rule-based chatbots and AI-driven chatbots.

4.1 Rule-based chatbots

Structured logic is the basis on which Rule-based chatbots function. There are preset scripts and conditional pathways which direct the chatbot on how to respond to different types of inputs from users. Detecting keywords, following structured prompts and conditional logic are some of the rules that link specific inputs to predetermined outputs. These chatbots are deterministic in nature. Hence, they are most effective in conditions where the user input can be predicted and are repetitive (Hobert, 2019). This on the other hand is the limitation of Rule-based chatbots. They are useful in answering frequently asked questions and to guide users through standard procedures. Basic customer support activities can be performed by these Rule-based chatbots. The popularity of Rule-based chatbots is largely due to the fact that they are relatively inexpensive, easily manageable and require simple computational resources.

Since Rule-based chatbots are extremely of a deterministic kind, their use becomes restricted to routine queries which can be predicted. The moment a conversation treads new paths and become specific to the particular context, the Rule-based chatbots cannot perform effectively. In such situations the Rule-based chatbots cannot understand the queries, interpret them wrongly, and hence give irrelevant responses.

4.2 AI-driven chatbots

AI-driven chatbots are technologically more developed than Rule-based chatbots. The AI-driven chatbots are based on Natural Language Processing (NLP), Machine Learning (ML), deep learning as well as context modelling. As a result, compared to Rule-based chatbots, the AI-driven chatbots give more flexible which are more human-like and adapt to changing contexts. (Følstad & Brandtzæg, 2017). The AI-driven chatbots can better understand the inputs from the user since they learn from past experience in a dynamic fashion. Predetermined scripts are not the basis of their responses. Open-ended and complex questions are dealt with more effectively by AI-driven chatbots rather than Rule-based ones.

The power of chatbots has been exponentially increased with developments in AI, particularly Transformer Architecture and Large Language Models (LLM). As a result of these developments,

chatbots are able to better grasp the context, recognize sentiments, understand and interpret multilingual inputs. The resultant conversations are more human-like, meaningful and natural. Apart from handling routine tasks, chatbots can also help in decision-making and guide the users in a flexible way by integrating information.

AI-driven chatbots have benefited from developments in technology, yet they continue to face challenges in their application in the consultancy sector. Consultancy services require a deep understanding of the circumstances or context, an extremely high level of domain knowledge, an awareness of the situation and the ability to interpret subtle cues. This requires human expertise which prevents full automation of the consulting process.

5. Overview of the Consultancy Sector in India

The past decade has seen great changes in India's consultancy sector. This is one of the fastest growing sectors of the contemporary Indian economy. As the need for specialized advisory support grows in both public and private enterprises, the consultancy sector is valued between USD 12 to 14 billion (IBEF, 2023). There are various sub-segments within the consultancy sector. These include management and strategy consulting, IT and technology consulting, human resource consulting, financial consulting, legal consultancy and others. Consultancy services are tailored for specific needs of small and medium enterprises (SMEs) as well. Each sub-sector has its own particular client base and its own models of service delivery. They all rely on deep domain expertise and personalized engagement.

The consultancy sector in India is facing a fiercely competitive market and a rapidly changing environment both in terms of regulations, workforce challenges and digital technology. Requirements in terms of domain knowledge and quality of delivery are extremely high. Customer service queries in transactional industries such as retail and banking are relatively standardized and routine. In contrast, customer service queries in the consultancy sector involve complex and multidimensional problem solving which requires human judgement, tacit knowledge and a deep understanding of client context (Schein, 2016). This poses a big challenge in terms of automating customer services in the consultancy sector.

However, with growing competition and increasing developments in digital technology, the consultancy sector is being compelled to meet growing customer expectations in terms of accessibility and speed of responses. Trust, confidentiality, analytical capability and customization are what customers seek in the consultancy organizations. With such developments, consulting firms are being compelled to redesign their customer services. Greater efficiency and scalability of services, together with keeping costs in control, are the call of the day for consulting firms. Hence AI-driven chatbots are being increasingly used for functions like lead generation, initial communication with the clients, onboarding assistance, and the dissemination of routine information. While not replacing expert consulting judgement, these chatbots are complementing human judgement to streamline the services of the consulting firms.

6. Applications of Chatbots in Consultancy Customer Service

In consultancy organizations, chatbots are used particularly in customer service and frontline activities. Five major areas have been identified by existing literature. Routine activities are being streamlined, turnaround time being reduced and overall client experience being enhanced by the application of chatbots. In a growing emergence of hybrid service models, chatbots are being integrated in consulting operations. Repetitive tasks and information-based activities are being handled by chatbots while analytical and strategic functions are being focused on by human consultants.

6.1 Lead Generation and Pre-sales Communication

It is in the area of lead generation and pre-sales activities that chatbots have been earliest used in the consultancy services and have been widely documented in the body of research. Prospective clients are identified from the organization's website and social media pages and interactions are initiated with them by chatbots instead of dedicated human resources. Client information is collected at a basic level, and their initial needs are understood through intent-detection algorithms. This provides guidance on what services are to be offered. Chatbots are synchronized with calendars and automatic scheduling helps the clients and organization. Prospective clients are filtered based on the services they require, their budget, their timelines. As a result, the lead qualification cycles are improved. TeamLease, NIIT and other such Indian HR consultancy firms have employed chatbots for these lead generation and pre-sales screening which has accelerated this process and increased conversion rates (Accenture, 2020).

6.2 Client Onboarding

There is a lot of documentation, information gathering and explanation of procedures required at the time of client onboarding. These activities are streamlined by chatbots. They guide clients through each step of the process, answer their queries and gather data in a structured manner. The chatbots function like virtual onboarding assistants. Depending on the consulting service, the chatbots provide customized onboarding flows. The automation by chatbots reduces the administrative burden on consultants, increases the accuracy and leads to the quicker initiation of consulting projects (KPMG, 2020). In consulting areas like IT and HR with high-volume engagements, the onboarding process becomes more consistent across different clients thanks to the automation provided by chatbots.

6.3 Real-time Query Resolution and Customer Support

Routine and repetitive client queries are widely handled by chatbots. Even though specialized issues in consultancy may not be fully resolved by chatbots, they are employed successfully for providing clients with information about the service process, timeline of the project, documents required and status updates. Knowledge articles, policy documents and templates can be quickly accessed through chatbots. When the chatbots cannot cope with queries which go beyond their AI capabilities, there is a smooth transition of the query to human clients. As a result, client frustration is reduced. The reduced response delays due to the engagement of chatbots lead to greater customer satisfaction (Grewal et al., 2020). Following the implementation of AI helpdesks for clients to troubleshoot basic issues, Indian IT consulting companies have reported improved internal support metrics.

6.4 Knowledge Management and Internal Efficiency

Given the knowledge intensive nature of their work, consulting firms need to access information in a timely manner. They are able to retrieve documents, access knowledge repositories and offer procedural guidance thanks to the functioning of chatbots. Instructions given by the chatbot lead to internal work processes becoming standardized. Greater automation implies less dependence on individual human capabilities. Thanks to chatbots operational efficiency is increased since less time is needed for information searching. This allows consultants to turn their time and energy to more complex analytical tasks. This kind of application of chatbots is particularly advantageous for large consultancy firms which deal with a large volume of documentation and have complex work processes.

6.5 Client Engagement and Relationship Management

A critical factor in the success of consultancy firms is the building up of long-term relationships with clients. In this area the help from chatbots comes from sending personalized reminders and updates.

Chatbots also share newsletters and gather feedback. Pulse surveys are also conducted by them on a periodic basis. Natural Language Processors enable chatbots to do sentiment analysis. By identifying sentiments, chatbots can point out areas of improvement. By carrying out all these activities, chatbots help to free up valuable human resources. The enhanced client loyalty is strengthened and leads to the basis of a long-term relationship between the organization and the client (Følstad & Skjuve, 2019). This is a huge advantage for consultancy firms in the face of fierce competition as the perception of service quality goes up.

7. Benefits of Chatbots in Consultancy Services

The benefits accruing to the consultancy firm as a result of using chatbots are both tangible and strategic in nature. One of the greatest benefits, widely cited in literature, is 24/7 availability. This allows clients to gain access to basic information and initiate service requests at any time. Client engagement is not constrained by office hours and availability. Waiting time is reduced and responsiveness to client queries enhanced, leading to greater customer satisfaction. Given the fast-paced environment in which consultants work, this advantage is of great value.

Cost efficiency is yet another advantage of using chatbots. Routine and repetitive interactions are automated as is the gathering of information and providing of updates to the clients. Administrative workload is hence reduced and human resources can focus on more high-value and complex tasks which required analytical and strategic expertise. Such efficiencies caused by automation can bring down the cost of customer service by up to as much as 30% (IBM, 2021) which is of great benefit, particularly to small and medium consultancy firms in India with financial resource constraints.

Scalability is another benefit gained from the application of chatbots. There is a huge growth in the volume of customer interactions which is disproportionate to the growth of the consultancy business. Chatbots can handle this growing volume with much greater efficiency than human agents. During peak traffic like recruitment drives, major IT deployments, compliance cycles and so forth, client engagement continues to be smoothly handled by chatbots.

The service delivery continues to be consistent due to the application of chatbots. Human agents differ from each other in terms of manner of communication, availability, interpretation of the policies of the organization and so forth. In contrast, automated responses by chatbots remain standardized, in line with the organization's policies, knowledge base and communication guidelines. As a result, variations are reduced, and all clients receive uniform and accurate information from chatbots.

All these benefits – 24/7 availability, cost efficiency, scalability and consistency in service delivery – translate into better client experience and therefore higher customer satisfaction. As response times get better and onboarding processes become more structured, the consulting firms are able to stand apart from their competitors. Innovation, responsiveness and operational maturity become the forte of these firms.

8. Challenges and Limitations

It is the complexity of consultancy services and their contextual nature which poses a major challenge in the application of chatbots to this sector. Business scenarios differ from client to client. Each client has to be delivered a unique customized solution. This high level of sensitivity cannot be handled even by advanced AI-driven chatbots. Maintaining client trust and credibility is of paramount importance in consultancy services. Clients are reluctant to share sensitive business information with automated systems. They fear that their privacy and confidentiality may be breached and that there may be no point of accountability with chatbots. Flaws in chatbot design and the way in which they are integrated into the work processes might expose the system to risks of data security. There are regulatory

frameworks including the Digital Personal Data Protection Act (DPDP) in India to guard against data and privacy breach. Such security concerns make the application of chatbots extremely complex.

India is a country of diverse languages and cultures. Different languages with different local dialects, the use of mixed languages like Hindi and English, the presence of multiple sub-cultures all make chatbot adoption a major challenge. It is only with exponential developments in the areas of sophisticated multilingual NLP models can such problems be overcome to some extent.

Consulting firms in India often work with old legacy systems, enterprise software, which is outdated, compartmentalized data repositories and so forth. While integrating chatbots with these existing systems, care has to be taken not to compromise data accuracy. All this is a big challenge in terms of expertise.

Finally, in consulting areas like legal and financial services, the constraints imposed by regulatory bodies restrict the degree of automation allowed in client services. Human accountability is of utmost importance in the eyes of these regulatory bodies. This creates boundaries and limits to the kind of information that chatbots can legally provide.

9. Sector-wise Adoption Trends in India

Within the Indian consultancy sector, and even within the subsectors, there are variations in the adoption of chatbots.

As is to be expected, the adoption rates are highest in the IT consulting sector because of its technological advancement and familiarity with digital tools. In IT advisory firms, chatbots are used for interacting with clients and also for internal activities including systems guidance, ticketing and troubleshooting.

Adoption of chatbots is also high in HR consulting. Screening of candidates, scheduling interviews, onboarding, carrying out employee engagement surveys and handling frequently asked questions are some of the activities in this sector where chatbots are extensively employed. Companies such as TeamLease and NIIT are examples of how conversational bots are successful in managing high volume interactions.

Consultancy firms in the Management and Strategy sector are slower in adoption of chatbots. The use of chatbots is limited to initial activities like lead qualification and client communication. More critical activities like strategic diagnosis continue to be human driven. Firms in this sector are cautious about using chatbots for critical interactions with clients.

The slowest adoption of chatbots has been in Legal consultancy. Automation is limited because of strong confidentiality requirements and ethical issues. The use of chatbots in this sector has been for general information support rather than advisory functions.

The adoption has been slow but steady in the Financial advisory companies. Automation is primarily in customer support functions like assistance with documentation and procedural queries. Advisory tasks continue to be controlled through human supervision.

The variations among different sub sectors of the consultancy sector goes to prove that the adoption and integration of chatbots depends on the complexity of the activities, the regulatory constraints and also the digital maturity of the organization.

10. Strategic Implications for Consultancy Firms

The adoption of chatbots in the consultancy sector primarily continues to be a partnership between automation of routine tasks and human expertise for complex advisory roles. This hybrid service model is leading to greater efficiency of the consultancy firms without compromising, or even enhancing, the quality of service delivered which is reflected in greater customer satisfaction.

For the successful integration of chatbots in the consultancy firms, investment in NLP technologies which are relevant to Indian language and cultural contexts is of utmost importance. The chatbots must be able to interact with clients using diverse linguistic patterns, colloquial phrasing and regional nuances to be truly effective and relevant in their responses.

Given the nature of confidential data handled by security firms, it is essential to be compliant with the DPDP Act and follow global best practices in cybersecurity. This will enhance client trust. On the other hand, if the chatbot systems are not properly secured, it will lead to damage of the company's reputation and legal consequences.

Another area of great priority is educating the client. All clients will not be equally familiar with conversational AI, their usage and also the limit to their abilities. These must be spelt out to the clients by the firms so that the customers' expectations from chatbots are realistic. Else the customer satisfaction will be negatively impacted.

The adoption of chatbots must go hand-in-hand with upskilling of the workforce. Consultants must be trained to collaborate effectively with the AI tools. They must learn how to interpret chatbot analytics, refine the workflow of chatbots and maintain knowledge bases in a way which chatbots can access. This calls for significant investment in training.

11. Future Research Directions

There are several areas which require further research as evident in this paper. Firstly, studies need to be carried out through surveys, interviews and experiments to understand customer perceptions. To what extent clients trust chatbots, are satisfied with them and consider them to be useful in consultancy firms needs to be examined at depth through empirical research. The existing studies are mostly conceptual or anecdotal.

The ethical issues and regulatory framework need to be studied at greater depth. These studies should include transparency, fairness, accountability and other such aspects of consultancy services in the context of chatbot adoption.

The successful adoption of chatbots will increase with greater research on multilingual NLP performance in the Indian context.

The collaboration between chatbots and humans in knowledge-intensive work needs to be explored at greater depth. Like the perception of clients, similarly that of consultants regarding chatbot adoption needs to be understood. Empirical studies must establish the impact of chatbots on productivity, the quality of work and professional identity.

Finally, research needs to be carried out to develop performance measurement metrics for the effectiveness of chatbots in consultancy in terms of efficiency, client satisfaction and accuracy of services offered.

12. Conclusion

AI tools like chatbots are here to not only stay but grow in different sectors including the consultancy sector in India. They can definitely be used to improve responsiveness, enhance efficiency and support structured client interactions. However, they cannot be a substitute for the expertise and judgement of human consultants. Chatbots and human consultants must complement each other. They will provide a great advantage to small and medium consultancy firms to compete in the market and become more professional.

However, limitations regarding trust, the contextual complexity, data privacy, diversity of languages and integration of technology need to be addressed to achieve greater adoption of chatbots. Greater investment in NLP technology and strengthening of data governance can help to overcome some of the critical constraints in the adoption of chatbots. With the adoption of hybrid models where the automation of chatbots is partnered effectively with human expertise, the full potential of chatbots can be utilized by the consultancy firms in India.

References

- Accenture. (2020). *AI in professional services: Enhancing client engagement*. Accenture Research.
- Adam, M., Wessel, M., & Benlian, A. (2021). AI-based chatbots in customer service and their effects on user compliance. *Electronic Markets*, 31(2), 427–444.
- Deloitte. (2021). *Automation and AI in consulting: The future of work in professional services*.
- Følstad, A., & Brandtzæg, P. B. (2017). Chatbots and the new world of HCI. *Interactions*, 24(4), 38–42.
- Følstad, A., & Skjuve, M. (2019). Chatbots for customer service: User experiences and motivations. *Computers in Human Behavior*, 92, 407–418.
- Grewal, D., Roggeveen, A. L., & Nordfält, J. (2020). The future of customer engagement. *Journal of Retailing*, 96(1), 1–6.
- Hobert, S. (2019). How are you, chatbot? Evaluating user satisfaction. *International Journal of Human–Computer Interaction*, 35(10), 919–931.
- IBM. (2021). *The value of AI-enabled customer engagement*. IBM Institute for Business Value.
- IBEF. (2023). *Management consulting industry in India*. India Brand Equity Foundation.
- KPMG. (2020). *Future of consulting: Intelligent automation trends*.
- Luger, E., & Sellen, A. (2016). Like having a really bad PA: The gaps between user expectation and experience of conversational agents. *CHI Conference Proceedings*, 5286–5297.
- NASSCOM. (2022). *Conversational AI in India: Adoption trends and opportunities*.
- PwC. (2020). *AI in consulting: Risks and regulatory considerations*.
- Schein, E. H. (2016). *Humble consulting*. Berrett-Koehler Publishers.
- Shawar, B. A., & Atwell, E. (2007). Chatbots: Are they really useful? *LDV Forum*, 22(1), 29–49.
- Vaswani, A., Shazeer, N., Parmar, N., Uszkoreit, J., Jones, L., Gomez, A. N., ... Polosukhin, I. (2017). Attention is all you need. *Advances in Neural Information Processing Systems*, 5998–6008.

A COMPREHENSIVE STUDY OF LITERATURE ON ESG AND ITS IMPACT ON CORPORATE PERFORMANCE

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Abstract:

This study unfolds a comprehensive review of literature, analysing the relation between Environmental, Social and Governance (ESG) practices and performance of the firm. Starting from investor, suppliers, entrepreneur, employees of the firm to policy maker, Government, researcher and academicians employ a primary concern on risk associated with environment, social responsibility and appropriate Governance on sustainability. Therefore, this study assists to provide an extensive investigation on ESG activities and its impact on firm performance by both systematic literature review and bibliometric analysis. This study reviews over twenty years of literature and emphasizes various aspects such as impact of ESG on corporate governance, corporate credit spreads, corporate financial performance, corporate value, cost of capital, corporate social responsibility and corporate strategy. Additionally, through bibliometric analysis it presents a global connections and trends in research related to ESG and Corporate performance. This research aids to comprehend the trends by focusing on number of publications each year, co-authorship network analysis, sources of cited paper and density visualization of impacted journals. This study enhances understanding of the critical gap in literature on the field of ESG and firm performance and recognises future scope of the study on evaluation of ESG activities in corporate strategy and decision making.

Keywords: *ESG, Corporate Performance, Systematic Literature Review, Bibliometric Analysis, Corporate sustainability*

Introduction

Various international organizations are collaborating with financial institutions to establish a cohesive framework for ESG measurement that corresponds with common objectives of sustainable and long-term economic advancement. Stakeholders need to accurately capture ESG related information disclosed by firms to incorporate the ESG issues in their decision-making. This shift is driven by increasing awareness of the interconnectedness between environment, society, and overall governance structures and their impact on corporate performance. Before the term ESG first appeared in modern literature a more comprehensive idea of Corporate Social Responsibility (CSR) and Socially Responsible Investing (SRI) was established in late 20th century. Then, in early 2000s the term ESG emerged particularly after United Nation's Principles for Responsible Investment (PRI) were introduced in 2006. Today ESG has become a primary concern for corporate entrepreneurs, investors, employees, suppliers, policy makers, researchers etc. This paper aims to provide a comprehensive study on ESG activities and its impact on firm performance by both systematic literature review and bibliometric analysis. This study consolidates data from over twenty years of research studies undertaken across a variety of geographic regions, industries and methodologies with a focus on both consensus and discord. This research also provides an overview of ESG and investigates its interrelated impacts on corporate value, corporate credit spreads, corporate governance, cost of capital and corporate strategies. This study also presents an overview of bibliometric analysis, with a particular focus on the number of research papers published each year, the network metrics of each country, the sources of cited papers, name of journals, co-authorship network analysis where the articles are published and the density visualization that

shows where journals have the most impact. Overall, this study presents many perspectives on several aspects of ESG and its impact on firm performance. It shows consensus as well as conflicts in various sectors, geographical dimensions and approaches related to ESG and its impact on corporate performance in the body of literature. Most studies show positive correlation between ESG and financial results of firms such as return on Assets, Return on Equity and market valuation but few studies also depict other factors to influence firm performance like firm characteristics, governance structure and regional institution framework etc.

Systematic Literature Review

ESG and Corporate Performance

The effect of all ESG elements on financial performance in the global context is not conclusively demonstrated by previous research that examined the topic in depth. It is indicated in various studies that the majority of ESG operations do not adversely impact financial performance. (Xie et al., (2018) investigates the impact of distinguished ESG initiatives on numerous aspects of corporate financial performance where it shows the governance disclosure has the strongest beneficial link to firm efficiency. The study by (Zhao et al., (2018) emphasizes the importance of incorporating ESG elements into business decision-making, particularly in sectors such as power generation where sustainability issues are becoming more apparent. Integration of ESG report not only enhance the public relations but will also help in achieving long term sustainability and firm's financial growth. The research conducted by (Khoury et al., (2021) reveals that the relationship between ESG and CFP is not consistent; it fluctuates based on the specific ESG component, financial indicator, and industry setting. At the industry level, ESG negatively affects performance in the transportation sector, whereas it has no influence on the capital goods sector.

ESG and Corporate Governance

Standardized indicators are becoming more and more necessary as investors depend more on ESG measurements to comprehend internal operations and pay attention to important sustainability aspects. Numerous global financial institutions are searching for a common objective to achieve sustainable growth by constructing key performance indicators of Environmental, Social and Corporate Governance. The combination of ESG indicators into long-term investment strategy can also influence the economic perspective of a firm. Hence, (Kocmanova and Docekalova (2012) focuses on the relation between the ESG indicators and economic performance of the firm along with long-term risks and opportunities. The result shows that integrated reporting such as integration of ESG indicators with economic performance help to impact positively to boost long-term performance of a firm. In the modern business environment, where corporate decisions are critically evaluated for long-term effects, it is imperative to understand the concerns behind ESG controversies. In conjunction with the legitimacy, stakeholder, and agency theories, (Treepongkaruna et al., (2024) examine how ESG disputes affect a company's risk and profitability, emphasizing the true financial impact of these issues. The result of the study focuses on the crucial role of ESG practices and internal governance play in shaping the strategic and financial outcomes, particularly in the corporate control market. It also demonstrates that in support of resource dependence theory, larger boards are more productive. The research study suggests that larger boards are associated with fewer ESG- related conflicts as there remains diversity in culture, knowledge and ESG awareness.

ESG and Corporate Credit spreads

Corporate credit spreads are impacted by ESG since businesses with strong ESG policies are frequently seen as having fewer credit risks, which results in better borrowing conditions (Kim and Li, (2021). Conversely, neglecting ESG factors can expose companies to considerable financial dangers, including penalties from regulators, harm to their reputation, and a decline in investor confidence. According to

a study by (Yang et al., (2021), ESG disclosure may increase investor confidence and business value by reducing bond credit spreads. This benefit seems to be stronger for companies that operate in less polluting and energy-intensive industries. A cash flow channel analysis indicates that issuers with higher ESG ratings had statistically stronger financials compared to those with lower ratings, thereby enhancing the quality of their credit (Mendiratta et al., (2021). (Okimoto and Takaoka, (2022) conducts a study that examines the impact of ESG performance on bond price using corporate credit spreads where the overall findings show that credit spreads are significantly lower when ESG performance is high. The study by (Lian et al., (2023) finds ESG lowers the credit spreads on bond by reducing risk factors such as corporate information risk and expenditures on debt financing.

ESG and Corporate Value

Prior literatures have conducted research related to ESG and firm performance from various aspects, but limited research is shown the perspective of ESG in creation of value of firm. A paradigm change has occurred when environmental, social, and governance variables are incorporated into corporate valuation procedures. (Yu and Xiao, (2022) in their study, has constructed a new ESG scoring system to interpret the firm' performance of China where the result shows that ESG composite score has positive relation with firm value. However, individual score of ESG does not show consistent positive result on firm value. The analysis of the study by (Zheng et al., (2022) observes that ESG performance provides stakeholders relevant information about heavily polluting as well as non-heavily polluting enterprises and their effect on corporate value. It also demonstrates that one of the components of ESG – Governance has no significant connection with firm value whereas, Environmental and Social both have positive relation with firm value. This study further analyses relationship of mediators and ESG performance that helps to enhance corporate value. On the other hand, (Signori et al., (2021) examines additional initiative of value added to measure how firm generate and distribute value to stakeholders through ESG rating and Economic value added (EVA).

