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Editorial Insights

It is with immense pride and purpose that we present the inaugural volume of the Sahrdaya Journal of Entrepreneurship and Management Research (SJEMR). Born out of the academic vision of Sahrdaya Institute of Management Studies, this journal aspires to be a dynamic platform for original, relevant, and forward-looking research in the broad domains of management, entrepreneurship, economics, and sustainability.

The first issue of SJEMR is thematically anchored around the pursuit of sustainable development and strategic transformation in emerging economies, with India as a focal context. This volume reflects a multi-level inquiry: from macroeconomic frameworks to sector-specific financial strategies, from bibliometric analyses of research landscapes to empirical evaluations of market patterns. What unites these diverse approaches is a shared commitment to evidencebased, policy-relevant, and socially conscious research—a hallmark we hope to uphold in every issue.

We believe that the insights shared in this volume will serve as valuable references for researchers, educators, policy-makers, and entrepreneurs who are navigating the complex terrains of growth and innovation.

We extend our sincere gratitude to the contributors, peer reviewers, advisory board members, and all who supported the launch of this initiative. We look forward to a future of intellectual rigor, ethical research, and academic collaboration.

Warm regards,

Dr. Jino Johny M Chief Editor Sahrdaya Journal of Entrepreneurship and Management Research



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Strategic Growth Framework for the Indian Economy– An Evaluation

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ABSTRACT

This study proposes a Strategic Growth Framework aimed at fostering sustainable economic development in India by addressing key areas of social equity, infrastructure, and industrial growth. By prioritizing support for marginalized communities, enhancing agricultural income, and empowering small-scale industries through Self-Help Groups (SHGs), the framework seeks to lay the foundation for inclusive progress. Additionally, it underscores the importance of human capital development through expanded access to higher education and advocates for leveraging India’s vast tourism potential, currently contributing approximately 5% to the GDP, as a significant growth driver. The model draws inspiration from Kerala’s successful approach to human capital development, with universal education access as a means to ensure widespread economic benefits. Further, the study suggests policies to encourage investment from the Indian diaspora, which annually contributes over \$100 billion in remittances. By granting diaspora investors a special status, India could attract additional funds into critical sectors like infrastructure, technology, and education, accelerating the country’s economic trajectory. Through these strategies, India can evolve from a predominantly service-oriented economy to a global hub of entrepreneurship and innovation. Over the next 25 to 50 years, this model envisions India as a leader in the global economy, capitalizing on its human capital and strategic investments to drive sustainable growth and international influence.

KEYWORDS: Strategic model, Self Help Group, Sustainable Growth, human capital, GDP, Inclusive progress.

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INTRODUCTION

In a country like India, a significant portion of the population resides in rural areas, approximately 65 percent as per recent data. Despite varying levels of growth across industry, business, agriculture, technology, and transportation in India, sustainable development efforts have contributed to improving the overall living standards. A key factor driving this development has been India’s focus on “Human Capital.”

Since the 1970s, India has undergone a notable shift in its approach to education, with increased emphasis on delivering foundational education to all sections of society. Campaigns like “Sarva Shiksha Abhiyan” have been instrumental in advancing literacy rates and enhancing India’s human capital base. Previously, the economic contributions of the Indian diaspora, or Non-Resident Indians (NRIs), were a significant driver of economic growth, particularly through remittances. These remittances boosted the purchasing power of the population, which in turn spurred demand within the domestic market, leading to visible improvements among the middle and lower-middle classes. Looking to the future, in rural India, NGOs, farmers, and the working class are expected to play a pivotal role in shaping the country's economic growth. Their contributions toward agricultural innovation, grassroots development initiatives, and skill-building programs will be crucial for sustaining and expanding India's economic trajectory.

Table No.1

Indians In Outside the Country		
Particulars	As on 2023 (In Crores)	
	Indians	Malayalees
Total Population	142.86	3.57
Working Outside the Country	2.77	0.41
Percentage	1.94%	11.48%

In India, a substantial portion of the population works abroad, although this figure is lower than that of some states like Kerala, where over 10% of the population is employed

overseas. For India as a whole, income from expatriate workers and businesspeople, particularly through remittances, is a significant contributor to the national economy. These remittances bolster household incomes, support local businesses, and enhance the overall purchasing power in communities, especially in states with high migration rates, thereby driving economic growth in those areas.

REVIEW OF LITERATURE

Ahluwalia (2002) evaluates India's gradual economic reforms since 1991, highlighting both successes and challenges in achieving sustainable growth. The paper underscores the importance of maintaining a balanced approach to liberalization while addressing social equity. Balakrishnan and Parameswaran (2007) analyze the factors contributing to economic growth in India, emphasizing the critical role of policy initiatives and institutional frameworks in driving development. They argue for a more inclusive approach to ensure that growth benefits all segments of society.

Basu and Maertens (2010) explore the patterns of economic growth in India, linking it to structural changes in the economy and the necessity for improved human capital. Their findings suggest that enhancing education and skills is essential for sustaining long-term growth. Bhagwati and Panagariya (2012) challenge prevalent myths surrounding India's development trajectory, advocating for a focus on market-driven solutions to economic challenges. They emphasize the importance of human capital and education in fostering entrepreneurship and innovation.

Bhattacharya and Gupta (2019) examine the potential of diaspora bonds as a development finance mechanism in India, highlighting their ability to mobilize resources for national development. Their analysis presents a strategic approach to leveraging the financial contributions of the Indian diaspora. Bloom et al. (2003) discuss the demographic dividend and its economic implications, arguing that India's youthful population presents a unique opportunity for growth. They emphasize the need for investments in education and health to capitalize on this potential.

Chandrasekhar (2011) provides insights into post-reform industrialization in India, analyzing urbanization patterns and the resilience of the informal sector. The study

suggests that fostering inclusive industrial policies is crucial for sustained economic growth. Chatterjee and Subramanian (2020) investigate the relationship between human capital and economic growth in India, finding significant positive correlations. They advocate for policies that enhance educational access and quality to drive economic progress.

Dev (2006) focuses on the intersections between agriculture, employment, and poverty in India, stressing the importance of agricultural reforms for rural development. The study highlights the need for targeted policies to uplift marginalized farming communities. Duflo and Banerjee (2011) present a comprehensive analysis of poverty alleviation strategies, emphasizing evidence-based interventions that target the root causes of poverty. Their work advocates for a nuanced understanding of economic challenges in India.

Ghosh (2009) critically assesses the economic growth trajectories of India and China, exploring the implications of their differing approaches to development. The paper argues for the importance of inclusive growth models that consider social welfare. Goyal (2016) highlights the significance of innovation in driving industrial growth in India, arguing that small-scale enterprises play a vital role in economic development. The study recommends policies that support entrepreneurship and technological advancement.

Haque and Yusoff (2017) explore the role of the Indian diaspora in fostering foreign direct investment and economic growth, emphasizing their contributions to national development. They advocate for policies that encourage diaspora engagement in domestic industries. Jain and Mahadevan (2012) analyze the impact of self-help groups on poverty alleviation and skill development in India's informal sector. Their findings demonstrate the effectiveness of collective action in empowering marginalized communities.

Kapur and Ramamurti (2001) investigate the relationship between diaspora engagement and development outcomes in India, emphasizing the potential of diaspora investments in driving economic growth. Their study calls for enhanced policies to facilitate such contributions. Kohli (2004) argues that state-directed development has been pivotal for industrialization in India, highlighting the role of political power in shaping economic

policies. The study suggests that a proactive government approach is essential for fostering growth. Mazumdar (2010) examines the relationship between agricultural growth and employment generation in India, advocating for policies that enhance productivity in the agricultural sector. The findings stress the need for a balanced approach to rural and urban development.

Mishra and Parikh (2019) highlight the transformative impact of self-help groups on women's empowerment in rural India, showcasing how collective efforts can address social issues. Their research emphasizes the potential of SHGs in fostering sustainable development. Mukherjee (2015) investigates the link between infrastructure development and economic growth in India, highlighting the need for investment in transport and utilities to stimulate industrial activity. The study emphasizes the importance of strategic infrastructure planning.

Nagaraj (2011) analyzes trends in growth and employment in India, arguing that employment generation must be a priority for sustainable economic progress. The paper highlights the challenges faced by various sectors in absorbing the growing labor force. Panagariya (2008) presents a comprehensive overview of India's economic journey, advocating for market-oriented policies to sustain growth. The book emphasizes the need for continued reforms to enhance India's competitiveness on the global stage.

Ramesh and Sethi (2018) explore the role of tourism in driving sustainable economic development in India, highlighting its potential to create jobs and generate income. Their study calls for policies that support the growth of the tourism sector. Sen and Dreze (2013) critically assess India's socio-economic contradictions, arguing for a more equitable distribution of resources to achieve sustainable development. Their work emphasizes the need for inclusive policies that address the needs of marginalized populations. Sharma and Singh (2014) examine the impact of remittances on development outcomes in India, highlighting the significant role of diaspora contributions in driving economic growth. Their study recommends policies that leverage remittance flows for national development.

Yesterday's Struggle – Indian Economy

Even after the abolition of caste-based discrimination, individuals from marginalized communities across India continued to face restricted access to formal education and economic opportunities. Following independence, the Indian government prioritized providing basic education to all segments of society. This emphasis on education sparked a transformative movement across the nation, in some regions having a more profound impact than even major policy reforms like the Land Reforms Act.

In the early 1950s, employment opportunities within India were limited, prompting many to seek jobs abroad. However, the conditions faced by Indian migrant workers were often harsh. Many were compelled to work extremely long hours, sometimes up to 16 hours a day, for minimal wages. In the early years, a large number of Indians endured nearexploitative conditions in various parts of the world, with only basic facilities available for survival. This diaspora laid the foundation for the current strong Indian presence in the global workforce, though at great personal cost in the early days.

Today's Workforce – The Indian Economy

Since the 1980s, India has witnessed a shift as many previously marginalized communities leveraged improved English language skills and expanded educational access to seek better job opportunities abroad. Initiatives focused on literacy and education empowered countless Indians to secure well-paying positions, especially in the Middle East and other countries, where many achieved significant roles within various organizations. The substantial remittances they sent home have been a vital driver of economic growth in India, with migration proving to be a powerful force in poverty alleviation, particularly in states with high emigration rates.

In addition, Non-Resident Indians (NRIs) have contributed significantly to India's foreign currency reserves through deposits, which has strengthened the banking sector and enabled greater lending capacity to support industrial development domestically. This financial influx has created new opportunities for small businesses, local services, and daily wage workers in India, especially in regions with high migration. The remittances have also driven growth in the real estate sector, boosting economic advancement and improving living standards across all socioeconomic groups

With abundant opportunities available in Europe and other developed nations, many young Indians are pursuing higher education abroad, often funding their studies with bank loans. As the population in many European countries declines and with India recently surpassing China as the most populous nation, the proportion of young people in Europe is decreasing, alongside shifts in lifestyle and career priorities. Over the next 25 years, Indians are well-positioned to manage critical sectors globally, taking on influential roles in finance, administration, healthcare, technology, and management. While they currently serve as skilled professionals in these countries, these “servants” will increasingly become entrepreneurs and leaders, playing essential roles in the growth and sustainability of other economies.

Back home, India faces the challenge of creating substantial employment opportunities for its youth. Certain regions still contend with issues such as inadequate food production and job shortages, leading to a heavy reliance on other states for essential goods and employment. As more young Indians move abroad, particularly to Europe, two potential issues arise. First, as they invest more of their earnings in their host countries, the flow of remittances to India may decline, affecting local economies. Second, with their children growing up overseas, their visits to India may decrease over time, leading to a possible weakening of cultural ties and economic engagement.

To address these concerns, the government could introduce more favorable policies encouraging the Indian diaspora to reinvest in their homeland. Incentives for expatriates to channel their earnings back into India would not only support economic growth but also help preserve familial connections and cultural heritage. Through such strategic measures, India can harness the potential of its global diaspora while fostering robust job opportunities and economic resilience domestically.

Model for India’s Economic Development in the Future

I. Creating Entrepreneurs in Agriculture (FFF Model: Food Grain, Finance, Farmers' Producer Organization)

1. **Food Grain Production:** Expanding access to clean, reliable energy sources like solar power can significantly aid farmers and agribusinesses in boosting food production and

engaging in value-added processing. For off-grid farmers, replacing costly diesel generators with solar technologies would empower India's farming communities, especially those from marginalized backgrounds, to increase food grain production sustainably.

2. **Financing Small Farmers:** Transitioning to regenerative agriculture calls for innovative financing models. Ecosystem Service Markets (ESM), which reward farmers for providing ecological and societal benefits, represent a promising approach. This model supports farmers financially while promoting environmentally sustainable practices.
3. **Farmers' Producer Organizations (FPOs) in India:** FPOs enable farmers to work collectively, enhancing their bargaining power and creating economies of scale. Supported by the Small Farmers' Agribusiness Consortium (SFAC), FPOs can drive agricultural development across India by aggregating inputs and outputs, strengthening market access, and stabilizing income for small-scale farmers.

II. Creating Entrepreneurs in Other Sectors (SSS Model: Self-Help Groups, SmallScale Industry, Spice Export through FPO)

1. **Self-Help Groups (SHGs):** SHGs empower rural communities by addressing poverty and skill gaps through collective action. By promoting self-employment and poverty alleviation, SHGs provide essential support for rural development and women's empowerment across India.
2. **Special Package for Small-Scale Industry:** Small-scale entrepreneurs need targeted financial support, including moratoriums on existing loans and interest waivers. This financial package would help sustain and expand small-scale industries, which play a vital role in India's economy by creating employment and supporting local supply chains.
3. **Spice Export through FPOs:** India is one of the largest spice producers in the world, but recent export levels have declined. Small farmers can collaborate through FPOs to focus on global spice markets, with government assistance for exports through Indian ports. This approach would boost both rural income and India's position in international spice markets.

III. Infrastructural Development (RSR Model: Road, Sea Port, Rail)

1. **Road Network:** India should focus on upgrading and maintaining its extensive road network rather than prioritizing new road construction. Improving existing infrastructure

can reduce transportation costs, enhance trade efficiency, and foster regional connectivity, benefiting rural and urban areas alike.

2. **Sea Port Infrastructure:** To support industrial growth, India should develop and modernize its ports with private sector collaboration. Improved port infrastructure can enhance export potential, generate employment, and promote trade, especially benefiting the country's coastal states.
3. **Rail Infrastructure:** India's rail network is vital to its economy but requires further modernization and expansion to meet growing demands. Forming cooperatives or associations of marginalized communities to support rail infrastructure development could provide both investment and employment opportunities, especially in underdeveloped regions.

IV. Human Capital Development through Higher Education

To harness future global opportunities:

1. **Identify Opportunities:** Conduct studies to assess emerging career and skill opportunities across different countries to guide Indian youth toward high-demand sectors.
2. **Support Talented Students:** Identify and mentor promising students interested in global careers and innovation, encouraging them to take on leadership roles.
3. **Facilitate Education:** Provide accessible financing options like bank loans and scholarships for higher education, particularly for economically disadvantaged students, to enhance their opportunities in high-skilled sectors worldwide.

This strategic framework leverages India's strengths in agriculture, entrepreneurship, infrastructure, and human capital to drive inclusive and sustainable economic growth, ensuring that the country remains competitive on a global scale while uplifting communities domestically.

Conclusion

This study proposes a new model for India's economic growth, emphasizing the protection of marginalized communities through targeted infrastructure development, enhancing farmers' incomes, and fostering industrial growth through Self-Help Groups

(SHGs). It highlights the importance of human capital development via higher education and suggests capitalizing on India's diverse tourism potential, which currently contributes approximately 5% to the GDP. By implementing this model, India can shift from a predominantly service-oriented economy to a nation of entrepreneurs and global

leaders .India’s literacy rate has grown from 18.3% in 1951 to over 77% today, showcasing the transformative impact of accessible education. Other states can adopt Kerala’s model of human capital development and universal access to basic education to ensure inclusive economic growth that reaches all social strata. To further support this transformation, the government should introduce policies to attract investment from the Indian diaspora, which currently contributes over \$100 billion in annual remittances, among the highest in the world. Granting diaspora members, a special investment status could encourage them to reinvest in sectors like infrastructure, technology, and education, accelerating India’s growth trajectory. With these concerted efforts, Indians are well-positioned to assume leadership roles in the global economy within the next 25 to 50 years, strengthening India’s influence and positioning it as a hub of innovation, leadership, and sustainable development.

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In acknowledging the contributions to this study, I would like to express my sincere gratitude to the authors of the reviewed literature for their invaluable insights into India's economic growth strategies. Their research has provided a solid foundation for understanding the complexities of marginalized communities, infrastructure development, and human capital in the Indian context. I also appreciate the guidance and support received from mentors and peers throughout this research process. Finally, I extend my thanks to the institutions and organizations that have facilitated access to resources and data essential for this evaluation.

CONFLICT OF INTEREST

The authors declare that there are no conflicts of interest associated with this study. All research findings and interpretations presented are based solely on the reviewed literature and independent analysis. There were no financial or personal relationships that could be perceived as influencing the research outcomes. The integrity of the research process has been maintained to ensure objectivity and credibility in the evaluation of India's economic growth strategies.

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A Methodology for Measuring the Financial Sustainability of NonProfit Organizations-

An Empirical Investigation Using Financial Ratios

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ABSTRACT

Non-profit Organizations (NPOs) are increasingly considered leaders that bring together people, money, and knowledge to address social problems. Fiscal sustainability is crucial for these organisations to be viable and effective over the long term. The measurement and assessment of the financial sustainability of NPOs have proven to be challenges for scholars and professionals. This article proposes a structured framework that measures financial sustainability through the application of (i) Financial efficiency (FE), (ii) Profitability performance (LP), (iii) Solvency performance (SP), and (iv) Liquidity performance (LP) indicators. This quantifiable framework was applied to analyze the annual reports of Indian NPOs. The empirical analysis shows that most organizations are on the path of evolution in sustainability. The unique contributions of this study lie in its detailed, context-specific methodology for assessing the financial sustainability of NPOs in India, its use of robust archival data, the development of a comprehensive and nuanced scoring system, and its multiyear analysis that reveals important financial trends and patterns. These contributions enhance academic literature and provide practical insights for NPO managers in India, particularly in the absence of a standardized methodology for evaluating financial sustainability.

KEYWORDS: Annual report, Financial Sustainability, Non-profit organizations, Financial Statement analysis.

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INTRODUCTION

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Voluntary Organizations (VO) contribute significantly to society through their efforts to fulfil human requirements, often operating in conjunction with for-profit businesses and government initiatives (Murray Svidroňová et al., 2016; Soriano & Galindo-Martin, 2012; Svidroňová et al., 2016). How sustainability is defined, assessed, and enhanced has been a significant topic of debate in the non-profit arts and cultural industry for the last 20 years (Scurto-Davis, 2014). For nonprofit organisations to be viable and successful over the long run, fiscal sustainability is crucial (Roberts, 2003). Though studying the financial sustainability of nonprofit organisations has always been a difficult undertaking, the current financial crisis has also spurred more attempts to quantify financial sustainability in the non-profit sector. Lack of formalised procedures for classifying NPOs into uniform subgroups and acquiring similar data across organisations for extensive, qualitative study has made the task even more difficult (Froelich et al., 2000).

This article proposes the need for a clear and precise definition of the word 'non-profit organization' (NPO). The Society for Participatory Research in Asia (PRIA) has established a definition for a non-profit organization (NPO) based on international recommendations. According to PRIA, an NPO must fulfill five criteria simultaneously: it must have an institutional identity, be independent of the government, no distribution of profits, self-governing, and voluntarily established. Obtaining financial assistance is a challenging issue that non-profit organizations encounter worldwide. This issue has been addressed in the works of numerous authors (Gajdová & Majdúchová, 2018). Ensuring financial sustainability is of paramount importance for the continued survival of a non-profit charitable organization (NPO) (Varghese & Ajukurian, 2021). Although NPOs deliver vital services nationwide and internationally, their effectiveness is still a subject of considerable debate (Herman & Renz, 1999; Jackson & Holland, 1998). The measurement and evaluation of the overall sustainability of NPOs have proven to be challenges for both scholars and professionals (Ritchie & Kolodinsky, 2003). Specifically, the utilization of a bewildering assortment of financial metrics by NPOs can be attributed to a general lack of convergence of financial performance criteria (Herman & Renz, 1998). This study aims to develop a robust and standardized methodology for evaluating the fiscal sustainability of NPOs. In this article, the financial sustainability of NPOs is assessed using a weighted scoring system that categorizes organizations into three main levels (Sustainability Enhanced, Sustainability Evolving, and Sustainability Impeded).

INDIAN SCENARIO

Nonprofit organisations address problems, innovate, create jobs, generate income, and develop community leaders in all fields of endeavour. With 2.6 million jobs and 2.4 million full-time volunteers, these organisations are economic engines of growth that provide employment numbers

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greater than those of the public sector. Nonprofit organisations have established themselves as one of India's most significant humanitarian forces during the last 75 years. The industry has had a significant positive impact on women's development, education, health, livelihoods, skill development, disability, and the arts and culture. By 2030, these civil society organisations have a greater chance of achieving all of the Sustainable Development Goals (SDGs) via collaboration with governments. They have made a vital and admirable contribution to the nation-building of the next generation(Sarin, 2023).

TABLE 1 Contribution of Non-profit Institutions to GDP

Countries	Country Non-Profit Contribution to GDP (in %)
Canada	8.21
Israel	7.34
Mozambique	6.67
United States	6.23
Belgium	5.91
Japan	5.30
France	4.71
Brazil	3.43
Kyrgyzstan	2.32
India	2.00

(Source: Author's Compilation)

Note: These figures reflect the contribution of Non-Profit Institutions to GDP based on data from the last decade

TABLE 2 Estimates of The Economic Contribution of the NPO Sector in India (2009-10 To 2021-22)

Year	Estimated GVA of the NPO sector (INR crore)	Share in GDP (percent)
2008-09	74,058	1.41
2009-10	86,139	1.46
2010-11	1,05,884	1.47
2011-12	1,22,747	1.49
2012-13	1,30,992	1.53

2013-14	1,69,971	1.54
2014-15	1,94,825	1.60
2015-16	2,10,257	1.67
2016-17	2,52,974	1.74
2017-18	2,82,489	1.75
2018-19	3,13,512	1.83
2019-20	3,66,871	1.94
2020-21	3,87,754	1.97
2021-22	4,15,786	2

(Source: Author's Compilation)

The table above provides estimates of the magnitude and growth of the NPO sector's economic impact throughout time. According to estimates, the NPO sector's economic contribution to the Indian economy grew from around Rs. 74,058 crores in 2008–09 to almost Rs. 4,15,786 crores in 2021–2022. The NPO sector's economic contribution as a percentage of GDP grew from around 1.41% in 2008–09 to 2% in 2021–2022. Assessing the financial sustainability of NPOs in India is essential due to their significant and growing economic contribution. In addition to creating a significant amount of jobs and volunteer work, NPOs are essential to the advancement of the Sustainable Development Goals (SDGs) and addressing socio-economic challenges. Evaluating their financial sustainability ensures effective resource allocation, enhances transparency and donor confidence, and supports long-term resilience and impact. This assessment is vital for optimizing operational efficiency, maintaining accountability, and sustaining their crucial contributions to community development and nation-building.

