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Contents

- 1 Examining the Dynamic Interactions between Indicators of Sustainable Performance and Indian Stock Market 1 - 10
Sourav Das, Ashoke Mondal
- 2 Green Supply Chain Operations and Networking: Digital Pathways to Sustainable Performance 11 - 21
Pranjali Das, Gouri Prava Samal
- 3 CSR as a Corporate Sustainability Financing Mechanism: Role of PSUs and Non-PSUs in Rural Development 22 - 32
Sakti Ranjan Dash, Prahallad Chand
- 4 Values in Family Business Research: A Bibliometric Review 33 - 44
Jitha Thomas, Tinsy Rosetom
- 5 Integrated Reporting Disclosures of South African Listed Companies: An Assessment in Conformity with International Integrated Reporting Framework 45 - 59
Ananya Mishra, Rabindra Kumar Swain

Examining the Dynamic Interactions between Indicators of Sustainable Performance and Indian Stock Market

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Abstract: This study examined the relationship between the sustainability (i.e., ESG Index) and major Indian equity market indices over the period January 2021 to March 2025. Sensex, BSE 500 and BSE 100 ESG indices have been opted for the study. Since unit root tests confirmed stationarity at levels, the VAR model is considered appropriate for the analysis. VAR results found that lagged ESG returns positively influence both Sensex and BSE 500 returns, underscoring that ESG-compliant firms respond to market movements. Furthermore, Granger causality tests revealed bidirectional causality between ESG and Sensex returns and unidirectional causality from ESG to BSE 500 returns. These findings indicate that ESG investments play an active and increasingly integral role in shaping short-run dynamics and enhancing efficiency in the Indian equity market. Notably, ESG returns appear relatively decoupled, as they are not significantly influenced by past movements of market indices, reflecting their distinct informational content.

1. Introduction

The global financial ecosystem is undergoing a profound transition, marked by a decisive shift toward sustainable and responsible investment practices. This paradigm recognises that a conventional system, focusing primarily on economic returns, is incomplete without accounting for Environmental, Social, and Governance (ESG) factors. ESG criteria, which assess a company's commitment to corporate responsibility and sustainability, are no longer peripheral concerns but core determinants of long-term value, risk, and resilience (Eccles et al., 2014; Clark et al., 2015). The emergence of ESG ought to be gleaned through various theoretical perspectives. Stakeholder theory posits that firms create sustainable value by addressing diverse stakeholders (Freeman, 1984). Similarly, Legitimacy theory explains that firms adopt ESG practices to uphold social approval and adhere to social expectations (Suchman, 1995). Thus, it is strengthening corporate legitimacy and public trust. Furthermore, signalling theory posits that ESG disclosure serves as a signal of ethical conduct and transparency (Spence, 1973). In India, the relevance of ESG has grown enormously in recent years. ESG criteria have transitioned from peripheral concerns to strategic imperatives, particularly in regulatory, labour and governance-related aspects. Regulatory initiatives, notably mandatory Business Responsibility and Sustainability Report (BRSR) disclosures, have enhanced transparency and reinforced firms to align their objectives with ESG goals (SEBI, 2021). These disclosures compel firms to report their ESG performance systematically, thereby improving accountability and aligning firms with global standards. Consequently, ESG has turned into a crucial part of business practice and financial decisions in India. Hence, these initiatives have pushed Indian companies closer to global sustainability norms. Further, these efforts reinforce India's alignment with Sustainable Development Goals (SDGs) and support inclusive and sustainable growth by 2030. Thus, these initiatives strengthen corporate accountability and expedite progress toward the SDG targets.

Previous studies showed that firms with superior ESG performance tend to have reduced risk exposure, lower capital cost, and stakeholder trust (Clark et al., 2015; Lunawat and Lunawat, 2022).

These advantages stem from improved risk mitigation and better regulatory compliance (Broadstock et al., 2021; Clark et al., 2015). Consequently, this shift has encouraged investors to evaluate how companies manage environmental risks, treat stakeholders, and maintain ethical governance factors that are recognised as critical for sustainable growth and financial resilience. In contrast, some studies contended that prioritising social and environmental objectives beyond a certain level may undermine the profit-maximisation of a firm (Friedman, 1970). Accordingly, prior research revealed that higher ESG can be linked with lower or insignificant returns due to the costs of non-financial priorities. (Brammer et al., 2006; Revelli and Viviani, 2015; Vuppuluri and Pandey, 2024).

Thus, earlier literature remains inconclusive. Moreover, most prior studies have relied on a static analytical framework, thereby overlooking dynamic interaction. Further, in the Indian context, empirical evidence remains scarce, especially amid recent regulatory development, notably mandatory ESG disclosure. By incorporating recent data from January 2021 to March 2025, this study seeks to address the prevailing empirical gap. Hence, study objectives are adhered to, offering deeper insights into the dynamic interaction between indicators of sustainable performance and the Indian stock market.

2. Review of Literature

Early studies by Derwall et al. (2005) demonstrated that a portfolio with superior environmental performance outperformed conventional benchmarks, indicating that sustainability-driven efficiency gains enhance long-term firm value. Similarly, subsequent studies reported a generally positive association between ESG performance and financial outcomes (Fride et al., 2015; Lins et al., 2017; Lunawat and Lunawat, 2022; Broadstock et al., 2021). Further research at the Cross-country and firm-level stated that ESG adherence is positively associated with profitability and stakeholder trust (Wang et al., 2022; Soana, 2011). Khan et al., (2016); Sunitha et al. (2024); Bhavasar and Shah, (2025) revealed that ESG disclosure is positively associated with ROA and ROE. They highlighted that ESG disclosure serves as a credible insight for stakeholders, thereby minimising information asymmetry and positively influencing firm performance. Engle et al. (2020) and Ding et al., (2021) revealed that businesses with elevated ESG are resilient to financial upheaval and lower downside exposure. Makkar et al., (2023) found that sustainable indices outperformed standard indices in terms of risk-adjusted return and resilience, especially during the COVID-19. Conversely, the classical view articulated by Friedman (1970) contended that an excessive emphasis on social objectives could divert resources away from profit maximisation. Similarly, Brammer et al., (2006) and Hong and Kacperczyk (2009) revealed that firms exhibiting higher social performance might, in certain contexts, experience lower stock returns, thereby indicating potential costs associated with overinvestment in non-financial objectives. This highlights that capital markets may penalise firms whose social initiatives are perceived as misaligned with shareholder value. Moreover, Revelli and Viviani (2015) and Kurnoga et al., (2022) argued that the linkage between ESG performance and financial outcomes varies contingent upon market conditions and geographical settings. Furthermore, Vuppuluri and Pandey (2024) reported an insignificant or negative association between ESG scores and firm performance indicators, i.e., ROA and ROE. Their findings imply that ESG performance does not necessarily translate into improved firm profitability. Therefore, prior literature indicates that the financial impact of ESG practices is not uniformly positive, while others report negative or insignificant effects. These findings are shaped by firm-specific strategies and stakeholder expectations. Further, most studies focus on developed economies, with limited evidence on emerging economies such as India. Moreover, prior studies have relied on a static analytical framework, thereby overlooking dynamic interaction. Thus, the dynamic relationship between the stock market and sustainable performance remains underexplored. Consequently, these mixed outcomes underscore the need for a nuanced evaluation of ESG initiatives and their interaction with the Indian equity market. Hence, the study has the following objectives:

- To examine the association between indicators of sustainable performance and the Indian stock market.
- To assess the directionality and nature of causal linkages between indicators of sustainable performance and the Indian stock market.

3. Research Methodology

3.1. Variables and Period

This study is based on secondary data comprising daily closing prices from January 2021 to March 2025. For a sustainable performance indicator, the BSE 100 ESG index has been chosen. It represents the overall sustainability perspective of ESG-compliant companies. Furthermore, the Sensex and BSE 500 indices have been opted as a representation of the Indian stock market. Here, Sensex represents leading large-cap firms and serves as a benchmark for overall market movements. Whereas, BSE 500 captures broader market dynamics across all capitalisation segments. In addition, these indices enable an examination of how sustainability-focused companies and broad market trends affect and interact with each other.

Table 1: Variables Description

Sl. No.	Variables Description	Notation
i.	Natural logarithm of Daily Return on BSE Sensex	r_t
ii.	Natural logarithm of Daily Return on BSE 500	r_{B500_t}
iii.	Natural logarithm of Daily Return on BSE 100 ESG	r_{ESG_t}

Source: Authors’ collection.

Furthermore, the daily returns for each index are estimated using the formula listed below

$$r_t = \ln\left(\frac{Price_t}{Price_{t-1}}\right)$$

Where, $Price_t$ = closing price of the respective index at time t. $Price_{t-1}$ = closing price of respective index at time t-1. \ln = Natural logarithm.

3.2. Data Source

The data on selected indices have been collected from the websites of BSE.

3.3. Tools for the Study

Several statistical tools have been used for analysing the dataset. Initially, descriptive statistics have been computed to outline the basic features of variables. As the study uses time series data, unit root tests have been carried out to assess stationarity and integration order. For this purpose, Augmented Dickey-Fuller (ADF) and Phillips-Perron (PP) have been employed. Thereafter, the Vector Autoregressive (VAR) model has been applied to capture bivariate associations among the variables (Stock & Watson, 2001). Thus, the VAR(p) model is specified for the Sensex (r_t) and BSE 100 ESG (r_{ESG_t}), where each variable depends on its own and the other variable’s lagged values. The model is expressed as:

$$r_{1,t} = c_1 + \beta_{11,i} r_{1,t-i} + \beta_{12,i} r_{ESG_{2,t-i}} + \varepsilon_{1,t} \dots \dots \dots (1) \quad [i= 1,2,\dots,p]$$

$$r_{ESG_{2,t}} = c_2 + \beta_{21,i} r_{1,t-i} + \beta_{22,i} r_{ESG_{2,t-i}} + \varepsilon_{2,t} \dots \dots \dots (2) \quad [i= 1,2,\dots,p]$$

Where,

$r_{1,t}$ and $r_{ESG_{2,t}}$ = two endogenous variables at time t.

c_1 and c_2 = intercept terms.