ESG and Cost of Capital

There has been a rising realization of the connectivity between business sustainability and financial performance, which has led to an increase in the prevalence of the incorporation of environmental, social, and governance considerations into the process of making financial decisions. (Reverte, (2012) finds companies in environmentally sensitive industries have a stronger negative correlation between the quality of their CSR disclosures and the cost of equity capital. Ramirez et al., (2022) conduct a study that explores the relationship between ESG scores and the cost of capital, revealing that enhanced ESG practices may lower financing costs. It also reveals that, among the three ESG pillars, governance standards and internal transparency might enhance investor trust and firm valuation in the region. The various components of the cost of capital react differently to fluctuations in corporate sustainability, based on market conditions and industrial context. The research conducted by (Goncalves et al., (2022) is considered by both debt and equity markets. This study demonstrates that superior ESG scores correlate with a reduced cost of equity, while showing a positive association with the cost of debt. Companies exhibiting inferior ESG performance incur higher costs of equity.

ESG / Corporate Social Responsibility and Corporate strategy

As global stakeholders increasingly expect firms to operate responsibly, CSR is no longer viewed as a voluntary philanthropic activity but as strategic imperative that shapes long-term competitiveness. Although, many Chinese listed companies started voluntarily disclose CSR reports but the average number of disclosures are still less. (Yoon et al., (2018) observes in their research study that ESG score has affected on CSR performance and evaluates the valuation of firm accordingly. By embedding CSR into corporate strategy, firms can achieve both financial performance and sustainable development outcomes. The argument over CSR and its justifications for corporate culture, social innovation and civil society involvement must be evaluated critically. Hence, Hanke and Stark, (2009) draws a

conceptual framework in his study that is founded on the analytical distinctions between legitimization and sensemaking. Moreover, ESG considerations are increasingly integrated into corporate strategy, influencing decisions related to capital allocation, product development, and market entry, ultimately shaping corporate value and long-term resilience. (Weston and Nnadi, (2023) includes numerous real-world experiences to find the relation between CSR and Corporate financial performance and highlights strategic decision making that includes CSR and ESG concepts into corporate strategy and investment planning. It suggests business enterprises to follow Principles for Responsible Investing (PRI) to lead better financial results. Firms that are more focused on innovation and expansion are more likely to implement ESG practices. (Setiarini et al., (2023) investigates the ways in which the lifespan of a business stage, risk-taking behaviour and focus on strategy impact ESG practices globally. The study concludes that implementation of ESG practices are indicated as a key measurement of long-term sustainability of firms particularly in emerging financial markets.

Bibliometric Analysis of Review of Literature

With an emphasis on publishing trends and co-authorship patterns, this study provides a bibliometric analysis of the existing literature on ESG and its impact on corporate performance. It aims to determine the geographic distribution of scholarly collaborations, the evolution of research issues, and important contributing authors. The study demonstrates how international collaboration has influenced knowledge of sustainable financial practices by examining co-authorship networks. The network analysis also shows the increasing scholarly interest in the relationship between ESG and corporate performance. Overall, this bibliometric analysis provides a comprehensive perspective on ESG and its impact on corporate performance and evolution of research on ESG activities across time and regions.

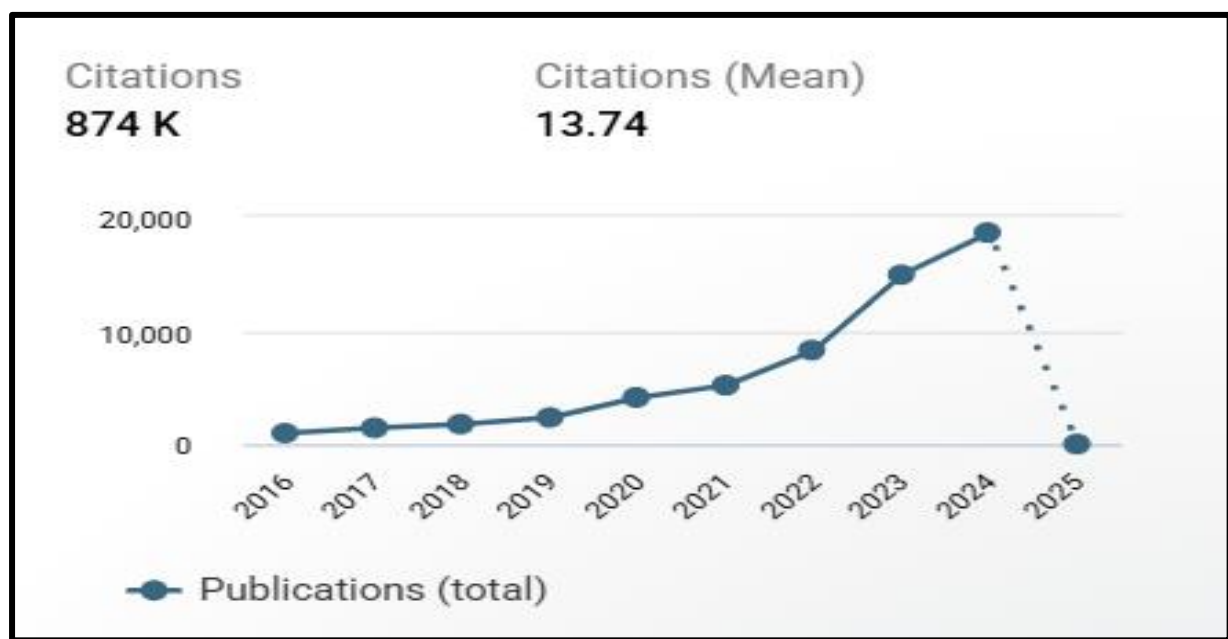


Fig. 1. Year wise publications of papers on ESG and corporate performance.

The graphical representation in Fig. 1 depicts the publication trend between 2016 and 2025. It shows total number of citations of research works on ESG and corporate performance during that period. The data was retrieved from one of the most scientific research databases- Dimensions AI. As per the trend it is shown that publications using ESG activities have grown over the years. The graph indicates a low number of cited works in the earlier years, followed by an upward trend beginning in 2020, peaking in 2024. Thus, this upward trend enhances understanding of the interdependence between ESG and corporate performance.

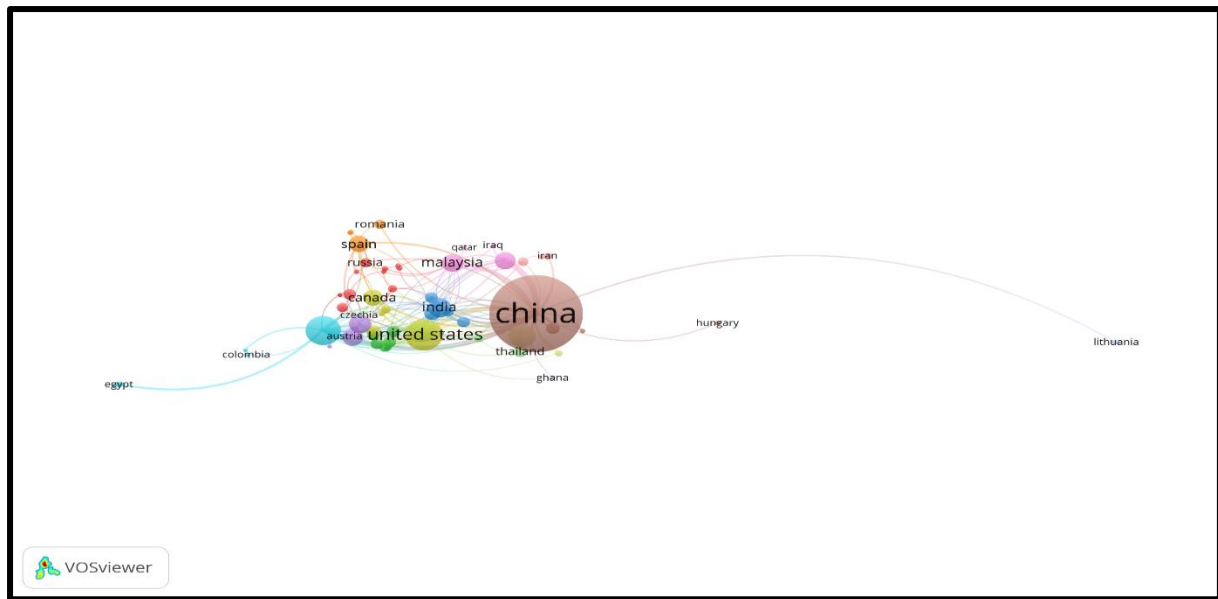


Fig. 2. Country wise network metrics on ESG and corporate performance

Network metrics are commonly employed to enrich discussion of research fields in bibliometric analysis. Therefore, in Fig. 2 a country wise network metrics are employed to assess the highest number of research works on ESG and corporate performance. This country-wise network metrics reveal that majority of research works related to ESG and corporate performance are conducted in China, indicating its strong scholarly output and influence in this field. It is also most centrally connected node, suggesting extensive international partnerships. In the collaboration network it is seen that there are highest number of interconnected nodes between China, Unites States, India, Brazil on the study of ESG and corporate performance. The other countries also carry out research works in this area, but the number is less in comparison to the former three countries mentioned as the number of interconnected nodes is quite less. Overall, China emerges as the most dominant and influential contributor in the global ESG research landscape.

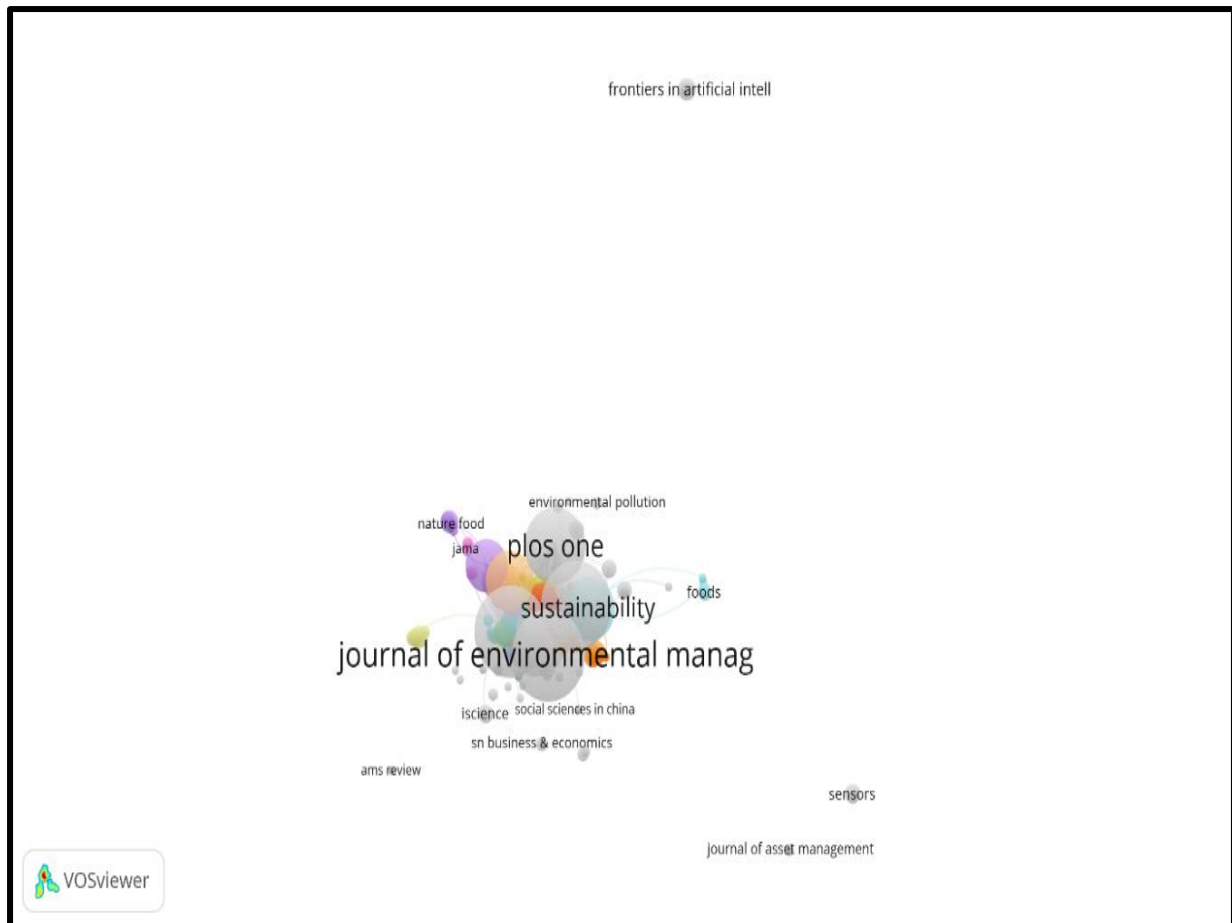


Fig. 3. Source-wise cited publications on ESG and corporate performance

The graphical representation in Fig. 3 depicts the citation analysis of the research work on ESG and corporate performance. It highlights the prominence and scholarly impact of specific academic journals where publications in the domain of ESG and corporate performance are mostly cited. A higher number of citations concentrated in few journals- such as Journal of Environmental management, sustainability, Plos one, which are represented by the bigger size of nodes. These three journals consistently publish huge-quality and frequently cited work on ESG related studies.

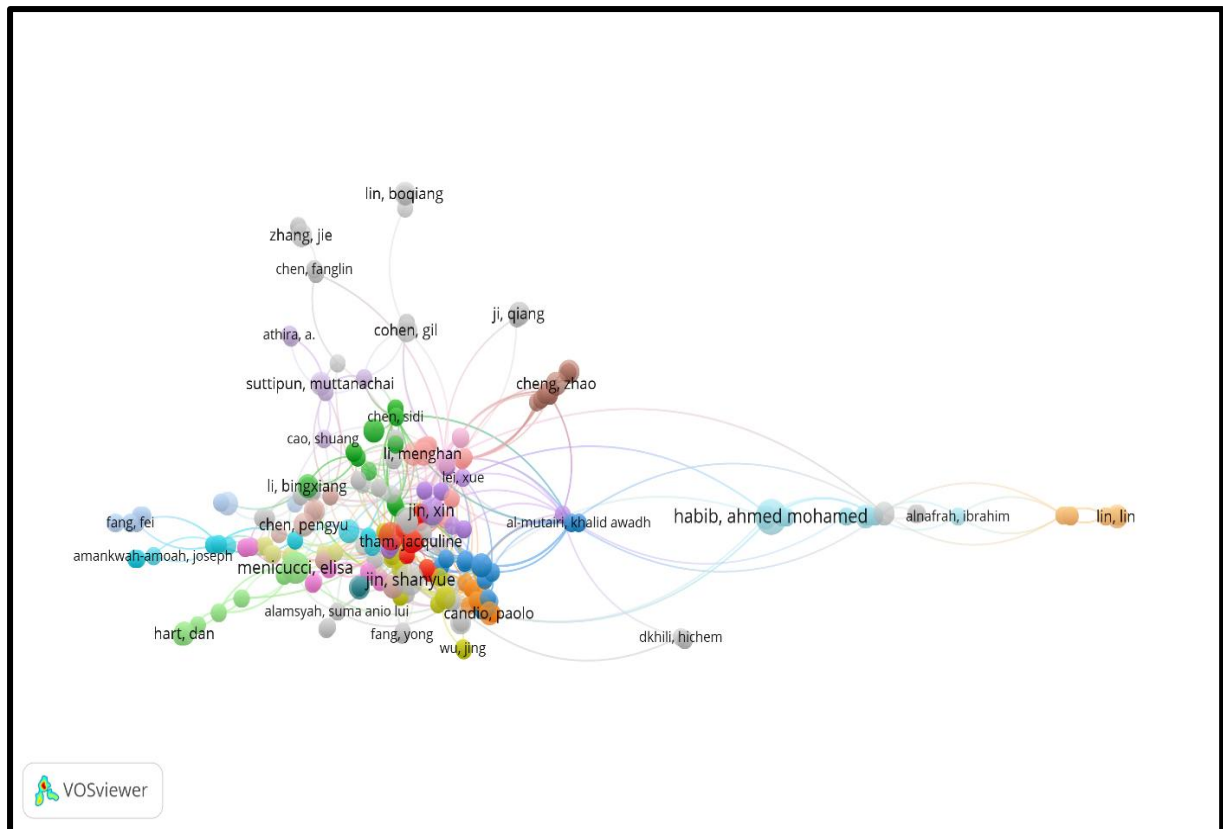


Fig. 4. Co-authorship analysis on ESG and corporate performance

The above graphical representation in the Fig. 4 shows author-wise collaboration patterns in the field of ESG and corporate performance research. In this case, each node represents an author, and the size of the node reflects the number of publications or citations attributed to that author. Here it is depicted that Habib, Ahmed Mohamed, Xin, Xin, and Tham, Jacqueline appears as bigger nodes, indicating their central contribution and influence within this research domain. The lines connecting the nodes signify co-authorship or collaborative research, indicating that Habib, Ahmed Mohamed, has strong collaborative links with Almutairi, Khalid Awadh, and Dkhili, Hichem. In the left dense of the overall network structure, it shows the high degree of interconnectedness between the authors on the similar research work on ESG and corporate performance.

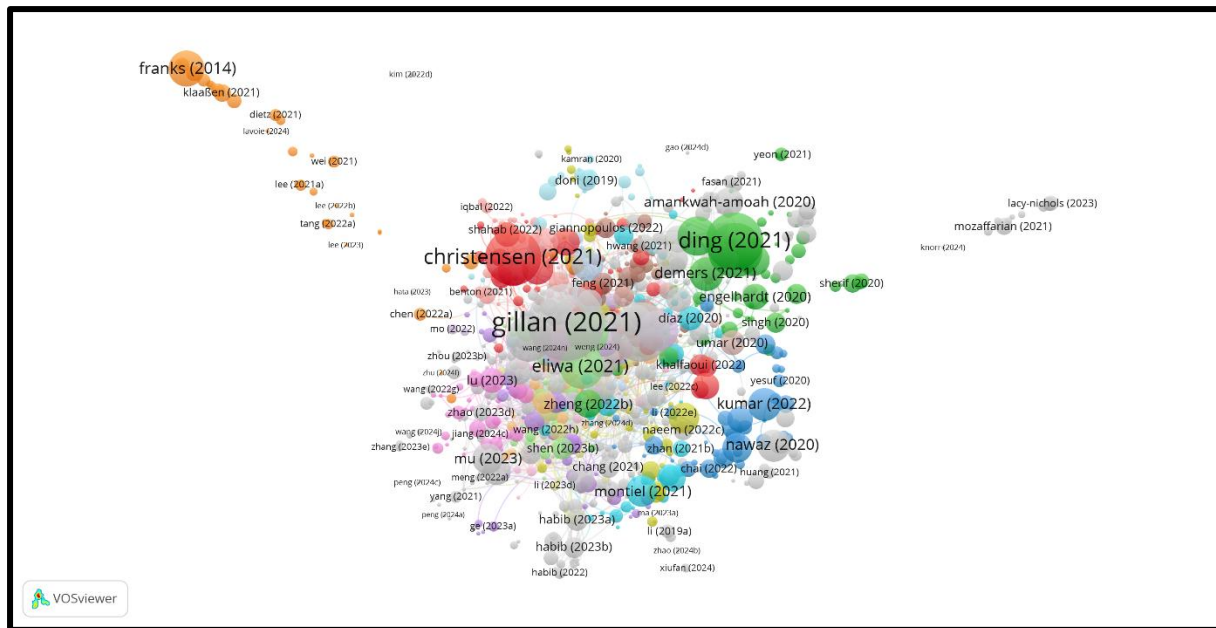


Fig. 5. Network Visualization of citation analysis on ESG and corporate performance

This visualization above in Fig.5 illustrates the citation frequency of academic publications by author and year within the literature on ESG and corporate performance, highlighting the impact and interrelation of significant studies. Here, the bigger node indicates the higher number of citations the publication has received. Gillan (2021) and Christensen (2021) are prominent, extensively referenced contributions within the aforementioned network. The visualization indicates that the majority of articles were published from 2020 to 2023, signifying the recent emergence and increasing significance of studies on ESG-related performance.

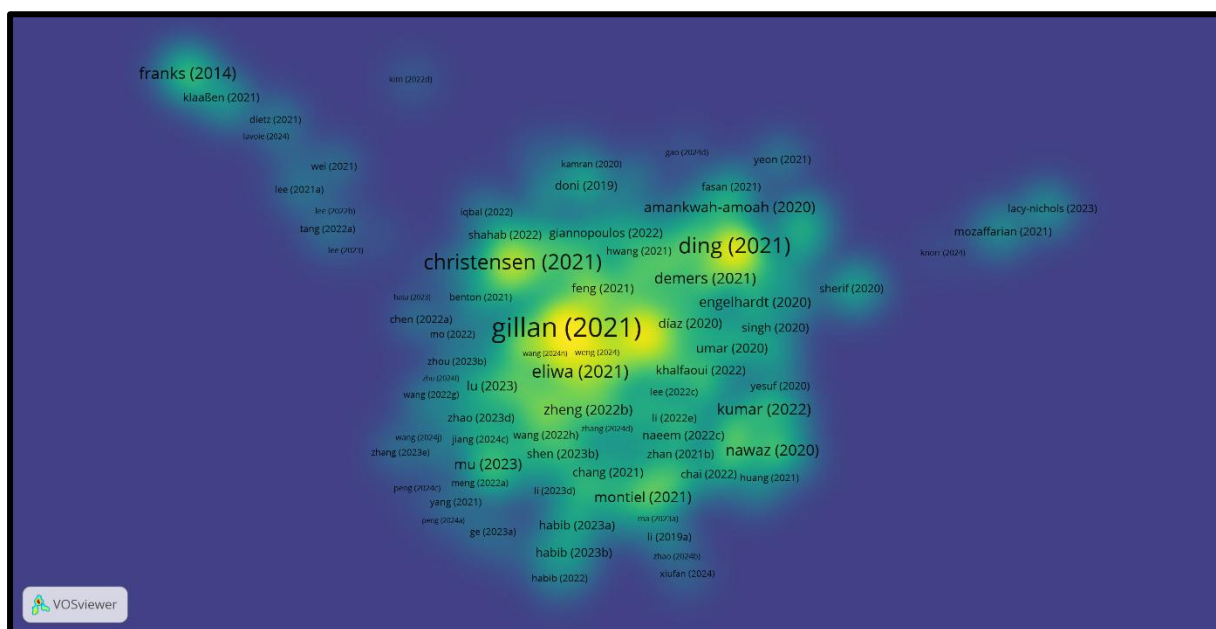


Fig. 6. Density Visualization of citation data on ESG and corporate performance

The above graphical representation illustrates the density of cited documents, with colour intensity signifying the citation impact or research importance of specific authors or publications pertaining to ESG and corporate performance. Bright yellow areas indicate high citation density such as, Gillan (2021)

is the high intensely cited work and considered central to the field of ESG and Corporate performance. The publications of Christensen (2021), Ding (2021), and Eliwa (2021) are also considered as frequently cited and the most influential research study in ESG-related domain followed by Montiel (2021), Nawaz (2020) and Kumar (2022) represented in green patches indicating moderate citation activity. Blue or violet areas indicate low citation density, possibly from newer or less integrated research like Franks (2014), Lacy-Nichols (2023), and Mozafarrian (2021) located in darker zones.

Research Objective

To demonstrate a comprehensive perspective on ESG-related initiatives.

To investigate the research connection among ESG and other domains in contemporary research study.

To explore the effectiveness of information generated by Bibliometric analysis utilizing Vos Viewer.

Findings and Further scope

ESG factors are now viewed as a critical determinant of long-term economic growth and risk avoidance, rather than merely an ethical or moral concern, and have gained significance in the financial and strategic evaluations of firms in recent years. The purpose of the study is to provide an overview of ESG in various aspects and its impact on firm value, corporate strategy, internal governance, cost of capital and corporate spreads. Numerous research investigated that ESG activity assessment shows that there is a positive relationship with corporate financial performance. There is a mandatory requirement for the publication of ESG data by specific authorities. The integration of ESG factor not only improves financial results of firm but also approves the corporate excellence for long term viability of shareholder's wealth. Many research observes that ESG integration can be a proper justification for maximizing firm value and minimizing financial risk such as credit spreads. A substantial amount of research has examined the relationship between ESG and firm value. However, notable inconsistencies and gaps remain, limiting a full understanding of how ESG integration influences corporate performance across different economic and regulatory environments. Although emerging economies are pulling behind than developed economies like US, Europe in the field related to ESG and firm's performance but China has significant scholarly output in this field. There is a limited attention to the impact of individual ESG element on financial performance whereas, most study has emphasized in generating composite ESG scores. This study additionally employs bibliometric analysis by using Vos viewer to represent global connections and trends in research related to ESG and firm performance. It focuses on the number of research papers published annually, the network metrics of each nation, the sources of cited publications, and the journal names. Author-wise collaboration trends in the field of corporate performance and ESG research are highlighted by the co-authorship analysis. The frequency of academic paper citations in the literature on ESG and corporate performance is visualised by this citation network. Thereafter, density visualization underscores that the field of ESG and corporate performance is anchored by a few influential, frequently cited studies. This research helps in understanding how elements of ESG interplay to impact on financial outcome of the firm. Hence, there is a need for more refined and standardized approaches to holistically assess ESG impacts on corporate performance.

Reference:

- Abramov, A., Chernova, M., & Shcherbak, A. (2024). *The impact of ESG rankings on credit spreads of corporate bonds in Russia*. *Journal of Corporate Finance Research*/ ISSN: 2073-0438, 18(3), 38-48.
- Dalal, K. K., & Thaker, N. (2019). *ESG and corporate financial performance: A panel study of Indian companies*. *IUP Journal of Corporate Governance*, 18(1), 44-59.