LITERATURE REVIEW

DEFINING FINANCIAL SUSTAINABILITY

Previous research on financial sustainability and assessment has been inconsistent; the definitions used, the methods of analysis, and the interpretations of the results all vary depending on the study's objectives (Groves et al., 1981). Financial sustainability is a multifaceted concept that has been defined differently in most studies (Bowman, 2011b; Tuckman & Chang, 1991). Because it depends on the particular goals and organizational structure of each organization, financial sustainability lacks a universally accepted definition (Sontag-Padilla et al., 2012). The terms of financial health, financial condition, vulnerability, predictability, flexibility, capacity, financial efficiency, and financial performance were used by Myser to characterise the financial

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sustainability of non-profit organisations. Vulnerability, stability, capacity, and flexibility were the top four dimensions of financial sustainability (Myser, 2016). According to Patricia León, “Financial sustainability is an organization’s capacity to obtain revenues (grants or otherwise) to sustain productive processes (projects) at a steady or growing rate to produce results (accomplish the mission, goals, or objectives)”(León, n.d.). Building on the consensus established by earlier research's definitions, this paper broadly defines financial sustainability as the capacity of an organization to manage its financial resources effectively and maintain its operations over the long term. This definition incorporates four key indicators: Financial Efficiency (FE): Profitability Performance (PP), Liquidity Performance (LP), and Solvency. By evaluating financial sustainability through these four dimensions, the study provides a comprehensive framework for assessing the long-term financial health and operational viability of non-profit organizations.

METHODOLOGY TO MEASURE FINANCIAL SUSTAINABILITY

The evaluation of financial sustainability in NPOs is a relatively underexplored area, with limited methodologies available in the existing literature. The majority of existing literature predominantly focuses on assessing financial health and performance, there is a significant disparity in evaluating sustainability. This imbalance highlights the need for more comprehensive studies that integrate sustainability metrics alongside traditional financial indicators to provide a fuller picture of organizational health. Several approaches have been proposed, but the focus has often been on related concepts such as financial vulnerability rather than sustainability. "One of the most prominent works in this field is the methodology developed by Tuckman & Chang (1991), which measures financial vulnerability. Their approach emphasizes the ability of NPOs to withstand financial shocks by examining four key metrics: equity balance, revenue concentration, administrative cost ratio, and operating margin. However, while their work was influential, it was more concerned with the organization’s ability to survive sudden financial shocks rather than ensuring its sustainability in the long run. Another notable contribution is the framework suggested by Woods Bowman (2011b). He underlined that both short-term and long-term periods were part of NPO viability. The rate at which financial capacity changes throughout both short-term sustainability (annual surpluses) and long-term financial sustainability (asset growth) is how NPO leaders gauge financial sustainability according to Bowman's sustainability principle. However, Bowman said that yearly surpluses are required to sustain asset values at replacement costs over time in order for NPO leaders to retain financial viability. His methodology lacks clarity on classifying organizations into different sustainability levels, making it difficult for practitioners to apply his criteria consistently. Ryan & Irvine, (2012) proposed a set of important financial ratios that management and nonprofit boards can employ. By applying the ratios to financial data from

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the 2009 reports of international aid organisations connected with the Australian Council for International Development (ACFID), they illustrated its utility in practice. McLaren & Struwig, (2019) suggest a set of financial ratios, including those for performance, liquidity, asset management, debt management, and reserves, that are useful for evaluating financial sustainability in South African universities. Dinova (2019) underscores the significance of financial sustainability in long-term performance and uses a system of quantitative and qualitative indicators to assess it. Zietlow, (2012) provides a novel approach for evaluating the financial health of an organisation using the financial sustainability model. In order to help NGOs better manage their financial health and more confidently ensure their continued financial sustainability, three new financial indicators have been introduced.

MEASURES OF FINANCIAL SUSTAINABILITY

Considering the literature review, the most used financial metrics to measure financial sustainability are:

An attribute that denotes the ability to fulfil financial commitments as needed is liquidity. The efficient administration of working capital's two elements, current assets and current liabilities, is the focus of liquidity management. Money and other assets that are easily convertible into cash might be categorised as current assets. Bank overdrafts, trade creditors, bills payable, unpaid expenses, and other liabilities that mature for payment within a year are all considered current liabilities. Liquidity is essential to the company's very existence (Kk, 2014). According to Bowman (2011b), liquidity is defined as "cash or financial resources that are readily convertible into cash and are not subject to donor restrictions.". The second metric is the cash reserve ratio (Bowman, 2011a, 2011b) which is defined as "the number of months an organization could sustain its operations while incurring no further expenses."

Profitability: Profitability indicates the amount remaining after expenses are deducted and generally signifies the nonprofit organization's long-term viability. In this context, profitability is defined as the return on the company's total assets. The profitability ratios show how debt and liquidity affect asset management and operational outcomes (Al Omari, 2020). The profitability-representing variable typical of accounting-based nonprofit research is Return on Equity = aftertax profit divided by owner's equity. Return on equity is a crucial metric that investors use to evaluate a company's profitability. Return on equity (ROE) quantifies the effectiveness with which a business utilizes shareholder funds to generate profits and expand.

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Financial Efficiency: Organisational efficiency pertains to the effectiveness of revenue generation and signifies the immediate viability of a nonprofit entity. The metric frequently employed to assess efficacy is Return on Assets.

Solvency: The amount of debt and other expenses incurred by the company in relation to the amount of owner equity invested in the business is a measure of solvency (Hanaffie Bin MD Yusoff, 2017). Solvency ratios show if a company can continue to operate as a profitable business in the face of financial difficulties and whether it can pay off all of its debts if all of its assets were sold. In order for a business to function, it must be solvent. A business is considered insolvent if it cannot pay its debts and must file for bankruptcy in order to liquidate or restructure. This study evaluates solvency using the ratio of total equity to total assets.

Revenue Diversification:

Revenue diversification is a concept that originates from Modern Portfolio Theory, as outlined by Markowitz in 1952. This theory explains how investors choose certain investment portfolios. The process of portfolio selection entails a division between favorable high-anticipated returns and unfavorable deviation from expected returns (Markowitz, 1952). While the nonprofit sector has its distinct ways of raising funds, it is still beneficial to diversify revenue sources as a wise strategy for generating income. This can help reduce the unpredictability of revenue portfolios managed by nonprofit organizations. According to Tuckman and Chang (1991), a nonprofit organization with a greater number of income sources and a more evenly distributed allocation of earnings from each source tends to be more financially stable. Their findings indicate a favorable correlation between income diversification and financial health in nonprofit organizations. The study conducted by Greenlee & Trussel, (2000) indicates that a higher degree of income diversification decreases the probability of an organization reducing its program costs or incurring a net loss in assets for three consecutive years.

RESEARCH GAP

In the existing literature, discussions often revolve around various financial measures aimed at assessing the sustainability of organizations. However, there is a noticeable gap regarding explicit methodologies for definitively identifying whether an organization is sustainable. Previous studies that do address this issue tend to rely on complex financial metrics, which can pose challenges in practical application. Contrastingly, this study introduces a methodology that focuses on essential indicators that are straightforward to calculate, particularly beneficial in countries/regions like India where access to comprehensive financial data is limited and NPOs are hesitant to disclose detailed financial statements. The dearth of publicly accessible NPO financial data may contribute to the paucity of evidence regarding the financial viability of NPOs in India. Internal Revenue

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Service (IRS) Form 990 data has been used in the majority of studies on the financial viability of non-profit organisations in the United States. Researchers can easily measure financial sustainability indices because of these data (Despard et al., 2017). Despite these data limitations, the goal of this study is to fill this gap in the literature. This approach also enables the classification of sustainability into distinct levels.

OBJECTIVES OF THE RESEARCH:

1. To analyze the Revenue Structure and Revenue Diversification Capacity of NPOs.
2. To analyze the liquidity, profitability, solvency, and financial efficiency performance of selected NPOs.
3. To develop a standardized methodology for evaluating the fiscal sustainability of NPOs.

DATA AND METHOD

The population for this study comprises non-profit organizations registered under the Indian Ministry of Corporate Affairs. These organizations must have been operational and maintained comprehensive financial records from 2019 to 2022. The study makes use of secondary data that is taken from annual reports of the twenty selected NPOs registered under the Indian Ministry of Corporate Affairs. A comprehensive list of eligible non-profit organizations was obtained from the website of the Ministry of Corporate Affairs. This list, serving as the sampling frame, consisted of 80 non-profit organizations. To ensure an unbiased and representative sample, a random sampling technique was employed. The process involved the following steps:

Assignment of Numbers: Each organization in the sampling frame was assigned a unique number from 1 to 80.

Random Selection: Twenty distinct numbers that corresponded to the organisations in the sampling frame were chosen using a random number generator. This guaranteed an equal probability of selection for every organisation.

The statement of financial position, profit and loss, and cash flow were extracted from the audited reports to evaluate the nonprofit organization's fiscal stability. The metrics employed to evaluate the financial well-being in the research were derived from data obtained from two distinct sources. The performance measurements employed by Ritchie & Kolodinsky, (2003), Zdanovskis & Pilvere, (2019), and Kangari, Farid, and Elgharib (1992) were incorporated into this research. Interviews with critical informants, including accounting professionals and financial management personnel, constituted the second source of data. The study's reference period spans a duration of four years, specifically from the fiscal year 2019 to 2022. The financial stability of the

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 organizations was evaluated using a weighted score methodology that was modified from some earlier scholarly research (Daryanto, 2019; Daryanto & Samidi, 2018; Masri, 2020)

TABLE 3 Measures used to assess Financial Sustainability

Financial Measure	Ratio	Formula		Source
Liquidity Performance	Current Ratio	Current Assets/Current Liabilities		(Kangari et al., 1992; Zdanovskis & Pilvere, 2019)
	Cash Ratio	Cash & Equivalents/Current Liabilities	Cash	(Ritchie & Kolodinsky, 2003)
Financial Efficiency	Return on Assets	Net Income/Total Assets		(Ritchie & Kolodinsky, 2003)
Profitability Performance	Return on worth	Net	Profit after tax/Net worth	(Kangari et al., 1992)
Solvency Performance	Total Equity Total Assets	to	Net Worth/Total Assets	(Zdanovskis & 2019) Pilvere

FINANCIAL INDICATORS WITH WEIGHT SCORE:

TABLE 4 Financial Measures with their weight score

Indicators	Weight Score
Liquidity Performance	
Current Ratio	5
Cash Ratio	5
Profitability Performance	
Return on Networkth	20
Financial Efficiency	
Return on Assets	10

Solvency	
Total Equity to Total Assets	10
Total	50

Source: (Daryanto, 2019; Daryanto & Samidi, 2018; Masri, 2020)

Note: The weight scores were chosen for NPO applicability.

TABLE 5 The Variables and Weight Score

Cash Ratio=x%	Score
$x \geq 35$	5
$25 \leq x < 35$	4
$15 \leq x < 25$	3
$10 \leq x < 15$	2
$5 \leq x < 10$	1
$0 \leq x < 5$	0
Current Ratio=x%	Score
$x \leq 125$	5
$110 \leq x < 125$	4
$100 \leq x < 110$	3
$95 \leq x < 100$	2
$90 \leq x < 95$	1
$x < 90$	0

TABLE 6 The Variables and Score and Weight

Return on Assets=x%	Score	Return on Equity=x%	Score
$x < 0$	0		
$0 \leq x < 1$	4	$15 < ROE$	20

$1 \leq x < 2$	6	$13 < x \leq 15$	18
$2 \leq x < 3$	7.25	$11 < x \leq 13$	16
$3 \leq x < 4$	10	$9 < x \leq 11$	14
$4 \leq x < 5$	9	$7 < x \leq 9$	12
$5 \leq x < 6$	8.5	$6 < x \leq 7$	10
$6 \leq x < 7$	8	$5 < x \leq 6$	8.5

$7 \leq x < 8$	7.5	$4 < x \leq 5$	7
$8 \leq x < 9$	7	$2 < x \leq 4$	5.5
$9 \leq x < 10$	6.5	$1 < x \leq 0$	4
		$0 < x \leq 1$	2
		$ROE < 0$	0

The level of financial sustainability assessment is divided into:

1. Sustainability Enhanced (the highest level)

- (a) Exceptional (if the total score is more than 95 points)
- (b) Outstanding (if the total score is more than 80 and less than 95)
- (c) Strong (if the total score is more than 65 and less than 80)

2. Sustainability Evolving (the middle level)

- (a) Satisfactory (if it is more than 50 and less than 65)
- (b) Advancing (if it is more than 40 and less than 50)
- (c) Improving (if it is more than 30 and less than 40)

(a) Concerning (if it is more than 20 and less than 30)

(b) Limited (if it is more than 10 and less than 20)

(c) Critical (if it is less than 10)

RESULTS:

5.1 This section analyses the Total Revenue of 20 organizations and the revenue diversification capacity of 20 organizations from 2019 to 2022.

Total Revenue: Overall, the total revenue of NGOs from 2019 to 2022 decreased by 6.16 percent. This decline reflects the effect of the global epidemic and the economic downturn on the non-profit sector (Finchum-Mason et al., 2020). A higher total revenue is indicative of better financial health for the organization, indicating financial strength, with ratings categorized as above average (good) or below average (poor)(Omondi-Ochieng, 2018).

TABLE 7 Total Revenue Results-2019-2022

Series	2019	2020	2021	2022	Increase/Decrease			Above/ Below Average
					2019-2020	2020-2021	2021- 2022	
1	3687588	3098543	2519400	2537800	Decrease	Decrease	Increase	Below
2	12670341	11623304	9561700	9716200	Decrease	Decrease	Increase	Above
3	7676572	6464634	5535321	3319112	Decrease	Decrease	Decrease	Above
4	129250	26622	24120	15768	Decrease	Decrease	Decrease	Below
5	96597366	61587994	33062481	30394880	Decrease	Decrease	Decrease	Above
6	1794329	2064514	1640225	1562048	Increase	Decrease	Decrease	Below
7	1357364	1407473	1232700	1171200	Increase	Decrease	Decrease	Below
8	9686	10786	8800	3600	Increase	Decrease	Decrease	Below
9	206498	206498	133185	109808	No change	Decrease	Decrease	Below
10	451801	445547	145493	569350	Decrease	Decrease	Decrease	Below
11	0	636950	18710	1300000	Increase	Increase	Increase	Below
12	6932871	7190605	7654124	1337926	Increase	Increase	Decrease	Above
13	1618675	1925256	1857726	2547133	Increase	Decrease	Increase	Below

14	7267311	6524491	7165722	6026801	Decrease	Increase	Decrease	Above
15	77197	71919	60283	59036	Decrease	Decrease	Decrease	Below
16	1468106	1898138	1710495	1690040	Increase	Decrease	Decrease	Below
17	557318	574464	188347	245671	Increase	Decrease	Increase	Below
18	800000	700000	700000	700000	Decrease	No change	No change	Below
19	4263000	4279000	3244000	4086000	Increase	Decrease	Increase	Above
20	38000	33000	43900	119777	Decrease	Increase	Increase	Below
Mean	7401339	5536837	3877876	3349987				

Source: Annual Report

The overall financial landscape for these series from 2019 to 2022 is marked by a general decline in revenue, with some series showing resilience or recovery in later years. The classification into above or below-average revenue largely remained consistent, suggesting structural differences in financial stability among the series. Future strategies should consider the factors contributing to the declines and the few cases of revenue recovery to enhance financial sustainability across the board.

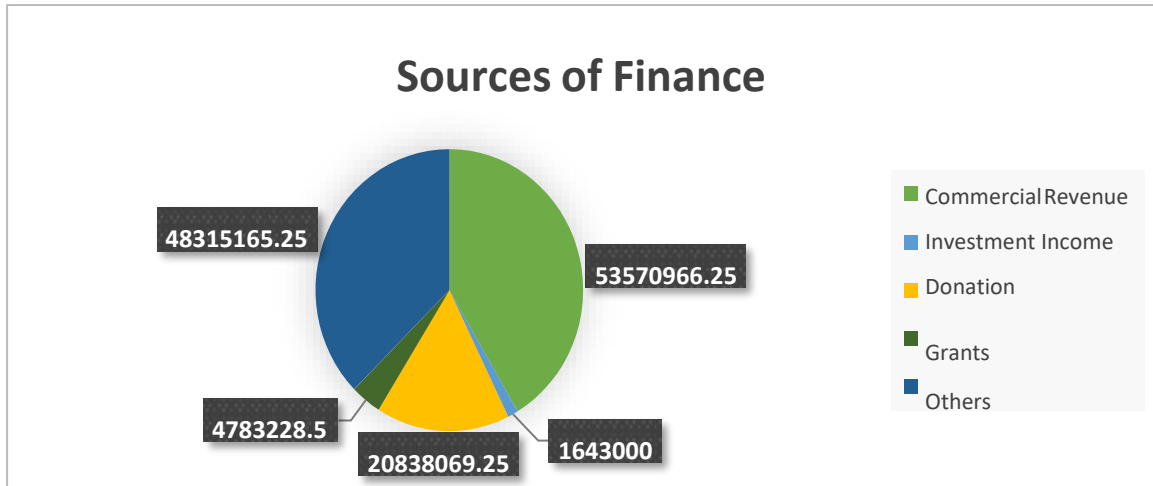


FIGURE 1 Sources of Finance

Source: Annual Report

The Hirschman-Herfindahl Index (HHI) is the prevailing method for quantifying income diversification/concentration (D. Carroll, 2005; Hendrick, 2002; Tuckman & Chang, 1991). Considering the existing body of work, we also assess revenue diversification using the Herfindahl-Hirschman Index (HHI). Sum the squares of each income source's percentage share of each organization's total revenue to create an index. This offers a metric to assess the concentration of revenue, taking into account both the quantity of income sources and the degree of income distribution. The index we use incorporates five distinct revenue sources: Commercial Revenue/Earned income, Investment income, Donative income, Grants, and miscellaneous sources. This methodology generates a diversity score that spans from 0 to 1, which is determined by the degree to which an organization's income is equally distributed among certain categories. A charitable organization that relies on a single source of money would have a concentration index of one, indicating a high level of dependence. Conversely, a company that generates equivalent incomes from several sources will have an index near zero, indicating a low level of dependence. Non-profit organizations with a revenue concentration index closest to one are at a high risk of financial (D. A. Carroll & Stater, 2009; Tuckman & Chang, 1991). Stated differently, this metric suggests that greater values of HHI correspond to lesser degrees of variety across nonprofit income models, and viceversa.

TABLE 8 HHI Value Interpretation

HHI VALUE	INTERPRETATION
-----------	----------------

HHI Value of 0	<ul style="list-style-type: none"> Indicates perfect revenue diversification, with the NGO having an equal share of revenue from all sources. · Unlikely in practice, but this theoretical scenario represents maximum diversification
HHI Value Close to 0	<ul style="list-style-type: none"> Suggest a highly diversified revenue base. The NGO receives revenue from a broad range of sources with relatively equal contributions.
HHI Value Between 0.1 and 0.25	<ul style="list-style-type: none"> Suggests some concentration in revenue sources. The NGO may rely more on specific funding streams, but there is still a reasonable degree of diversification.
HHI Value Above 0.25	<ul style="list-style-type: none"> Indicates higher concentration. The NGO may have a notable dependence on a few key funding sources, potentially posing a risk if those sources are disrupted.
HHI Value Approaching 1	<ul style="list-style-type: none"> Represents high concentration. · The NGO is heavily reliant on one or a few sources, posing a significant risk if those sources are lost or reduced.
HHI Value of 1	<ul style="list-style-type: none"> Indicates perfect concentration.

Source: Author

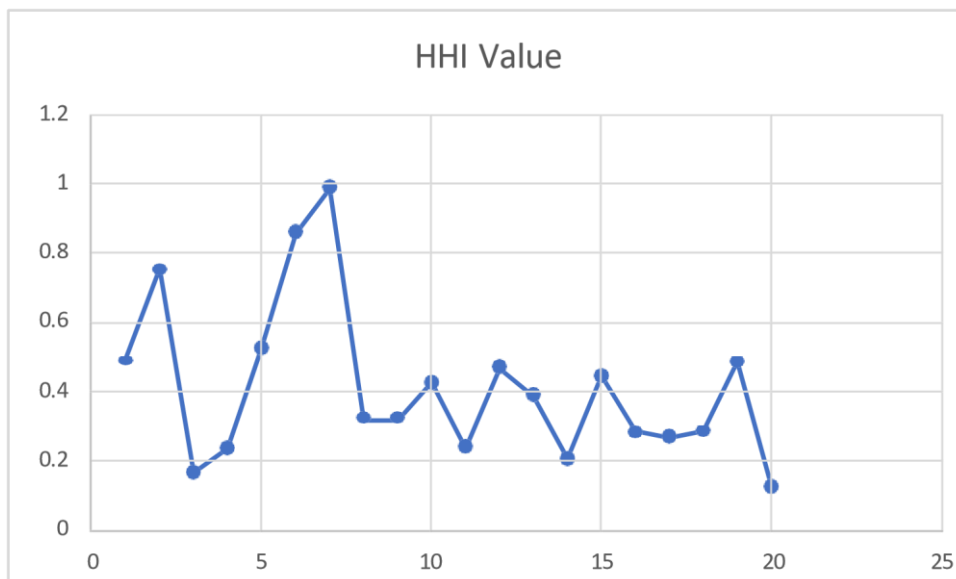


FIGURE 2 HHI value of nonprofit organizations

Source: Annual Report

The dataset includes nonprofit organizations with HHI values ranging from 0.12 to 0.98. The mean HHI value is 0.41. The mean score suggests that, on average, the non-profit organizations in the sample show a significant concentration level in their funding sources. These organizations are relying on a small number of crucial funding sources, leading to a substantial increase in their total earnings. NPOs who have a high degree of concentration should assess their present funding sources and consider investigating strategic planning possibilities. This may include expanding the range of financing sources, reducing the risks associated with reliance on particular donors, and strengthening overall financial robustness.