$\beta_{11,i}$ and $\beta_{22,i}$ = coefficient of each variable’s own i lag.

$\beta_{12,i}$ = coefficient of the i lag of r_{ESG_2} on r_1 .

$\beta_{21,i}$ = coefficient of the i lag of r_1 on r_{ESG_2}

$\varepsilon_{1,t}$ and $\varepsilon_{2,t}$ = error terms.

Subsequently, a separate VAR(p) model is specified for the BSE 500 (r_{B500_t}) and BSE 100 ESG (r_{ESG_t}), following the same dynamic structure. The model is expressed as:

$$r_B500_{1,t} = c_1 + \beta_{11,i} r_B500_{1,t-i} + \beta_{12,i} r_ESG_{2,t-i} + \varepsilon_{1,t} \dots \dots (3) \quad [i= 1,2,\dots,p]$$

$$r_ESG_{2,t} = c_2 + \beta_{21,i} r_B500_{1,t-i} + \beta_{22,i} r_ESG_{2,t-i} + \varepsilon_{2,t} \dots \dots (4) \quad [i= 1,2,\dots,p]$$

Where,
 $r_B500_{1,t}$ and $r_ESG_{2,t}$ = two endogenous variables at time t.
 c_1 and c_2 = intercept terms.
 $\beta_{11,i}$ and $\beta_{22,i}$ = coefficient of each variable's own i lag.
 $\beta_{12,i}$ = coefficient of the i lag of r_ESG_2 on r_B500_1 .
 $\beta_{21,i}$ = coefficient of the i lag of r_B500_1 on r_ESG_2
 $\varepsilon_{1,t}$ and $\varepsilon_{2,t}$ = error terms.

Additionally, the VAR-Granger Causality test has been applied on the estimated VAR(p) model to identify the direction of short-run causality among the variables (Stock & Watson, 2001). Since autoregressive models are sensitive to lag length, the Akaike Information Criterion (AIC) and Schwarz Information Criterion (SIC) have been used for optimal lag selection. Furthermore, diagnostic tests have been undertaken to assess the reliability and stability of the model. The serial correlation LM test and heteroskedasticity test have been employed to examine autocorrelation and constancy of error variance, respectively. Additionally, the inverse roots polynomial test has been performed to satisfy the stability conditions of the model.

4. Results and Discussion

Table 2: Descriptive Statistics

Statistic	r_t	r_B500_t	r_ESG_t
Mean	0.000457	0.000572	0.000517
Median	0.000519	0.001229	0.000846
Maximum	0.048802	0.040754	0.043858
Minimum	-0.059119	-0.069614	-0.053249
Std. Dev.	0.009105	0.009262	0.009096
Skewness	-0.415084	-0.892853	-0.496054
Kurtosis	6.973478	8.270798	6.459546
Jarque–Bera	722.2727	1357.521	566.6824
Prob.	0.0000	0.0000	0.0000

Source: Authors' compilation.

From Table 2, the mean and median values of all return series, namely Sensex returns (r_t), BSE 500 returns (r_B500_t), and ESG index returns (r_ESG_t), have been found to be very close to zero. This indicates that returns remain centred around zero. The maximum and minimum values have shown noticeable fluctuations in all indices during the sample period. All series have been negatively skewed, indicating asymmetry toward left tails. The kurtosis values have been found to be much higher than the reference value of three, indicating a highly leptokurtic distribution. Furthermore, the Jarque-Bera statistics have been found to be significant for all variables, confirming that none of the series follows normality.

Table 3: Results of Unit Root Test

Returns	ADF Test (t-Stat.)		PP Test (Adj. t-Stat.)		Result
	Intercept Without Trend	Intercept With Trend	Intercept Without Trend	Intercept With Trend	
r_t	-31.82170* (0.0000)	-31.81131* (0.0000)	-31.82048* (0.0000)	-31.80980* (0.0000)	I(0)

r_{B500_t}	-31.29666* (0.0000)	-31.29208* (0.0000)	-31.28144* (0.0000)	-31.27665* (0.0000)	I(0)
r_{ESG_t}	-31.85343* (0.0000)	-31.84787* (0.0000)	-31.85376* (0.0000)	-31.84822* (0.0000)	I(0)

Note: () MacKinnon (1996) one-sided p-values;

* Significant at 1% level; ** Significant at 5% level; I(0): Stationary at level.

Source: Authors' compilation.

From Table 3, the results of the Augmented Dickey-Fuller (ADF) and Phillips-Perron (PP) unit root tests have been found statistically significant at the 1% level under both intercept and trend specifications, indicating that all selected variables are stationary at their levels, i.e., I(0). This implies that data series are suitable for further time series modelling.

Table 4: Result of VAR Lag Order Selection (Sensex and ESG Index)

Lag	AIC	SIC
0	-13.98805	-13.97852
1	-13.98866	-13.96008
2	-14.23794	-14.19030
3	-14.23789	-14.17119
4	-14.29384	-14.20809*
5	-14.29314	-14.18833
6	-14.29905	-14.17519
7	-14.29285	-14.14993
8	-14.31515*	-14.15317
9	-14.30775	-14.12672
10	-14.30887	-14.10878
11	-14.30150	-14.08236
12	-14.29579	-14.05759

Note: * Indicates lag order selected by the criterion.

Source: Authors' compilation.

From Table 4, the VAR lag order selection for r_t and r_{ESG_t} has shown a divergence between AIC and SIC, with AIC favouring lag 8 and SIC selecting lag 4. However, to avoid over-parameterisation, the SIC model (lag 4) has been preferred for VAR estimation.

Table 5: Results of Vector Autoregressive Model (Sensex and BSE 100 ESG)

Independent Variables	Dependent Variables	
	r_t	r_{ESG_t}
$r_t (-1)$	-0.005256 [-0.10292]	0.103566 [1.90605]
$r_t (-2)$	-0.542608* [-10.5746]	-0.082088 [-1.50353]
$r_t (-3)$	-0.053619 [-1.08562]	-0.053714 [-1.02212]
$r_t (-4)$	-0.174285* [-3.54130]	-0.017539 [-0.33494]
$r_{ESG_t} (-1)$	0.047011 [0.96404]	-0.059830 [-1.15310]

$r_ESG_t (-2)$	0.588516* [12.0153]	0.039167 [0.75154]
$r_ESG_t (-3)$	-0.028975 [-0.56051]	-0.036834 [-0.66968]
$r_ESG_t (-4)$	0.301173* [5.85535]	0.083180 [1.51989]
C	0.000341 [1.28462]	0.000514 [1.81963]

Note: * Significant at 1% level; ** Significant at 5% level; [] t-statistics.

Source: Authors' compilation.

From Table 5, Sensex returns (r_t) have been significantly affected by their own past values, with the second and fourth lags showing negative effects. Meanwhile, lagged r_ESG_t have been found to exert positive effects on r_t , indicating that the past performance of ESG firms enhances Sensex. For ESG returns (r_ESG_t), none of the lags of either r_t or r_ESG_t has been statistically significant. This indicates that ESG returns have not been altered by past values of either itself or Sensex during the period.

Table 6: Results of VAR Granger Causality (Sensex and BSE 100 ESG)

Independent Variable	Dependent Variables	
	r_t	r_ESG_t
r_ESG_t	152.5013* (0.0000)	—
r_t	—	9.636005** (0.0470)

Note: * Significant at 1% level; ** Significant at 5% level; () Probability values.

Source: Authors' compilation.

Although from Table 6, a significant bidirectional causal link has been found between r_ESG_t and r_t . This finding indicates that past values of each series influence the short-run dynamics of the other.

Table 7: Results of VAR Residual Serial Correlation LM Test

Lags	LM Test Statistics
1	7.6478 (0.105)
2	6.2026 (0.184)
3	8.2235 (0.084)
4	7.7785 (0.100)

Note: () P-values.

Source: Authors' compilation.

Table 8: Results of VAR Residual Heteroskedasticity Tests (Includes Cross Terms)

Test	Chi-square Statistic	df	Prob.
Joint Test	148.3015	132	0.158

Source: Authors' compilation.

Inverse Roots of AR Characteristic Polynomial

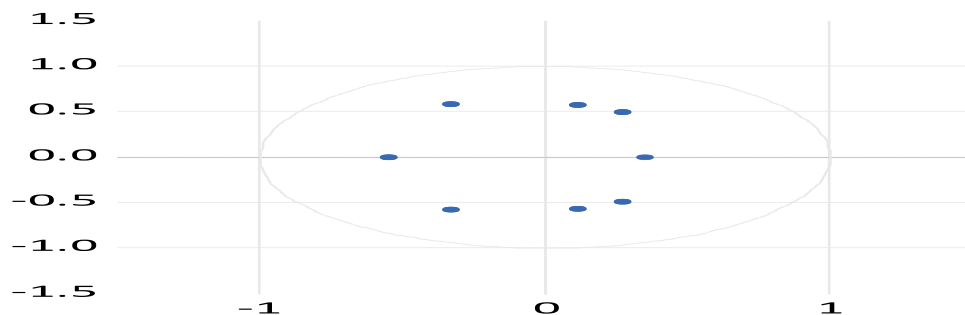


Figure 1: Inverse Roots of AR Characteristic Polynomial

Source: Authors' work.

From Table 7, the LM test confirms the absence of serial correlation in residuals up to lag 4. Further, Table 8 reveals that the chi-square statistic is insignificant at 5% level, indicating the absence of heteroskedasticity in residuals. Figure 1 shows that all plotted points lie inside the unit circle, indicating stability of the model. Therefore, diagnostic tests imply that the VAR model is properly specified.

Table 9: Result of VAR Lag Order Selection (BSE 500 and ESG Index)

Lag	AIC	SIC
0	-13.86829	-13.85876
1	-13.86622	-13.83764
2	-14.09982	-14.05218*
3	-14.09821	-14.03151
4	-14.13508	-14.04933
5	-14.13884	-14.03403
6	-14.14076	-14.01689
7	-14.13758	-13.99466
8	-14.15602*	-13.99404
9	-14.15095	-13.96992
10	-14.14787	-13.94779
11	-14.14269	-13.92354
12	-14.14082	-13.90262

* Indicates lag order selected by the criterion.