- Galbreath, J. (2006). Corporate social responsibility strategy: strategic options, global considerations. *Corporate Governance: The international journal of business in society*, 6(2), 175-187.
- Hanke, T., & Stark, W. (2009). Strategy development: Conceptual framework on corporate social responsibility. *Journal of Business Ethics*, 85, 507-516.
- Kim, S., & Li, Z. (2021). Understanding the impact of ESG practices in corporate finance. *Sustainability*, 13(7), 3746.
- Kocmanová, A., & Dočekalová, M. (2012). Construction of the economic indicators of performance in relation to environmental, social and corporate governance (ESG) factors. *Acta Universitatis Agriculturae et Silviculturae Mendelianae Brunensis*, 60(4), 195-206.
- Lian, Y., Ye, T., Zhang, Y., & Zhang, L. (2023). How does corporate ESG performance affect bond credit spreads: Empirical evidence from China. *International Review of Economics & Finance*, 85, 352-371.
- Mendiratta, R., Varsani, H. D., & Giese, G. (2021). How ESG affected corporate credit risk and performance. *The Journal of Impact and ESG Investing*, 2(2), 101-116.
- Naimy, V., El Khoury, R., & Iskandar, S. (2021). ESG versus corporate financial performance: Evidence from East Asian firms in the industrials sector. *Studies of Applied Economics*, 39(3).
- Okimoto, T., & Takaoka, S. (2024). Sustainability and credit spreads in Japan. *International Review of Financial Analysis*, 91, 103052.
- Ramirez, A. G., Monsalve, J., González-Ruiz, J. D., Almonacid, P., & Peña, A. (2022). Relationship between the cost of capital and environmental, social, and governance scores: Evidence from Latin America. *Sustainability*, 14(9), 5012.
- Reverte, C. (2012). The impact of better corporate social responsibility disclosure on the cost of equity capital. *Corporate Social Responsibility and environmental management*, 19(5), 253-272.
- Setiaini, A., Gani, L., Diyanty, V., & Adhariani, D. (2023). Strategic orientation, risk-taking, corporate life cycle and environmental, social and governance (ESG) practices: Evidence from ASEAN countries. *Business Strategy & Development*, 6(3), 491-502.
- Signori, S., San-Jose, L., Retolaza, J. L., & Rusconi, G. (2021). Stakeholder value creation: Comparing ESG and value added in European companies. *Sustainability*, 13(3), 1392.
- Treepongkaruna, S., Kyaw, K., & Jiraporn, P. (2024). ESG controversies, corporate governance, and the market for corporate control. *Journal of Sustainable Finance & Investment*, 14(4), 815-842.
- Treepongkaruna, S., Kyaw, K., & Jiraporn, P. (2024). ESG controversies and corporate governance: Evidence from board size. *Business Strategy and the Environment*, 33(5), 4218-4232.
- Weston, P., & Nnadi, M. (2023). Evaluation of strategic and financial variables of corporate sustainability and ESG policies on corporate finance performance. *Journal of Sustainable Finance & Investment*, 13(2), 1058-1074.
- Xie, J., Nozawa, W., Yagi, M., Fujii, H., & Managi, S. (2019). Do environmental, social, and governance activities improve corporate financial performance?. *Business Strategy and the Environment*, 28(2), 286-300.
- Yang, Y., Du, Z., Zhang, Z., Tong, G., & Zhou, R. (2021). Does ESG disclosure affect corporate-bond credit spreads? Evidence from China. *Sustainability*, 13(15), 8500.
- Yoon, B., Lee, J. H., & Byun, R. (2018). Does ESG performance enhance firm value? Evidence from Korea. *Sustainability*, 10(10), 3635.
- Yu, X., & Xiao, K. (2022). Does ESG performance affect firm value? Evidence from a new ESG-scoring approach for Chinese enterprises. *sustainability*, 14(24), 16940.
- Zhao, C., Guo, Y., Yuan, J., Wu, M., Li, D., Zhou, Y., & Kang, J. (2018). ESG and corporate financial performance: Empirical evidence from China's listed power generation companies. *Sustainability*, 10(8), 2607.
- Zheng, Y., Wang, B., Sun, X., & Li, X. (2022). ESG performance and corporate value: Analysis from the stakeholders' perspective. *Frontiers in Environmental Science*, 10, 1084632.

CEO'S TRAITS AND COMPANY'S ENVIRONMENTAL AND SUSTAINABILITY DISCLOSURES: A BIBLIOMETRIC REVIEW

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Abstract

Awareness of environmental and sustainability disclosure among stakeholders has increased in current scenario, CEOs and top management are concerned to maintain their 'Environment friendly' status among all, to use it as competitive advantage. This study aims to recognise influence of top management or CEO's traits on ESG and CSR disclosure by conducting a bibliometric overview of the study. This study explored 366 relevant journal articles retrieved from the Scopus database. This study followed five step bibliometric workflow. The findings suggested that the mentioned research area is well explored, had a boost in publications and citations in recent times. Researchers of a few Asian countries had put an effort in this side of navigating area alongside with researchers from United States and United Kingdom.

Keywords: *Environmental Disclosure, Sustainability Reporting, ESG Disclosure, Corporate Social Responsibility (CSR), CEO Characteristics, Top Management Traits, Competitive Advantage, Bibliometric Analysis.*

Introduction

"Research evidence and pleas that humans are undermining their own survival on a robust and unforgiving planet seem to be falling on deaf ears" (O'Riordan, 2004). Unfavourable condition of climate has developed environmental disclosures, as a matter of massive attention and a key area of research. (Arslan et al., 2022; Bilal et al., 2022; Ramos-Meza et al., 2021). The need for new accounting practices that promote democracy and open the door for more participatory social organization models is becoming more widely recognized (Brown, 2009; Giacomini et al., 2020). Chief Executive Officers (CEOs), being the key leader of any organization, faces an immense pressure increasing pressure to perform exceptionally well in Environmental, Social, and Governance (ESG) participation to meet the expectations of stakeholders. He et al. (2022) had proposed that manager's misconduct in ESG reporting is endorsed by the pressure of meeting the ESG standards. An important factor in the misconduct of ESG disclosures and the misconduct in Corporate Sustainable Responsibility (CSR) disclosures is that most of the companies aim to label themselves as green or environment friendly company, so the companies want to frame themselves in that manner and thus there is an increased pressure.

Available literature suggests that there are enough studies that show that CEO's traits are highly influential and effects their companies' strategies in handling environmental policies and disclosures (Arslan et al., 2022; Lewis et al., 2014; Shah et al., 2021; Shahab et al., 2018; Zhou et al., 2021). Literature brought up this topic time after time but still a common outlook is required. Studies have focused on

influence of top management's traits on environmental disclosures (Arslan et al., 2022). However, this study aims to recognise influence of top management or CEO's traits on ESG and CSR disclosure by conducting a bibliometric overview of the study as bibliometric analysis works as a tool to uncover upcoming trends in academic publications and discover research patterns in a specific area.

Based on the objective of our study our study addresses to below mentioned research question:

RQ. How much academic publications have put an effort to conduct research focusing on the influence of CEO's traits on ESG and CSR disclosures, and what are the research trends on that field?

Methodology

This study followed the bibliometric workflow, suggested by Silvente et al. (2018) and shown in Arslan et al. (2022), i.e. this research follows a process which is five steps. All of the steps are represented through Fig 1.

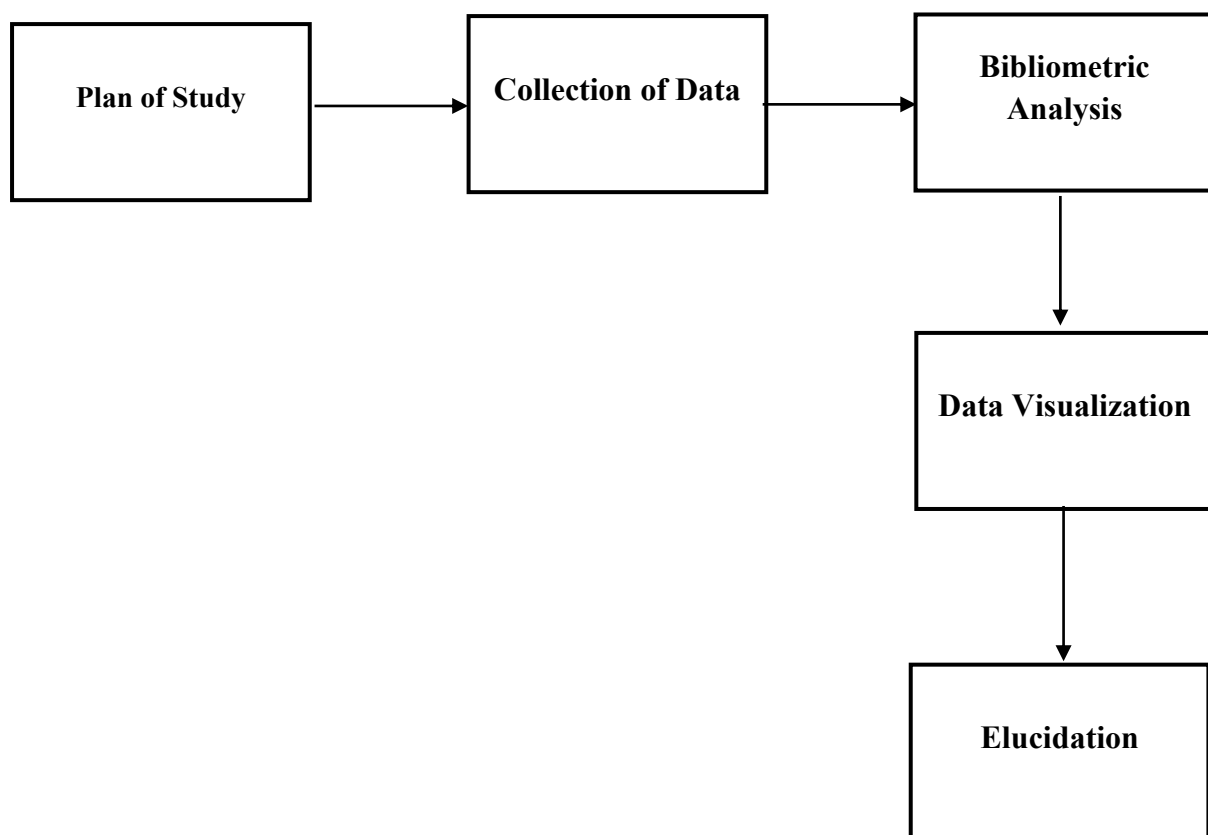


Figure 1. Process of Bibliometric Analysis as per (Silvente et al., 2018)

Objective of the study, instruments and techniques

The Objective of our study is to conduct a bibliometric overview of the influence of CEO's traits on ESG and CSR disclosures literature. VOS viewer was used to visualize bibliometric networks, the Scopus dataset was used to get the bibliometric information of research articles (Dr S Md Karimulla Basha, 2025). This study used descriptive analysis for elaborating trends in research publication over the years, journal wise citations, country wise research publications and citations which were exported from Scopus dataset the shorted in IBM SPSS 25.

Construction of bibliometric data

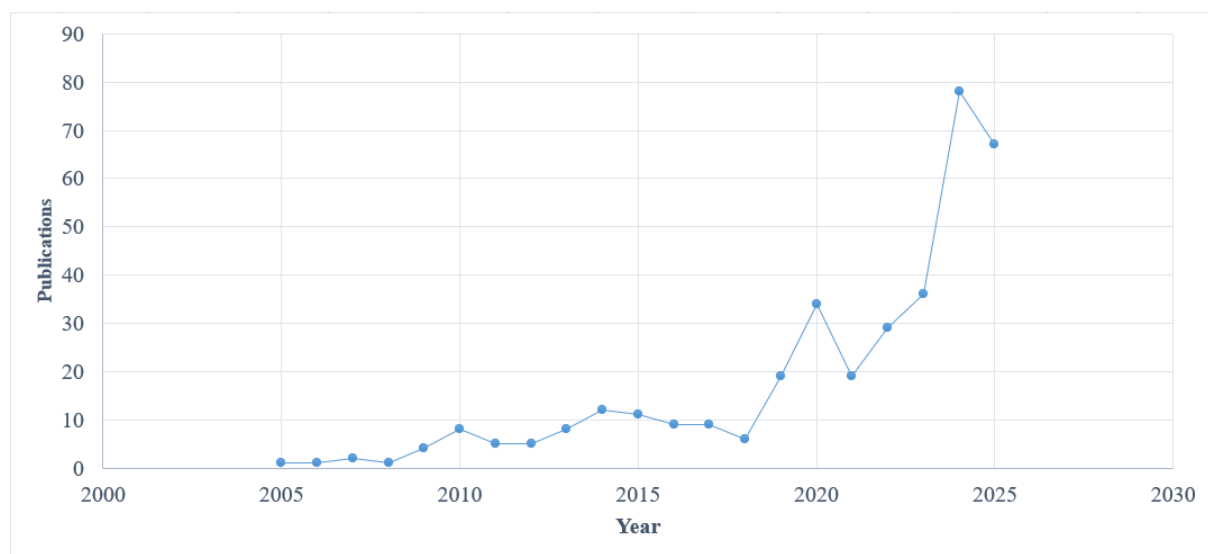
The scopus dataset was used and the research query used was TITLE-ABS-KEY("CEO traits" OR "CEO characteristics" OR "CEO personality" OR "CEO behavior" OR "CEO behavioural traits" OR "top executive traits" OR "executive characteristics" OR "leadership style" OR "managerial traits" OR "CEO demographics" OR "CEO background" OR "CEO profile")) AND (TITLE-ABS-KEY("ESG disclosure" OR "environmental social governance disclosure" OR "sustainability reporting" OR "corporate sustainability disclosure" OR "corporate social responsibility" OR "CSR disclosure" OR "non-financial disclosure" OR "sustainab*" OR "triple bottom line" OR "integrated reporting")) AND (LIMIT-TO(DOCTYPE, "ar") OR LIMIT-TO(DOCTYPE, "re")) AND (LIMIT-TO(LANGUAGE, "English")). The retrieved number of articles was 944 initially in response to the search query. The articles were filtered out focusing on 'Business Management and Accounting area' and excluding every type of academic publication except Journal Articles, 366 relevant journal articles were selected for analysis.

Analysis & Discussions

Following Tepe et al. (2021) approach our study had also appointed year wise publications, a visual representation in Figure 2 to understand trends of journal article publications in the same area of the study throughout the years.

Figure 2.

Publication trend



Source: (Own elaboration)

Fig 2. Represents the publications trend in this study's mentioned area for which the data were derived from Scopus database using the query mentioned in 'construction of bibliometric data' section. The figure depicts that publications on this area of study had emerged in early 2000's, i.e. in the year 2005, but it was not until 2019 that publications in this area accelerated, in year 2024, 2025 the publication metrics are high, there are 78 publications in the year 2024 and 67 publications till June 30th 2025.

Table 1

Most cited Publications

Publications/year	Citations
Petrenko (2016)	702
Kalshoven (2011)	488
Lewis (2014)	480
Manner (2010)	408
Raut (2019)	306
Metcalf (2013)	302
Sibenhüner (2007)	264
Huang (2013)	261
Bhutto (2021)	255
Maak (2016)	235
Groves (2011)	209
Du (2013)	193
Vlachos (2014)	174
Angus-leppan (2010)	154
Vurro (2010)	152
Defee (2009)	142
Riva (2021)	129
Kamberidou (2020)	126
Piwowar-sulej (2023)	126
Blome (2017)	121

Source: (Own elaboration)

Table 1 shows authors receiving most citations mention year of publications, top 20 publications in area of the research. Each paper has received on an average of 261.35 citations, and all the papers had received 5227 citations in total. The huge number of citations suggests that the area is well explored and still lot of research in this field is going on.

Table 2

Most Impactful Journals

Journals	Publications	Citations
Journal of Business Ethics	13	1819
Journal of Cleaner Production	12	1014
Business Strategy and The Environment	12	661
Cogent Business and Management	12	94
Corporate Social Responsibility and Environment	11	476
Journal of Management Development	5	87
Management Science Letters	5	67
Corporate Governance (Bingley)	5	43
Society And Business Review	5	32
Uncertain Supply Chain Management	5	27

Source: (Own elaboration)

Table 2 has listed most prolific journals exploring the influence of top managements' traits influence on CSR and ESG disclosures the Journal of Business Ethics had most publications in mentioned topic as well as it has got the greatest number of combined citations in this research area, then followed by Journal of Cleaner Production and Business Strategy and Environment journal. The top 5 most cited and published journals here have business responsibility theme in common.

Table 3

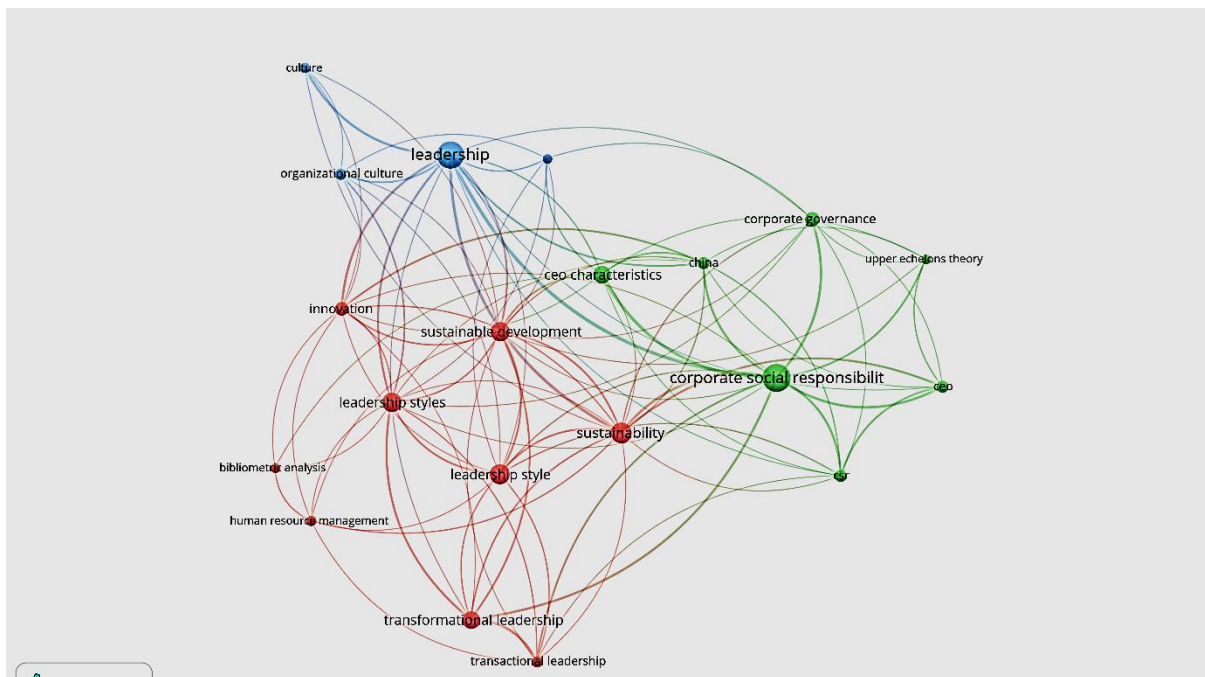
Countries with most Authorship and Citations

Country	Publications	Citations
United States	63	3332
China	43	817
United Kingdom	37	1512
Indonesia	34	342
India	33	792
Malayasia	26	344
Saudi Arabia	17	270
Pakistan	16	497
Spain	15	348
Tunisia	15	257
Australia	14	949
South Korea	12	245
Canada	10	417
Italy	10	265
Germany	9	556
France	9	352
United Arab Emirates	8	263
Netherlands	7	611
Greece	6	390
South Africa	6	355

Source: (Own elaboration)

Table 3 lists countries with most productive figures in publications and citations in the selected research field, United States, China and United Kingdom being most dominant. 8 Asian countries are listed in top 20 countries with publications and citations that indicates that these researchers of these countries are focused on our assigned topic.

Figure 2.



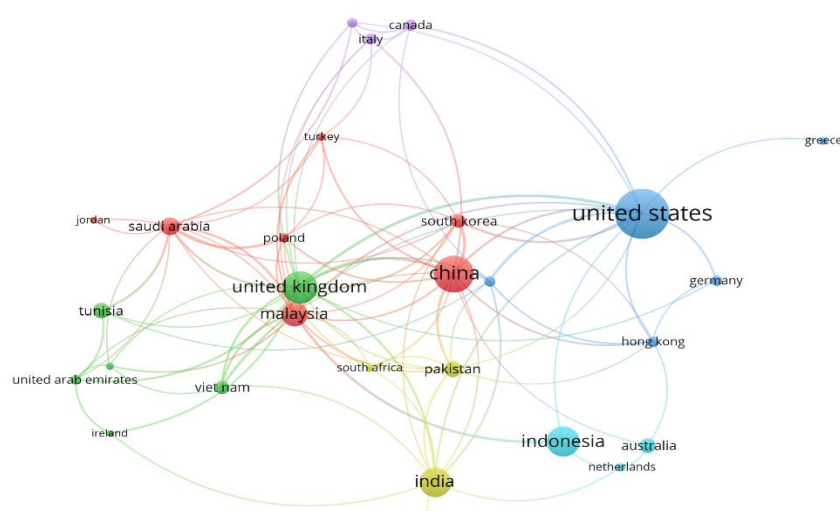
Network Visualization on Keywords Co-Occurrences

Source: (Own elaboration)

Figure 2. depicts the network of keywords. The connecting lines with the nodes denote a connection between keywords among published journal articles in this particular area, which can be segmented. Corporate social responsibility can be grouped with CEO characteristics, corporate governance, China etc. Leadership can be linked up with organizational culture and culture and Leadership styles on the other hand can be linked up with sustainability development, innovations, transformational leadership etc.

Figure 3.

Network visualization on Collaboration of Countries in authorship



Source (Own elaboration)

A network visualization showing collaborations between countries is shown in Figure 3, generated using VOSviewer. The network had shown that there is a strong publication collaboration between authors of United States and Indonesia, at the same time India and Pakistan as well as China and Malaysia have a strong co-authorship collaboration between researchers. On the other hand, United Kingdom (UK) have a strong collaboration with Tunisia and Vietnam. A standardization of at least 5 publications was set while generating this figure, 28 met the threshold.

Conclusion

The main objective of our study was to recognize the influence of top management or CEO traits on ESG and CSR disclosure by conducting a bibliometric overview of the literature. This study used the Scopus database, comprising domain and area-specific 366 journals, mostly from 2005 to 2025. Our study had appointed Silvente et al. (2018)'s five stepped bibliometric workflow. The bibliometric networks were formed using the VOSviewer application, and descriptive statistics were used to understand the trends publication in this area more precisely. The research question of this study was 'How much academic publications has put an effort to conduct research focusing on the influence of CEO's traits on ESG and CSR disclosures, and what are the research trends on that field?'. The findings of the study addressed the research question, because research publications in recent years have increased exploring influence of CEO's traits on ESG and CSR disclosures. United States, China and United Kingdom are most active countries in this area of research according to Scopus database and there is a strong collaboration between authors of different countries in this area of research, authors from United States have strong collaboration with Indonesia, Germany, same in case of China it has a strong collaboration with Malaysia, South Korea and Saudi Arabia. Bibliometric analysis is used to identify pattern, research areas and impactful publications to explore the area of research (Ahamer & Kumpfmüller, 2013). The bibliometric analysis in our study can act as a map for the research of allied and this area.