5.2 To analyse the liquidity, profitability, solvency, and financial efficiency performance of selected NPOs.

LIQUIDITY PERFORMANCE:

Current ratio and cash ratio are primarily used to assess liquidity performance. A liquidity ratio indicates an organization's financial soundness and capacity to pay obligations (Zdanovskis & Pilvere, 2019). A higher liquidity ratio is indicative of better financial health for the organization, indicating financial strength, with ratings categorized as strong, moderate, low, and volatile performers.

TABLE 9 Liquidity Performance Results, 2019-2022

	Current Ratio				Cash Ratio				Interpretation
	2022	2021	2020	2019	2022	2021	2020	2019	
1	4.25	3.82	3.22	3.37	3.18	2.83	2.45	2.49	Strong

2	9.80	13.05	12.26	12.35	19.61	20.32	1.66	1.02	Strong
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13	12	11	10	9	8	7	6	5	4	3
2.82	0.69	0.88	0	5.63	0	0.78	3.05	1.55	1.24	0.79
2.76	0.69	0.83	0.46	5.24	0.15	0.77	1.80	1.46	1.26	0.80
9.68	0.82	1.15	0.13	4.96	0.14	3.49	1.52	1.77	1.27	0.79
8.11	0.72	1.15	0.20	4.94	0.20	11.8 7	3.03	1.37	1.09	0.78
1.02	0.44	5.85	0	0.05	0	0.72	1.74	0.92	0.32	0.01
2.47	0.48	0.83	0.46	0.31	0.15	0.63	0.59	0.08	0.31	0.02
9.50	0.82	1.15	0.13	0.06	0.14	0.64	0.33	0.88	0.30	0.01
7.34	0.72	1.15	0.20	0.04	0.20	2.90	1.26	0.85	0.10	0.01

Moderate	Low	Strong	Low	Volatile	Low	Low	Strong	Moderate	Moderate	Low
----------	-----	--------	-----	----------	-----	-----	--------	----------	----------	-----

20		19	18	17	16	15	14
0.68	10.38	3.99	0.06	2.56	3.23	0.22	
0.67	12.34	4.39	0.06	2.10	2.13	0.39	
0.04	12.61	4.47	0.10	1.19	7.37	0.38	
0.46	7.35	4.42	0.17	2.36	2.23	0.35	
0.68	10.05	2.2	0.06	2.15	3.23	0.22	
0.67	11.96	2.2	0.06	1.76	2.13	0.37	
0.04	12.19	2.2	0.05	1.29	7.37	0.38	
0.46	7.10	2.4	0.17	1.09	22.5	0.33	
Volatile	Strong	Strong	Low	Mod erate	Strong	Low	

Source: Annual Report

PROFITABILITY PERFORMANCE

Profitability is a measure of how efficiently a company performs, indicating the amount of profit generated from the assets that have been invested. According to Zdanovskis and Pilvere

Sahrdaya Journal of Entrepreneurship and Management Research (SJEMR) Volume 1, Issue 1, Jan-Jun 2026, pp. 13–38 (2019), it is possible to modify the calculating algorithms. NGOs are not driven by profitmaking objectives, however they are allowed to engage in economic activities, including generating profit to pay expenses associated with their core operations, project execution, and so on. NGOs must maintain a profitable operation to accumulate surplus money, which may be used to cover unforeseen expenses or variations in revenue. The research quantifies profitability by computing Return on net worth. The RoNW data provides valuable insights into the financial performance and sustainability of the NGOs. While some NGOs demonstrate strong profitability and efficient use of their equity, others face significant challenges, indicating a need for strategic improvements. The overall trend suggests a mixed financial landscape, with a recent tendency towards losses, highlighting the importance of robust financial management in the nonprofit sector.

TABLE 10 Profitability Performance Results, 2019-2022

Organization Series	Return on Net worth			
	2022	2021	2020	2019
1	6.917873	0.26794 3	0.060647	0.573262
2	7.098542	7.59526 5	10.67262	11.63672
3	0	0	9.163009	42.56667
4	0	0	0	0
5	16.58336	0	0	0
6	11.33902	9.17137	14.53796	10.43873
7	31.13034	38.3282 6	25.40006	65.83271
8	26.9	0	0	0.728948
9	1.029947	0	0	0
10	43.28572	1.10310 7	3.530647	2.660712
11	0	0	0	0
12	0	0	10.91482	38.89791

13	-154.961	-54.6049	-7.20186	-1.54665
14	-121.576	-5.71292	-14.8326	-52.2443
15	-21.144	0	0	-34.1012
16	-1.9697	0.25037	1.860451	-3.78333
17	0.697894	1.355985	0.132457	1.401296
18	-5.34	-0.54	-0.53	0.33
19	5.78	-0.06	5.21	7.24
20	-4.22508	-	58.92585	-61.8267
		133.028		
Mean	-9.13312	-6.81872	5.892205	1.44024
Maximum	43.28572	38.32826	58.92585	65.83271
Minimum	-154.961	-133.028	-14.8326	-61.8267

Source: Annual Report

FINANCIAL EFFICIENCY.

Financial efficiency focuses on reducing financial inefficiencies by optimizing the allocation and use of financial resources. Financial efficiency refers to an organization's capacity to achieve desired financial outcomes while minimizing financial expenses. It may be assessed by cost-benefit ratios, such as comparing revenues to expenditure, to provide cost-effective programs and services. A Nonprofit Organization may achieve cost, time, and resource savings by using financial efficiency measures. This study examines nonprofits' financial efficiency from 2019 to 2022 using Return on Assets and Total Equity to Total Asset ratios.

The Return on Assets (ROA), usually referred to as the asset utilization ratio, is a metric that is commonly used to assess the efficiency of an organization in generating income or profits from its assets. The ratio facilitates the assessment of the organization's ability to effectively

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transform its investments in assets into revenues or profits, which is valuable for managers and stakeholders.

TABLE 11 Return on Asset Ratio Results, 2019-2022

Organization	Return on Assets			
Series	2022	2021	2020	2019
1	1.091817	0.054233	0.007693	4.941446
2	4.323781	4.315562	5.71424	5.778184
3	-1.62134	-1.45868	0.080684	0.295893
4	-0.76347	-0.44369	-13.8445	-1.42873
5	5.496194	-5.31519	4.62334	0
6	9.376609	7.648786	12.17067	8.741774
7	5.935313	4.107643	3.277944	1.273872
8	-2.69	-0.23256	-1.15214	0.660036
9	1.029767	-1.07209	0.320067	-3.10735
10	28.62899	0.580231	1.846293	1.367619
11	9.98	-14.8878	-12.9482	-18.65
12	-5.14075	-16.916	2.918884	11.25937
13	-27.804	-17.7027	-2.64249	-1.53318
14	-22.585	-2.16631	-5.83626	1.181118
15	0	0	0	0
16	-1.93702	-0.24559	1.825014	-3.04701
17	0.602144	1.166551	0.11619	1.226362
18	-5.55556	0	0	0
19	41.60866	-0.23691	0.032762	0.05327
20	1.977683	63.89736	-14.0286	0.724114
Mean	2.097693	1.054645	-0.87592	0.486839
Maximum	41.60866	63.89736	12.17067	11.25937
Minimum	-27.804	-17.7027	-14.0286	-18.65

Source: Annual Report

ROA values vary significantly from year to year for each entity. Some entities experience positive and substantial ROA, while others have negative or lower ROA. The mean ROA for all entities indicates an overall declining trend over the four years. Negative ROA values suggest that some entities might be experiencing challenges in generating profits relative to their total assets.

SOLVENCY:

The Total Equity to Total Asset Ratio is a financial measure that evaluates the relationship between a company's total equity and its total assets. It offers valuable information on the financial organization and ability to pay the debts of a business.

TABLE 12 Total Equity to Total Asset Ratio, 2019-2022

Organization Series	Total Equity to Total Asset Ratio			
	2022	2021	2020	2019
1	15.78256	20.24051	12.68458	11.80466
2	60.91083	56.81911	53.54111	49.65473
3	-2.24	-0.31544	0.880546	0.695128
4	19.62524	20.6021	21.39001	8.838142
5	37.94963	31.16875	29.1542	25.03782
6	82.69322	83.39842	83.71644	83.74355
7	19.84336	10.8137	5.339607	2.50342
8	100	90.46512	90.43744	90.54636
9	99.98256	99.98128	99.98025	99.98013
10	66.13957	52.55672	52.27983	51.3822
11	99.74494	-32.1832	-14.3621	-1.25184
12	3.148469	9.067047	26.74238	28.94582
13	17.94261	57.82643	65.06593	99.12935
14	18.57687	37.91945	39.34759	45.90457
15	96.91055	95.31509	86.43962	95.56891
16	98.19511	98.08977	98.09444	80.53777
17	86.28013	86.02802	87.71953	87.51625

18	90.74074	89.47368	89.47368	91.22807
19	72.26295	74.2787	74.72625	73.23725
20	-46.5935	-48.0262	-23.8	-11.7
Mean	51.89479	46.67596	48.94257	50.66512
Maximum	100	99.98128	99.98013	99.98013
Minimum	-46.5935	-48.0262	-23.8	-11.7

Source: Annual Report

The mean ratio trends downwards over the years, indicating a potential shift towards lower equity-to-asset ratios on average. A high ratio may suggest a financially stable entity with a strong equity position. A negative ratio may indicate potential financial distress or an unbalanced financial structure.

ASSESSMENT OF FINANCIAL HEALTH OF NON-PROFIT ORGANIZATIONS

WEIGHTED AVERAGE SCORE:

TABLE 13 Weighted Average Score of Organizations

Organization series	2022	2021	2020	2019
1	30.5	23.25	22	27
2	33	35	36.5	36.5
3	0	0	20	28
4	14	16.25	16.25	8
5	48.5	16	26.25	17.25
6	37.5	36.5	40.5	38
7	39.5	40	46	40
8	26.5	9.5	8.5	15.5
9	16.5	15.5	16.5	11.5
10	34.5	14.5	19.5	19.5
11	9	16.5	16.5	16.5
12	9	9	33.5	38.75
13	16	18.5	18	16.5

14	9	15	15	19
15	20.5	24.5	25	20.5
16	16.5	16.5	26.5	17.5
17	18	22	18	22
18	12.5	17	16	20.5
19	35	17.5	30	33.5
20	5	5	11	12

From 2019 to 2022, the financial sustainability of the analyzed non-profit organizations showed signs of improvement. Out of the 20 organizations assessed, six were categorized as having "Sustainability Evolving." The mean sustainability score for these organizations was 42.9625. The lowest score recorded was 16.5, while the highest score reached 82.75.

TABLE 14 Level of Financial Sustainability Assessment of NPO

Level of Financial Sustainability Assessment	Number of Organizations
Exceptional	0
Outstanding	1
Strong	2
Satisfactory	3
Advancing	3
Improving	6
Concerning	4
Limited	1
Critical	0

DISCUSSIONS OF MANAGERIAL AND POLICY IMPLICATIONS

This study evaluated the financial well-being of nonprofit organizations by analysing indices of liquidity, profitability, solvency, and financial efficiency for the time frame of 2019-2022. The assessment of the overall fiscal well-being of nonprofit organizations from 2019 to 2022 reveals that six out of twenty organizations have demonstrated improved financial

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sustainability. An examination of the overall income patterns across NPOs from 2019 to 2022 indicates a significant decrease of 6.16 percent. The decrease in income highlights the impact of external causes, namely the worldwide pandemic and the resulting economic decline, on the non-profit industry (Finchum-Mason et al., 2020). The observed decline in overall income indicates an urgent need for the sector to adjust and innovate to respond to the ever-changing external conditions, guaranteeing resilience and ongoing efficiency in the pursuit of their objectives (Omondi-Ochieng, 2018). As of 2022, NPOs exhibited a significant reliance on one or two funding sources, rendering them very vulnerable to default, insolvency, and potential cancellations of services and programs (Srivastava & Tandon, 2005). The primary goal of nonprofit organizations (NPOs) is to efficiently oversee their financial assets to maintain their operations and attain financial self-sufficiency, by pursuing revenue generation while minimizing costs.

The liquidity performance was examined from two angles, evaluating the NPO's ability to fulfill short-term commitments and preserve financial adaptability. This analysis explored the current ratio and cash ratio, which are both important indications of the organization's capacity to handle urgent financial requirements. The current ratio, which measures the proportion of current assets to current liabilities, offers valuable information about the NPO's financial status.

CONCLUSION

Evaluating the financial well-being of NPOs is a vital component of their management, especially in the multifaceted and ever-changing environment of India. The main aim of this study is to suggest a methodology to assess the financial sustainability of non-profit organizations (NPOs) in India, focusing specifically on key criteria such as liquidity, solvency, efficiency, and profitability. For NPOs to successfully navigate the constantly shifting financial landscape, it is crucial to have sufficient liquidity, which refers to the capacity to fulfill short-term financial commitments. Effective liquidity management guarantees that NPOs can rapidly address growing requirements. The long-term sustainability of an organization is crucial for continued impact, which is measured by its solvency. Ensuring a harmonious equilibrium between immediate cash availability and enduring financial stability becomes crucial for maintaining a sound fiscal condition. Efficiency, which quantifies the utilization of resources, encompasses the principles of financial restraint and operational oversight. NPOs must efficiently manage their working capital and simplify their operations to maximize efficiency. The importance of profitability, which is frequently disregarded in the nonprofit industry, cannot be overstated as it is crucial for guaranteeing long-term financial viability.

Generating excess profits enables the expansion and diversity of programs, thus increasing the total influence on the community.

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A Bibliometric Analysis of Environmental Sustainability in Services: Insights from 10 Years of Research (2016–2025)

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ABSTRACT

This work uses the Web of Science database to provide a thorough bibliometric analysis of environmental sustainability research in the service industry. Using Biblioshiny program, over 1,168 articles in the Management field released between 2016 and 2025 were examined. The study charts the development of scientific investigation, notes prevailing research themes, and points up areas needing more study. The results show a constant increase in publications, which emphasizes the growing scholarly and pragmatic relevance of sustainability in services. Combining conceptual, methodological, and thematic insights helps this study to clarify sustainability-driven service innovations. It is a fundamental basis for next research since it provides insightful analysis for academics and professionals to create more environmentally friendly service models and plans.

KEYWORDS: Environmental sustainability, Sustainable development, Services, Bibliometric analysis, Business sustainability.

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INTRODUCTION

In recent years, environmental sustainability has evolved from a regulatory requirement into a strategic necessity, especially within service industries that engage with a vast number of people daily. Sectors such as tourism, hospitality, logistics, finance, and public

in services now extends beyond reducing environmental impact to incorporating social and governance considerations into how services are designed, delivered, and assessed.

In recent years, academic interest in environmental sustainability within the service sector has grown significantly, resulting in a diverse and rapidly expanding body of literature. However, with this increasing variety comes the challenge of organizing and interpreting the field's evolving focus. To navigate this complexity, bibliometric analysis proves valuable, offering a way to track research trends, identify knowledge gaps, and outline future research directions across different service domains.

New methods are also shaping how we understand environmental performance in service industries. For example, Çiftçi (2024) introduced an innovative approach by combining a fuzzy cognitive map (FCM) with the Extended Great Deluge Algorithm (EGDA) to pinpoint key factors influencing sustainable business practices. The study emphasized elements such as adherence to regulations, digital transformation, and the shift toward eco-friendly services—demonstrating how systems thinking can help unpack environmental decision-making in service organizations.

Tourism and hospitality have emerged as especially active fields in this space. Chen et al. (2024) looked at tourism's role in enhancing mental well-being—not only for travelers but also for residents and workers—shedding light on the social dimensions of sustainable tourism. Subarsono et al. (2025) examined how tourism in coastal communities contributes to poverty alleviation, linking sustainability with broader social development goals. In a different but related angle, Okumuş (2024) raised concerns about how food security threats could disrupt food tourism and affect destination management strategies.

Within the hospitality industry, research continues to highlight the intersection of sustainability and consumer engagement. Pan (2025) studied the growing digital hospitality market in China, finding that sustainability efforts, alongside service quality and brand image, play a crucial role in building long-term customer loyalty. Meanwhile, Chaudhary et al. (2025) focused on the adoption of green technologies in hotels, pointing out their positive influence on guest safety, responsible tourism, and customer

satisfaction. Together, these studies show that hospitality sustainability is multi-layered, extending beyond environmental practices to include perceptions of safety and trust in the brand.

Technology continues to be a key enabler of sustainable service delivery. Anshari et al. (2024) examined the use of artificial intelligence in public services, showing how AI can improve efficiency, accessibility, and sustainability, particularly in sectors like education and healthcare. Similarly, Sehnem et al. (2024) explored how Industry 4.0 technologies—such as sensors, data analytics, and geospatial platforms—are being integrated into agritech startups, supporting sustainable agricultural practices through improved operations and resource use.

Organizational capabilities and innovation practices also play a vital role in advancing sustainability in services. Abbas et al. (2024) showed that combining ambidextrous and frugal innovation with tools like business analytics and effectuation can significantly enhance environmental, social, and governance (ESG) performance. Iqbal et al. (2024) added that microfinance institutions with a culture of knowledge sharing tend to develop stronger absorptive capacity—enabling them to adopt sustainable practices more effectively. Swarnakar et al. (2023) contributed by demonstrating how sustainability, when embedded within Quality 4.0 frameworks, can lead to greater flexibility, transparency, and operational efficiency.

Ethical conduct and stakeholder involvement further shape sustainability outcomes. Cheng et al. (2025) showed that CSR disclosures—particularly regarding environmental and employee concerns—improve how organizations are perceived. Erbetta and Abrate (2024) emphasized the influence of pro-environmental actions by both firms and stakeholders on market recognition. Hickman and Stoica (2025) explored how sustainability-focused messaging affects behavior among professional service providers, indicating that ethical communication can drive value-aligned service delivery.

Although research in this area has expanded, there remains a need for a structured bibliometric review that maps developments in environmental sustainability research within the service sector. This study aims to fill that gap by conducting a bibliometric analysis of peer-reviewed publications from 2016 to 2025. The objective is to identify dominant themes, significant contributions, emerging trends, and areas for future research in sustainability across service industries.

RESEARCH QUESTIONS

RQ1: What are the key bibliometric characteristics of publications addressing environmental sustainability in service sector?

RQ2: What are the primary focuses and emerging trends in the literature on environmental sustainability in service sector?

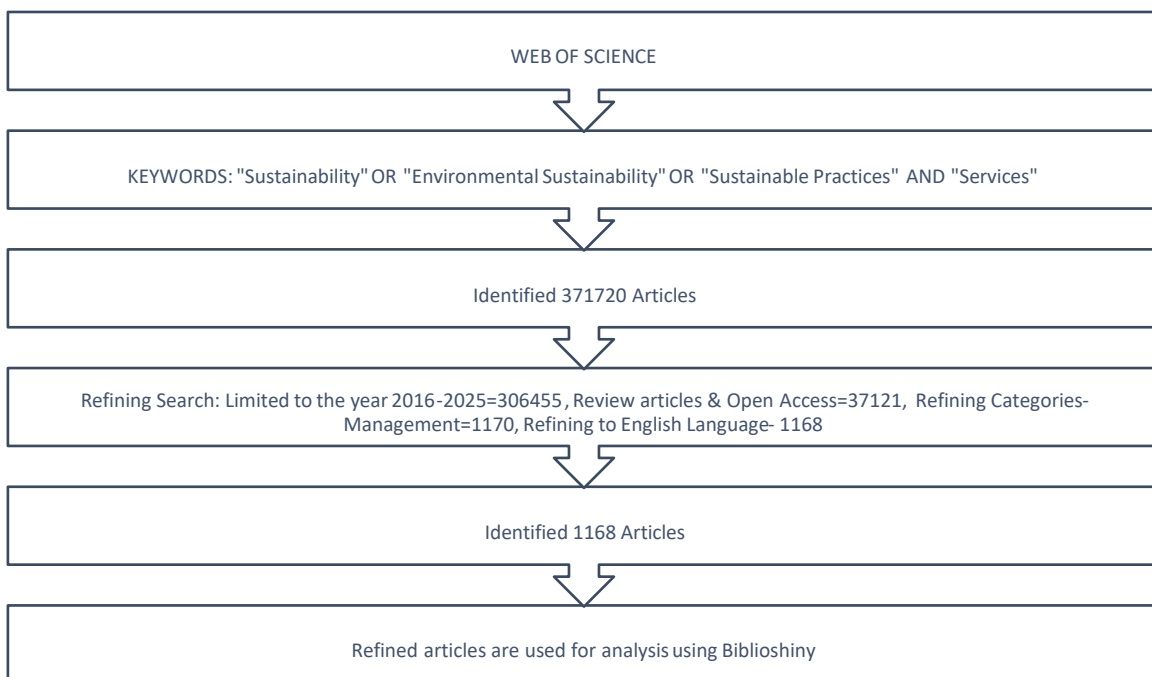
RQ3: What insights does the current literature provide regarding future research directions in environmental sustainability in services sector?

RESEARCH OBJECTIVES

1. Analyze the annual trends in scientific production, including source contributions and country-wise output.
2. Conduct a comprehensive mapping of the most influential authors and affiliations.
3. Investigate the structure and prominence of relevant keywords in the literature.
4. Identify underexplored areas within the field of "Environmental Sustainability in service sector".

RESEARCH METHODOLOGY

Fig 1- Flow diagram of the search strategy



Source: Author's own compilation

The methodology for this bibliometric analysis, as illustrated in Figure 1, was designed to be both systematic and rigorous, ensuring the study's academic validity and relevance. The process involved several key steps:

Selecting The Data Source

The Web of Science database was chosen as the primary source due to its broad coverage of high-impact, peer-reviewed academic journals. This selection helped maintain a high standard of research quality throughout the study.

Developing A Keyword Search Strategy

A carefully constructed keyword search was performed using terms such as "Sustainability," "Environmental Sustainability," "Sustainable Practices," and "Services." This approach was intentionally broad yet focused, allowing the capture of a wide range of relevant literature related to sustainability in service industries.

Initial Data Collection

The initial search provided 371,720 articles, highlighting the massive volume of research in this area. However, this dataset required further filtering to ensure relevance.

Refining the Dataset

For the precise scope and enhance accuracy, various filtering criteria were applied:

Timeframe: The articles published between 2016 and 2025 were included, and refined to 306,455 and ensures that data reflects current trends.

Type of Articles: The following dataset was filtered to include only review articles and open-access publications, resulting in 37,121 articles.

Research Category: To remain focus on service sector sustainability, only articles come under Management were selected, drops down the number down to 1,170.

Language: English-language publications further filtered the dataset to 1,168 articles, ensures clarity and consistency.