Source: Authors' compilation.

From Table 9, VAR lag order selection for r_{B500_t} and r_{ESG_t} has also revealed a divergence between AIC and SIC, with AIC favouring lag 8 and SIC selecting lag 2. Similarly, we have selected the SIC model (lag 2) to avoid model complexity and over-parameterisation for VAR estimation.

Table 10: Results of Vector Autoregressive Model (BSE 500 and BSE 100 ESG)

Independent Variables	Dependent Variables	
	r_{B500_t}	r_{ESG_t}
$r_{B500_t}(-1)$	-0.022810 [-0.52097]	0.058045 [1.28431]
$r_{B500_t}(-2)$	-0.364281* [-8.31848]	-0.044404 [-0.98232]
$r_{ESG_t}(-1)$	0.068599 [1.53857]	-0.026416 [-0.57397]
$r_{ESG_t}(-2)$	0.471511* [10.5666]	0.004447 [0.09655]
C	0.000503 [1.84037]	0.000508 [1.80153]

Note: * Significant at 1% level; ** Significant at 5% level; [] t-statistics.

Source: Authors' compilation.

From Table 10, BSE 500 returns (r_{B500_t}) have been adversely associated with their own second lag but positively affected by lagged r_{ESG_t} . This indicates that previous ESG performance supports overall market returns while self-correction constrains it. For the ESG return (r_{ESG_t}), none of the lags of BSE 500 or ESG returns have been statistically significant. This finding indicates that ESG returns remain largely unaffected by former market or ESG movements.

Table 11: Results of VAR Granger Causality (BSE 500 and BSE 100 ESG)

Independent Variable	Dependent Variables	
	r_B500_t	r_ESG_t
r_ESG_t	112.5125* (0.0000)	—
r_B500_t	—	2.717427 (0.2570)

Note: * Significant at 1% level; ** Significant at 5% level; () Probability values.
 Source: Authors' compilation.

From Table 11, the results have demonstrated significant unidirectional causality from r_ESG_t to r_B500_t , indicating that ESG returns affect overall market returns in the short run.

Table 12: Results of VAR Residual Serial Correlation LM Tests

Lags	LM Test Statistics
1	5.4742(0.242)
2	7.5357 (0.109)

Note: () P-values.
 Source: Authors' compilation.

Table 13: Results of VAR Residual Heteroskedasticity Tests (Includes Cross Terms)

Test	Chi-square Statistic	df	Prob.
Joint Test	51.3022	42	0.116

Source: Authors' compilation.

Inverse Roots of AR Characteristic Polynomial

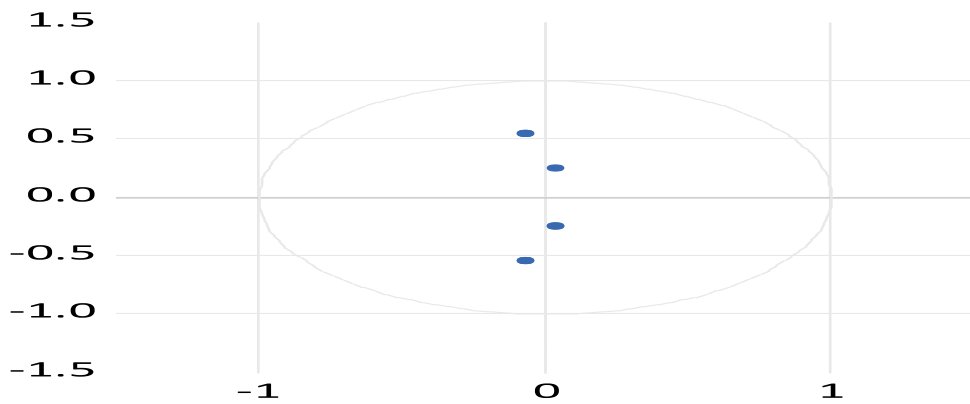


Figure 2: Inverse Roots of AR Characteristic Polynomial

Source: Authors' work.

From Table 12, the LM test confirms the absence of serial correlation in residuals up to lag 2. Further, Table 13 reveals that the chi-square statistic is insignificant at 5% level, indicating the presence of homoskedasticity in residuals. Figure 2 shows that all points lie within the unit circle, indicating stability of the model. Therefore, diagnostic tests suggest that the VAR model is appropriately specified.

5. Conclusion

This study examined the association and short-run causal linkages between the ESG Index and major Indian market indices from January 2021 to March 2025. The empirical results provide important insights into the role of ESG-oriented investments within the Indian equity market. Descriptive statistics revealed that return distributions across chosen indices are characterised by negatively

skewed, leptokurtosis, and non-normality. Moreover, unit root tests confirmed stationarity at levels, enabling VAR-based analysis.

VAR estimates disclosed that lagged ESG returns exert a positive influence on both Sensex and BSE 500 returns, underscoring that ESG-compliant firms respond to market movements. Additionally, Granger causality results revealed a bidirectional causality between ESG returns and Sensex returns. In contrast, a unidirectional causality from ESG returns to BSE 500 returns is observed. These findings imply that ESG outcomes play an active role in shaping short-run market dynamics. Notably, ESG returns are not significantly influenced by past movements of market indices, reflecting their distinct informational content. This study has profound managerial implications; Since ESG integration enhances information transparency and market efficiency, thereby becoming increasingly pertinent in the Indian equity market. Therefore, policymakers should strengthen ESG disclosure standards and ensure uniform reporting. Firms are also encouraged to integrate ESG factors, given their growing influence on market dynamics. Thus, investors would take well-informed decisions regarding ESG performance and market movements. However, the analysis is confined to aggregate index-level data, thereby overlooking sectoral variations. This study is also limited to the Indian market and doesn't capture ESG and market movements across various countries. Therefore, future research may incorporate sector-specific, cross-country comparisons and longer time horizons to offer in-depth insights into ESG-market linkage.

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Green Supply Chain Operations and Networking: Digital Pathways to Sustainable Performance

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Abstract: Digital technologies have been recognised as reformative agents in evolving Supply Chain Management (SCM) practices. Green SCM (GSCM) includes environmental thinking into traditional supply chain strategies. It is a commonly recognised green strategy where companies prioritise competitiveness with environmental stewardship. However, the integral role of digitisation in facilitating GSCM and driving sustainability in developing economies remains underexplored. Hence, the current research was designed to analyse the impact of Digital Green Operations (DGO) and Digital Green Networking (DGN) on Sustainable Performance (SP) dimensions, i.e., social, economic, and environmental performance. The study was supported by primary data, gathered from 195 manufacturing companies operating in Khurdha district of Odisha using a multi-stage random sampling technique. The study was descriptive and analytical in nature. Correlation-Based Structural Equation Modelling (CB-SEM) technique was employed to validate the proposed hypotheses through SPSS v25 and AMOS v29 software. The findings signified the growing importance of digitalised GSCM in achieving SP. It highlighted that 'DGO' and 'DGN' positively influenced SP outcomes. DGO significantly enhanced environmental, economic, and social dimensions, whereas DGN contributed positively to environmental and economic performance, with relatively weaker effects on the social dimension of SP. The analysis offered practical insights for stakeholders of GSCM by establishing the fact that prioritising DGO and DGN enhances overall SP.

1. Introduction

Cross-border industries are progressively acknowledging the necessity to harmonise growth with sustainability as supply chains are confronted with pressures from consumers, regulators, and other stakeholders (Seuring & Muller, 2008; Sarkis et al., 2017; Dubey et al., 2017). According to IBEF (2024) and Odisha Economic Survey (2024-25), the manufacturing sector is the most prioritised industry as it contributes to industrial output and helps in employment generation. However, the sector also impacts the environment through its supply chain activities. In contemporary society, companies are often embedding digital strategies in green supply chain practices in order to achieve sustainability (Wamba et al., 2019; Bag et al., 2021). Digital Green Operations (DGO) and Digital Green Networking (DGN) in supply chains are two such digital interventions. They portray the complementary facets of digital GSCM. Within the framework of GSCM, DGO pertains to the assimilation of smart tools into internal processes of the supply chain activities in order to enhance efficiency, reduce emissions, and optimise resource usage (Zhu et al., 2005; Srivastava, 2007; Diabat & Govindan, 2011). Some of the modern-day digital solutions, such as Blockchain Technology (BT), automation, Internet of Things (IoT), and predictive analytics, can help in optimising green operations, thus strengthening the operational aspect of GSCM, as stated by Dubey et al. (2017) and Jabbour et al. (2019). On the other hand, DGN highlights the significance of virtual platforms and

smart technologies in boosting transparency among the supply chain partners (Saber et al., 2019). Queiroz et al. (2020) and Mubarak et al. (2021) further add that digital collaboration techniques, such as BT and cloud-based accounting systems, coordinate sustainability initiatives, help to track adherence with environmental standards, and ensure ethical practices across stakeholders. Despite the emerging relevance of DGO and DGN, studies examining the impact of DGO and DGN at the individual level continue to be limited, particularly in the manufacturing industry (Wamba et al., 2019; Yadav et al., 2020). Hence, the current study bridges the gap by probing into how DGO and DGN at particular levels influence the social, economic, and environmental performance of the manufacturing sector. The results are projected to offer both academic insights and applied recommendations for fostering supply chain practices in the digital landscape. The study is underpinned by the Resource-Based View (RBV) theory, which signifies that companies attain long-term strategic advantage by optimally utilising valuable, rare, and inimitable resources (Wernerfelt 1984; Barney 1991). Within the framework of SCM, digital technologies depict innovation-driven strategic resources that facilitate companies to maintain transparency, coordination, and environmental monitoring across the supply chain. When the tech-enabled resources are combined with green supply chain activities and joint networking practices, companies can foster core competencies that optimise both environmental and operational performance. Hence, the RBV theory facilitates an appropriate theoretical lens for knowing how digital pathways enable the deployment of GSCM practices and enhance SP. To address the identified research gap, the paper seeks to respond to the research questions such as what is the impact of DGO on the SP of the manufacturing sector? And what is the impact of DGN on the SP of the manufacturing sector?