References

- Ahamer, G., & Kumpfmüller, K. A. (2013). *Education and literature for development in responsibility: Partnership hedges globalization. Handbook of Research on Transnational Higher Education*, 2–2, 526–584. <https://doi.org/10.4018/978-1-4666-4458-8.CH027>
- Arslan, H. M., Chengang, Y., Bilal, Siddique, M., & Yahya, Y. (2022). *Influence of Senior Executives Characteristics on Corporate Environmental Disclosures: A Bibliometric Analysis. Journal of Risk and Financial Management* 2022, Vol. 15, Page 136, 15(3), 136. <https://doi.org/10.3390/JRFM15030136>
- Bilal, Khan, I., Tan, D., Azam, W., & Tauseef Hassan, S. (2022). *Alternate energy sources and environmental quality: The impact of inflation dynamics. Gondwana Research*, 106, 51–63. <https://doi.org/10.1016/J.GR.2021.12.011>
- Brown, J. (2009). *Democracy, sustainability and dialogic accounting technologies: Taking pluralism seriously. Critical Perspectives on Accounting*, 20(3), 313–342. <https://doi.org/10.1016/J.CPA.2008.08.002>
- Dr S Md Karimulla Basha. (2025, January 4). *Bibliometric Scopus data for Leaning Analytics* | IEEE DataPort. <https://iee-dataport.org/documents/bibliometric-scopus-data-leaning-analytics>
- Giacomini, D., Zola, P., Paredi, D., & Mazzoleni, M. (2020). *Environmental disclosure and stakeholder engagement via social media: State of the art and potential in public utilities. https://doi.org/10.1002/csr.1904*
- He, F., Du, H., & Yu, B. (2022). *Corporate ESG performance and manager misconduct: Evidence from China. International Review of Financial Analysis*, 82, 102201. <https://doi.org/10.1016/J.IRFA.2022.102201>

- Lewis, B. W., Walls, J. L., & Dowell, G. W. S. (2014). Difference in degrees: CEO characteristics and firm environmental disclosure. *Strategic Management Journal*, 35(5), 712–722. <https://doi.org/10.1002/SMJ.2127>;CTYPE:STRING:JOURNAL
- O’Riordan, T. (2004). Environmental science, sustainability and politics. *Transactions of the Institute of British Geographers*, 29(2), 234–247. <https://doi.org/10.1111/J.0020-2754.2004.00127.X>;REQUESTEDJOURNAL:JOURNAL:14755661
- Ramos-Meza, C. S., Zhanbayev, R., Bilal, H., Sultan, M., Pekergin, Z. B., & Arslan, H. M. (2021). Does digitalization matter in green preferences in nexus of output volatility and environmental quality? *Environmental Science and Pollution Research*, 28(47), 66957–66967. <https://doi.org/10.1007/S11356-021-15095-8>/METRICS
- Shah, S. G. M., Sarfraz, M., & Ivascu, L. (2021). Assessing the interrelationship corporate environmental responsibility, innovative strategies, cognitive and hierarchical CEO: A stakeholder theory perspective. *Corporate Social Responsibility and Environmental Management*, 28(1), 457–473. <https://doi.org/10.1002/CSR.2061>;WGROU:STRING:PUBLICATION
- Shahab, Y., Ntim, C. G., Chengang, Y., Ullah, F., & Fosu, S. (2018). Environmental policy, environmental performance, and financial distress in China: Do top management team characteristics matter? *Business Strategy and the Environment*, 27(8), 1635–1652. <https://doi.org/10.1002/BSE.2229>;WGROU:STRING:PUBLICATION
- Silvente, G. A., Ciupak, C., & Carneiro-Da-Cunha, J. A. (2018). Top management teams: A bibliometric research from 2005 to 2015. *International Journal of Management and Decision Making*, 17(1), 95–124. <https://doi.org/10.1504/IJMDM.2018.088822>;ISSUE:ISSUE:10.1504/IJMDM.2018.17.ISSUE-1;WGROU:STRING:PUBLICATION
- Tepe, G., Geyikci, U. B., & Sancak, F. M. (2021). FinTech Companies: A Bibliometric Analysis. *International Journal of Financial Studies* 2022, Vol. 10, Page 2, 10(1), 2. <https://doi.org/10.3390/IJFS10010002>
- Zhou, M., Chen, F., & Chen, Z. (2021). Can CEO education promote environmental innovation: Evidence from Chinese enterprises. *Journal of Cleaner Production*, 297, 126725. <https://doi.org/10.1016/J.JCLEPRO.2021.126725>

ASSESSING THE IMPACT OF MACRO-ECONOMIC FACTORS ON SUSTAINABLE INVESTING RISK: A CROSS-COUNTRY ANALYSIS

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Introduction

Global financial landscape is experiencing a profound transition towards sustainability because of growing environmental challenges and widening social inequalities. Nowadays, investors became proactive to integrate ESG (Environmental, Social & Governance) factors in their decision-making process. This shift is reshaping capital markets, as institutions, asset managers, and governments align investment strategies with broader environmental and societal objectives. Europe stands at the forefront of this movement, with sustainable finance emerging as a key policy and regulatory priority. Sustainable investing aims at achieving long-term financial returns along with some non-financial returns like environmental protection, social well-being and ethical governance. However, this approach introduces a complex risk environment. Besides traditional investment risks, sustainability-related risks may arise from non-financial factors, such as climate change, supply chain disruptions, reputational threats, and evolving regulatory landscapes. Additionally, the lack of standardized ESG data, the threat of "greenwashing," and the varying speed of ESG adoption across countries create further uncertainty for investors and policymakers.

Though European Nations adopted sustainability in its true sense, they differ significantly in ESG performance, regulatory maturity, and socio-economic contexts. Some countries have been more prone to advanced systems for integrating sustainability into financial practices, whereas others remain in early adoption phases. This diversity provides a valuable opportunity to assess and compare sustainable investment risks across national boundaries.

This study aims to evaluate these investment risks by using ESG risk scores as indicators of sustainability-related exposure within European Union countries. It also analyzes country-specific risk levels and the key factors influencing them. Moreover, this study also highlights the implications for investors striving to align their portfolios with sustainability goals.

Keywords: *Sustainable Finance, ESG Risk Scores, Sustainability-Related Risks, Ethical Governance.*

I. Review of Literatures

Sustainable investing or ESG investing has gained considerable momentum in recent years. Sustainable investing involves integrating environmental, social, and governance (ESG) factors into financial analysis and decision-making. **Friede et al. (2015)** conducted a meta-analysis of over 2,000 empirical studies, concluding that ESG integration is often positively linked to corporate financial performance and can improve risk-adjusted returns while fostering long-term value creation. **Schanzenbach and Sitkoff (2020)** argued that ESG strategies may involve trade-offs and can expose investors to increased volatility due to shifting policies and inconsistent ESG data.

Europe leads in ESG regulatory development, with initiatives such as the European Commission's Sustainable Finance Disclosure Regulation (SFDR) and EU Taxonomy designed to reduce greenwashing and improve transparency (**European Commission, 2020**). Nevertheless, ESG

performance varies significantly across European countries. **Capelle-Blancard and Petit (2019)** highlighted these differences, as a result of varying regulatory pressures, public awareness, and corporate governance standards. Another challenge is the inconsistency in ESG ratings. **Berg et al. (2022)** showed that discrepancies among ESG rating agencies can result in divergent risk assessments, potentially misleading investors.

Empirical studies offer mixed conclusions regarding the financial benefits of ESG integration. **Khan et al. (2016)** found that firms focusing on material ESG issues tend to achieve superior risk-adjusted returns. According to **Eurosif (2021)**, ESG strategies such as negative screening, ESG integration, and impact investing are widely adopted in Europe with some regional variations, reflecting diverse regulatory and investor preferences. **Akala et al. (2022)** noted that sustainable investing remains conceptually fragmented, with inconsistent terminology and varied return expectations.

Despite extensive literature on ESG investing, few studies have quantitatively assessed investment risks across European nations using country-level ESG risk scores. This study addresses that gap and also offers insights into cross-country ESG risk variability and its implications for sustainable investment decisions.

II. Objectives of the Study

This study has three specific objectives:

- To assess the ESG risk profiles of European Union (EU)-Member Countries in the context of sustainable investing.
- To interpret the relationship between certain Macro-Economic variables and level of ESG Risk Scores of the EU-Member Countries.
- To analyze the impact of Macro-Economic variables on the ESG Risk Profile of the EU-Member Countries.

III. Data & Methodology

This section comprises of six sub-sections which are Selection of samples, Period of Study, Sources of data, Reporting Variables, Development of Hypothesis and statistical tools used for the study.

Reporting Countries: In this study, EU member countries are taken as sample as they lead global efforts in sustainable investing, backed by robust ESG regulations like SFDR, EU Taxonomy, and CSRD. The region's economic diversity, varying ESG adoption levels, mature markets, and strong regulatory commitment to sustainability make it ideal for comprehensive analysis.

Following are the EU Member countries:

1. Austria, 2. Belgium, 3. Bulgaria, 4. Croatia, 5. Republic of Cyprus, 6. Czech Republic, 7. Denmark, 8. Estonia, 9. Finland, 10. France, 11. Germany, 12. Greece, 13. Hungary, 14. Ireland, 15. Italy, 16. Latvia, 17. Lithuania, 18. Luxembourg, 19. Malta, 20. Netherlands, 21. Poland, 22. Portugal, 23. Romania, 24. Slovakia, 25. Slovenia, 26. Spain and 27. Sweden.

Period of Study: The period from 2020 to 2023 has been selected for this study as it marks a pivotal phase in the advancement of sustainable investing, especially within the European Union (EU). This timeframe captures the introduction of significant regulations, including the Sustainable Finance Disclosure Regulation (SFDR) in 2021 and the ongoing development of the EU Taxonomy.

Sources of Data: The data for this study have been collected from a combination of reliable secondary sources like Sustainable investment reports and ESG disclosures published by asset management companies and financial institutions operating within the EU and databases and reports from regulatory bodies such as the European Securities and Markets Authority (ESMA) and the European Commission, particularly those related to the Sustainable Finance Disclosure Regulation (SFDR), EU Taxonomy, and Corporate Sustainability Reporting Directive (CSRD).

Reporting Variables: For the purpose of this study, five variables are taken into consideration. These are mentioned in Table – 1.

Table – 1: Variables for the Study

List of Variables	Abbreviation of Variables	Nature of the Variables	Objectives behind Consideration
1. ESG Risk Score	ESGRS	Macro-Economic Variables	Dependent
2. GDP Growth Rate (%)	GDPGR	Macro-Economic Variables	Independent
3. Agriculture, Forestry, Fishing & Value Added (% of GDP)	AFFVA	Macro-Economic Variables	Independent
4. Ratio of Female to Male Labour Force Participation Rate (%)	RFMLFPR	Macro-Economic Variables	Independent
5. Revenue, Excluding Grants (% of GDP)	REVEG	Macro-Economic Variables	Independent

Source: Presentation by the Researchers

Table - 1 outlines the key variables selected for this study, including their abbreviations, nature, and the rationale for their inclusion. ESGRS is the dependent variable that represents the overall environmental, social, and governance risk profile of the countries analyzed. This score is aiming to identify the macro-economic factors influencing ESG risks across nations.

The independent variables are all macro-economic indicators selected for their potential impact on ESG risk. GDPGR reflects a country's economic performance and may signal better resource management and institutional strength. AFFVA, as a percentage of GDP, measures the role of primary sectors and can have significant environmental and social consequences. RFMLFPR captures gender balance, serving as a proxy for social inclusion and equity. Revenue Excluding Grants (REVEG) measures a country's financial self-reliance, which may influence its capacity to manage ESG risks. Together, these variables form a robust framework for analyzing ESG risk determinants.

Hypothesis of the Study

Following four hypotheses have been framed to achieve the objectives of this study:

H₀₁: No significant relationship exists between GDPGR and level of ESG Risk Score.

H₀₂: No significant relationship exists between AFFVA and level of ESG Risk Score.

H₀₃: No significant relationship exists between RFMLFPR and level of ESG Risk Score.

H₀₄: No significant relationship exists between REVEG and level of ESG Risk Score.

Methodology Used for the Study

For the purpose of analysis of the study, following methodologies are used here.

- Descriptive Statistics (Addressing Objective – 1)
- Correlation Analysis (Addressing Objective – 2)
- Simple Linear Regression (Addressing Objective – 2)
- Multiple Linear Regression (Addressing Objective – 3)

IV. Analysis & Findings

The European Union (EU) has taken a leading role in forming robust regulations to promote ESG practices, sustainable finance, and effective management of ESG investment risks. Some important

initiatives have been taken in this regard. These include the Sustainable Finance Disclosure Regulation (SFDR), effective from March 2021, which requires financial market participants to exhibit how they incorporate ESG factors and assess related risks in order to enhance transparency and reduce greenwashing. The EU Taxonomy Regulation provides a uniform classification system to determine environmentally sustainable activities, helping investors assess and mitigate potential ESG risks associated with their portfolios. The Corporate Sustainability Reporting Directive (CSRD) strengthens ESG reporting requirements in order to ensure that companies will provide comprehensive information on sustainability risks and impacts alongside financial disclosures. Additionally, the EU Green Bond Standard (EU GBS) sets strict criteria to guarantee that green bonds finance genuinely sustainable projects and thereby reducing the risk of misallocated capital. Collectively, these regulations aim to improve risk assessment, promote accountability, and support the transition to a sustainable economy.

Table – 2: Descriptive Statistics

Variables	N	Min.	Max.	Mean		S.D.	Skewness		Kurtosis	
	Statistic	Statistic	Statistic	Statistic	S.E.	Statistic	Statistic	S.E.	Statistic	S.E.
ESGRS	108	15.21	33.82	24.589	0.433	4.502	-0.009	0.233	-0.169	0.461
GDPGR	108	-10.9	16.3	2.006	0.490	5.0879	-0.127	0.233	0.078	0.461
AFFVA	108	0.2	5.1	2.078	0.111	1.1515	0.560	0.233	-0.497	0.461
RFMLFPR	108	67.6	91.0	81.740	0.531	5.5216	-0.829	0.233	0.136	0.461
REVEG	108	0.00	45.06	33.701	1.041	10.823	-2.177	0.233	4.554	0.461
Valid N (listwise)	108									

Source: Computed Results

Table-2 highlights meaningful insights into the distribution and variability of the selected variables across 108 observations. The ESGRS ranges from 15.21 to 33.82, with a mean of 24.59 and a standard deviation of 4.50, signifying moderate variability. Its distribution is nearly symmetrical and slightly flatter than normal. The GDPGR shows wide variation from -10.9% to 16.3%, with an average of 2.01% and a standard deviation of 5.09, reflecting considerable economic diversity. The slight negative skewness (-0.127) and near-normal kurtosis (0.078) suggest a balanced distribution with minor leaning towards lower growth rates. AFFVA has an average of 2.08% to GDP, ranging from 0.2% to 5.1%, with limited variability (SD: 1.15). Its positive skewness (0.560) indicates most countries have lower agricultural contributions. The RFMLFPR averages 81.74%, ranging from 67.6% to 91.0%, showing moderate variability (SD: 5.52). The negative skewness (-0.829) indicates higher ratios are more common, with a near-normal kurtosis (0.136). REVEG ranges from 0% to 45.06% (Mean: 33.70%; SD: 10.82), with pronounced negative skewness (-2.177) and high kurtosis (4.554), indicating extreme values. Overall, ESGRS and GDPGR are nearly normal, while AFFVA, RFMLFPR, and especially REVEG show noticeable asymmetry.

Table – 3: Correlation Analysis

Variables		ESGRS	GDPGR	AFFVA	RFMLFPR	REVEG
ESGRS	Pearson Correlation	1	0.060	.640**	-.732**	-0.038
	Sig. (2-tailed)	-	0.537	0.000	0.000	0.697
	N	108	108	108	108	108
GDPGR	Pearson Correlation	0.060	1	-0.028	-0.026	0.039
	Sig. (2-tailed)	0.537	-	0.774	0.793	0.691
	N	108	108	108	108	108
AFFVA	Pearson Correlation	.640**	-0.028	1	-.453**	-0.029
	Sig. (2-tailed)	0.000	0.774	-	0.000	0.767
	N	108	108	108	108	108
RFMLFPR	Pearson Correlation	-.732**	-0.026	-.453**	1	0.062
	Sig. (2-tailed)	0.000	0.793	0.000	-	0.524
	N	108	108	108	108	108
REVEG	Pearson Correlation	-0.038	0.039	-0.029	0.062	1
	Sig. (2-tailed)	0.697	0.691	0.767	0.524	-
	N	108	108	108	108	108

** . Correlation is significant at the 0.01 level (2-tailed).

Source: Computed Results

The correlation analysis establishes the relationship between ESGRS and selected macroeconomic variables across EU member countries. ESGRS demonstrates a weak and statistically insignificant positive correlation with GDPGR ($r = 0.060$, $p = 0.537$), which indicates that economic growth does not have a meaningful influence on ESG-related risks in the reporting countries. On the other hand, a strong and statistically significant positive correlation exists between ESGRS and AFFVA ($r = 0.640$, $p = 0.000$). This suggests that EU member countries being more reliant on the primary sector are likely to face higher ESG risks due to environmental fragility and a lack of economic diversification.

A strong and significant negative correlation is observed between ESGRS and the RFMLFPR ($r = -0.732$, $p = 0.000$), implying that greater gender parity in the workforce is associated with lower ESG risks. This highlights the critical role of gender equality and inclusive labour policies in promoting sustainable development. Meanwhile, REVEG shows a weak and statistically insignificant correlation with ESGRS ($r = -0.038$, $p = 0.697$), suggesting that a country's revenue-generating capacity has little influence on ESG risk levels.

Additionally, a moderate negative correlation between AFFVA and RFMLFPR ($r = -0.453$, $p = 0.000$) indicates that economies driven by the primary sector may restrict female participation in the labour force. Overall, the findings emphasize the significance of economic diversification and social inclusion in reducing ESG risks.

Simple Regression Analysis

1) To examine the relationship between GDPGR and ESGRS of reporting countries of EU, the following Null Hypothesis has been formulated and tested for the financial year 2020, 2021, 2022 and 2023.

H₀₁: There is no significant relationship between GDPGR and Level of ESGRS.

The Regression Model to test the hypothesis is:

$$Y = \alpha + \beta_1 X_1 + \epsilon$$

Where, Y = Level of ESG Risk Score (ESGRS)

α = Intercept, β_1 = Coefficient of GDPGR, X_1 = GDPGR, ϵ = Regression Residual

The result of the Regression Model has been presented in the table as below:

TABLE – 4: REGRESSION RESULT: GDPGR & ESGRS

Year	Constant	Coefficient of GDPGR	R Square	Adj. R Square	F Value	t Value	Sig.
2020	23.328	-0.308	0.057	0.019	1.51	-1.229	0.231
2021	22.309	0.307	0.041	0.003	1.065	1.032	0.312
2022	22.471	0.552	0.077	0.04	2.094	1.447	0.16
2023	24.01	0.683	0.125	0.09	3.566	1.888	0.071
1. Predictor: GDPGR							
2. Dependent Variable: ESGRS							

Source: Computed Result

Table 4 presents the year-wise linear regression results (2020–2023) with ESG Risk Score as the dependent variable and GDPGR as the independent variable. In 2020, GDPGR shows a weak negative relationship (coefficient = -0.308) with ESG risk, but the model is statistically insignificant ($R^2 = 0.057$, $p = 0.231$). In 2021, the coefficient turns positive (0.307), yet the model remains weak ($R^2 = 0.041$, $p = 0.312$). A modest improvement appears in 2022, where the coefficient rises to 0.552, indicating a stronger positive influence, though still statistically insignificant ($R^2 = 0.077$, $p = 0.160$). By 2023, the relationship is strongest (coefficient = 0.683), with the highest R^2 (0.125) and a near-significant p-value (0.071), suggesting a possible emerging relationship between GDPGR and ESG risk. Despite this upward trend, none of the years show a statistically significant association, implying that while GDPGR may gradually influence ESG risk scores, other variables likely contribute more substantially to the variations observed.

2) To examine the relationship between AFFVA and ESGRS of reporting countries of EU, the following Null Hypothesis has been formulated and tested for the financial year 2020, 2021, 2022 and 2023.

H₀₂: There is no significant relationship between AFFVA and Level of ESGRS

The Regression Model to test the hypothesis is:

$$Y = \alpha + \beta_2 X_2 + \epsilon$$

Where, Y = Level of ESG Risk Score (ESGRS)

α = Intercept, β_2 = Coefficient of AFFVA, X_2 = AFFVA, ϵ = Regression Residual

The result of the Regression Model has been presented in the table as below:

TABLE – 5: REGRESSION RESULT: AFFVA & ESGRS

Year	Constant	Coefficient of AFFVA	R - Square	Adj. R Square	F Value	t Value	Sig.
2020	19.135	2.615	0.412	0.388	17.494	4.183	.000
2021	19.392	2.483	0.436	0.413	19.309	4.394	.000
2022	19.727	2.279	0.366	0.340	14.404	3.795	.001

2023	19.202	2.693	0.435	0.412	19.230	4.385	.000
1. Predictor: AFFVA 2. Dependent Variable: ESGRS							

Source: Computed Result

Table 5 presents year-wise linear regression results (2020–2023) with ESG Risk Score as the dependent variable and AFFVA as the independent variable. In 2020, AFFVA shows a strong positive impact (coefficient = 2.615), with the model explaining 41.2% of the variance ($R^2 = 0.412$, $p = 0.000$), indicating high statistical significance. The trend continues in 2021, where the coefficient remains robust at 2.483 and the model's explanatory power increases slightly ($R^2 = 0.436$). The high F value (19.309) and t-value (4.394) reinforce the model's reliability and significance ($p = 0.000$). In 2022, the coefficient slightly drops to 2.279 and the model's fit decreases ($R^2 = 0.366$), but the relationship remains statistically significant ($p = 0.001$). By 2023, the coefficient rises again to 2.693, with the model maintaining strong explanatory power ($R^2 = 0.435$), and the results remain highly significant ($p = 0.000$). Overall, across all four years, AFFVA consistently shows a strong, positive, and statistically significant influence on ESG Risk Score, with relatively high model fit, highlighting it as a key determinant in shaping the dependent variable.

3) To examine the relationship between RFMLFPR and ESGRS of reporting countries of EU, the following Null Hypothesis has been formulated and tested for the financial year 2020, 2021, 2022 and 2023.

H₀₃: There is no significant relationship between RFMLFPR and Level of ESGRS

The Regression Model to test the hypothesis is:

$$Y = \alpha + \beta_3 X_3 + \epsilon$$

Where, Y = Level of ESG Risk Score (ESGRS)

α = Intercept, β_3 = Coefficient of RFMLFPR, X_3 = RFMLFPR, ϵ = Regression Residual

The result of the Regression Model has been presented in the table as below:

TABLE – 6: REGRESSION RESULT: RFMLFPR & ESGRS

Year	Constant	Coefficient of RFMLFPR	R - Square	Adj. R Square	F Value	t Value	Sig.
2020	72.885	-0.598	0.546	0.528	30.087	-5.485	.000
2021	73.407	-0.6	0.527	0.508	27.818	-5.274	.000
2022	75.757	-0.623	0.559	0.541	31.646	-5.625	.000
2023	74.923	-0.609	0.549	0.531	30.414	-5.515	.000
1. Predictor: RFMLFPR 2. Dependent Variable: ESGRS							

Source: Computed Result

Table 6 presents the year-wise linear regression results from 2020 to 2023, examining the relationship between the dependent variable ESGRS and the RFMLFPR. In 2020, the constant is 72.885, with a strong negative coefficient of -0.598 for RFMLFPR, which indicates that as female labour participation increases, the dependent variable decreases. The model explains 54.6% of the variance (R Square = 0.546), with an adjusted R Square of 0.528, reflecting strong explanatory power. The F value (30.087), t-value (-5.485), and p-value (0.000) confirm that the relationship is highly significant.

In 2021, the coefficient remains stable at -0.600, with R Square at 0.527 and an adjusted R Square of 0.508. The F value (27.818) and t-value (-5.274) further support the significance ($p = 0.000$). In 2022, the coefficient strengthens slightly to -0.623, with an improved R Square of 0.559. The F value (31.646), t-

value (-5.625), and p-value (0.000) confirm a consistently significant relationship. In 2023, the coefficient is -0.609, with an R Square of 0.549, an F value of 30.414, and a t-value of -5.515, again showing strong significance. Overall, the results consistently demonstrate a stable, significant negative relationship and thereby indicating that higher female labour force participation is associated with lower ESG risk or improved socio-economic outcomes.

4) To examine the relationship between REVEG and ESGRS of reporting countries of EU, the following Null Hypothesis has been formulated and tested for the financial year 2020, 2021, 2022 and 2023.

H₀₄: There is no significant relationship between REVEG and Level of ESGRS

The Regression Model to test the hypothesis is:

$$Y = \alpha + \beta_4 X_4 + \epsilon$$

Where, Y = Level of ESG Risk Score (ESGRS)

α = Intercept, β_4 = Coefficient of REVEG, X_4 = REVEG, ϵ = Regression Residual

The result of the Regression Model has been presented in the table as below:

TABLE – 7: REGRESSION RESULT: REVEG & ESGRS

Year	Constant	Coefficient of REVEG	R - Square	Adj. R Square	F Value	t Value	Sig.
2020	23.337	0.035	0.002	-0.038	0.043	0.206	0.838
2021	25.186	-0.017	0.000	-0.040	0.010	-0.099	0.922
2022	22.284	0.064	0.006	-0.034	0.144	0.380	0.707
2023	25.406	-0.031	0.015	-0.025	0.371	-0.609	0.548
1. Predictor: REVEG							
2. Dependent Variable: ESGRS							

Source: Computed Result

The regression analysis from 2020 to 2023 consistently shows that the independent variable REVEG has no significant impact on the dependent variable, ESGRS. In 2020, the constant was 23.337 with a positive REVEG coefficient of 0.035. However, the R-Square was extremely low at 0.002, and the adjusted R-Square was negative (-0.038), indicating poor model fit. The F-value (0.043) and p-value (0.838) confirmed the relationship was not statistically significant. In 2021, the constant was 25.186, and the REVEG coefficient was slightly negative (-0.017). Again, the R-Square (0.000) and adjusted R-Square (-0.040) suggested no explanatory power, and the p-value of 0.922 further supported this. In 2022, the constant was 22.284 with a REVEG coefficient of 0.064, but the R-Square remained low at 0.006, and the adjusted R-Square was -0.034. The p-value of 0.707 indicated no significant relationship. In 2023, the constant was 25.406 with a negative REVEG coefficient of -0.031. Although the R-Square slightly improved to 0.015, the adjusted R-Square stayed negative (-0.025), and the p-value of 0.548 showed no statistical significance. Overall, REVEG consistently demonstrated no meaningful effect on the dependent variable throughout all four years.