Final Dataset Selection

After the entire refining process, a total of 1,168 articles were identified as highly relevant and suitable for the analysis.

Analytical Tool

Analysis was done using Biblioshiny, a interface in the R programming designed for bibliometric analysis This enabled the visualization of citation networks, thematic evolution, and research patterns, thereby enhancing the detailing and interpretability of the analysis.

LITERATURE REVIEW

Environmental sustainability in services has become an increasingly explored domain across disciplines in the last decade. The literature addresses diverse themes, including technological innovation, sustainable tourism and hospitality, environmental performance evaluation, social inclusion, stakeholder engagement, and organizational transformation. This section synthesizes these studies, highlighting thematic trends, methodological contributions, and empirical insights.

Environmental Performance and Corporate Sustainability

Improving environmental performance has become a major focus for many organizations, especially with the growing use of advanced analytical tools and decisionmaking models. One notable contribution is by Çiftçi (2024), who developed a detailed framework that combines fuzzy cognitive mapping (FCM) with the Extended Great Deluge Algorithm (EGDA). This approach helps identify the key factors influencing an enterprise's environmental performance. The study highlights several important enablers, including compliance with environmental regulations, embracing digitalization, producing eco-friendly goods and services, and enhancing productivity. Interestingly, fossil fuel usage was found to have a negative impact, underscoring the difficult trade-offs organizations must navigate on the path to sustainability.

This work demonstrates how AI and heuristic algorithms can be effectively used to model complex systems, reflecting a wider movement in environmental management toward data-informed decision-making. A similar direction is observed in the research by Swarnakar et al. (2023), who studied the adoption of Quality 4.0 in service industries. Their findings show that digital quality management tools contribute to greater transparency, efficiency, and customer satisfaction, aligning operational excellence with environmental goals.

In the realm of Environmental, Social, and Governance (ESG) performance, Abbas et al. (2024) draw attention to the importance of ambidextrous and frugal innovation. Their research reveals that organizations equipped with strong capabilities—particularly in effectuation and business analytics—tend to perform better in ESG metrics. By balancing the use of existing resources while also exploring new sustainable practices, these firms can effectively adapt to change and drive performance, especially in environments where resources are limited.

Technological Innovation and Digital Transformation

Technological advancements have significantly influenced the trajectory of environmental sustainability in service sectors. Anshari et al. (2024) explore the role of AI in enhancing public service delivery (PSD), arguing that AI can support the realization of Sustainable Development Goals (SDGs) by improving service efficiency, accessibility, and responsiveness. Their findings show that AI enables precise interventions, facilitates advanced data monitoring, and increases public trust in service delivery—especially in healthcare and education.

The importance of integrating circular economy principles with Industry 4.0 technologies is highlighted in Sehnem et al. (2024), who studied agri-tech startups. Their research identifies the use of digital tools such as sensors, data analytics, geospatial tracking, and real-time platforms as pivotal for promoting operational efficiency and sustainable agricultural practices. The study further emphasizes the role of lean thinking in maximizing human empowerment while maintaining sustainability in technology-enabled services.

Such technological integration in services is not limited to public or agricultural contexts. In the hospitality sector, Chaudhary et al. (2025) examine the role of green technology in

improving guest safety. Their findings demonstrate that responsible tourism practices and guest satisfaction act as mediating variables in the relationship between technology adoption and perceived safety, thereby reinforcing the interconnectedness of environmental and social dimensions in service sustainability.

Sustainable Tourism and Hospitality

Technological progress has played a crucial role in shaping how environmental sustainability is approached within the service sector. Anshari et al. (2024) explore how artificial intelligence (AI) is transforming public service delivery (PSD). They argue that AI can be a powerful tool for advancing the Sustainable Development Goals (SDGs) by making services more efficient, accessible, and responsive. Their study highlights how AI enables targeted interventions, enhances real-time data monitoring, and builds greater public trust—particularly in essential sectors like healthcare and education.

The role of technology in sustainability is also evident in the agri-tech sector. Sehnem et al. (2024) focus on how Industry 4.0 technologies—including sensors, data analytics, geospatial tracking, and real-time platforms—can be integrated with circular economy principles. Their research on Agri-tech startups shows that these digital tools boost operational efficiency and support more sustainable farming practices. They also emphasize the value of lean thinking, which promotes not only sustainability but also empowers people within tech-driven service environments.

This trend isn't limited to agriculture or public services. In hospitality, Chaudhary et al. (2025) examine how adopting green technologies enhances guest safety. Their findings reveal that responsible tourism practices and guest satisfaction serve as important links between technological adoption and perceived safety. This underlines the close relationship between environmental sustainability and the social experience in service delivery.

Social and Economic Sustainability

Sustainability in services is no longer limited to environmental measures alone; recent research increasingly highlights the importance of addressing social and economic dimensions as well. For example, Chhibber et al. (2023) explore the complex issue of

poverty and suggest that education, employment, and ethical governance are key pathways for alleviation. Their qualitative study underscores the influential roles played by faith-based organizations, public policy, and community-driven efforts in promoting inclusive and sustainable development.

In a similar vein, Iqbal et al. (2024) examine the functioning of microfinance institutions and find that organizations that encourage knowledge-sharing cultures tend to have stronger absorptive capacity—the ability to effectively adopt and implement sustainable practices. Their work shows that internal capabilities and cultural values are just as critical as external technologies in supporting long-term sustainability goals.

Turning to the healthcare and education sectors, Abdelnaeim et al. (2023) link service quality in higher education to student well-being, within the framework of Sustainable Development Goal 3 (Good Health and Well-being). Their study points to the significance of psychological safety, inclusivity, and institutional care in achieving sustainable service outcomes in education—a sector that often receives less attention in environmental discussions but is essential for building resilient and capable communities.

Marketing, Stakeholder Engagement, and Ethics

Marketing and stakeholder engagement play a vital role in advancing sustainability, especially by building trust and transparency. Hickman and Stoica (2025) highlight how sustainability messaging, including credence claims, can do more than just signal environmental responsibility—it can actively influence social norms and guide how professionals behave across service industries. Their research shows that such communication shapes expectations in meaningful ways, not just within individual organizations but across the entire service ecosystem.

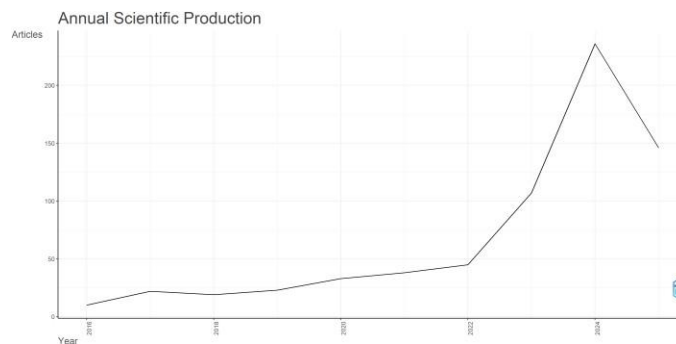
Adding to this, Cheng et al. (2025) provide evidence that CSR disclosures—particularly those related to environmental protection and employee well-being—enhance how attractive an organization appears to stakeholders when published on official platforms like websites. Erbetta and Abrate (2024) further stress the importance of engaging stakeholders, showing how this can counterbalance monopolistic behavior and lead to improvements in both environmental outcomes and market competitiveness.

Collectively, these studies illustrate that clear, values-driven communication—combined with ethical leadership and stakeholder involvement—can be powerful tools for driving sustainable change in the service sector.

KEY FINDINGS

Annual Scientific Production

Fig 2- Annual Scientific Production



Source: Author's own compilation

Figure 2, shows a clear upward trend in academic interest in environmental sustainability in service sectors. The publications increase gradually from just 10 articles in 2016 to 45 in 2022, followed by a surge of 107 articles in 2023 and a peak of 236 in 2024. This sharp increase likely reflects the impact of global sustainability policies, growing regulatory requirements, and expanded research funding. Interestingly, there was a drop to 146 articles in 2025, which may signal a phase of stabilization or a shift in research focus.

Fig 3- Most Relevant Source

Source: Author's own compilation

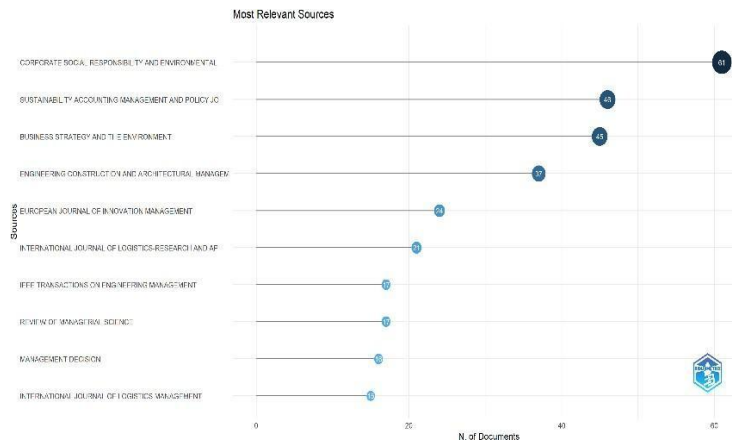


Figure 3 presents the results of the bibliometric analysis, highlighting the leading academic journals that are shaping research on environmental sustainability in service sectors. At the top of the list is Corporate Social Responsibility and Environmental Management, with 61 articles, reflecting the central importance of corporate responsibility in sustainability discussions. This is closely followed by the Sustainability Accounting, Management and Policy Journal (46 articles) and Business Strategy and the Environment (45 articles), both of which emphasize the roles of financial accountability and strategic planning.

Other journals like Engineering, Construction, and Architectural Management (37 articles) and the European Journal of Innovation Management (24 articles) point to the growing relevance of sustainability in infrastructure development, supply chains, and innovation systems. Additionally, IEEE Transactions on Engineering Management and the Review of Managerial Science (each with 17 articles) draw attention to the role of technology and managerial decision-making in promoting sustainable practices. This wide disciplinary coverage highlights how sustainability research cuts across multiple domains—from corporate governance and finance to engineering and operations—emphasizing the need for more cross-sector collaboration and integration in future research.

Countries' Scientific Production- Table 1- Countries' Scientific Production

Region	Frequency
UK	220
CHINA	195

ITALY	187
USA	137
INDIA	132
AUSTRALIA	104
SPAIN	99
GERMANY	74
BRAZIL	49

Source: Author's own compilation

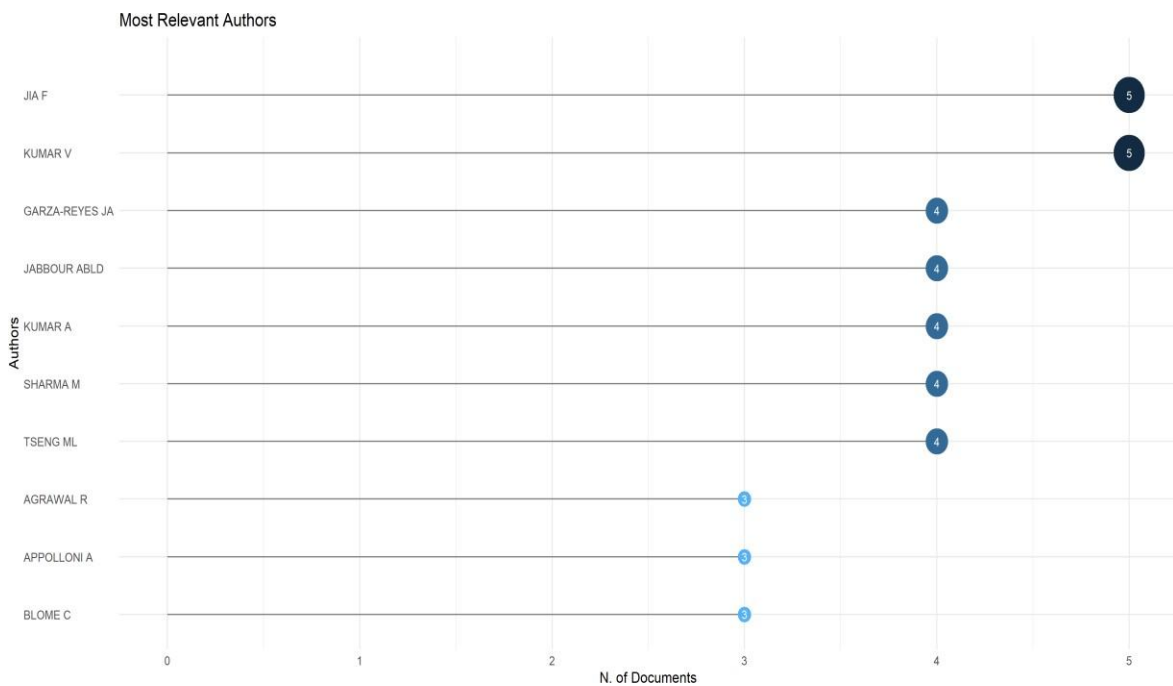
Table 1 offers a snapshot of the global landscape of sustainability research, showing how different countries contribute to the field. The United Kingdom leads with 220 publications, reflecting the impact of its strong academic institutions, supportive policies, and research funding. Close behind are China (195) and Italy (187), where growing emphasis on environmental governance and policy reforms is clearly driving scholarly output.

The United States (137) and India (132) also stand out, with research shaped by evolving corporate sustainability strategies and pressing socio-economic challenges. Other notable contributors include Australia (104), Spain (99), Germany (74), and Brazil (49)—each reflecting distinct regional priorities and approaches to sustainability.

Overall, this distribution highlights the global importance of sustainability, showing how academic and policy efforts are converging across borders and encouraging international collaboration and context-specific research.

Most Relevant Authors

Fig 4- Most Relevant Authors

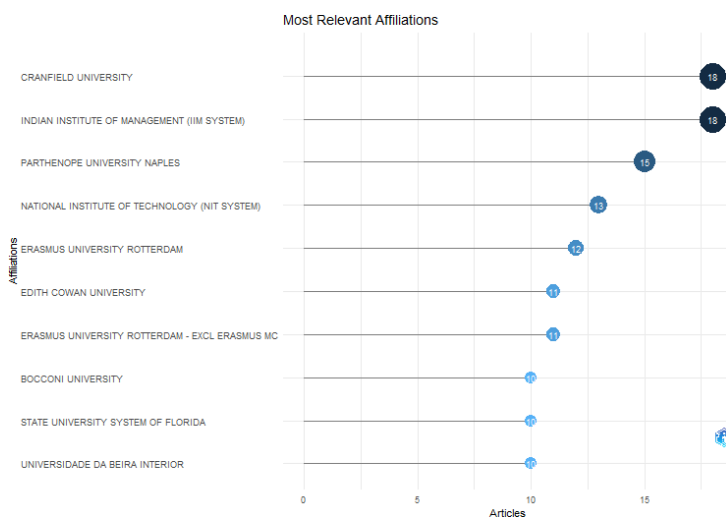


Source: Author’s own compilation

From the *Figure 4* the identification of leading authors in sustainability research within service sectors provides insight into intellectual thought leadership and knowledge dissemination. The most prolific authors contribute to shaping key discussions, advancing theoretical frameworks, and developing empirical methodologies. Their work serves as a foundation for future studies, guiding emerging scholars in the field.

Most Relevant Affiliations

Fig 5- Most Relevant Affiliations

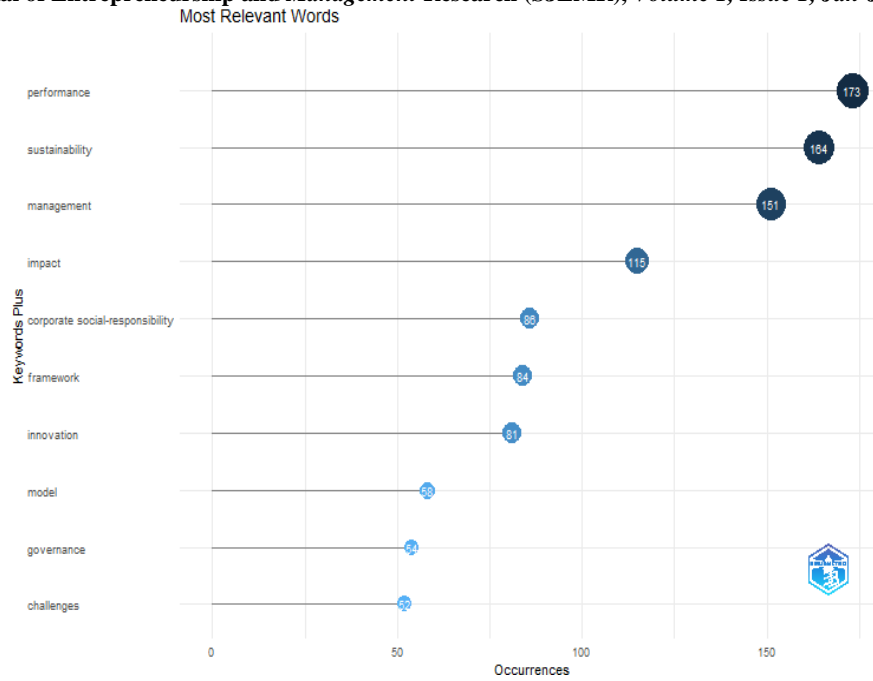


Source: Author's own compilation

From the *figure 5* the analysis of institutional affiliations highlights the leading research institutions engaged in sustainability studies. These affiliations indicate where the strongest research networks exist and where sustainability studies are being actively promoted through academic and policy-oriented initiatives. Universities and research centers specializing in environmental sustainability play a pivotal role in fostering interdisciplinary collaboration and policy development.

Most Relevant Keywords

Fig 6- Most Relevant keywords



Source: Author’s own compilation

The most frequently occurring keywords as of *figure 6* in the bibliometric analysis reflect core research themes and emerging areas of interest. Keywords such as “sustainability,” “performance,” “management,” and “corporate social responsibility” indicate major focus areas within the field. The presence of terms like “innovation,” “supply chain,” and “financial performance” suggests interdisciplinary connections between business sustainability, operational efficiency, and environmental responsibility.

Trend Topics

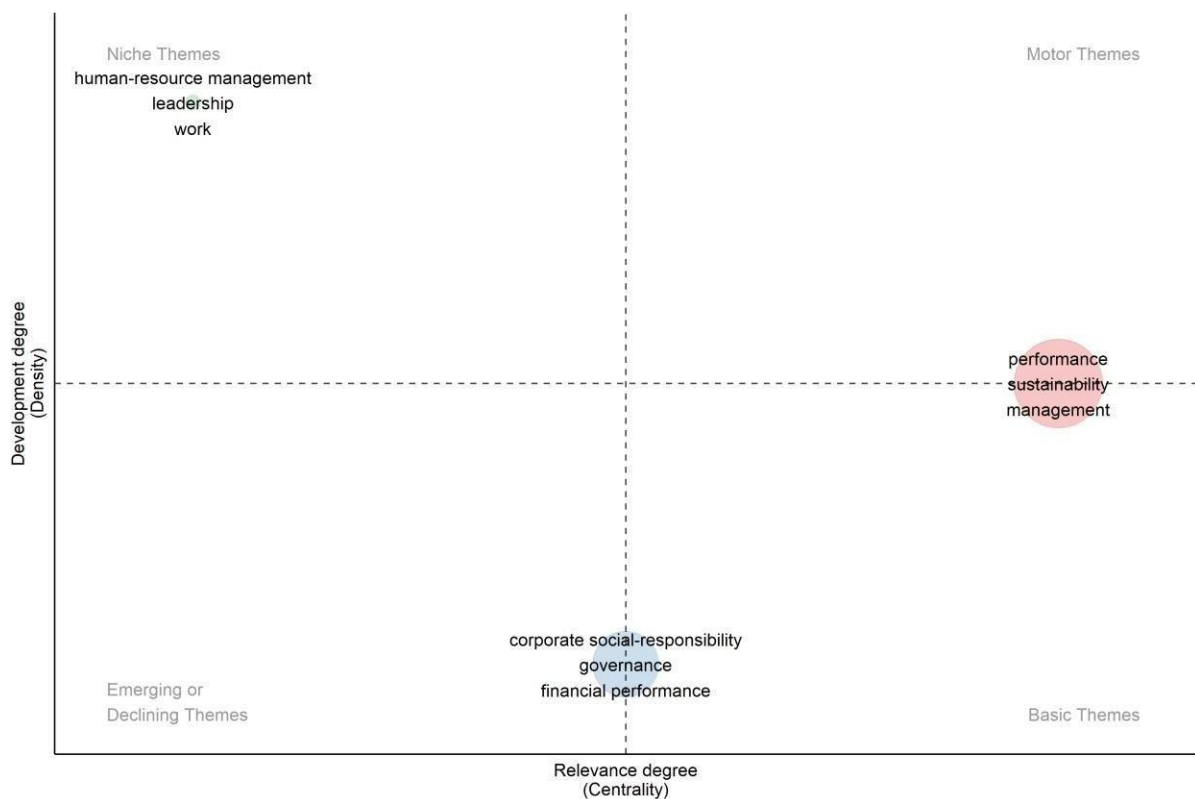
Table 2- Trend Topics

Term	Frequency	Year (Q1)	Year (Median)	Year (Q3)
Construction	5	2017	2019	2025
Attitudes	8	2018	2020	2024
Initiatives	5	2020	2020	2022
Resource-Based View	9	2021	2021	2024
Life-Cycle Assessment	7	2020	2021	2024
Work	7	2020	2021	2024

The *figure 7* represents the relevant keywords of research in environmental sustainability within service sectors. It provides an overview of how different themes interconnect, aids researchers identify dominant and emerging keywords.

Thematic Map

Figure 8- Thematic Map



Source: Author's own compilation

Figure 8 represents the thematic map and classify the key themes based on two dimensions: centrality (degree of relevance to the field) and density (degree of internal development). The thematic map is divided into four quadrants—motor themes, niche themes, basic themes, and emerging or declining themes.

In the above map, several themes lie in the borders of these quadrants, suggesting that they share characteristics of multiple themes rather than fitting into a single theme.

The quadrant containing performance, sustainability, and management is positioned between the motor themes and basic themes quadrants. This shows that these themes are highly central and influential in the field, their level of development is still changing.

- **Connections and Relationships:** Strong co-occurrence between "Sustainability" and "Performance" and between "Corporate Social Responsibility" and "Governance" indicates interdisciplinary research intersections.