By addressing the above-mentioned research questions, the study seeks to make key contributions in two broad perspectives. First, from the conceptual point of view, it will contribute to understanding how DGO and DGN at individual levels impact SP, adding to the existing literature. Second, from the practical viewpoint, the study is likely to provide valuable insights to the supply chain professionals, policymakers, and the manufacturing sector in particular by emphasising how DGO and DGN in GSCM can be streamlined as strategic practices to enhance SP. In this background, it has the following two objectives: (i) To examine the impact of DGO on the SP of the manufacturing sector. (ii) To examine the impact of DGN on the SP of the manufacturing sector.

2. Literature Review

The fusion of smart technologies with green supply chains is important for understanding how manufacturing companies maintain sustainability. Two evolving practices, namely, DGO and DGN in GSCM, play crucial roles in the integration of smart and green practices. DGO mainly focuses on leveraging digital tools in the internal operations of GSCM, such as the use of BT, IoT, automation, etc., to boost eco-friendly operations, reduce environmental impacts, and mitigate resource usage (Dubey et al., 2017; Jabbour et al., 2019). DGN focuses on the usage of digital platforms in the external practices of GSCM, such as enhancing transparency, collaboration, and knowledge sharing among the stakeholders (Saber et al., 2019). DGO explicitly adapts to operational efficiency and environmental outcomes, whereas DGN supports ethical adherence, social accountability, and stakeholder engagement, which can enhance SP (Yadav et al., 2020; Sarkis, 2020). Collectively, these mechanisms signify that digital GSCM operates as a vital parameter of balanced SP, forming the base for further empirical validation. Although prior research highlights the role of digital technologies in enabling GSCM practices, the majority of the research considers digitalisation as a broad construct without differentiating the operational and networking frameworks. Moreover, existing research often examines GSCM practices in collective forms, impeding the understanding of how particular digital-enabled practices, such as DGO and DGN, individually impact SP. Additionally, empirical studies with the SEM technique have predominantly focused on green practices instead of digitally enabled practices within the manufacturing sector. Thus, it is imperative to empirically explore the individual roles of DGO and DGN in influencing SP.

2.1. DGO and SP dimensions

DGO is the practice of aligning digital technologies with the core operational activities of supply chain practices. Such alignment enhances eco-efficiency and promotes overall SP. In the context of green supply chain practices, DGO primarily focuses on automating production processes, stock management, logistics, waste reduction techniques, etc., which leads to enhanced resource optimisation and environmentally efficient practices (Dubey et al., 2017). Numerous studies (Saber et al., 2019; Bag et al., 2021) prioritised that digital tools such as BT, Predictive Analytics, and IoT facilitate real-time tracking of operational energy use and its emissions. Dubey et al. (2017) and Jabbour et al. (2019) stated that embedding digital practices within supply chain practices improves performance. Nevertheless, these studies primarily explore technology tools as operational enablers within broader supply chain mechanisms rather than specifically structuring DGO as a distinct operational competence. In spite of these findings, existing empirical research often depends on conceptual analyses and examines GSCM practices without empirically testing DGO using advanced statistical techniques such as SEM. Consequently, exploring the impact of DGO on SP dimensions persists as a key research focus. Backed by the previous findings, the following hypotheses are put forward:

H_{1a}: DGO has a significant impact on social performance.

H_{1b}: DGO has a significant impact on economic performance.

H_{1c}: DGO has a significant impact on environmental performance.

2.2. DGN and SP dimensions

DGN relates to the usage of digital technologies to enable communication, collaboration, and knowledge sharing among supply chain stakeholders with a focus on maintaining SP. Under the scope of GSCM, DGN encourages suppliers, manufacturers, distributors, and other supply chain partners to coordinate various green initiatives and ensure adherence to social and environmental standards (Queiroz & Wamba, 2019; Saber et al., 2019). Digital tools such as BT, cloud-based accounting systems, and integrated digital platforms enhance traceability, accountability, and transparency, making supply chains sustainable and resilient (Queiroz et al., 2020; Mubarik et al., 2021). The implementation of DGN impacts the SP dimensions. Social performance improves as integration strengthens compliance with regulatory compliance, corporate social responsibility, and ethical practices, whilst enhancing stakeholder participation and knowledge sharing (Sarkis, 2020; Yadav et al., 2020). Economic performance is improved through optimum resource utilisation, reduced inefficiencies, and cost effectiveness achieved through an integrated planning approach and information sharing practices (Jabbour et al., 2019; Bag et al., 2021). Environmental performance is improved from optimised monitoring and collaboration across the supply chain practices, minimising waste, emissions, and environmental impacts (Zhu et al., 2005; Dubey et al., 2017). Organisations adopting DGN gain a competitive advantage due to optimised network integration, accountability, and transparency. Queiroz & Wamba (2019) stated that digital networking improves knowledge sharing and real-time collaboration, which in turn uplifts competitive advantage and SP. DGN in GSCM enhances traceability, supply chain visibility, and ensures compliance with ethical standards, which ultimately supports social and environmental outcomes (Saber et al. 2019). Even though existing studies recognised the significance of digital networking for improved coordination and transparency in supply chain practices, most of them focused on digital integration rather than particularly DGN as a distinct capability influencing SP. In addition, empirical studies examining the multidimensional impact of DGN on SP dimensions using the SEM technique continue to be limited, primarily in the manufacturing sector. Evidenced by the prior studies, the following hypotheses are put to test:

H_{2a}: DGN has a significant impact on social performance.

H_{2b}: DGN has a significant impact on economic performance.

H_{2c}: DGN has a significant impact on environmental performance.

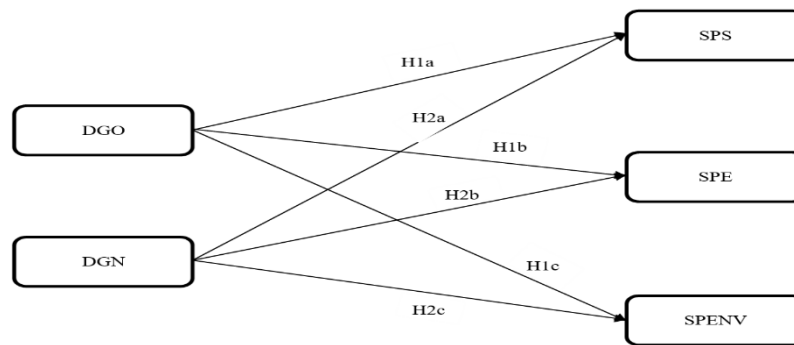


Figure 1: Conceptual Model

Source: Authors' work.

3. Research Methodology

The study was carried out among the manufacturing companies operating in Khurdha district of Odisha, including micro, small, medium, and large companies across various sub-sectors, such as metals and allied, polymer and rubber, textiles, apparel, and other manufacturing sub-divisions (Table 1). According to 'Invest Odisha', a Government of Odisha initiative, the population of registered manufacturing companies in Khurdha is 1,601. As per Taro Yamane (1967), with a 5% margin of error, a sample of 320 companies using a multi-stage random sampling technique was considered as adequate for the study. Out of the 320 companies approached purposively, 195 companies returned the duly filled questionnaires, yielding a 60.94% response rate (Table 1). Of the remaining 125 companies, 70 returned incomplete questionnaires, 35 could not be contacted despite repeated efforts, and 20 declined participation due to confidential reasons. The study focused on those companies that had practical experience with operational practices prospectively shaped by GSCM initiatives and digitisation. Out of the 195 questionnaires that were returned, 45 responses were removed during the process of data screening as respondents lacked adequate knowledge of DGO and DGN practices, making them unsuitable for the study. Hence, the final sample size for data analysis consisted of 150 valid responses. The questionnaire was answered by the key decision makers of the companies, such as the Managing Director, Director of Operations and Production, General Manager, Supply Chain Manager, IT Manager, etc., who are considered competent about the company's operational practices and digital green initiatives. Primary data were gathered through a well-structured questionnaire adapted from past literature. The construct items employed in the study were adapted from validated scales in the GSCM and digital supply chain literature. Items for DGO were adapted from literature analysing the incorporation of digital technologies in sustainable supply chain practices (Dubey et al., 2017; Jabbour et al., 2019; Bag et al., 2021). DGN construct was measured with items derived from prior studies focusing on transparency, information sharing, and digital collaboration across supply chain networks (Queiroz & Wamba, 2019; Saberi et al., 2019; Mubarik et al., 2021). SP was measured using its three parameters, i.e., social, economic, and environmental performance, adapted from literature based on sustainability (Wamba et al., 2019; Yadav et al., 2020; Sarkis, 2020). A 7-point Likert scale varying from 1 (Strongly Disagree) to 7 (Strongly Agree) was employed to quantify key constructs related to DGO, DGN, and SP. The questionnaires were circulated through a combination of scheduled appointments, Google Forms, and personal visits to industrial areas, including Chandaka, Mancheswar, Khurdha, and Rasulgarh. Even though online circulation helped in covering a wider pool of companies, personal visits were still a necessity to improve participation and validate accurate and quality data collection. The resultant sample of 150 responses offered a solid base for empirical analysis. The study deployed a CB-SEM technique for data analysis in order to examine the hypothesised relationships among digital green supply chain practices and SP.

Prior to the full-scale data collection, pilot testing was done in two stages for questionnaire validation. Initially, the instrument was reviewed by academic experts in SCM to validate its content, clarity, relevance, and suitability. Based on the feedback received, minor revisions were made to improve the wording and understandability of certain items. In the second stage validation, the revised

questionnaire was administered to 46 respondents from manufacturing companies to evaluate its practical relevance and establish construct validity. Construct validation was examined using Pearson's correlation analysis in SPSS software, where items were considered valid if they showed a significant and positive correlation coefficient (Amalia & Nugraha, 2021). The results of pilot testing confirmed that all items were valid according to the criteria.