Multiple Linear Regression Analysis

In order to examine the collective effort of all the independent variables on the dependent variable, Multivariate Analysis has been done. The equation that has been applied is given below along with the results obtained by estimating the regression model.

The Regression Equation is:

$$Y = \alpha + \beta_1 X_1 + \beta_2 X_2 + \beta_3 X_3 + \beta_4 X_4 + \epsilon$$

Where, Y = Level of ESG Risk Score (ESGRS)

α = Intercept, X_1 = GDPGR, X_2 = AFFVA, X_3 = RFMLFPR, X_4 = REVEG

$\beta_1, \beta_2, \beta_3, \beta_4$ = Respective Coefficients

ϵ = Regression Residual

The result of the Regression Model has been presented in the table as below:

TABLE – 8: MODEL SUMMARY

Model	R	R Square	Adjusted R Square	Std. Error of the Estimate
1	0.81133	0.65826	0.64499	2.68263005
• Predictors: (Constant), REVEG, AFFVA, GDPGR, RFMLFPR				

Source: Computed through SPSS

Table 8 presents key statistical measures assessing the effectiveness of the multiple linear regression model. The correlation coefficient (R) is 0.81133, indicating a strong positive relationship between the dependent variable, ESGRS and the combined independent variables: REVEG, AFFVA, GDPGR, and RFMLFPR. The R Square value of 0.65826 shows that approximately 65.83% of the variability in the dependent variable is explained by the model. The Adjusted R Square (0.64499) indicates that about 64.50% of the variance remains explained after accounting for model complexity. This adjustment confirms the model's robustness. The Standard Error of the Estimate (2.6826) suggests a reasonable level of prediction accuracy, with observed values typically deviating by this amount from the regression line. Overall, the model demonstrates strong explanatory power and a satisfactory prediction fit, validating the effectiveness of the selected independent variables in explaining variations in the dependent variable.

TABLE – 9: ANOVA RESULT

Model	Sum of Squares	df	Mean Square	F	Sig.
1. Regression	1427.77	4	356.943	49.5995	0.000
2. Residual	741.24	103	7.1965		
3. Total	2169.01	107			
1. Predictors: (Constant), REVEG, AFFVA, GDPGR, RFMLFPR					
2. Dependent Variable: ESGRS					

Source: Computed through SPSS

The ANOVA table summarizes the significance of the multiple linear regression model in explaining the variation in ESG Risk Score (ESGRS). The Regression Sum of Squares is 1427.77, indicating the variability in ESGRS explained by the four independent variables: REVEG, AFFVA, GDPGR, and RFMLFPR. The Residual Sum of Squares is 741.24, representing the unexplained variation, while the Total Sum of Squares is 2169.01, capturing the overall variability in ESGRS. The model's F-statistic is 49.5995, indicating that the variation explained by the model is significantly greater than the unexplained variation. The p-value is 0.000, confirming that the regression model is highly statistically significant. These results validate the model's ability to meaningfully predict ESG risk based on the selected variables.

TABLE – 10: REGRESSION RESULT

Model		Unstandardized Coefficients		Standardized Coefficients	t	Sig.	Collinearity Statistics	
		B	Std. Error	Beta			Tolerance	VIF
1	(Constant)	58.124	4.622	-	12.577	0.000	-	-
	GDPGR	0.050	0.051	0.057	0.980	0.329	0.996	1.004
	AFFVA	1.528	0.253	0.391	6.040	0.000	0.793	1.261
	RFMLFPR	-0.451	0.053	-0.553	-8.542	0.000	0.790	1.265
	REVEG	0.002	0.024	0.006	0.096	0.924	0.995	1.005
a. Dependent Variable: ESGRS								

Source: Computed through SPSS

The coefficients table describes how each independent variable contributes to predicting ESGRS. The constant (intercept) is 58.124, representing the estimated ESG risk score when all predictors are zero. GDPGR has an unstandardized coefficient of 0.050, with a t-value of 0.980 and a p-value of 0.329, indicating it is not a significant predictor of ESG risk. Similarly, REVEG shows no meaningful impact, with a coefficient of 0.002, a very low t-value of 0.096, and a p-value of 0.924. On the other hand, AFFVA significantly predicts ESG risk, with a positive coefficient of 1.528, a t-value of 6.040, and a p-value of 0.000. The most impactful variable is the RFMLFPR since it has a negative coefficient of -0.451, a t-value of -8.542, and a p-value of 0.000. This implies that higher gender participation balance strongly reduces ESG risks. Its Beta coefficient (-0.553) confirms its dominant role in the model. Collinearity statistics indicate no multicollinearity issues, as all Tolerance values are near 1 and VIF values are well below 10. Overall, AFFVA and RFMLFPR are significant predictors, while GDPGR and REVEG show no substantial effect.

V. CONCLUSION & RECOMMENDATIONS

This study basically evaluated the investment risks associated with sustainable investing across European Union (EU) member countries after taking into consideration ESG risk scores as indicators of sustainability-related risk exposure. The analysis identified that AFFVA and the RFMLFPR significantly influence ESG risk profiles in the EU. Specifically, higher agricultural value added may enhance ESG risk, suggesting probable unsustainable practices within the agricultural sector. Conversely, a higher rate of female participation in the labour force is strongly associated with lower ESG risk which indicates that gender inclusivity contributes to better sustainability outcomes and more stable investment environments. On the other hand, GDPGR and REVEG do not show statistically significant impacts on sustainability-related risks in this context. The findings emphasized on inclusion of social & sector specific economic structures in sustainable finance to reshape ESG-Investment risks. Based on the above conclusion, this study proposes several recommendations. The Government of different countries should take initiatives to promote gender equality in the labour market. Since increase in female participation reduces ESG risks. Stakeholders may adopt environmentally sustainable farming techniques to reduce sector-related risks.

Investors may integrate broader ESG indicators to ensure a more accurate assessment of sustainability risks. Investment strategies should actively consider gender diversity as a key factor in ESG analysis. Additionally, further sector-specific research is recommended to better understand the relationship between agriculture and ESG risks. Governments should also construct targeted policies to support sustainable agricultural practices.

Reference:

- Akala, C., Neuhaus, T. & Govender, I. (2022). A Systematic Review of Sustainable Investment Approaches. *International Journal of Economics and Finance*. 14(12). 72 – 83. <https://doi.org/10.5539/ijef.v14n12p72>.
- Basak, S. & Sana, K. A. (2025). Relationship between Environmental Reporting Practices and Financial Performance of Some Select Companies in the USA: An Empirical Study. *International Journal of Management and Human Science*. 9(1). 38 – 50. <https://doi.org/10.31674/ijmhs.2025.v09i01.00>.
- Berg, F., Kölbel, J. F., & Rigobon, R. (2022). Aggregate confusion: The divergence of ESG ratings. *Review of Finance*, 26(6), 1315–1344. <https://doi.org/10.1093/rof/rfac033>.
- Capelle-Blancard, G., & Petit, A. (2019). Every little helps? ESG news and stock market reaction. *Journal of Business Ethics*, 157(2), 543–565. <https://doi.org/10.1007/s10551-017-3667-3>.
- European Commission. (2020). Sustainable finance and the EU taxonomy: Helping investors make informed decisions. https://ec.europa.eu/info/publications/200309-sustainable-finance-taxonomy_en.
- Eurosif. (2021). European SRI Study 2021. <https://www.eurosif.org/reports/sri-study-2021/>.
- Friede, G., Busch, T., & Bassen, A. (2015). ESG and financial performance: Aggregated evidence from more than 2000 empirical studies. *Journal of Sustainable Finance & Investment*, 5(4), 210–233. <https://doi.org/10.1080/20430795.2015.1118917>.
- <https://databank.worldbank.org/reports.aspx?source=2&series=NV.AGR.TOTL.ZS&country=>
- https://finance.ec.europa.eu/sustainable-finance/overview-sustainable-finance_en
- Institute for Energy Economics and Financial Analysis (IEEFA). (2024). ESG Investing: Steady Growth Amidst Adversity. https://ieefa.org/sites/default/files/2024-06/IEEFA%20Report_ESG%20Investing%2006.2024.pdf.
- Khan, M., Serafeim, G., & Yoon, A. (2016). Corporate sustainability: First evidence on materiality. *The Accounting Review*, 91(6), 1697–1724. <https://doi.org/10.2308/accr-51383>.
- Schanzenbach, M. M., & Sitkoff, R. H. (2020). Reconciling fiduciary duty and social conscience: The law and economics of ESG investing by a trustee. *Stanford Law Review*, 72(2), 381–456.

SUSTAINABLE DEVELOPMENT THROUGH ENTREPRENEURSHIP: EXAMINING THE ROLE OF STARTUPS IN JOB CREATION IN INDIA

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Abstract

Startup and entrepreneurship in India are evolving at a larger extent especially in recent few years where the government has also taken several initiatives to promote them at a greater scale for the overall sustainable growth and development. The major objective of several initiatives for the startups is to promote them to attain sustainable economic growth and provide employment across the nation. For a new venture to evolve and scale, there comes several stages as well as challenges, but such venture contributes immensely to the economy when scales up after overcoming such obstacles in its journey. There are several factors as well as players within a startup ecosystem that helps a new venture to nurture and grow, and such an ecosystem is growing and contributing largely to the Indian economy. The culture of entrepreneurship has evolved in the current era of industrial revolution and thereby, it is of crucial importance to study about the Indian entrepreneurship and startup ecosystem and how they are contributing to the economy towards sustainability especially in terms of job creation by the new ventures. Therefore, an attempt has been made by the researcher to understand the importance of entrepreneurship and startups for the future sustainable growth. To fulfill the objectives of the study, statistical techniques like correlation and regression analysis has been conducted in the study and the results suggests that the total number of startups as well as the number of accelerators and incubators are the key players which are significantly affecting the number of job creation positively which is in a way enhancing the sustainability of our nation. Finally, on the basis of the outcome of the study conclusion has been drawn by the researcher.

Keywords: *Entrepreneurship, Incubators, Regression, Startup, Sustainability.*

Background of the Study

In Indian economy, each business entity has got its distinct identity which contributes to the overall economic growth and development of the nation. With the growth in business entity, there has been a rise in entrepreneurship and startups in Indian economy. When a new venture grows and scales up, the economy and its people are benefitted to a large extent contributing to the growth of the country. India is now of the world's most startup friendly nations across the globe, and it is not the 3rd largest startup ecosystem around the whole world. The startups in India are rising at a rapid pace, and it has now more than 1.59 lakh registered startups and more than 123 unicorn startups in India. In a developing country like India, startups can cater to the mass population with an impartial and fixable working environment where the new generation and youth and are not afraid of casting aside their regular jobs and start doing something new based on their creative ideas. The best talented young professionals in India have been limited to multinational corporations in the last few decades, but the gap is being bridged at the recent scenario where the talented youths want to start something new on their own taking the startup ecosystem at a global level. The imagination in the minds of young Indian entrepreneurs never actually lacked and with numerous young aspirants having curious and young entrepreneurial mindset, have the ability to start a new venture to solve recent problems at a global level. Earlier, the best talents in India were limited to big multinational companies only but now the element and potential of entrepreneurship are evolving into Indian culture which is driving the entrepreneurs to create new ventures through creative and entrepreneurial activities.

In the recent scenario, sustainable development has emerged as one of the critical frameworks for addressing various complex challenges like productive employment, environmental degradation,

economic growth, and social inequality where entrepreneurship has gained recognition as a vital catalyst for sustainable development. While the Indian startup ecosystem has seen a tremendous growth in the last decade, much more attention has been given to the economic contributions of startups and entrepreneurship and there remains a clear gap in comprehensively assessing a startup ecosystem's role in promoting sustainable development in India. As India struggles with high unemployment rates with a huge amount of population and the need for inclusive growth, understanding how startups, innovation and entrepreneurship contribute towards job creation can provide valuable insights for the young aspiring entrepreneurs. Sustainable development is therefore very much necessary in the current context which can be possibly attained with the help of entrepreneurship, innovation and startup ecosystem in India. This current research work therefore aims to fill the gap by examining how startups not only generate employment but also integrate sustainable practices into their business models and thus, the current study will illuminate the pathways through which the whole Indian startup ecosystem can contribute towards sustainable job creation.

Review of Literature

The following literatures has been reviewed by the researcher to identify the research gap in the current study:

Chillakuri et al., (2020) examines the need for linking sustainability with the startup ecosystem in India since innovation, entrepreneurship and startups are the fuel of societal progress and economic development in India. It was also identified by the researchers that entrepreneurship alone cannot solve the problem of sustainable development and therefore the support of a startup ecosystem is required for scalable and sustainable growth.

Malhotra and Kiran (2023) have undertaken the study on student's perception relating to entrepreneurial perceived behaviour (EPB) and entrepreneurial intentions (EI) and it was found that there is a relationship between sustainable growth and EI, and with EPB and EI where sustainable growth is measured through student's perception on United Nations sustainable development goals (SDG) measured through SDG3, SDG8, SDG9, and SDG10. It was further observed that entrepreneurial competencies (ECs) should be highlighted to improve entrepreneurial intentions (EIs) and its impact on sustainable development goals (SDGs).

Mukherjee et al., (2024) found that the multinational companies (MNCs) significantly impact wealth distribution and job creation that which fosters economic growth and development in India. Therefore, the researchers concluded that the MNCs contribute positively towards economic development which can ensure equitable wealth distribution and sustainable development within a local tech ecosystem.

Pais, M. V. (2024) identified major challenges of Indian startups such as complex regulatory environments, limited financing due to hesitancy of investor, stiff competition, and shortage of skilled professionals which create a challenging environment for scaling sustainable business models. Therefore, regulators should ease regulations related to startups and invest in infrastructure, while entrepreneurship education should emphasize towards sustainability.

Sharma et al., (2024) explored that the challenges of circular startups (CSUs) like lack of customer awareness, problem of financial support, changes in operations and technologies such that to adopt innovative solutions on sustainability, startups can situate themselves within a unique circular business model.

Research Gap

It was found out by the researcher with the help of the above extensive literature review in the concerned area that till now a comprehensive research study has not yet been conducted to show how the entrepreneurs and startups in India have an impact on sustainability that too with the help of job

creation in India, as well as how entrepreneurship in the current scenario has an influence on the economic growth and development of our nation. On the basis of the need of the study, especially in the recent scenario, the current study has explored the untouched area that has got a national importance and significance from the perspective of Indian economy. Therefore, the researcher tried to fill up the research gap of the current study up to some extent through the exploratory research study through its below mentioned research objectives.

Research Objectives

On the basis of the research gap of the study, the following research objectives have been identified as per the need of the study:

- To understand the economic impact of entrepreneurship in the Indian economy.
- To explore the relationship between entrepreneurship, innovation and employment generation in India.
- To evaluate the impact of startups and entrepreneurship on job creation in India.

Research Questions

To fulfill the objectives of the current study, the below mentioned research questions have been raised by the researcher.

- Do entrepreneurs have any positive economic impact in the Indian economy?
- Is there any relationship between entrepreneurship, innovation and employment generation in India?
- Are there any impact of startups and entrepreneurship on job creation in India?

Research Hypothesis

The below mentioned research hypotheses have been developed as per the current context of the study:

- H₀₁: There exists no significant impact of growth in total number of Indian startups on rise in job creation in India.
- H₀₂: There exists no significant impact of accelerators and incubators on rise in job creation in India.
- H₀₃: There exists no significant impact of innovation on rise in job creation in India.

Research Methodology

It is one of the most crucial parts of any research study that elaborates the whole process of conducting the current study in a systematic manner. This section particularly considers the overall different tools as well as techniques which have been used in the study to fulfil the objectives of the study. The research methodology portion in the current study here consists of two sub-sections: period of the study and sources of data; and selection of variables and tools used in the study.

Period of the Study and Sources of Data:

The research work is an attempt to understand the impact of entrepreneurship and startups for sustainable development in the Indian economy that through with the help of job creation in India. The study is completely relying on secondary sources of information and data which are exploratory and empirical in nature. The available dataset has been collected from the website of The Department for Promotion of Industry and Internal Trade (DPIIT) under the Ministry of Commerce and Industry, National Association of Software and Service Companies (NASSCOM) and World Intellectual Property Organization (WIPO). The data have been collected for the period of last nine years starting from the year 2016 to 2024 as available on various sources of all the variables and its suitability for a continuous period. Furthermore, the secondary sources of available information related to the current research

work have been collected from several journals, news reports, research papers, bulletins, working papers, research articles, and other relevant information related to the current research domain which have been studied such that the motive of the study can be achieved.

Selection of Variables and Tools used:

Data related to entrepreneurship, startups and its associated variables has been considered in the study for the fulfillment of objectives of the study. The variables which have been used in the study are total number of registered startups in India, number of accelerators and incubators in India, India's rank in innovation as per global innovation index, and jobs created by the entrepreneurs and startups in India. Based on the nature of the data and to establish an empirical relationship, correlation and regression analysis has been conducted in the current study. At first, Pearson Correlation analysis has been conducted by the researcher to find out the significant association, if any, between the independent and dependent variables as well as on the basis of that Correlation analysis, Regression analysis has been done to establish an empirical relationship between the dependent and explanatory variables in the study, and also to find out if the independent variables have any significant impact on the dependent variable or not such that the formulated hypotheses of the study can be tested. The independent or exploratory variables which have been used in the study are total number of registered startups in India, number of accelerators and incubators in India, India's rank in innovation as per global innovation index whereas the dependent variable considered in the study is jobs created by the entrepreneurs and startups in India, which signifies sustainable development in the Indian economy. EVIEWS software has been used in the current research work to conduct statistical tests and to analyze the data. Based on the overall analysis, the results of the study were ascertained and finally on that basis, the findings and conclusions of the study have been drawn by the researcher.

Data Presentation and Analysis

Entrepreneurs drive a country towards a productive economy, and it also fosters a culture of innovation by generating a larger number of employment and job creation within a nation. In India, the startups are increasing at a rapid pace in the current scenario such that a new startup idea is coming up almost each and every day to simplify the hectic life of individuals. India has become a startup hub in quick succession which is mainly because of global investors and venture capitalists who are backing up the ideas of new entrepreneurs with funds to create a successful startup that will scale up in near future for the economic development of a nation. The role of entrepreneurship is very crucial for a vast country like India and therefore, the study has been conducted to establish an empirical relationship between entrepreneurship, innovation and job creation in India to promote sustainable development within the economy and also to fulfill the research objectives of the study and yet to test the formulated research hypotheses based on the research questions raised in the study.

Table 1: Pearson's Correlation Coefficient

	Jobs Created	Number of Startups	Accelerators and Incubators	Innovation Rank
Jobs Created	1			

Number of Startups	0.941928	1		
	0.0001	-----		
Accelerators and Incubators	0.959833	0.871297	1	
	0.00	0.0022	-----	

Innovation Rank	-0.88129	-0.72065	-0.84892	1
	0.0017	0.0285	0.0038	-----

Source: Researcher's computation through EViews

From the above Table 1 of Pearson's correlation matrix, it can be depicted that there is a significant and linear association between the dependent variable jobs created by the entrepreneurs and startups in India with its independent variables at 5% level of significance which can be clearly figured out from its p value being less than 0.05. It can also clearly seen that there is a high and positive correlation between dependent variable jobs created by the entrepreneurs and startups in India with its explanatory variable total number of registered startups in India at 0.941928, which is significant at 5% level depicting a positive and strong association between entrepreneurs and startups in India and, total number of registered startups suggesting that as the number of startups increases, the number of jobs created in our economy also tends to rise significantly.

There is also a strong positive correlation between the dependent variable jobs created by the entrepreneurs and startups in India with its explanatory variable number of accelerators and incubators in India at 0.959833 that is significant at 5% level, which suggests a positive association between the dependent variable and number of accelerators and incubators in India indicating that a higher number of accelerators and incubators corresponds with a greater number of jobs created in India.

The correlation between dependent variable jobs created by the entrepreneurs and startups in India and its explanatory variable India's rank in innovation as per global innovation index is -0.88129, depicting a negative and high correlation between them indicating a very strong negative association between the dependent variable and India's rank in innovation which is significant at 5% level of significance, implying that lower is the rank of innovation, job creation rises, where lower rank in innovation signifies improvement in employment generation and sustainability. Therefore, as per the Pearson's Correlation Coefficient, there is a significant as well as strong association between the dependent variable with its independent variables.

After the Correlation analysis, with the next step multiple regression analysis was conducted to establish an empirical relationship between the dependent variable jobs created by the entrepreneurs and startups in India with its explanatory variables since the Pearson's correlation matrix ensures that there is a significant and linear association between the dependent variable with its explanatory variables. Therefore, the current work is further conducted with the below formulated regression model:

$$Y = \beta_0 + \beta_1 [X_1] + \beta_2 [X_2] + \beta_3 [X_3] + \varepsilon$$

where, Y = jobs created by the entrepreneurs and startups in India;

X1 = total number of registered startups in India;

X2 = number of accelerators and incubators in India;

X3 = India's rank in innovation;

Table 2: Model Summary of Regression

Variable	Coefficient	Std. Error	t-Statistic	Prob.
Constant	257989.2	98434.52	2.620922	0.047
Number of Startups	3.28618	0.722786	4.546546	0.0061
Accelerators and Incubators	210.2613	84.37866	2.491878	0.055
Innovation Rank	-4344.02	1515.134	-2.86709	0.0351

R squared	0.987748	Mean dependent variable	207444.4
Adjusted R squared	0.980397	S.D. dependent variable	158371.5
Standard Error	22173.74	Akaike information criterion	23.15231
Sum squared residual	2.46+09	Schwarz criterion	23.23996
Log likelihood	-100.185	Hannan Quinn criteria	22.96315
F statistic	134.3666	Durbin Watson statistics	2.100279
Probability (F statistic)	0.000034		

Source: Researcher's computation through EViews

Table 2 is all about the regression table and here it is clearly observed from the above table that the value of R square is at 0.987748 which is significant at 5% level of significance indicating that more than 98% of the variation in jobs created by the entrepreneurs and startups in India has been explained by its explanatory variables considered in the study. The adjusted R square value here is 0.980397, which is also very high in the model as per the table. There is no autocorrelation present in the regression model that can be depicted from the Durbin Watson value in the model as per the table at 2.100279 which is less than 2.5. Here, the probability value is 134.3666 that measures the ratio between the mean square of regression and its residual, which is significant at 5% level clearly depicting the overall fit of the model and thereby the table is of crucial importance since the P value is 0.000034 (<0.05), which is statistically significant and hence it signifies that the overall fit of the model is good and reliable.

From the above regression coefficient table, the regression equation obtained is given below:

$$Y = 257989.2 + 3.28618 [X1] + 210.2613 [X2] - 4344.02 [X3] + \varepsilon$$

The regression coefficients table depicted above shows the estimated values of its coefficients along with their P values including their intercept terms. As per the table, it is found that the constant term and the coefficient of the explanatory variables are significant at 5% level since its P value is 0.000 (<0.05). The table also exhibits that the unstandardized beta value of total number of registered startups in India is 3.28618, which explains that for every 1 unit change in growth in number of registered startups in India, there will be a 3.28618 unit change in jobs created by the entrepreneurs and startups in India which is significant at 5% level as its p value is less than 0.05 at 0.0061. The second independent variable i.e., number of accelerators and incubators in India is having an unstandardized beta value of 210.2613 depicting that for every 1 unit change in growth in number of accelerators and incubators in India, there will be a 210.2613 unit change in jobs created by the entrepreneurs and startups in India which is not significant at 5% level but significant at 1% level since its p value is 0.055. The last exploratory variable of the regression model i.e., rank of India's innovation as per global innovation index is significant at 5% level of significance having a P value of 0.0351 with an unstandardized beta value of -4344.02 indicating that less the rank of innovation in India, the larger will be the job creation in India.

Thus, from the above regression table, it can be clearly said that entrepreneurship and startups in India do have a positive impact in our economy which influences our economic growth and development that can lead us towards sustainability, where rise in job creation being the result of economic development and sustainability in our economy.

Findings and Conclusion

Based on the above results derived from the statistical tests, it was found that there were both significant as well as insignificant results arising to test the formulated hypotheses in the current research work such that it can be examined if there is any impact of entrepreneurship and startups in Indian job creation in a positive or negative way which is further elaborated below:

- H_{01} is rejected at 5% level of significance which depicts that there exists a significant impact of growth in total number of Indian startups on rise in job creation in India.

- H_{02} is not rejected at 5% level of significance which signifies that there exists no significant impact of accelerators and incubators on rise in job creation in India.
- H_{03} is rejected at 5% level of significance which elaborates that there exists a significant impact of innovation on rise in job creation in India.

On this backdrop, it can be said that there exists an empirical relationship between the entrepreneurs and startups in India with sustainable growth and development through job creation within the nation and therefore, the startups and entrepreneurship are very much relevant especially in the recent era to have a crucial impact on the Indian economy which is very much necessary for India's economic development and growth. The findings of the study also clearly depict that entrepreneurship does have an impact on sustainability and sustainable development in an economy. The rise in the number of startups and entrepreneurs as well as the rise in the number of accelerators and incubators where new ideas are nurtured and developed in India, do have a positive impact on job creation in India which provides sustainable development in the economy. The rise in innovation in India is also one the element through which job creation and sustainable development can be achieved. Sustainable development goals can also be achieved through entrepreneurship and startups in India and the reason being Indian startups and entrepreneurs are on a rising trend, and it will rise in the foreseeable future as well since the culture of entrepreneurship has accelerated and the startup ecosystem as a whole is contributing to promote the country towards economic development.