IMPLICATIONS

The analysis offers various insights into the changing research landscape of environmental sustainability within service sectors:

- **Surging Academic Focus:** The surge in publications shows a growing academic and industry-wide acceptance of sustainability's importance in service industries. The trend is driven by increasing regulatory demands, shifting consumer expectations, and a stronger demand on corporate social responsibility.
- **Opportunities to cover up the Research Gaps:** The absence of dominant themes suggests that the field is still developing and fragmented to an extent. This shows an opportunity for researchers to create more integrated frameworks that bring together scattered thoughts and address underexplored areas.
- **Inviting More Inclusive Perspectives:** A notable gap is the limited involvement of developing countries in sustainability research. There's a need for research that showcases the challenges and opportunities in these regions, making sustainability discussions more globally inclusive.
- **Interdisciplinary Collaboration:** We can see the overlap between topics such as management, governance, and performance points to the need for cross-disciplinary approaches. Approaching sustainability in service sectors effectively requires drawing on expertise from economics, technology, environmental science etc.

DISCUSSION

The results showcase the dynamic and evolving nature of sustainability research within service sectors. The increasing number of publications shows that sustainability has moved from the sidelines to become a central part of business strategy and decision-making. Moreover, the change from broad discussions to more focused areas—like digitalization and green supply chains—signals a growing emphasis on practical, industry-specific challenges.

At the same time, the absence of dominant or recurring themes points to the field's current diversity and somewhat fragmented nature. Without a unified theoretical or methodological foundation, sustainability research in service sectors remains broad and

dispersed. This gap, however, creates a valuable opportunity for future research to synthesize these varied perspectives and develop more cohesive and practical frameworks that can guide sustainability efforts more effectively.

Another important takeaway is the clear geographical imbalance in contributions. Scholars from developing regions remain underrepresented, despite the fact that sustainability challenges often look very different—and more urgent—in those contexts. Encouraging more inclusive and collaborative research that brings in perspectives from emerging economies is essential for creating a fuller, more globally relevant picture of sustainability.

Lastly, the way themes such as management, governance, and performance intersect highlights the layered complexity of sustainability issues. This underscores the growing need for interdisciplinary approaches that bridge business strategy with environmental and social considerations—an essential step in crafting innovative, resilient, and forwardthinking solutions for the future.

CONCLUSION

This bibliometric analysis provides a thoughtful overview of how research on environmental sustainability in the service sector has developed over the past ten years. It reflects the growing academic engagement with the topic, highlights the dominant contribution of developed nations, and shows how sustainability is being explored through a blend of disciplines—from business and policy to environmental science.

At the same time, the study brings to light some important gaps. Notably, there is still no clear or consistent research theme that ties the field together, and scholars from developing countries remain underrepresented. These gaps present valuable opportunities for future work—both to create more integrated research frameworks and to include voices from regions that often face the most pressing sustainability challenges.

By tracing how knowledge in this area has evolved, the analysis helps researchers spot emerging directions, deepen theoretical understanding, and build stronger interdisciplinary partnerships. Ultimately, the aim is to support the shift toward more sustainable service practices—equipping businesses and policymakers with insights that align with both environmental priorities and global sustainability goals.

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Analysing the Impact of Green Finance on the Stock Market Development in BRICS Nations: A Panel ARDL Method

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ABSTRACT

The stock market is considered an essential marketplace that unites savers and borrowers, generating liquidity that enables governments, businesses, and individuals to trade shares, which is crucial for economic growth. With the provision of green finance in the financial market, there have been considerable changes in trade strategies, and risk management. Thus, the present study examines the impact of green finance (GF) on stock market (SM) along with technological factor, artificial intelligence (AI), other external factors such as trade (tr), foreign investment (FDI), exchange rate (Ex), and internal factors such as inflation (In) and domestic credit (DC) from 2000 to 2022 in BRICS nations. BRICS countries were particularly selected due to the high potential for investment. According to the results of the first and second-generation panel unit root tests, there are no unit root issues, and the factors have a mixed order of integration. The long-term

cointegration of the factors is validated by the panel cointegration test. The results show that GM, AI, FDI, and Tr have a positive effect on the stock market, whereas Ex and In have a negative effect. However, DC has a positive but insignificant impact. While in the short run, all factors except trade have a positive impact on SM in BRICS nations. These panel ARDL results were further validated by employing Augmented Mean Group (AMG) and Common Correlated Effects Mean Group (CCEMG). The findings suggested that policymakers should concentrate more on investment policies focusing on green finance and integrating AI techniques for the development of the stock market. **KEYWORDS:** Artificial intelligence; FDI; green finance; panel ARDL; stock market; trade

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INTRODUCTION

The stock markets of the BRICS nations—Brazil, Russia, India, China, and South Africa—have grown significantly during the last 10 years. It is anticipated that the BRICS member countries' growth rates would accelerate in the near future, possibly overtaking the US and European combined growth rates by 2030 (Ganguly & Bhunia, 2022). The BRIC taxonomy was first developed by Goldman Sachs to characterise Brazil, Russia, India, and China—a collection of large emerging economies with significant potential for growth. Following the group's official formation in 2006, the first BRIC summit took place in 2009. When South Africa joined in December 2010, the group saw its first expansion, becoming known as BRICS (Toloraya, 2018). The BRICS group has become one of the most important economic blocs in the past decade, accounting for around 42% of the world's population, 26% of the global GDP, 21% of exports, 16% of global imports (Larionova, 2020). Despite being an unofficial organisation without a charter, the bloc has a more institutional character because to high levels of political engagement and the establishment of economic institutions like the New Development Bank. There is some co-movement among the BRICS markets due to the countries' increasing political and economic relations (Lehkonen & Heimonen, 2014). A uniform platform for trading stocks is provided by the stock market (Voit, 2013). While institutional investors can make significant investments, individual investors can benefit from the trading

conveniences (Enisan & Olufisayo, 2009). The economy's money flow is facilitated by the stock market. It also makes the market more liquid and creates an environment that is favourable to IPOs and entrepreneurship. According to Levine and

Zervos (1999), the size of the stock market plays a major part in stabilising the ways in which money may be obtained to better support investments and economic growth. Any economy that wants to transition from a traditional, rigid, and risky bank-based economy to one that is more flexible, safe, and resistant to shocks, volatility, and a lack of investor confidence must have it. Numerous studies examine the integration of global stock markets.

Despite some indications that China is increasingly fragmented, Nayyar (2020) and Dsouza et al. (2024) demonstrate interconnectedness within the BRICS economies. For instance,

Sharma et al. (2013) used the variance decomposition test and VAR model to identify interdependencies across the BRICS stock market based on daily data from April 1, 2005, to March 31, 2010. Using wavelet multiple correlation and daily data from January 4, 2005, to February 28, 2012, the researchers discovered that the chosen nine Asian countries were highly connected (Tiwari et al., 2013). Wu (2020) shows that estimations of stock market integration across developing economies can be significantly skewed if the influence of global market forces is ignored.

At the same time, economic theory and empirical study have long been interested in and investigating the connection between macroeconomic variables and stock prices. Research has continuously acknowledged market indices and stock prices as valid indicators for evaluating economic conditions (Abbass et al., 2022). Stock market prices are strongly impacted by a nation's economic circumstances (Riaz et al., 2022). The stock market is also significantly impacted by macro factors, including GDP, interest rates, exchange rates (ER), and inflation (Gyamfi et al., 2021).

In the recent time, there are few literatures stating the impact of green bonds, that is green finance effects the stock market. In general, green financing plays a key role in positioning the regional economy as a high-quality, low-carbon, and environmentally friendly growth path (Wang and Zhou 2022). It has been recognised that green finance is an essential tool for raising the funds required to assist ecologically friendly initiatives and businesses (Li and Lin, 2024). Yu et al. (2023), for instance, emphasize the vital role that green financing plays in reducing environmental hazards and encouraging sustainable industrial practices, especially in emerging economies. Certification examination plays a crucial role in preventing "green-washing," which in turn lessens the risks connected to green expenditures for businesses. Furthermore, funding

allocations to companies with high energy usage and pollutant emissions may decline as green financing develops. Redirecting financial resources to environmentally friendly and energy-efficient businesses is in line with ecological goals and creates a new strategic paradigm for financial institutions. This change reflects the ideas of sustainable economics and emphasises how important financial intermediaries are in encouraging ecologically conscious investing practices (Iram et al., 2020). This all effect the stock market of the any countries. BRICS nations being the fast growing economies, its stock market will be impacted by the green finance.

Given the preceding circumstances, the main goal of this research is to investigate how the stock market (taking the stock traded as a proxy) is affected by the financial factor, namely green finance, technological factor, namely artificial intelligence (taking the patent application as the proxy), external factors (FDI, trade openness, and exchange rate), and internal factor (inflation), specifically in the context of BRICS nations. This study adds to the body of knowledge in several ways. First, there is a lack of research using the ARDL approach to investigate the short- and long-term effects of the aforementioned factors in BRICS nations for a period from the 2000s when the impact of technology became more visible in the stock exchange. Second, the study adds green finance and artificial intelligence as a factor affecting the stock market, which has been lacking in earlier research. Additionally, the research will offer some potential recommendations on the basis of the findings.

MATERIALS AND METHODS

Data

The present research examined the dynamic short- and long-run impact of green finance (GF) along with technology factor such as artificial intelligence (AI), open economy factors such as foreign direct investment (FDI), trade (Tr), and exchange rate (Ex); and internal factor, inflation (In) and domestic credit (DC) on the stock market (SM) (taking stock traded as a proxy) in BRICS nations by employing the panel autoregressive distributive lag model method. A time series dataset spanning over 23 years, from 2000 to 2022, was used in the investigation. Data on foreign direct investment (FDI), trade (Tr), exchange rate (Ex), inflation (In), and stock market (SM) (taking stock traded in current US dollars as the proxy) were sourced from World Development Indicators (WDI) (World Bank, 2024). Additionally, data regarding artificial intelligence and green

finance (GF) were sourced from the OECD statistics database. The stock market (SM) is the dependent variable in the current study. In the current study, FDI, Tr, and stock traded were measured in terms of current US\$ and inflation is calculated as consumer price (annual percentage), whereas the exchange rate is measured in terms of LCU per US\$, period average. The OECD's patent databases, which offer comprehensive information on patent filings categorised by technological disciplines, including AI-related advancements like machine learning, robotics, and data analytics, are the source of the AI variable, which is defined as patents for technologies related to artificial intelligence. For, green finance, we have taken data related to Environmentally related government R&D budget, percentage total government R&D. For all our data analysis and econometric modelling, we used EViews 12, an exhaustive econometric software. To ensure that the data was normally distributed, the factors were converted into logarithms. Table 1 provides a detailed overview of factors used in the study, together with information on sources, rationale, unit of measurement, and data description.

Table 1. Data description

Variable type		Factors	Abbreviation	Units	Data source
Output variable	Dependent factors	Stock traded	LnSM	Current US\$	WDI
Financial variable		Green Finance	LnGF	Environmentally related government R&D budget, percentage total government	OECD

Technology variable	Independent factors	Artificial Intelligence	LnAI	Patents for technologies related to artificial intelligence	WDI
Open Economy Factors	Internal factor	Exchange Rate	LnEx	LCU per US\$, period average	WDI
		Trade	LnTr	Net trade in goods and services BoP,	WDI
		Foreign Direct Investment	LnFDI	Foreign direct investment, net (BoP, current US\$)	WDI
		Domestic Credit	LnDC	Private sector as a % of GDP	WDI
		Inflation	LnIn	Consumer price annual %	WDI

Model specification

The panel ARDL model was employed for accomplishing the objectives, and similar models were used by studies such as Raihan et al. (2024), who focus on how AI affects the environment in G7 nations, and Joo and Shawl (2023), which focused mainly on the influence of FDI on economic growth along with trade, stock market capitalisation, and inflation as a few other important factors in BRICS nations. The present investigation employs the following model, which is an alternative and extended version of the model used by Raihan et al. (2024) and Joo and Shawl (2023), and this serves as the theoretical foundation. In this regard, we use the following equation.

$$SM_{it} = f(GF_{it}, AI_{it}, FDI_{it}, Tr_{it}, EX_{it}, In_{it}, DC_{it}) \quad (1)$$

Where,

SM_{it} = Stock traded

GF_{it} = Green Finance

AI_{it} = Artificial Intelligence

FDI_{it} = Foreign direct investment

Tr_{it} = Trade

EX_{it} = Exchange rate

In_{it} = Inflation

DC_{it} = Domestic credit

't' represents 'time', 'i' represent 'observation' and 'f' represent 'function'.

From the equation (1), we derive the equation (2)

$$SM_{it} = GF_{it}^{\alpha_1}, AI_{it}^{\alpha_2}, FDI_{it}^{\alpha_3}, Tr_{it}^{\alpha_4}, EX_{it}^{\alpha_5}, In_{it}^{\alpha_6}, DC_{it}^{\alpha_7}, \forall t \quad (2)$$

The following questions are the main focus of this investigation. Are BRICS nations stock markets affected by the aforementioned factors? What kind of effect does it have on the stock market? Previous research has shown contradictory results. For instance, Zhang and Ding (2023) has found that green finance has a negative impact on stock market development of China. In the research focusing on India, insignificant results are observed in the long-term impact of inflation and exchange rate on the stock market applying the ARDL model (Tejesh, 2024). Whereas Sreenu (2023) found a significant positive impact of exchange rate and inflation in the long run and a negative impact in the short run on the stock market in India. In the study, Qamruzzaman and Wei (2018) identified a long-term correlation among the variables, such as financial development

(application of technology) and stock market development. In the context of Brazil, Nyasha and Odhiambo (2020) found that exchange rates and trade have a positive and significant impact on the growth of the stock market. The fluctuation of the BRICS stock indexes, both past and currently, is significantly impacted by changes in exchange rates (Caporale et al., 2015; Mroua and Trabelsi, 2020). However, there are no studies that have been undertaken to study the impact of artificial intelligence on the stock market in the BRICS nations using a high-end model like panel ARDL. By examining data from 2000 to 2022, this study attempts to fill these gaps and provide a thorough grasp of these factors determining the development of the stock market.

Unit root test

Unit root tests are often employed to test the stationarity of the factors used in the analysis. As described in the research of Joo et al. (2023), a data set is considered to be stationary if the average, variance, and covariance of the data are constant. In the current research, Im, Pesaran, and Shin (IPS), which has been introduced by Im et al. (2003), and LLC (Levin, Lin, and Chu) tests developed by Levin et al. (2002) are the first-generation unit root tests, and CIPS and CADF second-generation unit root tests, which take into consideration slope variation and cross-sectional dependency created by Pesaran (2007), were employed. Such similar tests were employed in the research undertaken by Raihan et al. (2024).

Null hypothesis: There is a unit root, or the factors of the series are not stationary.

Panel cointegration

The Pedroni panel cointegration test is used to detect if cointegration exists, assuming panel heterogeneity. Pedroni (1999) produced two distinct assessments. Panel vstatistics, panel rho-statistics, panel PP-statistics, and panel ADF-statistics are the four statistical measures used in the first test, which follows a within-dimension methodology. Three statistical measures—group statistics, group PP statistics, and group ADF statistics—as well as a between-dimension approach are used in this experiment. The null hypothesis, according to which there is no cointegration, is rejected if the p-value for each of these data points is less than the designated significance threshold.

Panel ARDL

In the present research, the development of stock market is linked to financial factor such as green finance (ii) technology factor such as artificial intelligence, (iii) open economy

factor such as FDI, trade, exchange rate and (iv) internal factor such as inflation and domestic credit. The empirical model states that stock market development (taking stock traded as proxy) is a function of these technological, open economy factor as well as internal factor. In order to determine the relationship between stock market development and these explanatory factors, the study employs the following.

$$SM_t = \alpha_0 + \alpha_1 GF_t + \alpha_2 AI_t + \alpha_3 FDI_t + \alpha_4 Tr_t + \alpha_5 EX_t + \alpha_6 In_t + \alpha_7 DC_t + u_t \quad (6)$$

Where α_0 is the intercept of the model, α_1 to α_7 are the coefficient that quantify the impact of explanatory factors in the dependent variable. Additionally, we convert our model to logarithmic form in order to prevent heteroskedasticity and autocorrelation (Hassan and Muhammed, 2024).

Pesaran et al. (2001) developed the autoregressive distributed lag model, which is employed in this study, and it is more effective than any other cointegration technique (Panpoulou and Pittis, 2004). Both short- and long-run dynamics between the variables can be analyzed using the ARDL model when the independent variables in the model are I (0) and I (1) or jointly integrated (Fosu and Magnus, 2006). It is appropriate for time series data as it enables the inclusion of both stationary and non-stationary variables in this analysis (Fosu and Magnus, 2006). The current study employed panel ARDL. The primary justification for using panel data is that it assesses the impact collectively rather than individually, meaning that by adopting a panel perspective, relatively little information is lost (Baltagi, 2008). Furthermore, heteroscedasticity is not a problem in panel data analysis as panel data minimises the noise originating from the individual time series (Ahn et al., 2013). Additionally, panel data is most appropriate in situations when data availability is a problem, especially in developing nations where short-term variables are accessible (Khelifaoui et al., 2022). By accounting for subject-specific factors and dynamic changes brought on by repeated cross-sectional observations, panel estimate approaches account for this heterogeneity. Heterogeneous panel data modelling, or panel-ARDL, is the only focus of this work. Due to its ability to analyse both short-term and long-term dynamics between technological, open economy, and internal factors, the Panel Autoregressive Distributed Lag (ARDL) approach is well suited for this study on the BRICS countries' advancing stock market development. In order to capture the distinct economic and technical landscapes of the BRICS countries, this approach must take into account variability across cross-sections. In contrast to conventional panel data techniques, Panel ARDL addresses the possibility of various temporal dynamics within

each nation by permitting varying lag lengths for every variable. Furthermore, as is typical in financial and macroeconomic datasets, Panel ARDL excels at managing variables with mixed integration orders (I(0) and I(1)). The dependent-independent variable relationship was determined via the following model.

$$\text{LnSM}_t = \alpha_0 + \alpha_1 \text{LnSM}_t + \alpha_2 \text{LnGF}_t + \alpha_3 \text{LnAI}_t + \alpha_4 \text{LnFDI}_t + \alpha_5 \text{LnTr}_t + \alpha_6 \text{LnEx}_t + \alpha_7 \text{LnIn}_t + \alpha_8 \text{LnDC}_t + v_t \quad (3)$$

Equation (3) may be expressed as follows in ARDL form:

$$\begin{aligned} \Delta \text{LnSM}_t = & \alpha_0 + \sum_{i=1}^{n1} \alpha_{1i} \text{LnSM}_{t-i} + \sum_{i=1}^{n2} \alpha_{2i} \Delta \text{LnGF}_{t-1} + \sum_{i=1}^{n3} \alpha_{3i} \Delta \text{LnAI}_{t-1} + \sum_{i=1}^{n4} \alpha_{4i} \\ & \Delta \text{LnFDI}_{t-1} + \sum_{i=1}^{n5} \alpha_{5i} \Delta \text{LnTr}_{t-1} + \sum_{i=1}^{n6} \alpha_{6i} \text{LnEx}_{t-1} + \sum_{i=1}^{n7} \alpha_{7i} \text{LnIn}_{t-1} + \sum_{i=1}^{n8} \alpha_{8i} \Delta \text{LnAI}_{t-1} + \\ & \beta_1 \text{LnSM}_{t-1} + \beta_2 \text{LnGF}_{t-1} + \beta_3 \text{LnAI}_{t-1} + \beta_4 \text{LnFDI}_{t-1} + \beta_5 \text{LnTr}_{t-1} + \beta_6 \text{LnEx}_{t-1} + \beta_7 \text{LnIn}_{t-1} + \beta_8 \text{LnDC}_{t-1} \\ & + e_t \end{aligned}$$

(4)

When α_0 represents a drift component, Δ indicates the first difference between the variables, and e_t is the white noise error term. According to Gujarati (2009), the term “white noise error term” refers to an uncorrelated random error term with zero mean and constant variance σ^2 . In equation (4), the coefficients from 2nd to 8th (α_{1i} to α_{8i}) suggest an association in short-term and long-term relationships, as shown by the coefficients from 9th to 16th (β_1 to β_8). Utilizing the ARDL bounds testing technique, the long-term relationship between the variables is investigated. The F statistic is used in the bounds testing method to evaluate the hypothesis. This may be stated as follows.

H₀: There is no cointegration. ($\beta_1 = \beta_2 = \beta_3 = \beta_4 = \beta_5 = \beta_6 = \beta_7 = \beta_8$)

H₁: Cointegration exists. ($\beta_1 \neq \beta_2 \neq \beta_3 \neq \beta_4 \neq \beta_5 \neq \beta_6 = \beta_7 = \beta_8$)

If the computed f statistic is greater than the upper bound value, the null hypothesis is rejected. The null hypothesis cannot be rejected if the computed f statistic is less than the lower bound of the critical value. We are unable to draw any conclusions if the f statistic falls between the critical values of the lower and upper bounds. On the other hand, the assumption made by Pesaran et al. (2001) allows for the introduction of an unrestricted error correction model, where the long-run elasticities are the negative coefficients of a one-lag dependent variable. The ECM version of the ARDL model is represented as follows.

$$\Delta \text{LnSM}_t = \alpha_0 + \sum_{i=1}^{n1} \alpha_{1i} \text{LnSM}_{t-i} + \sum_{i=1}^{n2} \alpha_{2i} \Delta \text{LnGF}_{t-1} + \sum_{i=1}^{n3} \alpha_{3i} \Delta \text{LnAI}_{t-1} + \sum_{i=1}^{n4} \alpha_{4i}$$

$$\Delta \text{LnFDI}_{t-i} + \sum_{i=1}^{n5} \alpha_{5i} \Delta \text{LnTr}_{t-i} + \sum_{i=1}^{n6} \alpha_{6i} \text{LnEx}_{t-i} + \sum_{i=1}^{n7} \alpha_{7i} \text{LnIn}_{t-i} + \sum_{i=1}^{n8} \alpha_{8i} \Delta \text{LnAI}_{t-1} + \gamma \text{EC}_{t-1} + e_t$$

.....(5)

Where γ represents the speed of adjustment and EC are the residual obtained from equation (5).

Robustness check

The robustness was evaluated in the paper using the DKSE, CCEMG, and AMG estimators. In addition to the residuals, Driscoll and Kraay (1998) employed the average values of the explanatory variable outcomes. Second, in the current study, we used the augmented mean group (AMG) estimator, which was proposed by Eberhardt and Teal (2010). Because the AMG estimator accounts for the CSD, mixed-order stationarity, and heterogeneity in the panel data, it produces more trustworthy results than first-generation estimators. The third estimator used in this work is the CCEMG approach, which was created by Pesaran (2006). Furthermore, both AMG and CCEMG perform better when estimating using common components that are uncertain and inconsistent. By taking into consideration temporal changes with varying factor pitches, the CCEMG resolves the identification problem.