Table 1: Respondents' Profile

Category	Frequency	Percentage
Micro	25	12.82
Small	41	21.03
Medium	71	36.41
Large	58	29.74
Total	195	100
Sub-Sector		
Metals and Allied	45	23.08
Energy, Electrical, and Electronics	35	17.95
Chemicals and Chemical Products	34	17.44
Food and Beverages	27	13.84
Polymer and Rubber	30	15.38
Textiles and Apparels	24	12.31
Total	195	100

Source: Self-compiled.

4. Data Analysis

4.1. Exploratory Factor Analysis

While performing Exploratory Factor Analysis (EFA), the initial step is to check the sample adequacy. It was assessed with the help of the Kaiser-Meyer-Olkin (KMO) statistic. The KMO value was found to be 0.760, indicating the adequacy of data for performing factor analysis (Hair et al., 2006). Consequently, an assessment of data normality was conducted. The skewness values of all the variables fell within the acceptable range of ± 2 , and kurtosis values of all the variables remained within the acceptable range of ± 7 (Hair et al, 2010; Bryne, 2010). To assess the validity of items, EFA technique was executed, employing 'Principal Component Analysis' (PCA) along with the 'varimax' rotation method. The PCA clearly showed a pattern matrix having five separate factors. The eigenvalues of all five factors were more than one, cumulatively accounting 80.632% of the total variance explained. The items distinctly loaded onto their factors, ranging from 0.682 to 0.902. As per Hair et al (2010), for a sample size of 150, the minimum factor loading should be 0.45. Hence, the loadings surpassed the minimum acceptable threshold, indicating good construct representation.

4.2. Bias Testing

For testing the biasness of the data, 'Harman's Single Factor Test' was used to do the PCA. The percentage of variance was found to be 44.679, which is less than 50% (Podsakoff et al., 2003), and hence no threat of Common Method Bias was detected.

4.3. Multicollinearity

It analyses the degree of association among the independent variables. Analysing multicollinearity ensures that the hypothesis results are valid.

Table 2: Multicollinearity

Variable	Tolerance	VIF	Interpretation
DGO	0.881	1.136	No Concern
DGN	0.881	1.136	No Concern

Source: SPSS v25.

To check the multicollinearity between the predictor variables, 'Variance Inflation Factor' (VIF) and 'Tolerance' values were examined. In all three regression models (SPS, SPE, and SPENV), the VIF values for the predictors (DGO and DGN) were 1.136, and the corresponding Tolerance values were 0.881. According to Hair et al. (2010), a VIF value of less than 5 and a Tolerance value above 0.2 indicate an acceptable level of multicollinearity. As the obtained values were well within these acceptable ranges, it can be concluded that there is no multicollinearity present in the models.

4.4. Confirmatory Factor Analysis

Subsequent to the outcomes of EFA, the Confirmatory Factor Analysis (CFA) was executed. CFA is a statistical technique specifically used for validating the construct. CFA tests the reliability and validity of the constructs being measured using AMOS 29 software. In CFA, the model, specifically known as the 'Measurement Model' (Figure 2), details the relationships between the latent constructs and the observed variables. Model fit indices comprised of the following metrics, i.e., Chi-square/degrees of freedom (CMIN/df; 1.125), Goodness of Fit Index (GFI; 0.978), Confirmatory Fit Index (CFI; 0.968), Standardised Root Mean Square Residual (SRMR; 0.043), and Root Mean Square Error of Approximation (RMSEA; 0.034). The findings reflected a robust conformity between the data, furnishing empirical evidence for the studied constructs. The derived CMIN/df value of 1.125 stipulated satisfactory fit scores as the value was below the maximum prescribed value of 3.0 (Bentler, 1990). The CFI and GFI scores surpassed the minimum threshold value of 0.90, indicating a good model fit, the RMSEA value at 0.032, being less than 0.05, and the SRMR value at 0.043, being less than 0.09, underlined acceptable values (Hu & Bentler, 1999). Hence, the reported results exhibited a strong model fit, affirming the fitness of the outlined theoretical model (Fig.1) and can further be employed for SEM. Composite Reliability (CR) scores of more than 0.70 demonstrated good reliability among the constructs (Hair et al., 2014) as indicated in Table 3. For each latent (unobservable) variable, the convergent validity was examined by computing the scores of Average Variance Extract (AVE). Convergent validity was achieved with satisfactory results. The values for AVE were greater than the minimum recommended value of 0.50 (Hair et al., 2014). Discriminant validity was examined using the Fornell-Larcker criteria by ensuring that the square root of each construct's AVE value is greater than the other correlation values (Fornell & Larcker, 1981). Furthermore, discriminant validity was measured by ensuring that Maximum Shared Variance (MSV) scores are lower than AVE, CR scores are greater than AVE scores, and Maximum Reliability (H) or MaxR(H) scores are greater than 0.80 (Hu & Bentler, 1999). Every criterion exhibited in Table 3 met the recommended thresholds, assuring good discriminant validity.

Table 3: Reliability and Validity

	CR	AVE	MSV	MaxR(H)	SPE	DGO	DGN	SPS	SPENV
SPE	0.929	0.767	0.491	0.952	0.876				
DGO	0.970	0.889	0.491	0.979	0.701	0.943			
DGN	0.852	0.592	0.185	0.880	0.401	0.356	0.770		
SPS	0.846	0.595	0.176	0.954	0.154	0.271	0.072	0.771	
SPENV	0.905	0.706	0.377	0.930	0.593	0.614	0.430	0.420	0.840

Source: SPSS AMOS v29.

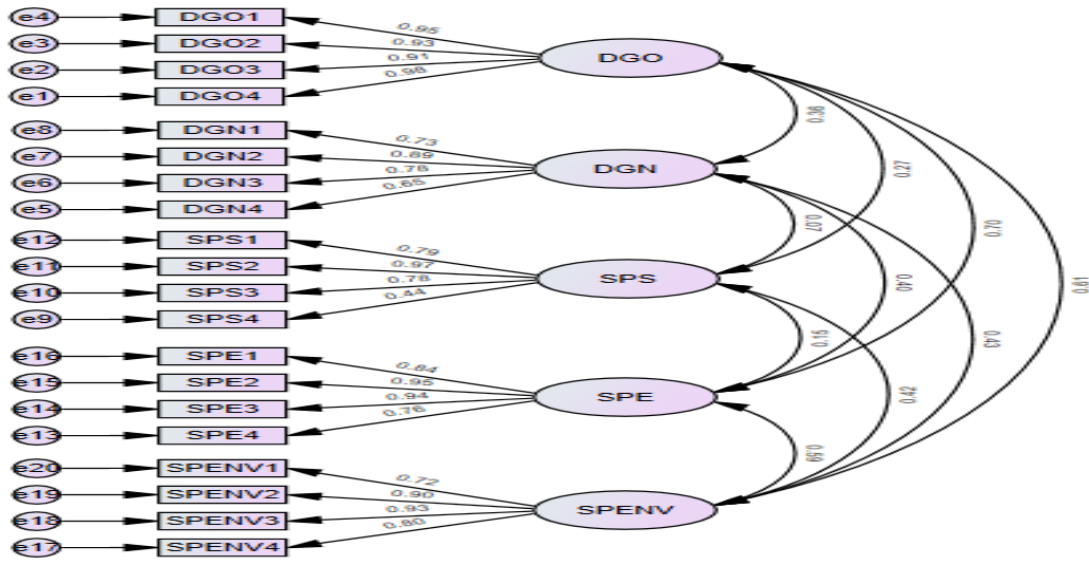


Figure 2: Measurement Model
Source: SPSS AMOS v29.

4.5. Structural Equation Modelling (SEM)

SEM or Path Analysis is a data-driven approach that examines the relationships between observed variables and latent constructs through a series of equations. It permits simultaneous testing of multiple relationships, confirming a comprehensive understanding of the model.

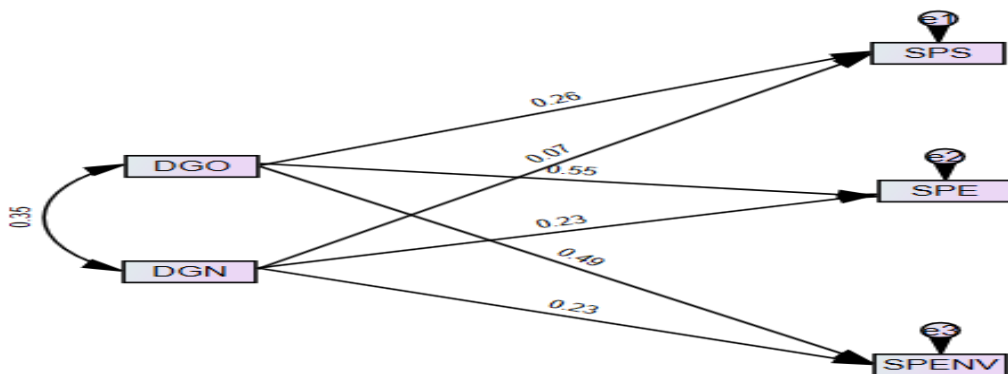


Figure 3: Structural Model
Source: SPSS AMOS v29.

Preceding hypothesis testing, a model fit analysis was performed on the structural model. The CMIN/df value was found to be 2.304, the CFI was 0.968, and the RMSEA was 0.034. Acceptable limit for CMIN/df is less than 3, CFI is 0.90 or higher, and for RMSEA is 0.05 or less (Bryne,2010; Hair et al., 2010). The model fit estimates of the structural model were within the recommended ranges. Hence, it can be inferred that the examined data are fit for hypothesis testing.

4.6. Hypotheses Testing Results

The model (Fig. 3) constructed by applying the SEM technique analyses the impact of a particular independent variable (exogenous variable) on a particular dependent variable (endogenous variable). Table 4 below summarises the results of the hypothesis testing.

Table 4: Hypotheses Testing

Relationship	Estimate	P-Value	Significance	Result
SPS <--- DGO	0.261	.002	Significant	H1a-Accepted
SPE <--- DGO	0.552	***	Significant	H1b-Accepted
SPENV <--DGO	0.491	***	Significant	H1c-Accepted
SPS <--- DGN	0.072	.434	Non-significant	H2a- Rejected
SPE <--- DGN	0.234	***	Significant	H2b- Accepted
SPENV <--DGN	0.233	***	Significant	H2c- Accepted

Note: DGO=Digital Green Operations, DGN= Digital Green Networking, SPS=Sustainable Performance Social, SPE= Sustainable Performance Economic, SPENV= Sustainable Performance Environmental, and ***Represents significance level at 0.001 (two-tailed)

Source: SPSS AMOS v29.