The rise in accelerators and incubators do have an impact in the Indian economy but it has got a less positive impact as compared to the rise in the number of startups as well as the growth in innovation in the current phase in the Indian context. The economic impact of entrepreneurship in India is huge, and it is not just about rise in job creation but it also helps in development of technology as well as innovation and skill development which not only develops an economy but also takes part in development of a particular region. As per the study, there is a correlation between growth in total number of Indian startups, rise in accelerators and incubators on job creation in India, with rise in job creation in India but with rank of innovation in India there is an inverse relationship with rise in job creation in India suggesting that rise in innovation also correlates with rise in job creation in India. Therefore, it can be said that there is a relationship between entrepreneurship, innovation and employment generation in India which correlates with each other in an economic environment for the overall growth and sustainable development. In the current phase, the contribution of Indian startup and entrepreneurship ecosystem towards sustainable development is commendable. The culture of startups and entrepreneurship can drive the economy towards innovation, fostering competition and job creation but everything is not in the hands of the entrepreneurs and therefore the policy makers should come up with necessary rules and regulations from time to time for the smooth functioning of the entrepreneurs entrepreneurial journey since there is no shortage of creative brains in India to start something new since the industry has both the resources and capability to capture the untapped market and to deliver innovative services and thereby adding inclusive growth and equitable development in Indian economy.

References

- Chillakuri, B., Vanka, S., & Mogili, R. (2020). Linking sustainable development to startup ecosystem in India-a conceptual framework. *International Journal of Business and Globalisation*, 25(2), 139-153.
- Kwon, O. (2020). A study on how startups approach sustainable development through intellectual property. *Sustainable Development*, 28(4), 613-625.
- Kravchenko, T. (2022, December). *Innovative Entrepreneurship and Startup Management*. In *Shaping a Sustainable Future* (pp. 239-256). Nomos Verlagsgesellschaft mbH & Co. KG.
- Malhotra, S., & Kiran, R. (2023). Examining the relationship between entrepreneurial perceived behaviour, intentions, and competencies as catalysts for sustainable growth: An Indian perspective. *Sustainability*, 15(8), 6617.

- Mukherjee, S., Das, S., Kansara, D., Pushpam, M. P., Pulkit, M., Sharma, J., & Naidu, M. R. (2024). *Examining the Socioeconomic Dynamics: MNC's Influence on Tech Startups, Job Creation, Wealth Distribution and Community Development*. In *Proceedings of the International Conference on Industrial Engineering and Operations Management*. Presented at the 4th Indian International Conference on Industrial Engineering and Operations Management, Hyderabad, Telangana, India. IEOM Society International, USA.
- Nagar, S., & Ahmad, S. A. (2024). *The startup India scheme: fostering entrepreneurship and innovation in the Indian ecosystem*. *J. Inform. Educ. Res*, 4(2).
- Pais, M. V. (2024). *Entrepreneurship and Startups in Sustainable Development: Recent Trends and Challenges in India*. *Kristu Jayanti Journal of Management Sciences (KJMS)*, 109-123.
- Schaltegger, S., Beckmann, M., & Hockerts, K. (2018). *Collaborative entrepreneurship for sustainability. Creating solutions in light of the UN sustainable development goals*. *International Journal of Entrepreneurial Venturing*, 10(2), 131-152.
- Sharma, V., Manohar, S., & Paul, V. (2024). *Exploring challenges for sustainable development among circular start-ups in India*. *Environment, Development and Sustainability*, 1-26.
- Tiba, S., van Rijnsoever, F. J., & Hekkert, M. P. (2021). *Sustainability startups and where to find them: Investigating the share of sustainability startups across entrepreneurial ecosystems and the causal drivers of differences*. *Journal of Cleaner Production*, 306, 127054.

GENDER EQUITY AND ECONOMIC PERFORMANCE: AN ANALYTICAL VIEW OF THE BRICS ECONOMIES

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Abstract:

According to World Bank reports, the rate of gender equality is influenced by the dynamic indicators of developed nations' overall economic performance. Developed countries have recently established a connection and association between gender equality and economic orientations. However, the dispersion of economic components caused the influence to become fragmented when it came to developing nations. So, the study focuses on how gender equality has been impacted by the economic success of the Brazil, Russia, India, China, South Africa, Egypt, Ethiopia, Iran, Saudi Arabia, and the United Arab Emirates are known as the BRICS countries. Using empirical data from the past 20 years, the study examines how economic indicators, such as GDP per capita in emerging economies, affect gender equality. The findings demonstrate that economic growth has a major impact on trends in gender equality in the BRICS countries.

Keywords: *Gender Equality; Economic Performances; Economic Growth; BRICS nations.*

Introduction:

Gender equality is both a moral imperative and an economic necessity. In **Brazil, Russia, India, China, South Africa, Egypt, Ethiopia, Iran, Saudi Arabia, and the United Arab Emirates are known as the BRICS countries**—rapid economic growth has not always translated into equitable gender outcomes. This demographic shift has significant social, economic, and policy implications.

Global Trends

Global development agendas now place a strong emphasis on gender equity, which is the fair treatment, access, and opportunity of all genders according to their individual needs. Significant strides have been made globally in the last 20 years to increase women's access to political representation, healthcare, and education. However, complete equity across regions and sectors is still hampered by ingrained structural and cultural barriers.

➤ **Education: Great Advancements, However, Unequal Results**

In the majority of nations, enrolment in primary and secondary education has reached global parity. In more than 100 countries, women now outnumber men in higher education. Nonetheless, there are still gender disparities in STEM fields, with fewer women pursuing careers in science, engineering, and technology. Women still encounter obstacles when trying to turn their education into leadership positions or economic mobility, even with increased educational attainment.

➤ **Labour Market: Inequitable Compensation and Access**

Despite making up almost 40% of the worldwide workforce, women's participation is still lower than men's in almost every nation. Women are paid less than men for doing the same work, with a gender pay gap of about 20% worldwide. Equity is further hampered by informal employment, a lack of maternity support, and restricted access to leadership positions. Women are underrepresented in high-paying executive roles and overrepresented in caregiving.

- **Political Empowerment: Slowly but steadily improving**
As of 2023, the global average for the percentage of women in national parliaments is about 26%. South Africa, Sweden, Rwanda, and other nations with affirmative action or quotas have benefited greatly. Women encounter institutional and cultural obstacles to leadership and political participation in many areas. Although political gender equity is improving, structural reforms are still decades away from achieving true parity.
- **Survival and Health: A Complicated Picture**
Particularly in South Asia and Sub-Saharan Africa, maternal mortality rates have dramatically decreased. Although it has increased, access to reproductive healthcare is still restricted in conservative or conflict-affected areas. Due to cultural preferences for sons, sex ratio imbalances still exist in some nations (such as China and India).
- **Institutional and Legal Reforms**
Over 150 countries now have laws promoting gender equality, but implementation and enforcement remain weak. The rise of gender budgeting, gender audits, and corporate ESG disclosure is helping integrate equity into policy and practice.

Important Worldwide Trends:

An increase has been recognised in female entrepreneurs particularly in the informal and digital sectors, where microfinance is becoming more widely available. Pay Attention to Gender-Based Violence Cultural changes and legal reforms have been sparked by global movements like:

- **Policy Inter-sectionality:** Understanding the ways in which gender interacts with race, class, disability, and other factors.
- **Digital Inclusion** Recent initiatives to reduce the gender gap in tech skills and connectivity.

The Descriptive Nature of Gender Equity and Economy: Theoretical Views

• Modernization Theory:

The central tenet of modernization theory is that social advancement, including gender equality, follows economic growth. Countries tend to invest more in healthcare and education as they become more industrialized and urbanized, which disproportionately benefits women. Growing incomes enable women to participate more fully in the labour force and lower fertility rates. As economies move from agrarian to service sectors, gender roles change. However the theory doesn't adequately account for cultural resistance in rapidly expanding economies like China or India or the on-going gender disparity in high-income nations.

• Kuznets Curve of Gender Inequality

Adapted from the original income inequality model by Simon Kuznets, the idea of gender inequality initially worsens with economic growth, then improves after reaching a threshold.

- In early stages, economic gains benefit men more due to patriarchal labour markets.
- Over time, institutional reforms, education, and rights-based movements reduce disparities.

Application to BRICS: Countries like China and India show increasing GDP with mixed progress in gender equality, suggesting non-linear effects.

• Human capital Theory

The main idea of human capital theory is that disparities in investment in human capital (education, experience, and training) can account for gender differences in wages and labour force participation. Investments in female education increase in tandem with GDP. Gender differences in employment and income are lessened by higher skill levels. Though critique of the theory says that it does not take into consideration the persistence of social norms, discrimination, and unpaid domestic work, even in cases where women are equally qualified.

- **Feminist Economic Theory**

The central tenet of feminist economic theory is that systemic discrimination, caregiving duties, and unpaid labour by women are all ignored or undervalued by traditional economic models. Women are overrepresented in informal and unpaid labour, which is not included in GDP. The gender gap cannot be automatically closed by economic growth in the absence of redistributive laws and policies. Highlights that in order to properly evaluate equity, gender-sensitive metrics other than GDP are required.

- **Approach to Capabilities by Amartya Sen**

The core concept of Capabilities Approach is the freedom and opportunity people have to live the lives they value should be used to gauge development, not just income. A high GDP is only significant if it gives women more options in terms of political voice, health care, and education. The foundation of real development is equity in capabilities, not just results. In order to transform growth into true gender equity, nations must concentrate on creating enabling environments, such as infrastructure, laws, and education.

- **Gender and Development (GAD) Framework**

The core idea for the theory Focuses on how development policies and economic structures affect power relations between genders.

- Argues that macroeconomic growth can deepen gender inequality if not actively addressed.
- Promotes gender mainstreaming in governance, budgeting, and economic planning.

Application: Used by UN agencies and many national governments in policy design.

Literature Review:

Researchers have been examining gender equity of different nations and try to detect the varying significantly, influenced by economic development, social policies, and cultural factors and their correlation.

Doris C. Chu¹, Bill Heberton, and Albert Toh (2021) investigated the possibility of a greater rate of female prosecution in nations with a lower gender difference in the Global Gender difference indexes of political empowerment. Additionally, they discovered that political Both female conviction rates and rates of property offenses were substantially correlated with empowerment. The pattern of results generally supports the emancipation theory.¹

After a period of stagnation, Sweden made great strides toward achieving the high degree of gender equality for which it is now renowned starting in the 1940s, according to **Tobias Karlsson, Joris Kok,**

and Faustine Perrin (2021). While some counties have closed the gap more quickly than others, all counties have made significant progress over time.²

Following an empirical investigation, **Faustine Perrin (2022)** focused on two major regions of France: the North and the South. The Northern counties that have made the greatest efforts to close the gap, in particular, have performed better economically. Gender equality seems to be significantly influenced by the family structures and educational attainment of both boys and girls. Gender equality and economic performance are positively and significantly connected. Economic development must take into consideration the various facets of gender equality.²

Daniel Fernandez-Kranz, Natalia Nollenberger, and Esther Arenas-Arroyo (2022) investigated and found no evidence of a rise in cyber-bullying. Lastly, we demonstrate how fiber expansion degrades father-daughter relationships, particularly those that have been harmed by a prior conflict. Our findings hold up well to a variety of sensitivity tests and contribute to the explanation of the observed growing gender disparity in adolescent mental health.³

Ana-Catarina Pinho-Gomes in 2022 deduced, gender equality seems to benefit men and women equally in terms of life expectancy, emphasizing how important gender equality is to improving population longevity and health.⁴

Based on the findings of **Simona Juhászová1, Ján Buleca, Peter Tóth, Rajmund Mirdala (2023)** that was defined that there was either no spatial autocorrelation or neither positive nor negative for GDP per capita. Moran's I statistic demonstrated that GDP per capita values were clustered based on a particular formula rather than being distributed at random.⁵

According to **Lisa Cameron's (2023)** research, policies that make it easier for women to work while juggling family obligations, like childcare and flexible work schedules, are likely to boost women's labour force participation. To see notable increases in the number of working women, it is also necessary to address social norms that reinforce mothers as the primary caregiver in the family.⁶

According to a 2023 study by **Podolchak, Nazar; Martyniuk, Volodymyr; and Tsygylyk, Natalia**, regardless of a country's degree of development, there is no consistently clear relationship between the GGI level and GDP per capita growth (annual). Despite a 5% increase in population, the UK, the largest non-EU European country, witnessed a 9% rise in the number of civil officials.⁷

Research Gap:

Prior studies have demonstrated that social policies, family structures, political empowerment, and educational attainment all strategically influence gender equity. The diverse literature showed how researchers have examined specific aspects of gender equity and its unique impacts. In order to determine the factors that contribute to gender equity and the economic and social effects of it, the majority of researchers have focused on developed nations. The study's lacuna is that developing and upper-developing nations—specifically, the **BRICS**.

—have not yet been included in the count. Thus, we are attempting to bridge the gap by investigating the aforementioned field with this research project.

The Objective of the Study:

BRICS nations have immense gravity in the domain of economy at the wider outlook and hold a great stake in the same. So, inculcating their gender equity and economic impact the following objectives of the study have been framed:

1. To explore the indicator of economic performance within a population that affects gender equity of the BRICS nation.
2. To examine extent of female participation in the formal economy and its impact that affect gender equity of the BRICS nation.
3. To assess the proportion of the total labour force that is unemployed, representing a country's overall unemployment rate and its impact that affect gender equity of the BRICS nation.

Research Methodology:

• Data Source, Tools, and Survey Period:

The World Bank Development Indicators and the World Economic Forum provided the data. Comprehensive analyses of different indicators provide important background information for the research. Second in importance is the study's research methodology. The study has focused on the **BRICS**. Eviews 8, MS-Excel, and other software programs serve as the foundation for the data analysis tools used to examine the associated impacts and effects. The survey was conducted between 2006 and 2023, a span of 18 years. This covers the time before and after the paradigm shift in the economic environment of the nation being studied.

Hypotheses:

The study is framed to examine the following hypotheses:

1. Ha0 = Economic performance within a population does not have a significant influence on the gender equity of the BRICS nation.

Ha1= Economic performance within a population does have a significant influence on the gender equity of the BRICS nation

2. Hb0 = Female participation in the formal economy do not have a significant influence on the gender equity of the BRICS nation.

Hb1= Female participation in the formal economy has a significant influence on the gender equity of the BRICS nation.

3. Hc0 =Total labour force that is unemployed, representing a country's overall unemployment rate, do not have a significant influence on the gender equity of the BRICS nation.

Hc1 = Total labour force that is unemployed, representing a country's overall unemployment rate have a significant influence on the gender equity of the BRICS nation.

Data Analysis and Findings:

A clear and comprehensive review of the literature provided the guidance required to develop the research design and identify the measurement variables. Global Gender Gap Index (GGGI) can be considered as one of the prominent and globally admired indicators of gender equity. To support the hypothesis and instill economic orientations and performances, the study has taken into account three dimensions. Labour force females (as a percentage of the total labour force) (LFF) are the key indicators to recognize a country's overall unemployment rate and female participation in the formal economy, while GDP per capita (GDP) can be indexed as the key measurement indicators to recognize average economic output per person and to quantify the economic performance within a population. Nonetheless, the country's overall unemployment rate can be evaluated using Unemployment, Total (% of Total Labour Force) (UNE).

The following are the measurement variables (Table 1):

Table 1: Variables

Variable Name	Abbreviation
<i>Dependent variables</i>	
Global Gender Gap Index	GGGI
<i>Independent Variables</i>	
GDP per capita	GDP
Female labour force (% of total labour force)	LFF
Unemployment, total (% of total labour force)	UNE

Reflecting shifts in demographics and economic activity and its impact that affect gender equity of the BRICS nation, it has been found that-

1. There are many time observations and few cross-sections in the data i.e. $T > N$.
2. Then in Table 2 Variance Inflation Factor (VIF) with the Mean VIF= 1.10 has been observed. It indicates that there is no multicollinearity between the independent variables.

Table 2:

Variable	VIF	1/VIF
GDP	1.13	0.881730
LFF	1.12	0.896134
UNE	1.06	0.947807
Mean VIF	1.10	

3. It has been analysed from Levin-Lin-Chu unit-root test that the dependent variables as well as all independent variables are stationary at level or in first difference. On consequence of the same the Kao Residual Co-integration Test (Table 3) has been executed to find out long-run relationship among variables. The said analysis deduced a non-significant result at a 95% confidence interval with Prob = 0.1882. With the acceptance of null hypothesis, it is inferred that co-integration does not exist in this model.

Table 3:

Kao Residual Cointegration Test Series: GGGI GDP Date: 06/03/25 Time: 19:43 Sample: 1 180 Included observations: 180 Null Hypothesis: No cointegration Trend assumption: No deterministic trend User-specified lag length: 1 Newey-West automatic bandwidth selection and Bartlett kernel				
			t-Statistic	Prob.
ADF			0.884728	0.1882
Residual variance			0.001189	
HAC variance			0.000618	
 Augmented Dickey-Fuller Test Equation Dependent Variable: D(RESID) Method: Least Squares Date: 06/03/25 Time: 19:43 Sample: 1 180 Included observations: 160				
Variable	Coefficient	Std. Error	t-Statistic	Prob.
RESID (-1)	-0.438244	0.097934	-4.474902	0.0000
D (RESID(-1))	-0.291455	0.113430	-2.569481	0.0111
R-squared	0.317839	Mean dependent var		0.002777
Adjusted R-squared	0.313522	S.D. dependent var		0.034754
S.E. of regression	0.028795	Akaike info criterion		-4.244780
Sum squared resid	0.131010	Schwarz criterion		-4.206340
Log likelihood	341.5824	Hannan-Quinn criter.		-
Durbin-Watson stat	2.029982	4.229171		

These observations and exploration drive the study to extrapolate that Vector Auto-regression (VAR) Model is apt to note the significance of the influential relation among dependent and independent variables.

Data analysis reveals that, in the case where the dependent variable is GGGI, as shown in Table 4 and Table 5, the Fixed Effect Panel Least Square and Random Effect Panel Least Square of Dynamic Panel Data (DPD) both have produced significant results at a 95% confidence interval with Prob(F-statistic)=0.000 for one as well as the other. Consequently to find out the apt model between the above two, Hausman Test (Table 6) has been executed which culminate a significant result at a 95% confidence interval with Prob(F-statistic)=0.0023 and conclude that Fixed Effect Panel Least Square should be the preferred model for the analysis. Since all of the null hypotheses were rejected, it has been determined that the Global Gender Gap Index (GGGI) of the **BRICS countries – Brazil, Russia, India, China, South**

Africa, Egypt, Ethiopia, Iran, Saudi Arabia, and the United Arab Emirates is significantly influenced by GDP per capita (GDP), the proportion of female working (as a percentage of all workers) (LFF), and unemployment overall (as a percentage of the total labour force) (UNE).

Table 4:

Dependent Variable: GGGI					
Method: Panel Least Squares					
Date: 06/03/25 Time: 19:46					
Sample: 1 180					
Periods included: 16					
Cross-sections included: 10					
Total panel (balanced) observations: 160					
Variable	Coefficien t	Std. Error	t-Statistic	Prob.	
C	0.271468	0.067474	4.023294	0.0001	
GGGI(-1)	0.218667	0.091740	2.383560	0.0184	
GGGI(-2)	0.388265	0.123051	3.155314	0.0019	
GDP	1.25E-06	1.37E-06	0.913266	0.3626	
GDP(-1)	-1.65E-06	1.63E-06	-1.012097	0.3132	
GDP(-2)	-4.98E-07	1.38E-06	-0.362069	0.7178	
Effects Specification					
Cross-section fixed (dummy variables)					
R-squared	0.754159	Mean dependent var	0.662689		
Adjusted R-squared	0.730423	S.D. dependent var	0.056297		
S.E. of regression	0.029230	Akaike info criterion	-4.138181		
Sum squared resid	0.123887	Schwarz criterion	-3.849884		
Log likelihood	346.0545	Hannan-Quinn criter.	-4.021113		
F-statistic	31.77229	Durbin-Watson stat	2.085428		
Prob(F-statistic)	0.000000				

Table 5:

Dependent Variable: GGGI Method: Panel EGLS (Cross-section random effects) Date: 06/03/25 Time: 19:45 Sample: 1 180 Periods included: 16 Cross-sections included: 10 Total panel (balanced) observations: 160 Swamy and Arora estimator of component variances				
Variable	Coefficient	Std. Error	t-Statistic	Prob.
C	0.048164	0.030149	1.597509	0.1122
GGGI(-1)	0.331450	0.087488	3.788518	0.0002
GGGI(-2)	0.597850	0.095319	6.272121	0.0000
GDP	1.85E-06	1.18E-06	1.570649	0.1183
GDP(-1)	-1.86E-06	1.63E-06	-1.139381	0.2563

GDP(-2)	2.76E-07	1.18E-06	0.232544	0.8164
Effects Specification				
			S.D.	Rho
Cross-section random			0.000000	0.0000
Idiosyncratic random			0.029230	1.0000
Weighted Statistics				
R-squared	0.721759	Mean dependent var		0.662689
Adjusted R-squared	0.712725	S.D. dependent var		0.056297
S.E. of regression	0.030174	Sum squared resid		0.140215
F-statistic	79.89531	Durbin-Watson stat		2.120485
Prob(F-statistic)	0.000000			
Unweighted Statistics				
R-squared	0.721759	Mean dependent var		0.662689
Sum squared resid	0.140215	Durbin-Watson stat		2.120485

Table 6:

Correlated Random Effects - Hausman Test				
Equation: Untitled				
Test cross-section random effects				
Test Summary		Chi-Sq. Statistic	Chi-Sq. d.f.	Prob.
Cross-section random		18.561372	5	0.0023
** WARNING: estimated cross-section random effects variance is zero. Cross-section random effects test comparisons:				
Variable	Fixed	Random	Var(Diff.)	Prob.
GCCI(-1)	0.218667	0.331450	0.000762	0.0000
GCCI(-2)	0.388265	0.597850	0.006056	0.0071
GDP	0.000001	0.000002	0.000000	0.3873
GDP(-1)	-0.000002	-0.000002	0.000000	0.0310
GDP(-2)	-0.000000	0.000000	0.000000	0.2676
Cross-section random effects test equation:				
Dependent Variable: GCCGI				
Method: Panel Least Squares				
Date: 06/03/25 Time: 19:48				
Sample: 1 180				
Periods included: 16				
Cross-sections included: 10				
Total panel (balanced) observations: 160				
Variable	Coefficient	Std. Error	t-Statistic	Prob.

C	0.271468	0.067474	4.023294	0.0001
GGGI(-	0.218667	0.091740	2.383560	0.0184
1)	0.388265	0.123051	3.155314	0.0019
GGGI(-	1.25E-06	1.37E-06	0.913266	0.3626
2) GDP	-1.65E-06	1.63E-06	-1.012097	0.3132
GDP(-1)	-4.98E-07	1.38E-06	-0.362069	0.7178
GDP(-2)				
Effects Specification				
Cross-section fixed (dummy variables)				
R-squared	0.754159	Mean dependent var	0.662689	
Adjusted R-squared	0.730423	S.D. dependent	0.056297	
S.E. of regression	0.029230	var Akaike info	-4.138181	
Sum squared resid	0.123887	criterion Schwarz	-3.849884	
Log likelihood	346.0545	criterion Hannan-	-4.021113	
F-statistic	31.77229	Quinn criter.	2.085428	
Prob(F-statistic)	0.000000	Durbin-Watson	stat	

Subsequently when we try to explore the Granger Causality between Global Gender Gap Index (**GGGI**) and GDP per capita (**GDP**) of the BRICS nation we found that GDP does not granger cause GGGI (Table:7) whereas GGGI granger cause GDP (Table:8).

Table 7:

Wald Test: Equation: Untitled			
Test Statistic	Value	df	Probability
F-statistic	1.415327	(3, 154)	0.2405
Chi-square	4.245982	3	0.2361
Null Hypothesis: C(3)=C(4)=C(5)=0 Null Hypothesis Summary:			
Normalized Restriction (= 0)	Value	Std. Err.	
C(3)	0.032923	0.071623	
C(4)	7994.729	4684.969	
C(5)	2980.145	5512.416	
Restrictions are linear in coefficients.			

Table 8:

Wald Test: Equation: Untitled			
Test Statistic	Value	df	Probability
F-statistic	13.66914	(3, 154)	0.0000
Chi-square	41.00742	3	0.0000
Null Hypothesis: C(3)=C(4)=C(5)=0 Null Hypothesis Summary:			
Normalized Restriction (= 0)		Value	Std. Err.
C(3)		0.597850	0.095319
C(4)		1.85E-06	1.18E-06
C(5)		-1.86E-06	1.63E-06
Restrictions are linear in coefficients.			