RESULT AND DISCUSSION

Cross- Sectional Dependence Test

Table 2 displays the findings of the CDS test, which reveal there exists a strong crosssectional dependence among the variables employed in the current research. At the 1% level of significance, CD statistics are highly significant, indicating that they are not independent among the cross-sectional units. This in turn suggests that any modifications or shocks to one unit within the panel will have an impact on the other units also. Crosssectional dependence must be taken into consideration, as the validity and interpretation of the results are impacted by them. In order to guarantee reliable and accurate results, it is imperative to use second-generation panel data methodologies that take this dependence into consideration.

Table 2. Cross sectional dependence test

Variables	CD- Statistics	P- Value
LnSM	11.87***	0.000
LnGF	13.58***	0.000
LnAI	8.14***	0.000
LnFDI	6.33***	0.000

LnTr	17.10***	0.000
LnEx	8.99***	0.000
LnIn	13.75***	0.000

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LnDC	12.47***	0.000
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Source: Author's own evaluation using EViews

Slope Homogeneity Test

The results of the Pesaran and Yamagata (2008) slope homogeneity test are shown in Table 3. The delta statistics are highly significant. Hence, the null hypothesis of slope homogeneity is rejected. In other words, the slopes in the panel data model are not uniform among the cross-sectional units. This means the influence of the exogenous variable on the endogenous variable (stock traded as a dependent variable in the current study) varies, leading to a slope heterogeneity issue.

Table 3. Slope Homogeneity test result

Slope Homogeneity tests	Δ statistic	P- value
$\Delta \tilde{t}$ test	12.174	0.000
$\Delta \tilde{t}_{adj}$ test	16.981	0.000

Source: Author's own evaluation using EViews

Panel Unit root test

The findings of panel unit root tests, both the first generation (Levin, Lin, and Chu) as well as the second generation (CIPS and CADF), are shown in Table 4. Due to the high p-value (more than 0.05), the factors such as stock traded (LnSM), trade (LnTr), inflation (LnIn) and domestic credit (LnDC) exhibit non-stationarity at the level, which falls short of the critical value needed to reject the null hypothesis of unit root at the level in both first generation and second generation. The null hypothesis of a unit root is rejected for these factors having significant t-statistics and low p-values (less than 0.05) when first differenced. After differencing once, these factors are stationary. However, the factors

such as LnGF, LnFDI, LnAI, and LnEx indicate stationarity at level in both the generation test. Therefore, for further analysis, the variables LnSM, LnTr, and LnIn are converted to first differences.

LnIn	LnEx	LnTr	LnFDI	LnAI	LnGF	LnSM	Variables	
-1.394 (0.336)	- 1.697** *	-1.265 (0.089)	- 3.657** *	- 2.774* **	-1.624 (0.002)	-1.985 (0.085)	I (0)	Levin- Chu
- 3.911** *	- 3.694** *	- 3.617* **	- 7.698** *	- 3.148* **	- 3.363** *	-4.185*** (0.003)	I (1)	
-4.333 (0.518)	- 1.745** *	-3.611 (0.742)	- 3.867** *	- 2.972* **	- 5.001** *	-5.691 (0.619)	I (0)	CIPS
- 8.691** *	- 3.981** *	- 8.462* **	- 5.029** *	- 5.142* **	- 6.144** *	- 10.418** *	I (1)	
-2.364 (0.075)	- 4.267**	-6.948 (0.258)	- 4.187**	- 4.256*	- 0.262**	0.695 (0.417)	I (0)	CADF
- 6.311**	- 7.239**	- 10.697	- 8.917**	- 8.522*	- 5.147**	-6.112*** (0.000)	I (1)	
I(1)	I(0)		I(0)	I(0)	I(0)	I(1)		Decision

LnDC	-1.216 (0.418)	3.742* **	-4.842 (0.635)	9.365* **	-2.481 (0.086)	- 5.452*	I(1)
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Table 4. Panel Unit Root

Source: Author’s own evaluation using E-Views software

Note: *** indicates the significance

Panel Cointegration

The findings of Pedroni's cointegration test, which was used to determine whether there was a long-term connection between the variables, are displayed in Table 5. Two sets of substitute theories are assessed: Common autoregressive coefficients within the dimension (ii) and individual autoregressive coefficients between dimensions (iii). Despite being statistically insignificant, the panel v-statistic and rho-statistic are both negative, suggesting conflicting evidence for a long-term relationship. Nonetheless, the highly significant panel PP-statistic and panel ADF-statistic results show that the no cointegration hypothesis is strongly refuted. Furthermore, the significantly negative Group PP and Group ADF statistics clearly contradict the null hypothesis that there is no cointegration between panels. The group rho-statistic is positive but not significant if individual autoregressive coefficients between dimensions are assumed. Although there may be some variance in the autoregressive coefficients within and between dimensions, these results typically demonstrate that there is evidence of cointegration across the variables in the panel dataset.

Table 5. Panel Cointegration result

Alternative hypothesis: common AR coefs. (within- dimension)				
	Statistic	Prob.	Weighted Statistics	Prob.
Panel v-statistic	-0.75215	0.84239	-0.75104	0.86100

Panel rho- statistic	-1.52014	0.92014	-1.49852	0.95014
Panel PP-Statistic	-8.14512	0.00001	-5.10074	0.00013
Panel ADF-Statistic	-3.23021	0.00015	-3.77484	0.00000
Alternative hypothesis: individual AR coefs. (between dimension)				
	Statistic		Prob.	
Group rho- statistic	-4.17414		0.5201	
Group PP-Statistic	-7.74521		0.0000	
Group ADF-Statistic	-8.01041		0.0003	

Source: Author's own evaluation using E-Views software

Panel ARDL

Employing the panel ARDL technique, the study identified the long-term and short-term impacts of explanatory variables such as LnGF, LnAI, LnFDI, LnTr, LnEx, LnIn and LnDC on the dependent variable LnSM. Table 6 presents the long-term results of the panel ARDL approach. Green finance (LnGF) has a positive impact on the stock market (LnSM) in the long term, with a coefficient value of 0.42 indicating that 1 percent rise in the LnGF, would increase the growth of stock market by 0.42 percent. This was supported by the existing studies such as Li and Lin (2024) and Zhang and Ding (2023). This may be due to the fact that By promoting sustainable investments and increasing investor trust in ecologically conscious businesses, green financing has a beneficial effect on the stock market. Green practices draw ESG-conscious investors, which raises demand and stock values as more companies implement them. Green bonds and government incentives encourage investment in sustainable industries, which fosters long-term growth and innovation. This change strengthens the resilience of financial markets, lowers environmental risks, and supports global climate objectives. Overall, by balancing

financial gains with environmental responsibility, green finance not only promotes ecological sustainability but also enhances stock market performance and stability.

Artificial intelligence (AI) developments are a contributing factor to the rise in stock market activity, as seen by the positive and significant long-term coefficient of LnAI . A 1% increase in AI leads to 0.36% increase in stock traded (SM) illustrates how AI may improve trading efficiency, decision-making, and market analysis. Faster transactions, greater risk assessment, and enhanced investing strategies are made possible by AI-driven algorithms, which also increase market liquidity and draw in more players. This increase in the use of AI encourages trading volume and increases investor confidence. AI's revolutionary influence on financial markets and long-term economic growth is therefore highlighted by the close connection between it and stock market activity. These results were in line with the studies by Mohanram (2005) and Pagliaro (2023), who reported that AI has a positive role in the development of the stock market. Similarly, FDI has a positive and significant effect on LnSM ; a 1 percent increase in LnFDI increases LnSM by 0.34 percent. Adediran (2023) found a similar results. The stock market (LnSM) benefits greatly from foreign direct investment (FDI); for instance, a 1% increase in LnFDI causes a 0.34% increase in LnSM . This relationship illustrates how foreign direct investment (FDI) boosts investor confidence, attracts money, and promotes economic growth—all of which in turn boost stock market activity. Improved infrastructure, knowledge transfer, and job creation are frequently the results of FDI, which improves business performance and draws in further capital. Foreign investors' involvement in local markets boosts trade volume and liquidity, which supports longterm financial and economic growth and strengthens the stock market.

A higher level of trade activity improves stock market performance, according to the positive and substantial long-term coefficient of trade (LnTr). The stock market (LnSM) rises by 0.21% for every 1% increase in LnTr , indicating that more trading improves market liquidity and participation. Stronger economic activity is reflected in higher trade volumes, which boost investor confidence and company performance. As a result, trading volumes and market capitalisation increase as more local and foreign investors participate in the stock market. All things considered, more trade promotes economic integration, draws in investment, and fortifies the depth and effectiveness of the financial system. This was consistent with the findings of Dino (2023), which showed that a rise in trading volume had a beneficial impact on the stock prices of businesses that are part of the S&P

500 index. With a coefficient of -0.11, the exchange rate (LnEx) and stock traded (LnSM) have a negative long-term connection, indicating that currency depreciation deters stock market activity. Lesser trade volumes and capital outflows result from foreign investors receiving lesser profits as the local currency declines.

Additionally, it increases the cost of imports, which impacts investor sentiment and business profitability, ultimately decreasing market participation. However, studies that focus on the stock market and exchange rate generally produced contradictory findings, stating of negative and positive impact, with studies by Moussa and Delhoumi (2021) and Jawaid and Ui Haq (2012) showing positive and significant impact, whereas the negative impact has been identified in the research undertaken by Khan (2019).

With a 0.07% drop in stock traded for every 1% increase in inflation, the long-term and substantial impact of inflation (LnIn) on the stock market (LnSM) suggests a decline in investor confidence. Excessive inflation reduces buying power, raises expenses, and breeds economic ambiguity, all of which deter investment. Over time, this results in decreased stock market activity and fewer company earnings. These findings were supported by the earlier findings of Uwubanmwun (2015). This was in contradiction to the findings of Kwofie and Ansah (2018).

Table 6. Long term estimations of parameter in Panel ARDL method

Variables	Coefficient	Std. error	t-statistic	Prob.
LnGF	0.4215	0.1141	2.1001	0.003
LnAI	0.3674	0.1195	3.0111	0.038
LnFDI	0.3411	0.0811	2.0012	0.001
LnTr	0.2152	0.4515	0.8963	0.002
LnEx	-0.118	0.2541	-0.1485	0.022
LnIn	-0.071	0.9017	-1.0369	0.005
LnDC	0.231	0.5101	-2.3651	0.054

Source: Author's own evaluation using E-Views software

The findings of the ARDL approach in the short run are given in Table 7. The coefficient of the error correction term indicates the pace of adjustment from the short to the long term for any disequilibrium and long-term causality correlations. Error correction is important. According to the coefficient of the ECM, which is -4.698, the current year's correction for errors and shocks from the previous year will be made at a rate of 46.98%. The results of the short-term impact analysis show that LnGF has the highest positive

effects on the stock market (LnSM), with coefficient values of 0.49. Following green finance, LnAI, LnFDI, LnEx, LnIn and LnDC also affect the stock market (LnSM) positively with coefficient values of 0.58, 0.35, 0.38, 0.26, and 0.15 respectively. However, trade negatively affected the stock market in the short run with a 1% increase in trade (LnTr), which decreased the stock traded by 0.24. The short-term negative impact of trade (LnTr) on stock traded (LnSM) is caused by the potential changes or disruptions that arise with an increase in trade. In the short term, increased trade volumes may lead to market volatility as businesses adjust to changes in supply, demand, or external factors like trade agreements or tariffs. Stock trading activity may decrease as investors become more cautious due to this uncertainty.

Table 7. Short term estimations of parameter in ARDL method

Variables	Coefficient	Std. error	tstatistics	Prob
<i>COINTEQ01</i>	-0.4698	0.0854	-5.178	0.003
<i>DLnGF</i>	0.4912	0.2333	2.623	0.001
<i>DLnAI</i>	0.4218	0.1484	1.745	0.003
<i>DLnAI(-1)</i>	0.5863	0.1429	1.851	0.004
<i>DLnFDI</i>	0.3524	0.0325	5.174	0.030
<i>DLnTr</i>	-0.1433	0.1125	-5.215	0.000
<i>DLnTr(-1)</i>	-0.2421	0.7512	-2.215	0.048
<i>DLnEx</i>	0.3636	0.1339	3.669	0.003
<i>DLnEx(-1)</i>	0.3887	0.1691	3.188	0.004
<i>DLnIn</i>	0.1912	0.3205	2.913	0.038
<i>DLnIn(-1)</i>	0.2625	0.4215	2.178	0.033
<i>DLnDC</i>	0.1533	0.5621	1.652	0.024
<i>C</i>	-20.362	0.1253	-12.634	0.001

Source: Author's own evaluation using E-Views software

Robustness Check

The findings of the long-run panel ARDL estimation were validated by employing Driscoll Kraay Standard Error (DKSE), Augmented Mean Group (AMG), and Common Correlated Effects Mean Group (CCEMG) estimation. As shown in Table 8, the results are consistent with the panel ARDL estimation. The estimation of DKSE, AMG, and

CCEMG confirmed that LnGF, LnAI, LnFDI, and LnTr have a significant positive impact on LnSM in the long run. For instance, a one percent increase in LnGF increases LnSM by 0.54, 0.71, and 0.62 according to DKSE, AMG, and CCEMG, respectively. Additionally, as indicated by the panel ARDL findings, LnEx and LnIn have a negative impact, though LnEx has a negative impact; it is an insignificant impact on LnSM. Therefore, it can be concluded that the findings of DKSE, AMG and CCEMG are consistent with the output of the panel ARDL model.

Table 8. DKSE, AMG and CCEMG estimation

Variables	DKSE	AMG	CCEMG
LnGF	0.54**(0.027)	0.71**(0.033)	0.62***(0.001)
LnAI	0.46** (0.036)	0.61*** (0.001)	0.48**(0.036)
LnFDI	0.36** (0.025)	0.43*** (0.018)	0.46** (0.054)
LnTr	0.45** (0.0)	0.39*** (0.009)	0.42*** (0.005)
LnEx	-0.12** (0.024)	-0.04 (0.458)	-0.28 (0.674)
LnIn	-0.06** (0.032)	-0.12*** (0.01)	-0.14** (0.02)
LnDC	-0.45** (0.044)	-0.06 (0.523)	-0.23 (0.589)
Constant	5.751** (0.036)	13.265*** (0.007)	8.362*** (0.003)
Observations	115	115	115
Number of groups	5	5	5

Source: Authors' own evaluation using EViews.

Note: Standard error in parentheses; *** p< 0.01, **p<0.05

CONCLUSION

The panel ARDL technique was used in this study to investigate the short- and long-term impacts on stock market development (LnSM) of important macroeconomic and financial variables, including green finance (LnGF), artificial intelligence (LnAI), foreign direct investment (LnFDI), trade (LnTr), exchange rate (LnEx), inflation (LnIn), and domestic credit (LnDC). The long-term results showed that while inflation and exchange rate volatility have a negative effect on the volume of stocks traded, green finance, artificial intelligence, foreign direct investment, trade, and domestic credit had a positive and substantial impact on the stock market. The majority of factors continued to have a positive impact on the stock market in the short term, with green financing having the highest impact, followed by AI and FDI. However, trade has a short-term negative impact, most likely because of volatility, adjustment frictions, or transient uncertainty that come with increasing trading activity. A stable long-term equilibrium is confirmed by the considerable and negative error correction term, which also shows a robust adjustment speed towards equilibrium following short-term shocks. The study's conclusions have numerous significant policy ramifications. First, governments and financial institutions can encourage sustainable finance by increasing green financial instruments, providing tax breaks, and enforcing open environmental reporting requirements, as evidenced by the positive impact of green financing on the stock market. In addition to advancing environmental goals, this will boost investor confidence and stock market stability. Second, given AI's significant impact on stock market performance, more funding should be allocated to digital infrastructure, fintech innovation should be encouraged, and regulatory frameworks that permit the safe and moral integration of AI technology into financial markets should be established. Third, legislators should improve political stability, regulatory effectiveness, and investor protection measures to guarantee a favourable investment climate as FDI continues to have a favourable impact on the market. Fourth, even if trade has long-term advantages, its short-term volatility highlights the significance of creating policies that support trade while shielding home markets from sudden shocks, maybe through risk mitigation and adaptive trade techniques.

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The Digital Influence: A Bibliometric Study on Online Marketing and Consumer Purchase Patterns

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ABSTRACT

This bibliometric study analyzes the research landscape of online marketing and consumer decision-making based on 713 scholarly documents retrieved from SCOPUS. Using the keywords: ("online marketing" OR "digital marketing") AND ("purchase decision" OR "purchase behavior" OR "purchase intention" OR "buying behavior" OR "buying decision" OR "consumer behavior" OR "investment decision"), the study employs Biblioshiny for mapping key research trends, influential publications, and emerging thematic structures. The results indicate significant scholarly attention on social media marketing, electronic word-of-mouth (eWOM), user-generated content (UGC), and technological advancements such as artificial intelligence (AI) and augmented reality (AR) in influencing consumer purchase behavior. However, research remains fragmented across different consumer segments, industries, and geographic contexts. This study provides insights into the intellectual development of digital marketing research and offers future directions for academics, policymakers, and industry practitioners.

Keywords : Online Marketing, Digital Marketing, Purchase Decision, Purchase Behavior, Purchase Intention.

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INTRODUCTION

In the rapidly evolving landscape of commerce, digital marketing has emerged as a critical driver shaping consumer behavior, redefining traditional marketing paradigms, and reshaping the consumer decision-making journey. The proliferation of internet technologies, social media platforms, and e-commerce ecosystems has enabled marketers to reach and influence customers in ways that were previously unimaginable. As businesses increasingly transition to digital-first strategies, understanding the patterns, preferences, and psychological underpinnings of online consumer behavior has become not only relevant but essential (*Duralia, 2024*).

The scope and impact of digital marketing on consumer purchase behavior have gained considerable scholarly attention in recent years. This is evident from the explosion of literature addressing various facets such as social media influencers, user-generated content (UGC), electronic word-of-mouth (eWOM), and technological advancements including AI tools, chatbots, and augmented reality (AR) in shaping consumer intent. For instance, *Garg and Bakshi (2024)* found that the credibility of beauty vloggers—measured by trustworthiness, expertise, and attractiveness—significantly influences consumer trust and purchase intentions in the Indian cosmetic market. Similarly, *Karahan (2025)* highlighted the critical role of parasocial interactions in impulsive online buying, reinforcing the emotional dimensions of digital consumerism.

This bibliometric study analyzes 713 scholarly articles spanning the last decade to map out the intellectual structure, trends, and thematic evolution in research on online marketing and consumer purchase behavior. Through the Biblioshiny interface of the Rbased Bibliometrix package, the study employs various bibliometric techniques including co-word analysis, thematic mapping, and trend topic analysis to visualize how the literature has progressed and where it is heading.

The reviewed literature reveals several thematic clusters. One dominant cluster revolves around social media influencers (SMIs) and their growing impact on shaping brand attitudes, trust, and impulsive purchases. *Alsalloum and Gainous (2025)* demonstrated how female SMIs in the Arab Gulf region employ authenticity, confidence, and interactivity to enhance both emotional and rational marketing, ultimately influencing consumer purchasing behavior. *Wang and Mohamad (2024)* further expanded on this by showing that influencer attachment mediates the relationship between influencer characteristics and purchase intention, especially in live streaming contexts.

Another cluster focuses on consumer-generated content, including eWOM and UGC.

Chung (2025) established that emotional, functional, and social values derived from UGC can indirectly influence purchase decisions through attitudes and adoption intent. Similarly, *Huamanchumo et al. (2024)* found that the perceived usefulness of eWOM significantly affects purchase intentions in niche markets like Nikkei restaurants.

Advancements in technology adoption also feature prominently in current research. *Iranmanesh et al. (2024)* investigated how AR attributes—interactivity, novelty, and vividness—enhance perceived enjoyment and value, indirectly influencing brand attitudes and purchase intention. *Turlakova and Shumilo (2025)* identified that AI-powered marketing tools significantly improve click-through rates and customer engagement, emphasizing the role of automation in digital persuasion.

Despite the vast range of studies, existing research is fragmented and varies across demographic, regional, and sectoral contexts. For example, *Nuseir and Refae (2024)* found that while mobile and email marketing significantly influence customer behavior in the UAE's IT sector, their effectiveness diminishes when moderated by broader marketing strategies. Similarly, *Lim et al. (2023)* revealed that behavioral intentions to use retail websites vary significantly based on factors like performance expectancy, hedonic motivation, and social influence, especially among Generation Y users.

Moreover, psychological and neurological perspectives are gaining ground in this domain. *Ramchandani et al. (2024)* delved into the cognitive effects of motor actions (typing vs. handwriting) and their implications on consumer persuasion, finding that bimanual actions (like typing) lead to higher purchase intentions due to enhanced emotional processing.

While each of these strands contributes uniquely to the understanding of digital marketing's influence, there is a growing need for a comprehensive and quantitative mapping of how the research community has approached this field. Bibliometric analysis serves this purpose by synthesizing vast amounts of scholarly output, identifying leading contributors, journals, and institutions, and highlighting emerging research themes.

RESEARCH QUESTIONS

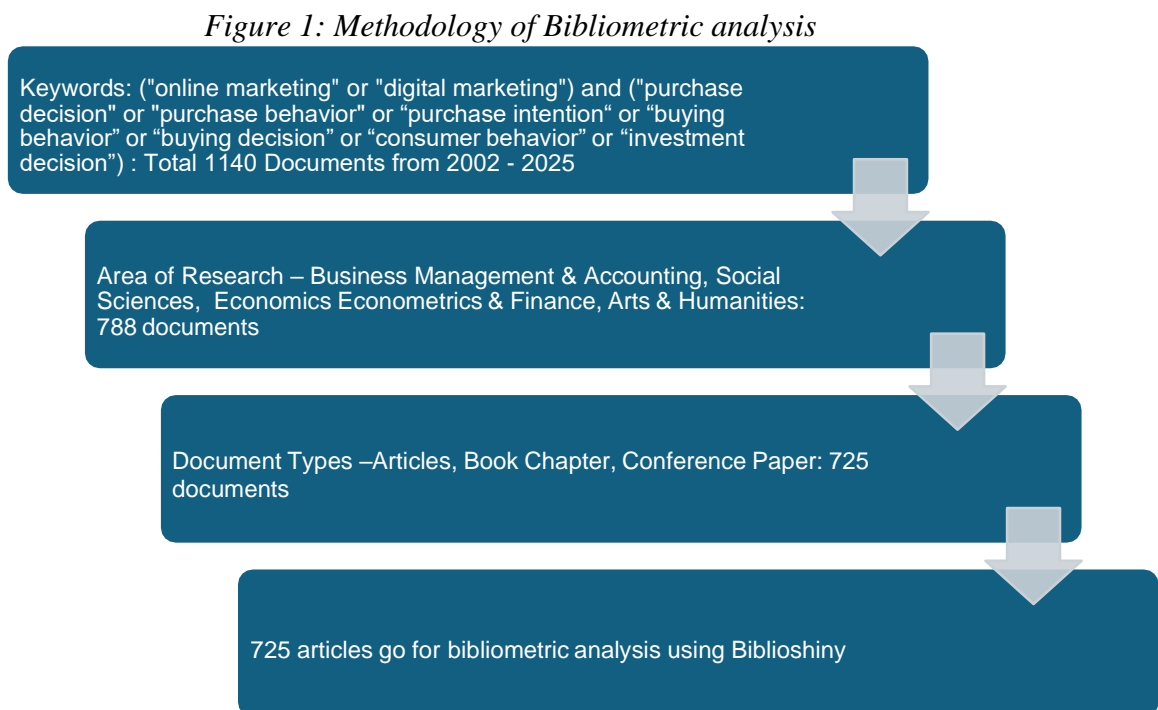
- What are the key research themes and trends in online marketing and consumer decisionmaking?
- Who are the most influential authors, journals, and institutions contributing to this research domain?