As per Table 4, DGO has a significant and positive influence on the social, economic, and environmental aspects of SP. This means that the incorporation of digital technologies with green operational activities empowers manufacturing companies to optimise efficient use of resources, strengthen socially responsible practices, and minimise environmental impacts. Specifically, DGO shows the strongest impact on SPE (Estimate=0.552; p-value<0.001), followed by SPENV (Estimate=0.491; p-value<0.001) and SPS (Estimate=0.261; p-value<0.005), resulting in the acceptance of H1a, H1b, and H1c. This demonstrates that digitally driven green practices strengthen operational effectiveness and optimisation of costs in manufacturing companies, which primarily contributes to improved economic performance while supporting environmental as well as social performance. In contrast, the effect of DGN on SPS (Estimate=0.072; p-value=0.434) is found to be non-significant, resulting in rejection of H2a. This signifies that digital networking among supply network participants may not directly impact social performance, as such outcomes mostly depend on internal organisational practices, employee performance, and corporate responsibility practices rather than external digital collaboration independently. However, DGN has significant positive effects on SPE (Estimate=0.234; p-value<0.001) and SPENV (Estimate=0.233; p-value<0.001), supporting the acceptance of H2b and H2c. This highlights that digital collaboration among supply chain practitioners improves transparency, resource management, and coordination, which contributes to improved economic efficiency as well as environmental sustainability. As a whole, these findings directly respond to the research questions by indicating that both DGO and DGN contribute positively to SP. DGO exerts a stronger influence across all dimensions, whereas DGN's role is more limited to economic and environmental aspects.

5. Conclusion

The paper focuses on the pivotal role of digitalised GSCM in driving holistic SP. By examining DGO and DGN, the research highlights that DGO consistently enhances social, economic, and environmental outcomes, while DGN selectively improves economic and environmental performance, with limited impact on social aspects. The findings also contribute to the digital supply chain literature and comply with the RBV theory, stating that digitally enabled operational and networking capabilities in supply chains can function as a strategic tool that enhances SP. From the perspective of SP, the results suggest that companies should prioritise DGO practices while strategically leveraging DGN for external collaboration and partnership. The empirical results stress the importance of prioritising DGO initiatives for balanced sustainability, augmented by strategic use of DGN to foster collaboration, external connectivity, and knowledge sharing. Operationally, the study offers guidance for government, managers, policymakers, researchers, and academicians in planning effective digital GSCM strategies to optimise operational effectiveness, resource utilisation, and SP. Despite these contributions, the study exhibits certain constraints as it is confined to the manufacturing sector in a single district of Odisha and considers only DGO and DGN while excluding other forms of digital innovation. In the context of the real world, the study provides key perspectives for companies, policymakers, and supply chain specialists by highlighting how DGO can strengthen internal

efficiencies, resource utilisation, and sustainable practices, while DGN enhances collaboration, knowledge sharing, and external connectivity. However, future research may expand the scope by examining other industries and regions, integrating multiple digital technologies, and employing longitudinal designs to capture long-term sustainability effects.

Conceptually, the study made notable contributions by expanding the existing body of knowledge on the digitalisation of GSCM and sustainability by explaining how DGO and DGN shape the facets of SP. The findings suggested that DGO exerts a stronger and more consistent influence across all dimensions of SP, while DGN contributes selectively, with a stronger impact on economic and environmental dimensions. These results imply that companies should prioritise DGO initiatives to achieve balanced sustainability across all dimensions, while leveraging DGN strategically to enhance economic and environmental performance, supplemented by additional measures to improve social outcomes. Despite theoretical contributions, the research further offers certain actionable recommendations for stakeholders in order to design digital GSCM by highlighting the differential roles of DGO and DGN in shaping comprehensive SP.

- Top-level managers and supply chain professionals can prioritise DGO to enhance social, economic, and environmental performance, while leveraging DGN to strengthen collaboration and knowledge sharing for environmental and economic gains.
- Government officials and Policymakers can implement the findings to promote digitalised green practices.
- Investors and industry practitioners can make informed decisions aligning profitability with sustainability.
- Researchers and Academicians can further explore the linkage between digital-driven innovation and green supply chain practices, contributing to empirical evidence and theoretical advancement.

Overall, the study guides stakeholders in designing and implementing effective digital GSCM strategies for holistic SP.

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CSR as a Corporate Sustainability Financing Mechanism: Role of PSUs and Non-PSUs in Rural Development

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Keywords

Corporate Social Responsibility; Rural Development; PSU; Non-PSU; Ganjam District; Sustainable Finance; t-test

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G34; M14; Q01; R11

Abstract: Corporate Social Responsibility (CSR) has emerged as a significant corporate sustainability and financing mechanism for rural transformation in India. The enactment of the Companies Act, 2013, made CSR spending mandatory for eligible firms and directed corporate resources toward social development. Rural development has become one of the major focus areas of CSR expenditure. This study examines CSR spending on rural development in Ganjam district, Odisha, and compares the contributions of Public Sector Undertakings (PSUs) and Non-PSU companies. The study uses secondary data collected from the GO CARE database of the Government of Odisha and official disclosures of selected companies operating in or contributing to the Ganjam district from 2014-2024. A comparative statistical analysis has been conducted using an independent-samples t-test to examine whether there is a significant difference in CSR spending on rural development activities between PSU and Non-PSU firms. The findings indicate that Non-PSU companies allocate higher, more consistent CSR funds to rural development. The t-test result reveals a statistically significant difference in spending patterns between PSU and Non-PSU companies. The study highlights the developmental role of corporate institutions in backward rural regions and suggests the need for more structured and region-specific CSR interventions.

1. Introduction

Corporate Social Responsibility (CSR) has emerged as an important instrument for promoting inclusive and sustainable development in India. With growing expectations from society, corporations are no longer viewed merely as economic entities responsible for profit generation (Swain et al., 2017). They are increasingly expected to contribute toward social welfare, environmental sustainability, and community development (Dash & Sethi, 2024). This transformation became more institutionalised after the implementation of the Companies Act, 2013, which made CSR expenditure mandatory for eligible companies in India. Schedule VII of the Act specifically includes rural development projects among the approved CSR activities, thereby encouraging corporate participation in addressing rural challenges.

Rural India continues to face multiple socio-economic problems despite continuous government intervention. Issues such as unemployment, inadequate healthcare facilities, poor infrastructure, low educational attainment, migration, and livelihood insecurity remain serious concerns in many districts. In this context, CSR spending has gained importance as a complementary source of developmental finance capable of supporting government efforts (Dash & Sethi, 2025). Companies increasingly invest in rural infrastructure, sanitation, education, healthcare, women's empowerment, skill development, and livelihood generation. Such initiatives not only improve community welfare but also strengthen corporate legitimacy and stakeholder relationships.

Ganjam district of Odisha presents a significant context for examining the developmental Role of CSR. The district has a predominantly rural population and experiences several structural challenges related to poverty, migration, disaster vulnerability, and uneven access to basic services. At the same time, a

number of Public Sector Undertakings (PSUs) and Non-PSU companies contribute toward rural welfare through CSR activities. PSU companies are generally expected to undertake broader, welfare-oriented developmental interventions due to their public ownership and social accountability. In contrast, Non-PSU companies often adopt more strategic, selective CSR approaches, influenced by business priorities, visibility, and stakeholder engagement. These differences may influence the scale, consistency, and orientation of CSR spending toward rural development.

Although CSR expenditure in India has increased considerably since the introduction of the mandatory CSR framework, limited empirical evidence exists on the comparative spending behaviour of PSU and Non-PSU companies at the district level. Existing studies mainly focus on national trends, sector-specific analysis, or broad CSR performance indicators. Very few studies examine whether PSU and non-PSU firms differ significantly in their contributions to rural development in backward districts such as Ganjam. This creates an important research gap, particularly in understanding how different categories of firms allocate CSR resources for rural transformation.

Against this background, the present study examines CSR spending on rural development in Ganjam district and compares the expenditure pattern of PSU and Non-PSU companies. The study specifically investigates whether there is a statistically significant difference in CSR spending behaviour between these two categories of firms using an independent-samples t-test. The analysis also provides insight into the major developmental areas supported through CSR interventions and highlights the broader role of corporate participation in rural development.

2. Review of Literature

The literature on Corporate Social Responsibility (CSR) and rural development has expanded significantly after the implementation of the mandatory CSR provisions under the Companies Act, 2013. Existing studies mainly focus on CSR expenditure patterns, inclusive growth, sustainability, women's empowerment, community development, and the developmental role of public and private sector enterprises. This review organises the literature thematically to identify the major trends, findings, and research gaps in CSR and rural development.

2.1. CSR and Rural Development

Several studies have emphasised the growing importance of CSR in promoting rural transformation and socio-economic development. Pradhan and Ranjan (2010) examined CSR initiatives undertaken by selected public and private Indian companies for rural development. Their study concluded that CSR has become an important business concern irrespective of company size, sector, and location. The study highlighted that corporations increasingly recognise that sustainable business growth depends upon the socio-economic development of local communities. Similarly, Tarai (2017) analysed CSR initiatives undertaken by Indian companies in areas such as livelihood, health, education, environment, and infrastructure. The study found that CSR plays a crucial role in the socio-economic development of rural and tribal communities, particularly in Odisha and Jharkhand. The research further observed that companies are adopting CSR not merely as philanthropy but as a strategic developmental responsibility. Nippatlapalli and Nair (2016) specifically focused on CSR and rural development by examining the role of education, health, environment, livelihood, and infrastructure initiatives. Using multiple correlation analysis, the study found a positive relationship between CSR thematic areas and rural development outcomes. The findings suggested that CSR interventions significantly contribute to rural welfare and community upliftment. More recently, Rai (2025) critically examined the relationship between CSR and rural development in India. The study highlighted that CSR initiatives contribute to poverty reduction, women's empowerment, environmental sustainability, skill development, and infrastructure development. Moreover studies of Sethi et al., (2025), found that firm performance can be achieved when corporations give due importance to environmental concerns. The paper argued that the real success of CSR lies in its ability to improve rural lives and promote inclusive growth. Likewise, Saive et al. (2026) observed that CSR has emerged as a major contributor to rural transformation in India. Their study on Maharashtra and Gujarat highlighted the positive developmental impact of corporate involvement in rural projects.