Conclusion: The Contemplation

Regarding the average economic output per person and its effect on gender equity, the analysis of the sample **BRICS countries—Brazil, Russia, India, China, South Africa, Egypt, Ethiopia, Iran, Saudi Arabia, and the United Arab Emirates** has revealed various dimensions and a practical picture. The following can be inferred as the exploration's conclusion:

1. The study has concluded, based on the dynamism of analyses, that the gender equity of the sample countries is significantly impacted by the average economic output per person, which can be used to measure the level of wealth or income inequality within a population and is the primary indicator of a nation's standard of living.
2. The study's thorough analysis has led it to the conclusion that the gender equity of the sample countries is significantly impacted by women's economic empowerment and participation, which reflect how actively engaged they are in paid work and contributing to the economy.
3. The study's extensive analysis has led it to conclude that the percentage of the total labour force that is unemployed, representing a country's overall unemployment rate and the extent to which women are participating in the economy and contributing to the labour and its impact have a significant influence on the gender equity of the sample nations.
4. In the end, the empirical study concluded that the gender equity of a country is significantly and favourably influenced by its economic conditions, gender-diversified constitution, labour market health, and economic performance of the BRICS countries.

Reference:

- Chu DC, Heberton B, Toh A. *Gender Equality and Female Offending: Evidence From International Data Sources*. *Int J Offender Ther Comp Criminol*. 2021;65(13-14):1496-1519. doi:10.1177/0306624X20986527
- Perrin F. *Can the historical gender gap index deepen our understanding of economic development?* *J Demogr Econ*. 2022;88(3):379-417. doi:10.1017/dem.2020.34

- Arenas-Arroyo E, Fernandez-Kranz D, Nollenberger N. High Speed Internet and the Widening Gender Gap in Adolescent Mental Health: Evidence from Hospital Records. *IZA Discuss Pap.* 2022;15728(15728). www.iza.org
- Pinho-Gomes AC, Vassallo A, Carcel C, Peters S, Woodward M. Gender equality and the gender gap in life expectancy in the European Union. *BMJ Glob Heal.* 2022;7(2). doi:10.1136/bmjgh-2021-008278
- Juhászová S, Buleca J, Tóth P, Mirdala R. The Impact of Gender Inequality on GDP in EU Countries. *Cent Eur J Public Policy.* 2023;17(2):13-32. doi:10.2478/cejpp-2023-0011
- Cameron L. Gender Equality and Development: Indonesia in a Global Context. *Bull Indones Econ Stud.* 2023;59(2):179-207. doi:10.1080/00074918.2023.2229476
- Podolchak N, Martyniuk V, Tsygulyk N. Study of Correlation Between the Gender Gap Index, Economic Efficiency, and Governance in European Countries. *Contemp Econ.* 2023;17(3):333-350. doi:10.5709/ce.1897-9254.514

CROSS BORDER ANALYSIS OF INDIAN AND INDONESIAN GOVERNMENT POLICIES AND PROGRAMS PROMOTING WOMEN ENTREPRENEURSHIP IN THE COUNTRY WITH SPECIAL REFERENCE TO MUSLIM WOMEN ENTREPRENEURS

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Abstract

Globally, Women entrepreneurs are getting their due respect and their contribution in the enrichment of the global economy is indisputable. Sensing the grave importance of the Women entrepreneurship, numerous research have been conducted and many researches are still underway on the topic. This study specifically focuses on the Muslim Women Entrepreneurs living in India and Indonesia. India, a large south Asian country is geographically far away and different to Indonesia, an archipelago nation. Indonesia, a Muslim dominated island country will surpass 298 million population by 2030. India with 1.46 billion population is Hindu dominated country. The countries share ancient cultural and maritime trade off and membership in the Indian Ocean Rim Association. According to 2021-2022 Labour force data, out of 50 million Muslim women (7% of total Indian population) only 15% are employed and majority of them are engaged in informal sector and earning livelihood as tailors, artisan, domestic worker, hawker etc. 31% of Muslim population in India live below poverty line. According to Ministry of religious affairs, Indonesia (2022) there is around 242 million Muslims (87% of the total population) in the country and as per census 2010 there are around 103 million female Muslim populations in the country. According to Global Entrepreneur monitor (2023) and World Bank Report (2020), Indonesia accounts for highest number of Women entrepreneurs in the Asia Pacific Region. Indonesian MSMEs accounts for 64.2 million in number and contributing approx 61% towards GDP. The workforce of Indonesia is primarily engaged in MSMEs with women work force constituting of 64.5% (Coordinating Ministry of Economic affairs, 2022). It is evident that both the countries are different in terms of geography, religion, size, demographics and expansion. The study also found out that the Muslim Women Entrepreneurs of both the countries face similar pathos in opting entrepreneurship and running the same. Such as lack of finance, lack of family support, lack of basic education and having no or less knowledge of technology and networking. Unfortunately, the list continues. The paper aims to analyze the prevalent policies and programs in both the countries for promoting Women Entrepreneurship with special reference to Muslim Women Entrepreneurs. Thus, drawing constructive comparison and learning followed by recommendation and suggestions for sprouting, nourishment and advancement of Muslim Women Entrepreneurs in India. The proposed study is purely descriptive in nature, relying completely on secondary data comprising of journals, articles and government reports majorly.

Keywords: *Muslim Women Entrepreneurs, India, Indonesia, Government, policies*

Introduction

A wholesome development of an economy can only happens with more and more individuals taking up entrepreneurship in that country. If those individuals belong to the most ignored and under-nurtured section of the society, namely, women, then it will definitely lead to an inclusive development

and balanced growth of the country. Recently gender-oriented entrepreneurship, that is, women taking up entrepreneurship, have suddenly surged in India as well as in many south Asian countries. Women entrepreneurs have a most visible presence in Indonesia, among the South Asian countries, followed by India. Women have become an indispensable factor in the sustainable and inclusive growth of both the economy. McKinsey Global Institute (MGI) forecasts that if India ropes in sixty-eight million more women in workforce by 2025 then there shall be an upsurge of 0.7 trillion USD in the Indian economy. Increase of women in Indian workforce by fifty percent can spike the Indian GDP by 1.5 percent, as per the World Bank Report. *As per latest research conducted by National Sample Survey office (2021-2022) in India, there are 63.38 million MSMEs (micro, small and medium enterprises). 20.5% MSMEs are owned by Women Entrepreneurs with a turnover of Rs.16,784,358 crores as per Udyam Registration Portal, Ministry of MSME (India).* Unfortunately, the exact number of Muslim Women entrepreneurs is not known. The subset of Muslim women lags far behind in respect of their entrepreneurial journey. There may be numerous socio-cultural issues to pull them back. But our experience says that many a Muslim woman have started showing courage to sail their entrepreneurial venture successfully and have become inspiration to the fellow women of her community. As per data of *Ministry of Co-operatives and Small and Medium Enterprises 2021*, 61% of Indonesian economy consists of micro, small and medium enterprises. According to *National Statistical Bureau 2021* nearly 64% of MSMEs are women-owned. Thus, the study of entrepreneurship from a gendered perspective seems to be intriguing and the present study delves into the domain of Muslim women entrepreneurship adding a religious dimension to it.

Literature Review

Major challenges faced by women entrepreneurs are financial in nature. They don't get credit as most of the lenders doubt their payback capabilities. Agrawal (2013) highlighted that how orders in small quantity are placed to women entrepreneurs first just to check their capability. The challenges faced by the Muslim women entrepreneurs are partly addressed by joining SHGs, SHG federations and NGOs. SHGs help building sustainable business model for rural women by inculcating in them leadership skills, confidence, communication and business skills etc. whereas SHG federation provides with financial literacy and support. NGOs impart training and development, creates platform where they can express and explore themselves by arranging various trade fairs (Mahato et al., 2022). There are many organisations in India such as *Federation of Indian Women Entrepreneurs, Consortium of Women Entrepreneurs, TiEStree shakti* and few others who work for the advancement of women entrepreneurship. It needs to be seen that Government Schemes and policies reach the women entrepreneurs at grassroot level (Bharathy and Kayarkatte (2021), Meenakshi and Ali (2021). Mohd Imran and Umme Aiman, (2019) noticed that training and seminars and workshops conducted by successful women entrepreneurs inspire other aspiring women.

Women entrepreneurs are engaged in providing employment and enhancing the life of their family through their contribution. They not only inspire other women entrepreneurs to join the entrepreneur journey but carve the path of innovation and development (Priya and Bose, 2021). Women entrepreneurs need a conducive gender bias-free environment to run a sustainable business. Women need to be future ready and transform their business digitally to overcome the threats and access the potential opportunities (Stefan, D et al., 2021, Yousuf, 2015). The study by Rahayu et al. (2021) reveals that to overcome the crisis women entrepreneurs in Indonesia devised new ways of promoting their business online through social medias namely *Whatsapp, Instagram* and *Facebook*. They took their business to social media by offering attractive discounts and offers, interacting with the potential buyers online by posting pictures and descriptions of their product and services. Hazudin et al., (2021) pointed out that lack of ICT literacy, fierce competition, lack of confidence and trust are prime challenges faced by women in the path of digital entrepreneurship. Lack of proper guidelines and policies to regulate online business is also a major concern and should be tactfully dealt with by the government.

Research Gap

After thoroughly reviewing the various literatures on women entrepreneurship it was found that much research has been conducted on women entrepreneurship in India focusing on dimensions like need, importance, motives, prospects, and challenges. Several research have also been conducted on the role of government in uplifting women entrepreneurship in India and also globally. However, the recent surge of entrepreneurship among Muslim women of India is still an unexplored area. Muslim women entrepreneurship has caught attention globally and many studies have been conducted in Asian and Middle Eastern countries such as Indonesia, Pakistan, China and Saudi Arabia on various aspects and dimensions. But no such research has yet been done on the Muslim women entrepreneurs of India specifically the role and initiative of Central Government in the growth and development of Muslim women entrepreneurs. According to *Ministry of Religious Affairs, Indonesia* (2022) there are around 242 million Muslims (87% of the total population) in the country. The census 2010 tells us that there are around 103 million female Muslim populations in the country. According to *Global Entrepreneur Monitor* (2023) and *World Bank Report* (2020), Indonesia accounts for highest number of Women entrepreneurs in the Asia Pacific Region. My current study will be a humble attempt to revisit the policies and programs taken up by the Government of Indonesia for promoting entrepreneurship among Muslim Women and comparing the same with the policies initiatives taken by the Indian Government in this regard. The study also aims to offer constructive suggestions and recommendations for boosting the presence of women entrepreneurs. The study attempts bridge the research gap and offer a meaningful contribution to existing literature.

Objectives of the study

The study is designed to address the following objectives:

1. To analyze the Central Government policies and programs for promoting Muslim Women Entrepreneurship in India.
2. To study the policies and programs adopted by Indonesia for promoting Muslim Women Entrepreneurship.
3. To draw constructive comparison followed by recommendation and suggestions for sprouting, nourishment and advancement of Muslim Women Entrepreneurs in India.

Research Methodology

To conceptualize the subject, secondary sources have been of immense help while conducting the research. Various books, journals such as International Journal of Islamic Management, International Journal in Commerce, IT & Social Sciences, IJIRT etc, research publications, newspapers, various relevant enactments, government pronouncements, and inputs from electronic media served as the sources of secondary data. The reports like MoMSME Annual Reports of various years, relevant NSSO Reports, International Labour Organization reports and publications, various enactments like MSME Act etc, decoding government support to women entrepreneurs in India (a report by RSNA-21 of NITI Aayog), Edelweiss Reports on Women Entrepreneurship, Stand Up India, Start Up India (Superstree) scheme and various other schemes data for women entrepreneurship has helped building the premise for studying the role of central Government for promoting Women Entrepreneurship in India. University of Melbourne report on empowering women entrepreneurship in Indonesia (2024), World Bank reports, International Journal of Religion (2024) have helped me get insights of the policy programs of Indonesia pertaining to Muslim Women Entrepreneurship. This is basically a descriptive study drawing largely from existing literature.

India Vs Indonesia: Comparative insights of women entrepreneurship

India, a large south Asian country is geographically far away and culturally different from Indonesia, an archipelago nation. Indonesia, a Muslim dominated island country, will surpass 298 million population by 2030. India with 1.46 billion population is largely a Hindu dominated country. The

countries share ancient cultural and maritime trade and membership in the *Indian Ocean Rim Association*. According to 2021-2022 Labour force data, out of 50 million Muslim women (7% of total Indian population) only 15% are employed and majority of them are engaged in informal sector and earning livelihood as tailors, artisan, domestic worker, hawker and so on. 31% of Muslim population in India live below poverty line. According to Ministry of religious affairs, Indonesia (2022), there are around 242 million Muslims (87% of the total population) in the country and as per census 2010 there are around 103 million female Muslim population in the country. According to *Global Entrepreneur Monitor (2023) and World Bank Report (2020)*, Indonesia accounts for highest number of women entrepreneurs in the Asia Pacific Region. It is evident that both the countries are different in terms of geography, religion, size, demographics and expansion but the Muslim women entrepreneurs of both the countries face similar pathos in their entrepreneurial journeys.

India is the 4th largest economy in the world. India is striving hard to reach the goal of achieving \$ 7 trillion-economy by 2030, keeping in focus its Sustainable Development Goals. The Ministerial Conference held at G20 Presidency Summit 2022, Indonesia highlighted the importance of women entrepreneurship and advocated for women empowerment and gender equality. Center for Integrated Services for Cooperatives and Micro, Small and Medium Enterprises (PLUT-KUMKM) strives to support the operations of the MSMEs, BPUM (Bantuan Produktif Usaha Mikro) program launched in 2020 aims to extend financial support to MSMEs. The Indonesian government has committed to achieve Sustainable development goals 2030 by facilitating more women participation in leadership, economic activity and STEM (Science, Technology, Engineering and Mathematics). In both the countries Women entrepreneurship will help in achieving sustainable development goals such as poverty reduction, gender equality, income equality, community development, access to quality education and conservation of environment.

Challenges faced by Muslim Women Entrepreneurs in India and Indonesia

- Lack of education and training
- Limited access to finance
- Lack of financial literacy
- Lack of digital literacy and skills
- Techno-phobia
- Gender discrimination/patriarchy
- Socio-religious constraint
- Lack of family support
- Limited access to market information
- Lack of legal knowledge and support (registration of companies, obtaining trademark, patent etc.)
- Lack of knowledge about various prevailing Government policies and support programs

Despite the challenges many Muslim Women Entrepreneurs have been able to rise and overcome all the barriers on their way to be an inspiration for others.

Few notable Muslim Women Entrepreneurs in India:

- Shahnaz Husain established Shahnaz Herbals Inc. A well-known name in herbal cosmetics and skincare world.
- Arma Sahar helped the women community through launching an app called Unicorn, a driver training app for women
- Nusrat Jahan has collaborated with Led by foundation (Harvard- Incubated social enterprise focused on imparting leadership training to Indian Muslim Women).

Few notable Muslim Women Entrepreneurs in Indonesia:

- Diajeng Lestari established a modest wear fashion enterprise named HijUp.
- Annisa Muslimah, she won IPEMI 2024 Female Muslim Entrepreneur Ambassador competition for her business venture Ann Modesty (a fashion brand)
- Nurhayati Subakat established Wardah cosmetics brand

Both the Governments of India and Indonesia have come up with various schemes, policies and programs at different point of times to help the women fight the hurdles setting up their ventures and also for channelizing the benefit and impact of entrepreneurship across genders.

Prominent Central Government initiatives over the years for promoting women entrepreneurship in India

Stand Up India

Stand up India scheme was launched in the year 2016 to finance Greenfield ventures started by *Women* or individuals belonging to either SC/ST. The scheduled commercial banks can only extend loan amount between 10 lakhs to 1 crore to support Greenfield ventures in trading, manufacturing, service and agriculture industries. The scheme makes sure that the venture should hold majority stakes by either the women or individuals belonging to SC/ST.

The composite loan comprising of term loan and working capital will cover 85% of the project cost with a low interest rate not exceeding the base rate (MCLR+3%+tenor premium). The loan may get sanctioned in exchange of collateral security or credit Guarantee fund scheme by Stand up India scheme to be decided by the bank and repayable in 7 years with maximum respite of 18 months. The scheme can be consolidated with any other prevalent Central/State Government Scheme with margin money up to 15% borne by the entrepreneur.

As per Ministry of Finance around 1,94,804 loans worth more than Rs 33,152 crore have been sanctioned to *Women Entrepreneurs* under the scheme as on 27th January 2025. The Stand up India scheme has been extended till 2025 with total number of loan sanctioned 2, 59,797 worth Rs 61367.79 crore as on 27th January 2025. Till December 2022 there were around 6120 loan accounts for *women entrepreneurs* in West Bengal. Around 2358 loans have been sanctioned in West Bengal to beneficiaries including women and individuals belonging to SC/ST under Stand up India Scheme for the time period between April 2021 till March 2024 (Source: SIDBI).

Start Up India

Start up India scheme was launched in the year 2016 by the Government of India, managed by the department for promotion of industry and internal trade (DPIIT). The scheme aims to encourage entrepreneurship with innovative thinking among youths specially *women* for sustainable inclusive development. As per report “Prabhav” 2024, 157000 start ups have been acknowledged by DPIIT out of which 75000 are *women led start ups*. In West Bengal there are 2610 start ups with *Women* as Directors (as on 31st December 2024).

The scheme operates across the following aspects:

- Simplification and Handholding
- Funding support and incentives
- Industry –Academia Partnership and Incubation

The Startup India scheme religiously supports the upliftment of Women Entrepreneurship. The scheme has been persistently coming up with networking initiatives and policies to strengthen

the women entrepreneurship ecosystem in the country. The following efforts have been mentioned below:

- In order to propagate information regarding their initiatives, to train them and to provide a platform for their start up the start up India scheme came up with Women capacity development programme (WING). 1150+ women across 9 states have been benefitted through this programme. Till now 21 workshops have been conducted.
- Selected women entrepreneurs get the opportunity to interact with lending institutions for venture funds facilitated by SIDBI. The scheme has also designed a webpage separately for women entrepreneurs on STARTUP HUB.
- 20 women led start ups were supported for 3 months on pro bono basis by Virtual Incubation programme for women entrepreneurs in association with Zero start up.

The startup India scheme has been scheduled to be in force till 2025.

Mudra Yojana

Pradhan Mantri MUDRA yojana was launched in the year 2015 with the purpose to develop and refinance micro units and small business. MUDRA (Micro Units Development and Refinance Agency Ltd.) scheme in the financial year 2024-2025 has successfully extended 46755721 numbers of collateral free Loans with amount sanctioned 491406.10 Crores and amount disbursed 480395.35 Crores. MUDRA aims to uplift the youths of the country with successfully building an entrepreneurship eco system. The scheme is not gender specific but has benefitted women entrepreneurs primarily. Youths especially women have been immensely benefitted under this scheme; it is evident from the figure that around 67.93 % loan account belongs to Women Entrepreneurs with disbursement amounting to 222297.27 Crores (41.76%) as per Annual Report FY 2023-2024.

Under MUDRA scheme loan amount is offered in three categories based on the amount size namely:

- Shishu (upto Rs 50,000)
- Kishore (above Rs 50,000 and upto Rs 5 lakh)
- Tarun (above Rs 5 lakh and upto Rs 10 lakh).

Budget 2024-2025 made new addition to the category namely Tarun plus extending support upto 20lakhs.

In the financial year 2023-2024 West Bengal ranked 5th among the other states in terms of loan amount disbursement which amounts to 46712.27 Crores.

Nai Roshni- Scheme for Leadership Development of Minority Women

The ministry of Minority affairs looks after the welfare of Minority communities namely Muslim, Buddhist, Sikh, Christian, Jain and Parsi in India. There are around 17, 22, 45,158 Muslims in India as per 2011 census that is around 14.2%. In the year 2012-2013 the ministry with an aim to educate and develop minority women introduced Nai-Roshni scheme in order to inculcate leadership qualities in them. The scheme operates in partnership with NGOs, civil societies and Government institutions in the country to impart financial education along with other 6-day training programs such as life skills, legal rights of women, digital literacy, swachhbharat, health and hygiene, advocacy for social and behavioural change. As per Annual report 2023-2024 the scheme has benefitted around 4.65 lakhs women. *Literacy rate among muslim women is 51.89% and 48.11% muslim women are illiterate. There are around 50 million muslim women in India which is 6.9% of population and 120.14 lakhs muslim women in west Bengal (Census 2011).* The figures are alarming and Nai-Roshni happens to be a sincere effort in mitigating the pathos of muslim women and other minority women in India. Though the scheme is not entrepreneurship oriented entirely but it paves the path for making women self-independent and resilient. Hence making the minority women to choose or build a path on their own be it being a job holder or an entrepreneur.

Trade Related Entrepreneurship Assistance and Development

The government of India launched TREAD during the 9th plan period with an aim to bridge the financial gap in the entrepreneurship journey of a woman. The scheme makes sure the women entrepreneurs not only receive proper training, counseling and motivation but provide them with finance on credit easily to take up business activities. NGOs receive grants by GOI and loan by funding agencies/banks/institutions to finance the business activities of women entrepreneurs. The grant by GOI constitutes 30% of the loan amount that can amount to up to 30 lakhs as assessed by lending institutions. NGOs play an important role for educating and up scaling and financing the women entrepreneurs in the TREAD scheme. Till 2015-2016 3560 women have been benefitted with grant of Rs 200 lakhs.

Mahila Coir Yojana and Entrepreneurship Development Programme

The coir board of India launched Mahila Coir Yojana in the year 1994 for the rural woman artisans so that they can generate self-employment and become financially independent. Under the scheme the women artisans are provided training with stipend to convert coir fibre into yarn and hence do big scale business out of it. Till March 2024, 1967, numbers of women artisans have been provided training under Mahila Coir Yojana Scheme.

Entrepreneurship development programs are also conducted to make sure the entrepreneurs irrespective of gender in the coir sector are able to tackle the business financially and resourcefully. Till March 2024, 40 EDPs have been organized along with 47 awareness programs, 10 educational tours, 13 workshops and 12 seminars.

Women Entrepreneurship Platform

NITI Aayog launched WEP in the 8th global entrepreneurship summit 2017 with an aim to create one click solution to all the questions and doubts of Women entrepreneurs in India. More than 25600 women entrepreneurs have registered on this platform and got benefitted out of it. WEP inspires women to take up entrepreneurship and provides them with relevant knowledge, training, skills and assistance. The platform imparts the concept of collaborating with peers and other stakeholders long with consolidating the available knowledge and resources so that they can learn and upgrade skills in order to develop and upscale their business.

Indonesian Government policies and programs supporting Muslim women entrepreneurship

Indonesia is the fourth most populous country with a population of around 275.8 million (2022) and 16th largest economy in the world. Indonesia is a Muslim dominated country but not an Islamic State. It is also a part of the G20 and aims to be among the 10th largest economy in the world by 2030. The Ministerial conference held at G20 Presidency summit 2022, Indonesia highlighted the importance of women entrepreneurship and advocated for women empowerment and gender equality. Indonesian economy highly benefits from micro and small level enterprises which accounted for around 4.16 million in the year 2021. Presidential regulation (No 2/2022) of Indonesia has defined Women Entrepreneurs as someone who owns 51% stake and someone who manages at least one business listed in a digitally integrated business licensing system. Women in Indonesia take up entrepreneurship due to lack of job opportunities and are more driven towards wholesale and retail sector (GEM, 2021). This is also known as Necessity-driven Entrepreneurship and not out of choice or passion. The following is an overview of the policy initiatives and schemes adopted by the Indonesian Government:

- **Center for Integrated Services for Cooperatives and Micro, Small and Medium Enterprises (PLUT-KUMKM)** strives to support the operations of the MSMEs, **BPUM (Bantuan Produktif Usaha Mikro)** program launched in 2020 aims to extend financial support to MSMEs. The Indonesian government has committed to achieve Sustainable development goals 2030 by facilitating more women participation in leadership, economic activity and STEM.