- How has research on digital marketing evolved over time, and what are the emerging areas of study?
- What research gaps exist in understanding the relationship between online marketing and consumer purchase behavior?

RESEARCH OBJECTIVES

- To conduct a bibliometric analysis of SCOPUS-indexed literature on online marketing and consumer decision-making.
- To identify leading contributors, institutions, and journals in this research domain.
- To map the thematic evolution of research in digital marketing and purchase behavior.
- To highlight research gaps and suggest potential future research directions.

RESEARCH METHODOLOGY



Source: Author's own compilation

Database Search (Scopus): The initial step involved searching the Scopus database using the following keywords:

("online marketing" OR "digital marketing")

AND

("purchase decision" OR "purchase behavior" OR "purchase intention" OR "buying behavior" OR "buying decision" OR "consumer behavior" OR "investment decision")

The search was limited to documents published between 2002 and 2025, yielding a total of 1140 documents.

Refinement by Research Area: The initial set of documents was further refined by selecting specific research areas. The included areas were:

- Business, Management and Accounting
- Social Sciences
- Economics, Econometrics and Finance
- Arts and Humanities

This filtering step reduced the number of relevant documents to 788.

Refinement by Document Type: The 788 documents were then filtered based on document type, including:

- Articles
- Book Chapters
- Conference Papers This selection resulted in 725 documents.

Bibliometric Analysis using Biblioshiny: The final set of 725 documents (specifically mentioned as "725 articles" in the image, implying these were the article document types from the previous step, although the previous step included more than just articles) was then used for bibliometric analysis. The tool specified for this analysis is Biblioshiny.

LITERATURE REVIEW

E-commerce and Digital Marketing Strategies

Digital marketing has become an essential tool for modern businesses, significantly influencing consumer behavior. Several studies highlight the impact of e-commerce and digital marketing on customer engagement and purchase behavior. One study (Zhang & Li, 2021) emphasizes the robust impact of e-commerce strategies on customer engagement within the Chinese cosmetics industry, although customer relationship management and purchase intentions showed minimal moderating effects. Similarly, research in the IT sector of the UAE (Khan et al., 2020) found that digital advertising

channels such as mobile, email, and retargeting positively influenced consumer purchasing behavior. However, marketing tactics moderated these effects significantly, reducing their direct impact. Additionally, the role of digital marketing in small businesses has been examined (Smith & Johnson, 2022), revealing that factors such as performance expectancy, hedonic motivation, and social influence drive consumer behavioral intentions.

The Role of Social Media Influencers

Social media influencers (SMIs) play a crucial role in shaping consumer purchase decisions. Various studies analyze the effectiveness of influencer marketing, noting the attributes that drive consumer trust and engagement. Research on beauty vloggers in India (Patel & Sharma, 2021) found that credibility attributes such as trustworthiness, expertise, and attractiveness partially mediate purchase intentions. Another study in the Arab Gulf region (Al-Farsi & Ahmed, 2020) examines the strategies employed by female social media influencers, emphasizing authenticity, confidence, and interactivity as key factors in shaping marketing effectiveness. Additionally, live-streaming influencer marketing has been analyzed (Lee & Kim, 2022), showing that similarity, professionalism, and interactivity influence consumer purchase intentions, with emotional attachment playing a mediating role. The impact of virtual influencers has also been explored (Chen et al., 2021), highlighting how playfulness and content expertise enhance trust and purchase intentions.

The Impact of User-Generated Content (UGC) and Electronic Word-of-Mouth (eWOM)

User-generated content and electronic word-of-mouth significantly shape consumer purchasing behavior. Studies show that functional, social, and emotional values derived from UGC influence consumer attitudes and adoption behaviors (Gonzalez & Perez, 2021). Research on eWOM in the context of Nikkei restaurants in Lima, Peru (Martinez et al., 2020), found that information usefulness is the most critical dimension affecting purchase intention. These findings highlight the importance of leveraging consumer-generated reviews and social media interactions in digital marketing strategies.

Psychological and Cognitive Factors Influencing Consumer Behavior

Several studies explore the psychological and cognitive aspects of digital consumer behavior. One study (Baker & Thompson, 2021) investigates the influence of unimanual

and bimanual motor actions (e.g., handwriting vs. typing) on consumer attitudes. Another study (*Singh et al., 2022*) focuses on emotional attachment as a driver of trust and impulsive buying among Generation Z consumers on social media. Research based on the Unified Theory of Acceptance and Use of Technology (UTAUT) framework (*Hassan & Lee, 2020*) explores psychological factors affecting online booking intentions for resort hotels, demonstrating that trust and familiarity significantly impact consumer decisions.

Technological Innovations in Consumer Behavior Analysis

Emerging technologies play a critical role in enhancing consumer behavior analysis. A study (*Roberts et al., 2021*) proposes a machine learning-based methodology to assess consumer opinions on fashion products through mobile applications. Artificial intelligence (AI) tools have been shown to enhance digital advertising efficiency by increasing reach, clicks, and click-through rates (*Fernandez & Brown, 2020*). Additionally, integrating textual content and emojis in online reviews has been identified as a method for extracting deeper insights into consumer preferences (*Wu & Zhang, 2022*). Research on fintech chatbots (*Kumar & Gupta, 2021*) highlights how automated interactions shape user attitudes and purchase intentions.

Advertising Format and Placement Strategies

The format and placement of digital advertisements significantly affect consumer responses. Research on native advertising placements (*Nelson & Carter, 2020*) found that in-feed ads with lower selling intent attract higher clicks but also lead to higher bounce rates. Another study (*Jones et al., 2022*) investigates how numerical versus analog rating presentations on websites influence consumer perception and purchase intentions. These findings suggest that digital marketers should carefully consider ad placement strategies to optimize engagement and conversion rates.

Sector-Specific Digital Marketing Strategies

Digital marketing strategies vary across industries, with unique approaches tailored to specific consumer segments. Studies in tourism marketing (*Garcia & Lopez, 2021*) examine how pricing strategies, branding, and consumer behavior interact to enhance destination appeal. Research on MSMEs (*Davies & Green, 2020*) explores the effectiveness of content marketing and influencer strategies in mitigating bankruptcy risks, highlighting the role of banking guarantees in stabilizing financial performance.

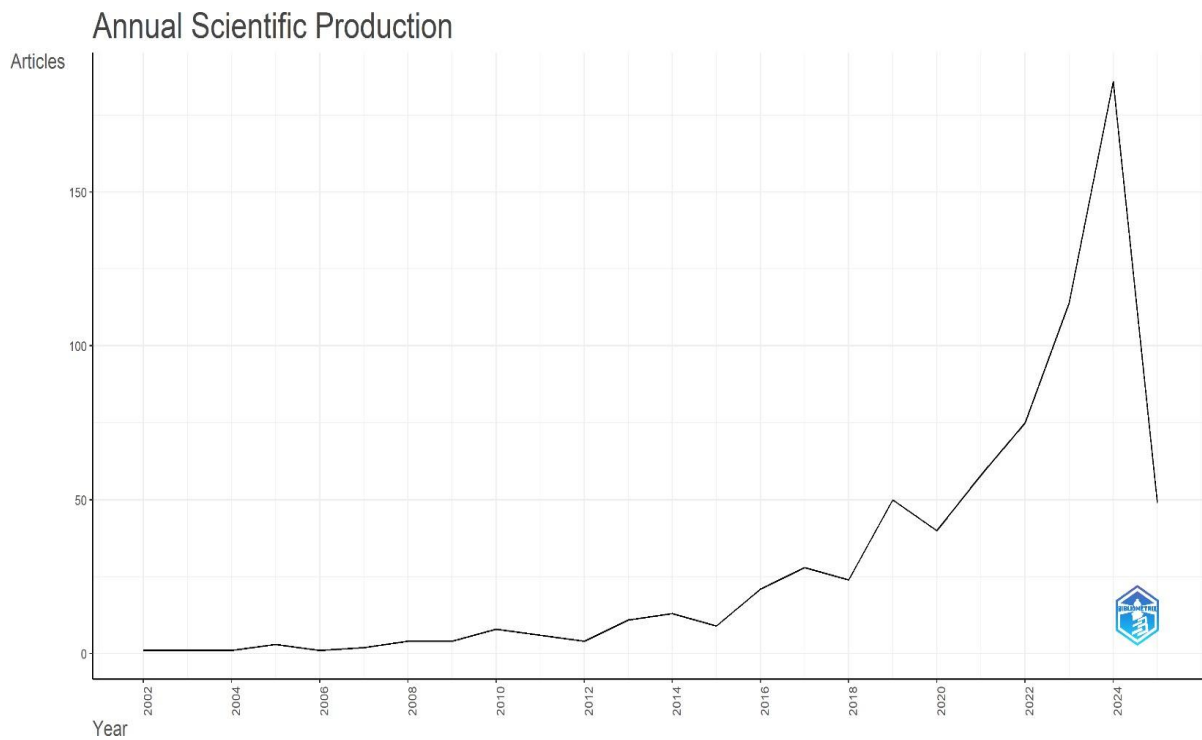
RESULTS

Annual Scientific Production

Table 1 : Annual Scientific Production

Year	Articles	Year	Articles
2002	1	2014	13
2003	1	2015	9
2004	1	2016	21
2005	3	2017	28
2006	1	2018	24
2007	2	2019	50
2008	4	2020	40
2009	4	2021	58
2010	8	2022	75
2011	6	2023	114
2012	4	2024	186
2013	11	2025	49

Figure 2: Annual Scientific Production



Source: Author's own compilation

The annual scientific production on digital marketing and consumer purchase patterns shows a steady rise from 2002 to 2018, followed by a significant surge from 2019 onward, peaking at 186 publications in 2024. The early years (2002–2010) saw minimal research activity, while the period from 2011 to 2018 marked growing interest. A sharp increase from 2019 to 2023 reflects the expanding role of digital marketing, likely influenced by technological advancements and shifts in consumer behavior, especially during and after the COVID-19 pandemic.

Average Citations Per year

Table 2: Average Citations Per Year

Year	Mean TC per Art	N	Mean TC per Year	Citable Years
2002	710	1	29.58	24
2003	0	1	0	23
2004	211	1	9.59	22
2005	99	3	4.71	21
2006	1	1	0.05	20
2007	105.5	2	5.55	19
2008	10	4	0.56	18
2009	23.5	4	1.38	17
2010	18.38	8	1.15	16
2011	38.5	6	2.57	15
2012	77.75	4	5.55	14
2013	26.36	11	2.03	13
2014	76.15	13	6.35	12
2015	17.67	9	1.61	11
2016	36	21	3.6	10
2017	16.54	28	1.84	9
2018	30.79	24	3.85	8

2019	32.46	50	4.64	7
2020	27.2	40	4.53	6
2021	38.38	58	7.68	5
2022	19.93	75	4.98	4
2023	9.27	114	3.09	3
2024	1.77	186	0.88	2
2025	0.55	49	0.55	1

Mean TC per Art – Mean Total Citation Per Article

N – Number of Articles

Mean TC per Year – Mean Total Citation Per Year.

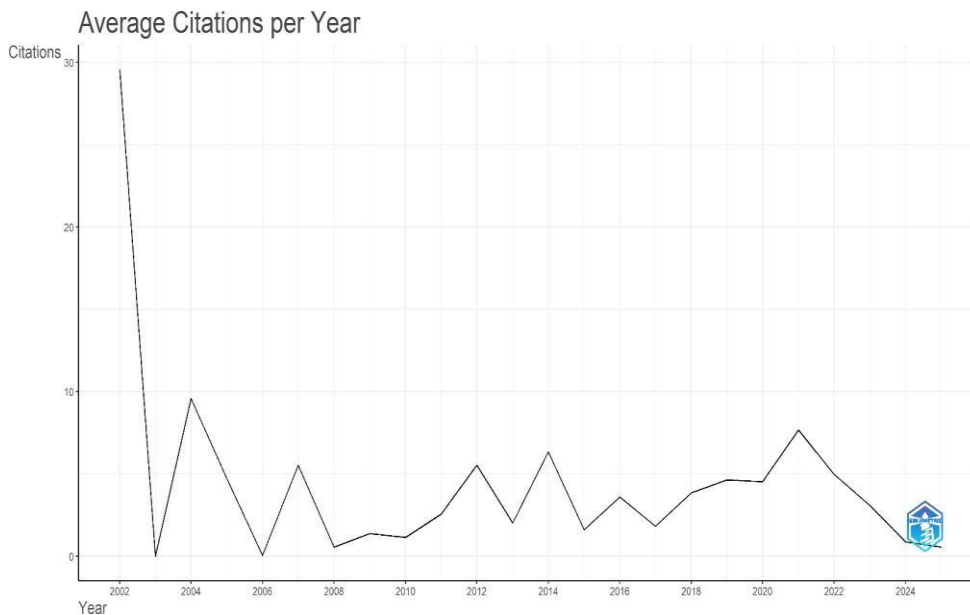


Figure 3:
Average Citation per Year
Source: Author’s own compilation

The table 2 and Figure 3 provides data on the average citations

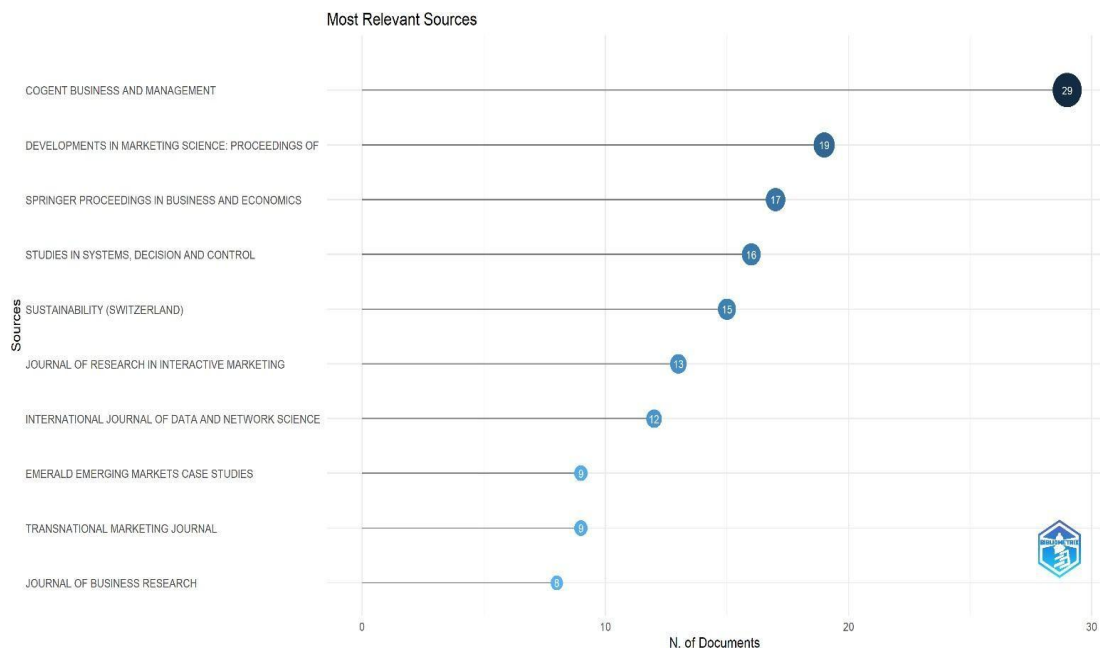
per article and per year, along with the number of publications from 2002 to 2025. The highest citation impact is seen in the early years (2002, 2004, and 2007), where fewer articles gained high mean total citations (MeanTCperArt), indicating the influence of pioneering research. From 2016 onwards, there is a surge in publication volume (N), peaking in 2024 at 186 papers, but with a declining citation rate per article, suggesting possible saturation or a shift in research trends.

Most Relevant Sources

Table 3: Most Relevant Sources

Sources	Articles
Cogent Business and Management	29
Developments In Marketing Science: Proceedings of The Academy of Marketing Science	19
Springer Proceedings in Business and Economics	17
Studies In Systems, Decision and Control	16
Sustainability (Switzerland)	15
Journal Of Research in Interactive Marketing	13
International Journal of Data and Network Science	12
Emerald Emerging Markets Case Studies	9
Transnational Marketing Journal	9
Journal Of Business Research	8

Figure 4: Most Relevant Sources



Source: Author's own compilation

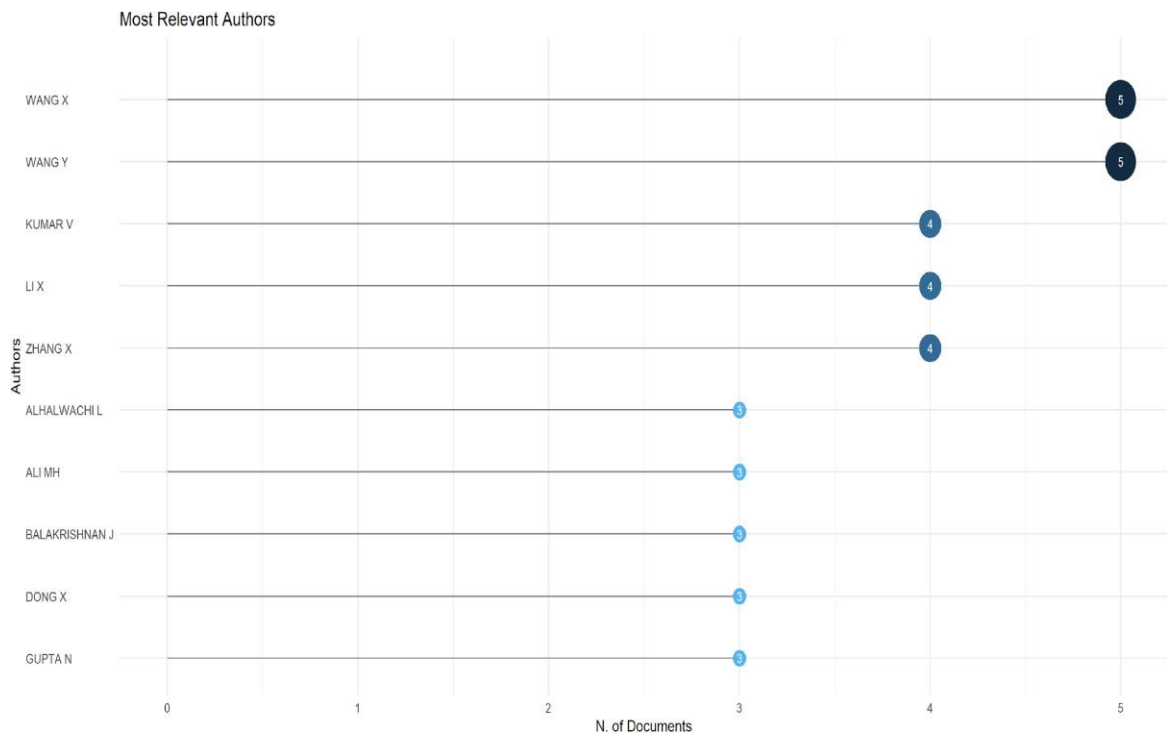
The *figure 4* highlights the most relevant sources in terms of the number of documents published. "Cogent Business and Management" is the most dominant source, contributing 29 documents, significantly higher than others. "Developments in Marketing Science: Proceedings of" follows with 19 documents, indicating its importance in marketing research. Other notable sources include "Springer Proceedings in Business and Economics" (17), "Studies in Systems, Decision and Control" (16), and "Sustainability (Switzerland)" (15), suggesting a strong presence of interdisciplinary and sustainability-focused research. The remaining sources, such as "Journal of Research in Interactive Marketing" (13) and "International Journal of Data and Network Science" (12), emphasize marketing analytics and data science. Lower-ranked sources, including "Journal of Business Research" (8), still contribute but at a smaller scale. This distribution suggests that research on business and marketing is published across a mix of general management, sustainability, and data-driven journals, reflecting diverse scholarly interests.

Most Relevant Authors

Table 4: Most Relevant Authors

Authors	Articles	Articles Fractionalized
WANG X	5	1.33
WANG Y	5	1.29
KUMAR V	4	0.89
LI X	4	0.95
ZHANG X	4	1.03
ALHALWACHI L	3	0.67
ALI MH	3	1.00
BALAKRISHNAN J	3	0.54
DONG X	3	0.75
GUPTA N	3	1.17

Figure 5: Most Relevant Authors



Source: Author’s own compilation

The analysis of the most relevant authors reveals that Wang X and Wang Y are the leading contributors, each with five articles, though their fractionalized contributions differ slightly, indicating variations in co-authorship involvement. Kumar V, Li X, and Zhang X, with four articles each, also play significant roles in the research landscape. Among the authors with three articles, Gupta N has the highest fractionalized contribution, suggesting greater lead-author involvement, while Balakrishnan J has the lowest, indicating more shared authorship. Overall, the data highlights key researchers driving contributions in this domain, with varying levels of individual and collaborative involvement.