2.2. CSR, Inclusive Growth, and Sustainability

A major stream of literature focuses on CSR as a mechanism for inclusive growth and sustainable development. Jagannathan & Vethirajan (2020) studied the impact of CSR activities on inclusive growth in the Chennai region using a large primary dataset of 500 beneficiaries. Applying statistical techniques such as factor analysis, t-test, ANOVA, and discriminant analysis, the study found that corporate companies significantly contribute toward inclusive growth through CSR interventions related to environmental protection, community development, and energy conservation.

Purnamawati et al. (2023) examined the role of CSR in sustainable economic development in villages. Using Structural Equation Modelling, the study emphasised the importance of green economy initiatives and digitalisation for sustainable rural growth, especially in the agricultural and plantation sectors. Sethi and Swain (2015) found that CSR spending in India has increased over the years. Similarly, Himalay et al. (2025) analysed year-by-year trends in CSR expenditure for rural-focused initiatives, including agricultural innovation, women's empowerment, clean energy, and digital literacy. Their findings indicated that targeted CSR interventions can reduce inequality, strengthen rural economies, and support Sustainable Development Goals (SDGs). Mahapatra (2025) studied the CSR initiatives of the Dalmia Bharat Foundation to empower rural women through Self-Help Groups (SHGs) in Odisha. Based on primary data from 100 women beneficiaries, the study found that CSR interventions improved economic opportunities, mobility, and decision-making capacity among rural women. In this regard, Udgata et al. (2022) examined the impact of Vedanta Limited's CSR activities on women. Using correlation and critical ratio analysis, the study reported a significant positive impact of CSR activities on the social and economic development of women beneficiaries. CSR also aligned with SDG acts as a mechanism to mitigate the risk (Dash et al., 2026)

2.3. PSU and Corporate CSR Initiatives in Odisha

Several studies specifically examined CSR initiatives undertaken by companies operating in Odisha. Patnaik & Patra (2017) conducted a comparative analysis of CSR expenditure by major corporate houses in Odisha, including BPSL, MCL, NALCO, TATA, and VEDANTA. Their study revealed that CSR spending was concentrated in districts such as Angul, Jajpur, and Sundargarh. The research highlighted the increasing role of corporations in regional development. In another Odisha-focused study, Pasumarti (2020) examined the CSR policies of PSU companies, including Mahanadi Coalfields Limited and NALCO. The findings indicated that these companies played an important role in improving the quality of life of tribal communities through developmental and environmental initiatives. Panigrahi & Mohapatra (2020) examined CSR spending patterns in India after mandatory CSR provisions. Their study found that companies mainly spend CSR funds on community development activities. However, the research criticised the absence of proper need identification and observed that non-industrialised regions often receive lower CSR support despite having greater developmental needs. Further, Dash and Dash (2025) focused on aspirational districts of Western Odisha and highlighted the role of CSR interventions in addressing developmental challenges in backward regions. The study emphasised the need for region-specific CSR strategies to achieve sustainable and inclusive growth. Das & Pandey (2022) analysed CSR disclosure practices in Indian FMCG companies. The study observed substantial differences between public and private companies in CSR disclosure and spending patterns. Public companies were found to allocate a larger proportion of their CSR expenditure toward social and environmental aspects. Papadopoulos & Dimitriadis (2013) examined consumer perceptions of CSR and found that companies demonstrating genuine concern for communities and employees elicited positive behavioural intentions.

The existing literature confirms that CSR contributes significantly toward rural development, inclusive growth, sustainability, women's empowerment, and community welfare. Several studies have examined CSR expenditure patterns, corporate initiatives, and developmental outcomes at national and regional levels. However, limited studies have specifically compared CSR spending between PSU and Non-PSU companies at the district level. Existing Odisha-based studies mainly focus on broad CSR initiatives rather than comparative expenditure analysis. Moreover, very few studies have applied statistical techniques, such as the independent-samples t-test, to examine whether significant differences exist between PSU and Non-PSU CSR spending on rural development. Research focusing specifically on the

Ganjam district remains extremely limited despite the district's developmental significance and rural challenges. Therefore, the present study attempts to fill this gap by comparing CSR spending on rural development in Ganjam district and statistically examining differences between PSU and Non-PSU companies. Accordingly, the following hypothesis is set for testing:

H₀: There is no significant difference between PSU and Non-PSU CSR spending on rural development in Ganjam district.

H₁: There is a significant difference between PSU and Non-PSU CSR spending on rural development in Ganjam district.

3. Methodology

This study adopts a quantitative, secondary-data design to examine trends and sectoral patterns of Corporate Social Responsibility (CSR) activities in Ganjam district, Odisha, over 2014–2024, using the Government of Odisha's GO CARE portal as the authoritative source for CSR project and governance metadata.

3.1. Data & Period

Project-level CSR records, company profiles, implementing agency listings, and indicator dashboards were extracted from the GO CARE portal of the Government of Odisha for the financial years 2013–2014 to 2023–2024. GO CARE provides district-aligned modules for Projects, Companies, Implementing Agencies, and State Indicators, along with Council-recommended projects and resources that enable longitudinal and cross-sectional analysis at the district scale. Further, the data are filtered to include projects located in or explicitly benefiting the Ganjam district.

3.2. Inclusion criteria, Standardisation, and cleaning

The study has applied several filters to finalise the data for analysis. Records within 2014–2024 for Projects (including filters by district, sector, project cost), and Companies are taken in the first step. Then entries with missing values and ongoing projects are excluded and only completed projects for the sample period are taken into consideration. Only projects on 'Rural development' are considered for analysis. Monetary amounts standardised in INR; multi-tranche projects allocated to reported financial years; duplicates reconciled via company name, project title, description, and fiscal year to avoid double-counting.

3.3. Tools and Techniques

A comparative statistical analysis has been conducted using an independent-samples t-test to examine whether there is a significant difference in CSR spending on rural development activities between PSU and Non-PSU firms. Trend analysis and descriptive statistics have been used for the analysis of CSR spending on rural development.

4. Results and Discussion

Table 1: CSR Spendings in Odisha and Ganjam District

Year	Overall CSR Spending in Odisha (₹ in Lakh)	Overall CSR Spending in Ganjam (₹ in Lakh)	Ganjam's Share in Overall Odisha's CSR Spending (%)
2014-15	44511.51	1,399.44	3.14%
2015-16	61727.22	3,668.28	5.94%
2016-17	49627.07	1,486.14	2.99%
2017-18	55488.56	122.22	0.22%
2018-19	39896.46	45.19	0.11%
2019-20	40587	224.18	0.55%
2020-21	48865.48	2,828.95	5.79%
2021-22	34609.13	644.39	1.86%
2022-23	53829.22	487.19	0.91%
2023-24	23631.76	2,066.05	8.74%

Source: Authors' calculation.

Table 1 presents the trend of CSR expenditure in Odisha and the corresponding share of Ganjam district in total CSR spending during the period from 2014–15 to 2023–24. The data indicate that CSR spending in Odisha remained substantial throughout the study period, although considerable year-to-year fluctuations can be observed. The highest overall CSR expenditure in Odisha was recorded in 2015–16, amounting to ₹61,727.22 lakhs, followed by 2022–23 with ₹53,829.22 lakhs. In contrast, the lowest CSR spending was observed in 2023–24 at ₹23,631.76 lakhs. With regard to the Ganjam district, CSR spending also showed significant variation over the years. The district received the highest CSR allocation in 2015–16, amounting to ₹3,668.28 lakhs, followed by 2020–21 (₹2,828.95 lakhs) and 2023–24 (₹2,066.05 lakhs). On the other hand, CSR expenditure in Ganjam was comparatively very low during 2018–19, where the district received only ₹45.19 lakhs, indicating minimal CSR activity during that year. The share of Ganjam district in Odisha’s overall CSR spending further highlights the changing importance of the district in corporate CSR allocations. The highest share was recorded in 2023–24, where Ganjam accounted for 8.74% of Odisha’s total CSR expenditure. Similarly, the district secured notable shares in 2015–16 (5.94%) and 2020–21 (5.79%), reflecting periods of increased corporate focus on development activities in the district. However, in several years, the share of Ganjam remained very low. For instance, the district accounted for only 0.11% of Odisha’s total CSR spending in 2018–19 and 0.22% in 2017–18. These findings indicate uneven distribution of CSR funds across years and suggest that Ganjam’s priority within Odisha’s CSR landscape has fluctuated considerably over time. Overall, the table demonstrates that although Ganjam district has received notable CSR investments in certain years, its share in Odisha’s total CSR expenditure has not remained consistent. The fluctuations may be attributed to changing corporate strategies, project availability, sectoral priorities, and varying levels of company engagement in the district. Nevertheless, the increasing share observed in recent years indicates growing corporate interest in supporting developmental initiatives in the Ganjam district through CSR funding.

Table 2: Descriptive Statistics

Particulars	Average	SD	Min	Max	Total	Share (PSU and Non- PSU in Total)
Total Expenditures (in lakhs)	189.44	162.68	21.19	442.67	1894.35	
Total No. of Projects	10.30	4.14	3	15	103	
Total No. of PSUs contributed	1.00	0.00	1	1	10	
No. of Projects by PSU	3.60	2.80	1	8	36	35%
Contribution by PSU (in lakhs)	30.85	24.98	0.3	65.73	308.51	16%
No. of organisations contributed other than PSU	1.70	0.67	1	3	17	
No. of projects by other than PSU	6.70	4.69	2	13	67	65%
Contribution by other than PSU (in lakhs)	158.58	157.40	4.7	414.27	1585.84	84%

Source: Authors’ calculation.