- Since 2017 **Pusat Investasi Pemerintah (PIP)**, a prominent Indonesian government agency provides financial assistance to micro or small businesses run by women entrepreneurs through microfinancing and co-operative Institutions.
- **Women Micro, small and medium enterprise development framework Action Plan (2022)**, a joint initiative of Indonesian Government and Asian Development Bank tries to mitigate the financial and digital challenges faced by Women Entrepreneurs in Indonesia. Regulations have also been laid down to banks for assisting Women Entrepreneurs with banking services and products.
- **Kredit Usaha Rakyat Program** introduced by Indonesian Government provides loan, working capital and other financing schemes for MSMEs and co-operatives.
- **International Finance Corporation in collaboration with Eastern Indonesia small and enterprise assistance program** provides finance service to MSMEs in below poverty line region of Indonesia.
- Government of Indonesia in the year 2020 introduced **National Financial Inclusion Strategy** to promote equality in accessing financial services especially to Women. The strategy encourages women holding bank accounts and owning businesses.
- **ILOs Women in STEM workforce Readiness and development Program (2017-2021)** emphasized on Digital literacy training for Women to enhance their technical and digital skills.
- Since 2022 **Government of Indonesia jointly collaborated with, WE connect International and ADB** to work on gender responsive public procurement strategy and roadmap in an order to mitigate the challenges arising from lack of access to market. To include Women in Public Procurement processes efforts were made by using the e-procurement platform to attract women owned business suppliers and to set a monetary limit by procuring agencies to limit competition among women owned business suppliers.
- International Labour Organisation and International Finance Corporation of Indonesia jointly introduced **Better Work Program** in the year 2011 in order to promote healthy competition and working environment in the garment export sector. Over 4lakh labors participated in the initiative and 80% of them were women.
- Small or Micro enterprises that are run by entrepreneurs are termed as ULTRA MICRO ENTREPRENEURS. To support Ultra Micro Entrepreneurs, PIP extends financial support in form of digital loans and also provides skills training. The Indonesian Government extends collateral free loans upto IDR 20 million via non-banking financial Institutions to support ULTRA micro-Entrepreneurs. 95% of the beneficiaries are women under this micro financing scheme. PIP has extended financial support to more than 5.4 million Ultra micro business worth IDR 18.08 trillion (Women's World Banking, 2022). Over the years Microfinancing Institutions have helped women entrepreneurs to run their businesses smoothly by providing them financial aid, skills training, seminars, workshops and business education.
- **Micro Waqf Bank** is a microfinancing institution that functions on Islamic finance principle operational since 2017 and inaugurated by the President of the Republic of Indonesia. It's one of the most popular microfinance institutions in Indonesia, jointly established by Financial Services Authority, Business Incubation Centre and the Amil Zakat Institution. Micro Waqf Bank receives funds from individuals, institutions, and corporate donations with an aim to support small business. Micro Waqf Bank has successfully managed to keep its non-performing finance at zero percent. The key elements of Islamic Microfinance are as follows:
 - Interest free financing with or without collateral
 - Prohibition of illegal products and services
 - Profit sharing

Key lessons from Indonesia:

The Government of India can curate policies emphasizing Islamic finance Principles such as interest free financing with or without collateral, prohibition of illegal products and services and profit sharing (sharing profit at pre-fixed ratios and losses as per ratio based on capital contribution of the partners). For example, Micro Waqf Bank of Indonesia receives fund from individuals, institutions, corporate donations with an aim to support small business run by Muslim Women Entrepreneurs.

Even though Indonesia's major of the population is Muslim and there are around 103 Million Muslim female, the country advocates gender equality and women empowerment. According to *Global Entrepreneur Monitor (2023)* and *World Bank Report (2020)*, Indonesia accounts for the highest number of Women entrepreneurs in the Asia Pacific Region. Needless to say, Indonesia has flourishing Muslim women entrepreneurs in the country with 64% of MSMEs managed by Muslim women. In Indonesia also there is no specific policy programs specifically meant for Muslim women entrepreneurs may be due to the fact that the majority of them are Muslims.

Key lesson from India:

India has been launching variety of policies and instruments from time to time to uplift Women entrepreneurship in the country. Interventions have also been made to uplift the minority group in the country. Indonesia needs to curate policies and initiatives to promote entrepreneurship among the minorities (Christians, Hindu, Buddhist and Confucians) like India has done by introducing schemes such as Nai-Roshni, for leadership development among minority women.

In this dynamic world both the countries are working hard to nourish the women entrepreneurs in their respective ways. There is always room for plenty of suggestions and improvements to keep pace with the ever-changing needs of the world.

Conclusion

The study was aimed at Muslim women entrepreneurship in India and Indonesia. But after thoroughly examining the available literatures and government reports of both the countries, it is discovered that the focus has only been on the women entrepreneurship only.

In India, schemes like Stand Up India focuses on women belonging to SC/STs whereas Nai-Roshni focuses on women belonging to minority religious groups (Muslim, Buddhist, Sikh, Christian, Jain and Parsi). There are no specific policy programs specifically for Muslim women pursuing business in India. Empirical Research should be conducted to get in-depth view of the prevailing landscape of the Muslim women pursuing business in the country. The Government of India should come up with customized policies programs and incentives for encouraging Muslim women entrepreneurs. A bird's eye view of all the eggs in the basket is necessary to make India triumph as a diversified nation. However, the study is constrained by data limitation as it is based on solely on secondary data and therefore, leaves ample scope for further in-depth empirical analysis.

Bibliography

- Anila, T. (2024). *The role of women's entrepreneurship in achieving sustainable development goals (SDGs): A comprehensive review*. *Journal of Biotechnology & Bioinformatics Research*. [https://doi.org/10.47363/JBBR/2024\(6\)174](https://doi.org/10.47363/JBBR/2024(6)174)
- Imran, M., & Aiman, U. (2019). *Women entrepreneurship and current scenario in India: An overview*. *JETIR*, 6(6). ISSN 2349-5162.
- ERIA Research Project Report. (2022). *Empowering women entrepreneurs in Eastern Indonesia* (No. 13).

- Lakshmi Priya, G., & Bose, S. S. (2021). A study on women entrepreneur's awareness about government schemes—Special reference to Chennai District, Tamil Nadu. *International Journal of Management (IJM)*, 12(9), 55–83. Retrieved from <https://iaeme.com/Home/issue/IJM?Volume=12&Issue=9>
- Hazudin, S. F., Sabri, M. F., Kader, M. A. R. A., & Ishak, M. (2021). Empowering women-owned businesses in the era of digital transformation: A review of the opportunities and challenges. *International Journal of Academic Research in Business and Social Sciences*, 11(19), 231–244.
- Mahato, J., Jha, M. K., & Verma, S. (2022, July). The role of social capital in developing sustainable micro-entrepreneurship among rural women in India: A theoretical framework. *International Journal of Innovation (IJI)*, 10(Special Issue), 504–526. <https://doi.org/10.5585/iji.v10i3.21771>
- Bharathy, [Ms.], & Kayarkatte, N. (2021). Women entrepreneurship in India: A review of related literature. *International Journal of Creative Research Thoughts (IJCRT)*, 9(7). ISSN 2320-2882.
- Rekarti, B., & Zahari, M. (2019). The sustainability of Muslim women entrepreneurs: A case study in Malaysia. *International Journal of Financial Research*, 10(5, Special Issue). <https://doi.org/10.5430/ijfr.v10n5p430>
- Soemitra, A., Kusmilawaty, & Rahma, T. I. F. (2022). The role of micro waqf bank in women's micro-business empowerment through Islamic social finance: Mixed-method evidence from Mawaridussalam Indonesia. *Economies*, 10(7), 157. <https://doi.org/10.3390/economies10070157>
- Garg, S., & Agarwal, P. (2017). Problems and prospects of woman entrepreneurship – A review of literature. *IOSR Journal of Business and Management (IOSR-JBM)*, 19(1), 55–60.
- Stefan, D., Vasile, V., Oltean, A., Comes, C.-A., Stefan, A.-B., Ciucan-Rusu, L., Bunduchi, E., Popa, M.-A., & Timus, M. (2021). Women entrepreneurship and sustainable business development: Key findings from a SWOT–AHP analysis. *Sustainability*, 13, 5298. <https://doi.org/10.3390/su13095298>
- United Nations Geneva. (2023). Trade and entrepreneurship in Indonesia from a gender and development perspective.
- United Nations Development Programme (UNDP). (2021). Women's entrepreneurship and access to finance: Challenges and opportunities of women-led social enterprises in Indonesia.
- Ministry of MSME. Know about scheme. Retrieved July 23, 2025, from <https://msme.gov.in/know-about-scheme>
- Ministry of MSME. . FINAL MSME Annual Report 2023–24 (English). Retrieved June 22, 2025, from <https://msme.gov.in/sites/default/files/FINALMSMEANNUALREPORT2023-24ENGLISH.pdf>
- Ministry of MSME. TREAD Guidelines. Retrieved June 23, 2025, from <https://msme.gov.in/sites/default/files/TREAD%20Guidelines.pdf>
- Press Information Bureau. Press Release (PRID 1987773). Retrieved June 23, 2025, from <https://pib.gov.in/PressReleasePage.aspx?PRID=1987773>
- Radiance Weekly. Empowering women entrepreneurs: The rise and future of women-owned MSMEs in India. Retrieved June 23, 2025, from <https://radianceweekly.net/empowering-women-entrepreneurs-the-rise-and-future-of-women-owned-msmes-in-india/>
- Startup India. Women entrepreneurs. Retrieved June 27, 2025, from https://startupindia.gov.in/content/sih/en/women_entrepreneurs.html
- Women Entrepreneurship Platform. About us. Retrieved July 2 2025, from <https://wep.gov.in/about-us>

- Jan Samarth. Business loan – Pradhan Mantri Mudra Yojana scheme. Retrieved July 2, 2025, from <https://www.jansamarth.in/business-loan-pradhan-mantri-mudra-yojana-scheme>
- Mudra. Offerings. Retrieved July 23, 2025, from <https://www.mudra.org.in/offering>s
- UNDP Indonesia. IWD 2021: Empowering women entrepreneurs & zakat social protection. Retrieved July 3, 2025, from <https://www.undp.org/indonesia/news/iwd-2021-empowering-women-entrepreneurs-zakat-social-protection>
- Women's World Banking.. Policy advocacy across Indonesia: A promising beginning for women ultra-micro entrepreneurs. Retrieved July 3, 2025, from <https://www.womensworldbanking.org/insights/policy-advocacy-across-indonesia-a-promising-beginning-for-women-ultra-micro-entrepreneurs/>
- Ministry of Minority Affairs. [PDF]. Retrieved July 3, 2025, from <https://minorityaffairs.gov.in/WriteReadData/RTF1984/1734524525.pdf>

EFFECTIVENESS OF ADOPTING ESG FRAMEWORK IN INDIA- AN ANALYTICAL STUDY

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Abstract

The term Sustainability has its origin in the year 1987. Since then, this term has gained importance over the years. In simple terms sustainability can be defined as the ability to maintain a level. From the business perspective it implies conducting business operations at present in a way without depleting natural resources and without hampering the capability of future generations to meet their own needs. Sustainability has three aspects viz economic, environmental and social which is also known as profit, planet and people. Environment is one of the main pillars of sustainability and environmental impact is becoming a serious matter of concern over the years. As a part of sustainable goals many businesses focus on reducing carbon footprints and conserving resources. ESG (Environmental, Social and Governance) is a tool which helps to assess company's performance on environmental, social and governance issues with emphasis on how these factors influence financial performance of a company. As ESG is evolving the role of accounting is expanding and it goes beyond the conventional accounting method. Sustainability accounting is emerging, which helps businesses to show their commitment to ESG. As ESG is gaining popularity over the years it is becoming quite valuable for the external stakeholders for informed decision making. Investors strongly believe that investing in a company with strong ESG principles and sustainability accounting practices ensures more return. This change in investors' attitude of the investors has led to the development of sustainability accounting and various ESG reporting frameworks and standards, such as the Global Reporting Initiative (GRI), the Sustainability Accounting Standards Board (SASB), and the Corporate Sustainability Reporting Directive (CSRD). This paper attempts to provide an insight into the implications of implementing ESG framework and adopting sustainability reporting practices with reference to India. This paper also focuses on the current scenario of BRSR reporting in India. Descriptive research methods have been used in this study. The study tries to analyse the effectiveness of adopting ESG framework and BRSR reporting in reducing the impact on environment.

Keywords: *BRSR, ESG, Sustainability, sustainability accounting.*

Introduction

Sustainability can be defined as using resources in such a way without depleting it for future generation. It is the ability to continue over time. Sustainability is all about striking balance between the need and wants today and ensuring that future generations will be able to meet their needs. In 1987, as per the UN Brundtland Commission sustainability is "meeting the needs of the present without compromising the ability of future generations to meet their own needs." Sustainability has gained importance over the years. It is widely accepted that there are three pillars of sustainability. Those are environmental, social and economic.

Environmental sustainability means making sure that we are using our natural resources, like materials, energy fuels, land, water etc, at a rate that can be sustained over time. It also includes zero carbon emission and reducing the carbon footprints. So, it focuses on using natural resources optimally ensuring their availability for future generations.

Social sustainability- implies creating an equitable society where every must have access to basic amenities of life like healthcare, education, and fair working conditions. It includes promoting social inclusion and community well-being. Achieving social sustainability means maintaining the long-term social well-being of a nation, an organization, or a community.

Economic sustainability- means that a country manages its resources wisely and responsibly, allowing it to function sustainably while consistently generating operational profits. It aims at creating a stable economy that supports current and future generations. It includes responsible resource management, efficient production and consumption, and fair distribution of wealth.

Sustainability is important for various reasons like protecting future generations, addressing the serious issue of climate change and ensuring long term well-being.

As a part of sustainable goals many businesses focus on reducing carbon footprints and conserving resources. ESG (Environmental, Social and Governance) is a framework used to evaluate how a company performs in relation to environmental, social, and governance matters with emphasis on how these factors influence financial performance of a company. Sustainability is becoming a major investment decision criterion for many investors integrating environmental, social and governance factors apart from only financial performance parameters. As the awareness about the sustainability issues are increasing ESG as a tool to assess company's performance on environmental, social and governance issues with emphasis on how these factors influence financial performance of a company is gaining importance. ESG is gaining importance over the years it is quite valuable for the external stakeholders for informed decision making. They believe that a company with strong ESG principles and sustainability accounting practices assures more return. The absence of a standardized ESG reporting framework across industries and countries makes it challenging to evaluate and compare companies' ESG performance. Improving the ESG reporting practices is indeed need of the hour. ESG reporting is a wider concept which includes various reporting mechanisms. BRSR is the ESG reporting framework in India. BRSR is a mandatory ESG reporting framework developed by SEBI for listed companies in India.

Today, nearly 140 developing nations are looking for ways to meet their development needs, but with the growing risks posed by climate change, it is essential to ensure that current progress does not harm future generations. ESG reporting helps businesses enhance transparency and accountability, strengthen their reputation, and build long-term value.

Literature Review

Lestari and Gangodawilage (2025) their study aimed to examine how investors perceive Environmental, Social, and Governance (ESG) reporting and how it influences sustainable investment decisions in Indonesia. They concluded by saying that studies future research should investigate how mandatory ESG disclosures influence reporting practices, as well as how technology can enhance the accuracy and transparency of ESG reporting.

Martiny, et.al (2024) said that understanding the importance and need of ESG is very essential to save the world from environmental and social challenges.

Kharola, Goyal and Saxena (2025) said that Environmental, Social, and Governance (ESG) reporting has become an essential element of corporate governance, promoting transparency and sustainable practices within organizations. They primarily focused on ESG reporting in India and its impact on corporate sustainability and investor confidence. Rao,et.al (2023) studied the impact of ESG practices on financial performance among Nifty 50 companies in India from 2015 to 2022. They conducted statistical analysis to observe that the link between ESG practices and financial profitability differs across various levels of return on equity (ROE). Menghnani and Shekar (2022) an overview of the background and introduction of BRSR, the factors driving the transition of sustainability reporting from Business Responsibility Reporting (BRR) to BRSR, and the additions and improvements introduced under the BRSR framework.

Objectives of study

In context of increasing importance of BRSR reporting this study aims to-

- To provide an insight into the implications of implementing ESG framework and adopting sustainability reporting practices with reference to India
- To focus on the current scenario of BRSR reporting in India
- To analyse the effectiveness of adopting ESG framework and BRSR reporting in reducing the impact on environment.

Proposed Methodology

This section of my study is based on the approach and methods used to gather data, analyze information, and achieve the research objectives primarily based on secondary data sources collected from websites, journals, and magazines. It is basically a descriptive study. No such statistical tools have been used in this study.

Discussion

As climate change is becoming an alarming global concern, and social equity, and corporate ethics continue to grow, there is a paradigm shift in ESG reporting. Moreover, global standards such as the Global Reporting Initiative (GRI), the Sustainability Accounting Standards Board (SASB), and the Task Force on Climate-Related Financial Disclosures (TCFD) have been created to help organizations ensure greater transparency and consistency in ESG reporting. Rising investor interest in ethical and sustainable business practices has elevated the significance of ESG reporting. ESG reporting has become an integral part of sustainable accounting practices and informed investors' decision making. Companies that adhere to the ESG principles tend to show sustainability, i.e. existence in the long run and gain competitive advantage.

BRSR (Business Responsibility and Sustainability Reporting) is a framework developed by the Securities and Exchange Board of India (SEBI) to encourage responsible and sustainable business practices among Indian companies. It makes the disclosure of Environmental, Social, and Governance (ESG) metrics in a standardized format, ensuring transparency and comparability mandatory.

Earlier it was BRR reporting which has been replaced by BRSR reporting. BRSR reporting is aligned with the global sustainability reporting standards like GRI, SASB, and TCFD. ESG helps investors to make informed decisions.

BRSR reporting is compulsory for the top 1,000 listed companies in India, determined by their market capitalization. For the rest it is voluntary. The mandatory reporting is effective from financial year 2022-2023.

Regarding the BRSR reporting format the BRSR report is divided into three **sections**:

1. General Disclosures

Corporate information

Products/services

Number of employees

Operations in India and abroad

2. Management and Process Disclosures

Governance of sustainability issues

Policies and stakeholder engagement

Grievance redressal mechanisms

3. Performance Disclosures Principle-wise

The nine principles outlined in the National Guidelines on Responsible Business Conduct (NGRBC) are:

Principle Theme

P1 Ethics, transparency & accountability

P2 Sustainable product lifecycle

P3 Employee well-being

P4 Stakeholder engagement

P5 Human rights

P6 Environmental protection

P7 Policy advocacy

P8 Inclusive growth and equitable development

P9 Customer value

There are several benefits of BRSR Reporting, they are

- Enhances ESG credibility of the companies
- Improves investor confidence. Helps investors to make informed decisions.
- Helps to promote sustainable growth
- Facilitates access to ESG-focused funds are becoming popular and accessible to investors in India. ESG-focused funds integrate the ESG factors or metrics in investment decision process which focuses on companies giving priority to sustainability practices.
- Ensures regulatory compliance
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The current status of **BRSR** in India:

Applicability

- It is Mandatory for the top 1,000 listed companies by market capitalization since FY 2022–23.
- Third-party verification (or assessment) compulsory for the top 500 firms starting FY 2025–26, expanding to the top 1,000 in FY 2026–27.
- Value-chain disclosures have been introduced initially under "comply-or-explain" for top 150 companies (FY 2024–25), then increasing to 250 companies including assurance by FY 2025–26—but now revised to a more voluntary format focusing on major partners >2% of purchase/sales by value.

As per the current reporting status 75% of Indian companies are now reporting on ESG metrics. BRSR Barometer 2025 (June 5) shows strong adherence—819 firms analyzed, but only one in four include Scope 3 data.

Companies require disclosing the following

- Comprehensive coverage across nine principles of NGRBC (National Guidelines for Responsible Business Conduct). Example environment, human rights, diversity, community, governance, consumer responsibility
- Reports related to 140 questions (98 essential, 42 leadership indicators) Firms must report on Scope 1 to 3 emissions, though only 25% currently disclose Scope 3—reflecting challenges in value-chain data. The questions are related to sustainability practices, impact on the environment, governance structures and more. Scope 3 emissions are all about indirect emissions occurring in the value chain from suppliers, transportation, waste etc. It is indeed difficult to collect data in this area and report hence the number of companies reporting on this issue is comparatively lower.

ESG metrics help businesses to reduce impact on the environment, increase social responsibility and ensure strong governance framework. It also helps to align corporate objectives with global sustainability goals like the UN Sustainable Development Goals (SDGs).

BRSR's Global Status

- BRSR is the regulation specific to India which focuses on corporate responsibility and sustainability. The guidelines of BRSR in India has similarity with global ESG frameworks like:
 - **Carbon Emissions and Climate Impact** (similar to TCFD)
 - **Human Rights and Fair Wages** (in line with UN principles)
 - **Governance and Ethics** (similar to GRI)
- 1. Global Corporations in India
 - ◆ MNCs in India can integrate with global standards like GRI or SASB with India specific standard BRSR to ensure that they meet both the local and global reporting standards.
 - ◆ Some corporations also publish Integrated Reports that is a combination of financial and non-financial performance, a practice recommended by the International Integrated Reporting Council (IIRC).
- 2. Asia-Pacific (APAC) and BRSR's Influence
 - ◆ While BRSR is specific to India, other Asian countries are also moving toward more comprehensive strong ESG reporting:
 - China has started implementing stricter ESG disclosure requirements.
 - Japan has emphasized on corporate sustainability through the Corporate Governance Code and Japan's Stewardship Code.
 - Singapore introduced the SGX ESG Reporting Guidelines.

BRSR Reporting by Sector (2023 Insights):

- **IT & Technology companies:** IT and tech companies in India, especially those listed on the Nifty 50 or Sensex, has revealed a leading position in adopting the BRSR framework, with detailed reports on their carbon footprint reduction efforts and social responsibility programs undertaken by them.
- **Manufacturing:** Manufacturing firms have focused more on environmental metrics, particularly in respect of energy use, water consumption, and waste management. However, reporting on social metrics seems to be a challenge for many of the companies in manufacturing sector.
- **Financial Sector:** Banks and other financial institutions are focusing on governance disclosures, including how they manage ESG risks in lending and investment activities. However, their environmental disclosures are relatively less compared to other sectors in case of financial sectors.
- **FMCG:** Fast-moving consumer goods companies are increasingly reporting on sustainable sourcing, waste management, and community engagement, but these reports are often not comprehensive.

A joint NSE–CFA Institute analysis of 300 leading firms (that accounts for 70% of total market capitalization) found:

- Energy consumption reporting increased in FY 23 as compared to FY22. About 96% of the companies reported on their energy consumption. It indicated 13% less energy consumption than previous year.
- 94% of the sampled companies reported on Scope 1 & 2 emissions in FY 23 which indicated 14% less carbon dioxide emission.
- 13% and 14% reductions in energy and emissions intensity from FY 2022 to FY 2023 respectively.
- 30% i.e 99 out of 300 companies conducted external assurance for environmental data.

- 25% i.e. 74 out of 300 companies assessed value chain environmental impacts.
- Sourcing from MSMEs increased to 22% in FY 2023 from 19% in FY 2022.

Challenges and Opportunities

When SEBI introduced this BRSR reporting in India it received huge acceptance and appreciation from different stakeholders and professionals. ESG reporting is set to bring a revolutionary change. Initially SEBI's decision is applicable to top 1000 companies based on market capitalization which leaves behind approximately 6500 companies in India below the threshold. The market capitalization criteria for selection of companies to report on ESG practices indeed have raised questions like-

- Missing out those companies which may significantly impact environment and society- There may be many companies which fall below the threshold limit of market capitalization but may significantly impact environment and society.
- High impact industries may be missed out like cement, pharmaceutical, or chemicals companies can avoid ESG reporting practices simply because of market capitalization criterion but they may have significant influence on the environment and society.
- Inconsistent ESG reporting criteria- Selection of market capitalization criterion is creating an inconsistent ESG reporting landscape. It may give misleading results in comparing two companies within same industry.
- Delay in adopting ESG framework- BRSR reach is restricted many entities especially those on voluntary basis may lack incentive in adoption of ESG framework.
- Reduced investors insight for smaller companies- Investors interested in sustainability-focused portfolios miss out on valuable ESG data for a large market segment, including smaller firms also which may have impact on the environment and society.

Some of the challenges are-

- Reporting standards are still fragmented, with different regions requiring different formats which are creating an inconsistent ESG reporting landscape.
- There are concerns over the accuracy, comparability, and reliability of ESG data.
- The lack of uniform ESG reporting standards, along with substantial compliance expenditures and risks associated, poses significant challenges for organizations. Green washing which indicates misrepresentation of data relating to ESG, and data collection complexities continue to pose significant hurdles.
- ♦ **Opportunities:**
 - Global consistency in reporting standards could lead to more harmonized frameworks, benefiting investors, policymakers, and the public.
 - There is increasing interest from investors and consumers regarding more sustainable and transparent business practices.

BRSR and the Future of Global Sustainability Reporting

The BRSR framework's adoption and implementation in India indicates a wider global push towards sustainability. The future may look for alignment of national frameworks with broader global standards, especially in the context of increasing investor demand for transparent and comparable ESG data to bring about consistency and evenness in the ESG reporting landscape.

Although ESG reporting is becoming more widely implemented, still many obstacles remain, including divergent reporting frameworks, the absence of uniform evaluative metrics, and concerns regarding green washing practices. These issues indeed question the effectiveness, credibility, and regulatory

enforcement of ESG disclosures. Mitigating these challenges through informed policy interventions, enhanced stakeholder collaboration, and systematic capacity-building efforts is essential for India to harmonize with global ESG reporting standards and promote sustainable long-term corporate development.

References

- *Bhattacharyya, A., & Rahman, M. L. (2021). ESG disclosure and firm performance: Evidence from emerging markets. Journal of Business Ethics, 170(3), 591–607.*
- *Global Reporting Initiative. (2021). GRI standards: Sustainability reporting guidelines. GRI.*
- *KPMG India. (2022). The future of ESG reporting: Trends and regulatory developments in India. KPMG.*
- *Ministry of Corporate Affairs, India. (2021). National guidelines on responsible business conduct (NGRBC). Government of India.*
- *PwC India. (2023). ESG compliance and corporate strategy: Aligning with SEBI's BRSR framework. PwC.*
- *SEBI. (2021). Business Responsibility and Sustainability Report (BRSR): A regulatory framework for ESG disclosure in India. Securities and Exchange Board of India.*
- *TCFD. (2021). Task Force on Climate-related Financial Disclosures (TCFD) recommendations report. Financial Stability Board.*
- *<https://jmsr-online.com/>*

ABOUT THE BOOK

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