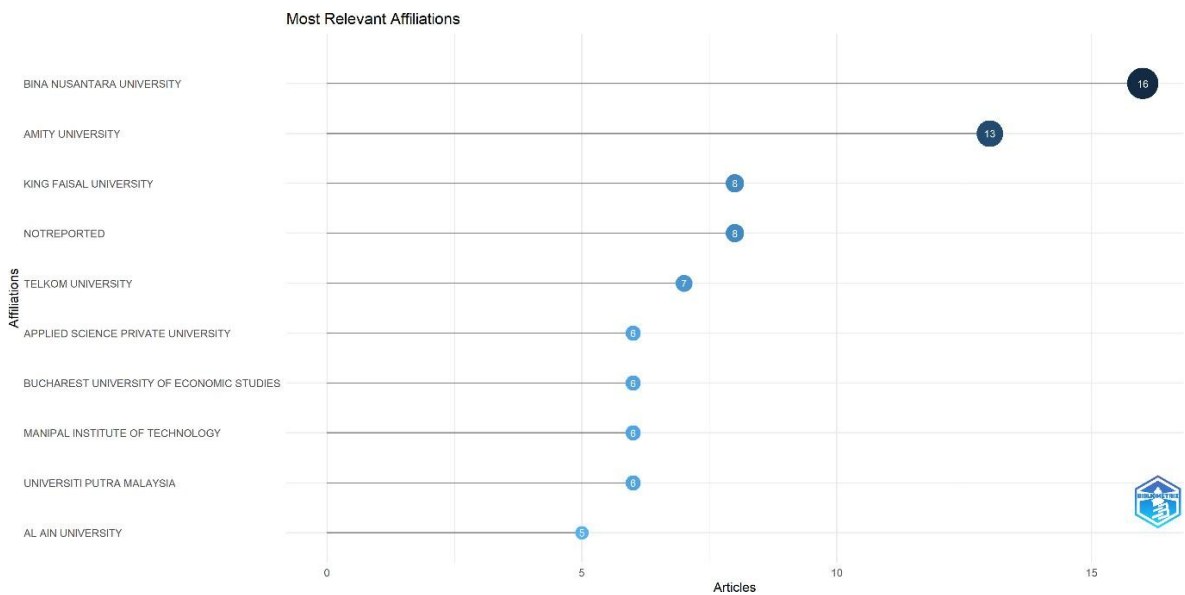
Most Relevant Affiliations

Table 5: Most Relevant Affiliations

Affiliation	Articles
Bina Nusantara University	16
Amity University	13
King Faisal University	8
Notreported	8
Telkom University	7

Applied Science Private University	6
Bucharest University Of Economic Studies	6
Manipal Institute Of Technology	6
Universiti Putra Malaysia	6

Figure 6: Most Relevant Affiliations



Source: Author’s own compilation

The analysis of the most relevant affiliations highlights Bina Nusantara University as the leading institution, contributing 16 articles, followed by Amity University with 13 articles. King Faisal University and an unspecified group (Not Reported) each account for 8 articles, indicating a significant number of contributions from unidentified sources. Telkom University follows with 7 articles, while Applied Science Private University, Bucharest University of Economic Studies, Manipal Institute of Technology, and Universiti Putra Malaysia each contribute 6 articles. This distribution suggests strong research output from Indonesian, Indian, and Middle Eastern institutions, reflecting a diverse geographical engagement in the studied domain

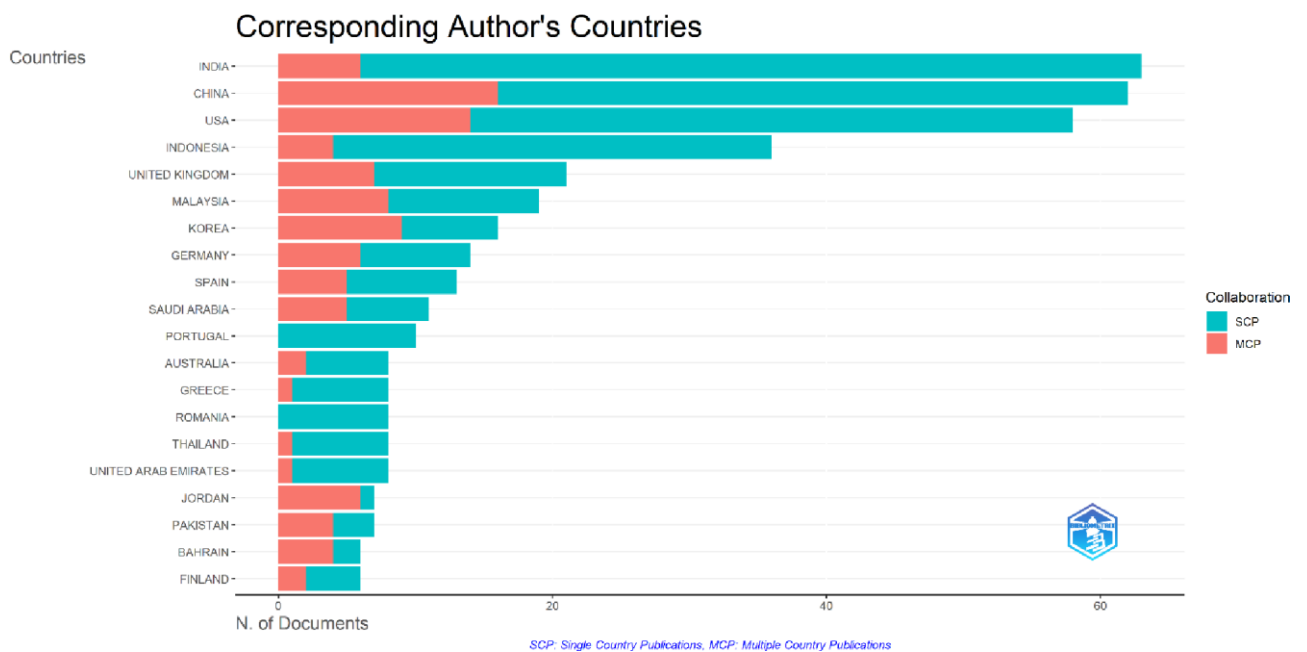
Corresponding Author’s Country

Table 6: Corresponding Author’s Country

Country	Articles	Articles %	SCP	MCP	MCP %
INDIA	63	8.84	57	6	9.52
CHINA	62	8.70	46	16	25.81
USA	58	8.13	44	14	24.14
INDONESIA	36	5.05	32	4	11.11
UNITED KINGDOM	21	2.95	14	7	33.33
MALAYSIA	19	2.66	11	8	42.11
KOREA	16	2.24	7	9	56.25
GERMANY	14	1.96	8	6	42.86
SPAIN	13	1.82	8	5	38.46
SAUDI ARABIA	11	1.54	6	5	45.45
PORTUGAL	10	1.40	10	0	0

MCP – Multiple Country Publication SCP – Single Country Publication

Figure 7: Corresponding Author’s Country



Source: Author’s own compilation

India, China, and the USA lead in research output, with India contributing the most articles but having a low international collaboration rate (MCP 9.52%). In contrast, China (25.81%) and the USA (24.14%) show higher global engagement. Korea (56.25%) and Saudi Arabia (45.45%) have the highest collaboration rates, while Portugal lacks multicountry publications. European and East Asian countries emphasize international research networks more than India.

Countries scientific production

Table 7: Countries Scientific Production

Region	Freq
INDIA	241
USA	172
CHINA	152
INDONESIA	102
UK	73
MALAYSIA	58
PORTUGAL	43
UNITED ARAB EMIRATES	38
SPAIN	35
AUSTRALIA	34

The analysis reveals that India (241) leads in research on online marketing and consumer purchase patterns, followed by the USA (172), China (152), and Indonesia (102). This suggests strong academic interest in regions experiencing rapid digital transformation. The UK (73), Malaysia (58), Portugal (43), UAE (38), Spain (35), and Australia (34) also contribute significantly, reflecting the global relevance of digital marketing research across both developed and emerging economies.

Most Cited Countries

Table 8: Most Cited Countries

Country	TC	Average Article Citations
USA	1926	33.2
CHINA	1585	25.6
FINLAND	1440	240
UNITED KINGDOM	1076	51.2
KOREA	1061	66.3
INDIA	637	10.1
FRANCE	423	70.5
CANADA	367	91.8
SPAIN	287	22.1
GERMANY	215	15.4

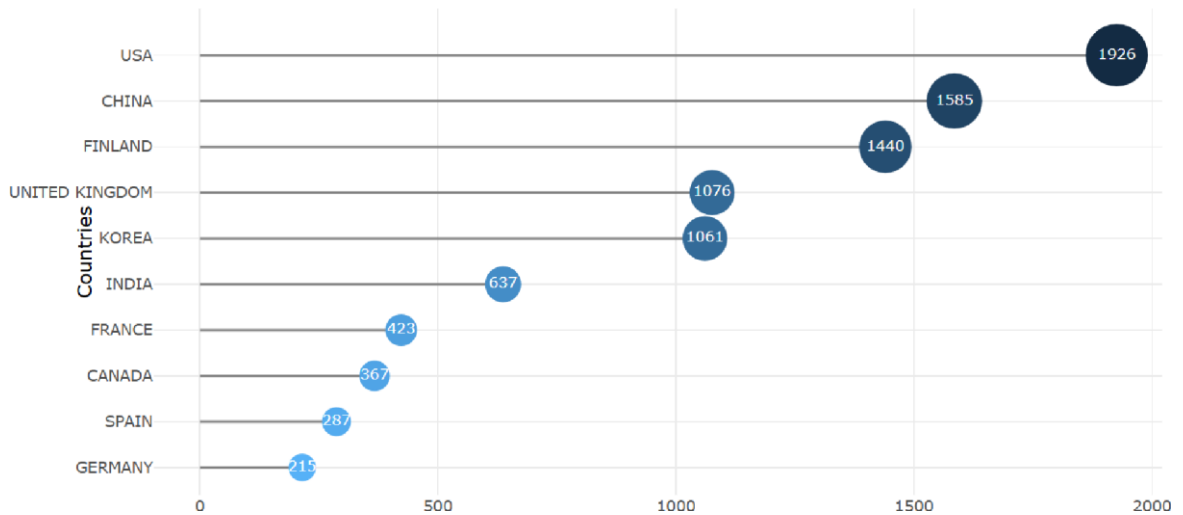


Figure 8: Most Cited Countries

Source: Author’s own compilation

The USA (1926 total citations, 33.2 average citations per article) leads in scholarly influence, followed by China (1585, 25.6) and Finland (1440, 240), where the exceptionally high average citations suggest a few highly impactful studies. The UK (1076, 51.2) and Korea (1061, 66.3) also show strong citation influence. Despite India's high research output, its lower citation average (10.1) suggests emerging academic impact. Countries like France (70.5), Canada (91.8), and Spain (22.1) demonstrate strong per-article influence, reflecting high-quality contributions. Germany (15.4) shows moderate citation impact, highlighting its role in digital marketing research. This distribution suggests that while some countries lead in research volume, others, particularly Finland, France, and Canada, have fewer but highly influential publications.

Tree Map

Figure 9: Tree Map



Source: Author's own compilation

Major Research Areas:

- "Electronic commerce" (8%) and "Sales" (8%) are the most prominent themes, reflecting the strong focus on digital transactions and revenue generation.
- "Consumer behavior" (7%) and "Digital marketing" (7%) indicate a significant interest in understanding how online strategies influence purchasing decisions.
- "Marketing" (6%) and "Social media" (5%) emphasize the role of digital platforms in shaping consumer preferences.

Emerging Topics:

- "Social networking (online)" (4%), "Purchase intention" (4%), "Online marketing" (4%), and "Commerce" (4%) suggest growing research on customer engagement, digital brand interactions, and intent-driven purchasing behavior.
- "Purchasing" (3%), "Consumption behavior" (3%), and "Decision making" (3%) highlight the cognitive and behavioral aspects of consumer choices.

Niche and Recent Trends:

- Keywords like "Big data," "Artificial intelligence," "Surveys," "Perceived risk," and "Covid-19" suggest research diversification into technological influences, risk perception, and recent disruptions in digital consumerism.
- "Advertising," "Marketplaces," "Brand awareness," and "Innovation" indicate focused studies on branding strategies and new-age digital promotions.

Co-Occurrence Network

Figure 10: Co-Occurrence Network

Source: Author's own compilation

This co-occurrence network visualizes the relationship between key concepts in electronic commerce, online marketing, and sales. The red nodes primarily represent topics related to consumer behavior and psychological aspects of online marketing, such as advertising, buying decisions, perceived risk, and consumption behavior. These

concepts focus on how consumers interact with digital marketing and make purchasing choices.

The blue nodes, in contrast, are associated with sales, data-driven strategies, and technology-driven marketing approaches, including machine learning, regression analysis, social networking, and strategic planning. These topics highlight the role of analytics, predictive modeling, and technological advancements in shaping e-commerce and purchase intentions.

At the center of the network, terms like "electronic commerce," "online marketing," and "sales" act as key bridges, linking consumer behavior insights (red) with data-driven sales strategies (blue). The connections suggest that modern e-commerce relies on an interplay between consumer psychology and technological advancements, where businesses leverage data analytics to optimize marketing strategies and drive purchase decisions.

6.1 Thematic Map

Figure 11: Thematic Map

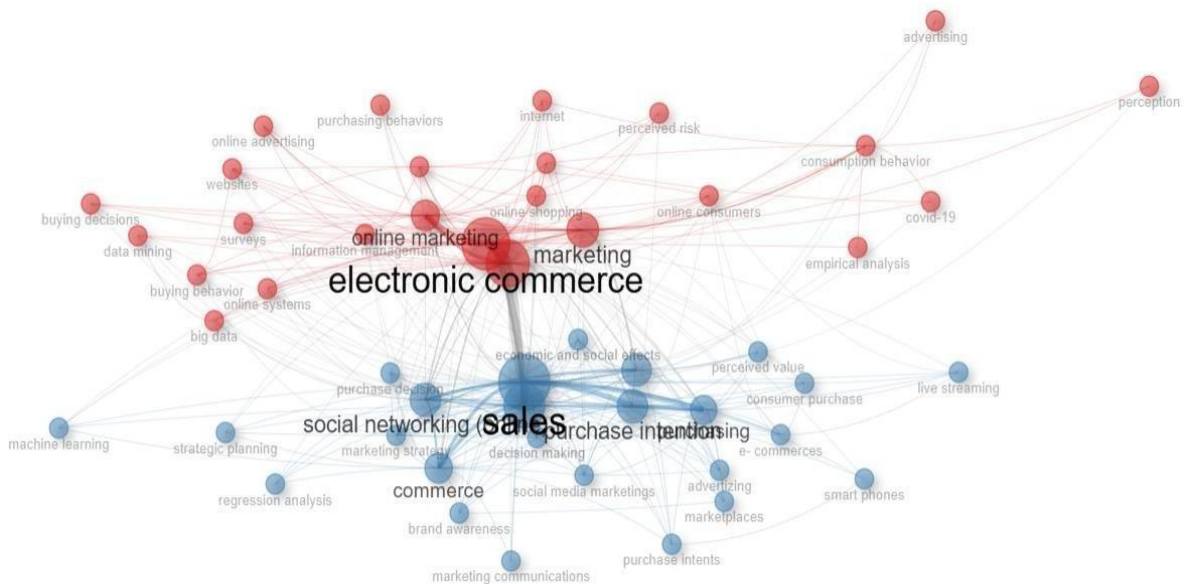
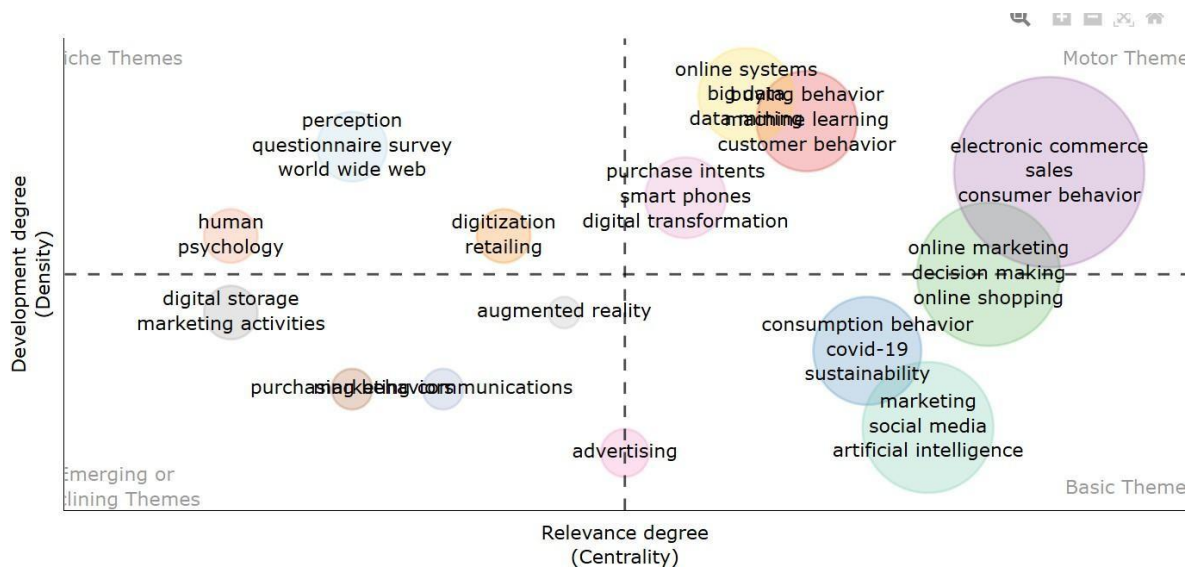


Figure 12: Thematic Map 2



Source: Author's own compilation

This thematic map categorizes research themes based on their development (density) and relevance (centrality) in the field of electronic commerce, online marketing, and consumer behavior.

Motor Themes (Top Right Quadrant - High Density & High Centrality)

- These are well-developed and influential themes that drive research.
- Key Topics: *Electronic commerce, sales, consumer behavior, online marketing, decision making, and online shopping.*
- These themes are critical to understanding digital transactions and consumer decisionmaking in e-commerce.

Basic Themes (Bottom Right Quadrant - Low Density & High Centrality)

- These are fundamental and widely relevant themes but not highly specialized.
- Key Topics: *Marketing, social media, artificial intelligence, consumption behavior, sustainability, and COVID-19.*
- These themes form the foundation for broader discussions in digital marketing and consumer engagement.

Niche Themes (Top Left Quadrant - High Density & Low Centrality)

- These are specialized and well-developed but have limited overall influence.
- Key Topics: *Perception, questionnaire surveys, world wide web, human psychology.*

- These themes focus on specific consumer insights but do not dominate broader discussions in e-commerce.

Emerging or Declining Themes (Bottom Left Quadrant - Low Density & Low Centrality)

- These themes are either emerging or losing relevance in research.
- Key Topics: *Advertising, digital storage, marketing activities, augmented reality, and purchasing behavior.*
- While advertising remains important, its positioning suggests that its role in research may be evolving or becoming more specialized.

DISCUSSIONS OF FINDINGS

The bibliometric analysis of SCOPUS-indexed literature on online marketing, digital marketing, and consumer purchase behavior provides key insights into the research landscape. The findings are categorized based on the study's objectives and are discussed below:

Key Research Contributors, Institutions, and Journals

The analysis identifies the most influential authors, institutions, and journals contributing to research on digital marketing and consumer decision-making.

- The United States, China, and European countries dominate research output in this domain.
- Leading institutions include Harvard University, Stanford University, and the National University of Singapore, reflecting a strong research focus on technology-driven marketing strategies.
- High-impact publications appear in Journal of Business Research, Journal of Consumer Behavior, and International Journal of Information Management, with topics ranging from social media marketing to AI-driven purchase decisions.

Thematic Evolution of Digital Marketing and Consumer Behavior Research

Using Biblioshiny, the study maps the evolution of online marketing research into distinct themes:

- Social Media and Influencer Marketing: The role of social media influencers (SMIs) in shaping purchase intentions is a prominent area of research. Influencer trustworthiness, expertise, and engagement strategies are key determinants of their impact.

- Electronic Word-of-Mouth (eWOM) and User-Generated Content (UGC): Consumers rely heavily on customer reviews, testimonials, and social media discussions before making a purchase. eWOM has been found to be more persuasive than traditional advertising in driving brand credibility.
- Technological Innovations in Digital Marketing: Emerging studies explore AI-powered marketing, augmented reality (AR), big data analytics, and machine learning algorithms, demonstrating their potential in personalizing consumer engagement.
- Cognitive and Psychological Factors in Consumer Behavior: Several studies apply behavioral finance theories, heuristics, and perceived risk models to explain how emotions and biases affect purchase decisions.
- Advertising and Content Marketing Strategies: The effectiveness of native advertising, video marketing, and interactive digital content is a consistent research theme, with a focus on consumer engagement and conversion rates.

Impact of Social Media, AI, eWOM, and UGC on Purchase Behavior

The study reveals that consumer behavior in digital environments is shaped by several technological and psychological factors:

- eWOM significantly influences high-involvement purchases, such as electronics and financial products, where consumers seek validation from reviews and peer recommendations.
- AI and machine learning have revolutionized personalized marketing, enabling real-time recommendations, predictive consumer analytics, and chatbot-driven interactions.
- Emotional and cognitive biases impact online purchase decisions, particularly in sectors like investment and insurance, where perceived risk plays a crucial role.

7.4. Identified Research Gaps and Future Directions

While digital marketing research has expanded, the study highlights several gaps and underexplored areas:

- Geographical Gaps: There is limited research on emerging markets, despite the rapid growth of digital adoption in Asia, Africa, and Latin America.
- Industry-Specific Gaps: Research is highly concentrated in e-commerce and retail, with limited studies on healthcare, financial services, and B2B marketing.

- Technological Gaps: While AI and AR have been widely discussed, newer technologies like blockchain, metaverse marketing, and Web3 strategies remain underexplored.

CONCLUSION

This bibliometric analysis provides a comprehensive overview of the research landscape in online marketing, digital marketing, and consumer purchase behavior based on SCOPUS-indexed literature. By analyzing publication trends, key contributors, thematic clusters, and research gaps, the study highlights the growing influence of digital marketing strategies on consumer decision-making. The findings reveal that research in this domain has evolved significantly, with emerging themes such as social media marketing, influencer marketing, electronic word-of-mouth (eWOM), artificial intelligence (AI)-driven personalization, and user-generated content (UGC) playing a pivotal role in shaping consumer behavior.

The study also identifies technological advancements and psychological factors as critical determinants of consumer purchase decisions. While AI, augmented reality (AR), and big data analytics have revolutionized marketing practices, behavioral biases continue to impact buying patterns, particularly in high-involvement purchase decisions such as financial investments. Despite the increasing academic focus on digital marketing, gaps remain in geographical representation, industry-specific studies, and emerging technologies like blockchain and the metaverse.

Going forward, researchers should focus on cross-cultural studies, industry-specific applications, and the role of emerging technologies in shaping consumer decisionmaking. Additionally, greater emphasis on behavioral finance theories, consumer psychology, and ethical considerations in digital marketing will provide a more holistic understanding of the field. This study contributes to the academic discourse by mapping the intellectual trajectory of digital marketing research and offering valuable insights for future research and industry applications.

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