This table presents a descriptive analysis of CSR expenditure and project distribution for rural development activities carried out by PSU and Non-PSU companies over the study period. The statistics include average, standard deviation, minimum, maximum, total contribution, and percentage share. The findings reveal that the total average CSR expenditure on rural development projects was ₹189.44 lakhs, with a relatively high standard deviation of ₹162.68 lakhs, indicating substantial variation in annual spending levels among companies. The total CSR expenditure during the study period amounted to ₹1894.35 lakhs. Similarly, the average number of projects undertaken was 10.30 projects per year, with a total of 103 projects implemented. The analysis shows that PSUs had a limited contribution compared to Non-PSU companies. On average, only one PSU company contributed annually, undertaking

approximately 3.60 projects per year. The total number of PSU-supported projects was 36, representing 35% of total projects. The average amount contributed by PSUs was ₹30.85 lakhs, with a total contribution of ₹308.51 lakhs, accounting for only 16% of total CSR expenditure. The relatively lower mean and total values indicate modest participation of PSUs in rural development initiatives in the district. In contrast, Non-PSU companies played a dominant role in CSR-led rural development activities. The average number of Non-PSU organisations contributing annually was 1.70, and they implemented an average of 6.70 projects per year. The total number of projects executed by Non-PSU firms was 67, constituting 65% of the total projects undertaken. Financially, Non-PSU companies contributed an average of ₹158.58 lakhs, with total spending amounting to ₹1585.84 lakhs, which represented 84% of the total CSR expenditure during the study period. The higher contribution share and project involvement of Non-PSU firms suggest that private sector companies are more active and financially committed toward rural development initiatives in Ganjam district. The large standard deviation in Non-PSU spending further indicates differences in the scale of CSR investment among firms. Overall, the table demonstrates that while both PSU and Non-PSU companies participate in CSR activities, Non-PSU firms contribute significantly more in terms of both project implementation and financial allocation toward rural development.

Table 3: CSR Expenditure on Rural Development by PSUs & Non-PSUs

Year	Total Expenditure	PSU Contribution in %	Non-PSU Contribution in %
2014-15	856.94	3.31%	96.69%
2015-16	723.19	2.60%	97.4%
2016-17	170.08	0.18%	99.82%
2017-18	204.82	2.91%	97.09%
2018-19	26.67	61.83%	38.17%
2019-20	210.63	32.25%	67.75%
2020-21	435.97	28.84%	71.16%
2021-22	119.15	0.54%	45.56%
2022-23	198.74	5.03%	94.97%
2023-24	814.58	7.37%	92.63%

Source: Authors' calculation.

Table 3 presents the year-wise CSR expenditure on rural development activities in Ganjam district and highlights the relative contribution of PSU and Non-PSU companies during the study period from 2014–15 to 2023–24. The table indicates considerable fluctuations in total CSR expenditure across the years. The highest expenditure was recorded in 2014–15 at ₹856.94 lakhs, followed closely by 2023–24 with ₹814.58 lakhs. In contrast, the lowest expenditure was observed in 2018–19, amounting to only ₹26.67 lakhs. These variations suggest inconsistent CSR investment patterns over the years, possibly influenced by corporate priorities, economic conditions, project cycles, and regulatory compliance. The data further reveal that Non-PSU companies dominated CSR expenditure on rural development in most years. In 2014–15, Non-PSU firms contributed 96.69% of total expenditure, while PSU contribution was limited to 3.31%. A similar pattern continued in 2015–16 (97.4%), 2016–17 (99.82%), 2017–18 (97.09%), 2022–23 (94.97%), and 2023–24 (92.63%), demonstrating the overwhelming financial role of Non-PSU companies in supporting rural development initiatives. The year 2016–17 recorded the lowest PSU participation, with PSU companies contributing only 0.18% of the total expenditure, indicating near-complete dependence on Non-PSU firms for CSR funding during that year. Similarly, PSU participation remained negligible in 2021–22, contributing only 0.54% of total spending. However, a few years witnessed comparatively higher PSU involvement. In 2018–19, PSU companies accounted for 61.83% of total CSR expenditure, surpassing Non-PSU companies for the only time during the study period. Likewise, PSU contributions increased significantly in 2019–20 (32.25%) and 2020–21 (28.84%), indicating occasional active participation of public sector enterprises in rural development programmes. Overall, the table clearly demonstrates that although PSUs contributed in selected years, Non-PSU companies consistently remained the major contributors to CSR expenditure on rural

development in Ganjam district. The findings suggest stronger financial commitment and sustained CSR engagement from Non-PSU firms compared to PSUs. This pattern reflects the growing role of private sector enterprises in supporting local development and community welfare initiatives through CSR funding.

Table 4: Project-wise CSR Expenditure on Rural Development in Ganjam District

Major Projects	Expenditure	PSU Contribution (%)	Non-PSU Contribution (%)
Agriculture	910.75	100%	0%
Infrastructure	1555.41	19.51%	80.49%
Rural Livelihood	299.85	0%	100%
SHG/Enterprise Promotion	282.79	100%	0%
Renewable Energy	27.16	84.79%	15.21%

Source: Author's calculation.

Table 4 presents the project-wise distribution of CSR expenditure on rural development activities in Ganjam district and highlights the relative contribution of PSU and Non-PSU companies across different development sectors. The findings reveal that CSR expenditure was concentrated mainly in Infrastructure development, which received the highest allocation of ₹1555.41 lakhs. Among this amount, Non-PSU companies contributed 80.49%, while PSUs accounted for only 19.51%. This indicates that private sector firms played a dominant role in financing infrastructure-related rural development projects such as roads, community buildings, water facilities, sanitation, and other public utility services. The second-largest expenditure was observed in the Agriculture sector, which received ₹910.75 lakhs entirely from PSU companies (100%). The absence of Non-PSU contribution in this area suggests that PSUs were more actively involved in promoting agricultural development, possibly through initiatives related to farming support, irrigation, agricultural training, or allied activities. Similarly, projects related to Self-Help Groups (SHGs) and Enterprise Promotion received ₹282.79 lakhs, with the entire contribution coming from PSUs (100%). This reflects the emphasis of public sector enterprises on community empowerment, women's participation, and promotion of rural entrepreneurship through CSR interventions. In contrast, the Rural Livelihood category received ₹299.85 lakhs, fully financed by Non-PSU companies (100%). This suggests that private companies were more focused on income generation, skill development, employment creation, and livelihood enhancement programmes in rural areas. The table further shows that Renewable Energy projects received the lowest CSR allocation of ₹27.16 lakhs. In this category, PSUs contributed 84.79%, while Non-PSU firms accounted for 15.21%. Although the investment amount is relatively small, the higher PSU share indicates greater public sector interest in supporting sustainable and clean energy initiatives in rural areas. Overall, the table highlights distinct sectoral preferences between PSU and Non-PSU companies in CSR spending. PSUs were more concentrated on agriculture, SHG promotion, and renewable energy projects, whereas Non-PSU companies contributed predominantly toward infrastructure and rural livelihood development. The findings demonstrate that both sectors complement each other in addressing different dimensions of rural development in Ganjam district through CSR initiatives.

Table 5: T-Test Result for CSR Contribution between PSUs and Non-PSUs in Rural Development

Particulars	Value
Observations	11
Hypothesised Mean Difference	0
df	10
t Stat	-2.879
P(T<=t) one-tail	0.008
t Critical one-tailed	1.812
P(T<=t) two-tail	0.016
t Critical two-tailed	2.228

Source: Author's calculation.

Table 5 presents the results of an independent samples t-test assuming unequal variances, conducted to examine whether there is a statistically significant difference between the CSR contributions of PSU and Non-PSU companies toward rural development activities in Ganjam district. The t-test was conducted with 11 observations for each group under the assumption of unequal variances. The calculated t-statistic (-2.879) exceeds the critical two-tailed value (± 2.228) in absolute terms. Moreover, the two-tailed p-value (0.016) is less than the conventional significance level of 0.05. Therefore, the null hypothesis of no significant difference between PSU and Non-PSU CSR contributions is rejected. The findings confirm that there is a statistically significant difference in CSR expenditure patterns between PSU and Non-PSU companies in rural development initiatives in Ganjam district. The earlier descriptive results also imply that Non-PSU companies contributed significantly higher CSR funds than PSUs during the study period. This highlights the comparatively stronger financial participation of private sector enterprises in rural development activities and indicates their increasing role in supporting local socio-economic development through CSR initiatives.

5. Conclusion

The study examined the role of Corporate Social Responsibility (CSR) expenditure in promoting rural development in Ganjam district, Odisha, with a comparative analysis of PSU and Non-PSU companies. The findings reveal that CSR has emerged as an important corporate sustainability financing mechanism for supporting rural transformation and community development in the district. The analysis of CSR spending trends indicates considerable fluctuations in annual expenditure both at the Odisha state level and within Ganjam district. However, certain years, such as 2015–16, 2020–21, and 2023–24, recorded substantial CSR inflows into the district, reflecting growing corporate attention toward regional development initiatives. The descriptive analysis further shows that Non-PSU companies played a dominant role in rural development activities through CSR expenditure. Non-PSU firms contributed nearly 84% of the total CSR spending and implemented around 65% of the total projects undertaken during the study period. In contrast, PSU contributions remained comparatively lower in terms of both financial allocation and project implementation. The project-wise analysis also highlighted sectoral differences in CSR priorities. PSU companies are primarily focused on agriculture, SHG and enterprise promotion, and renewable energy projects, whereas Non-PSU companies concentrate more on infrastructure development and rural livelihood programmes. Infrastructure development emerged as the major area of CSR investment in the district. The statistical analysis using the independent-samples t-test confirmed a significant difference between the CSR contributions of PSU and Non-PSU companies. The results revealed that Non-PSU firms contributed significantly higher CSR funds toward rural development compared to PSU companies. This indicates the increasing role of private sector enterprises in supporting local socio-economic development through CSR initiatives.

Overall, the study concludes that CSR expenditure has become an important instrument for promoting inclusive and sustainable rural development in Ganjam district. The mandatory CSR provisions under the Companies Act 2013 have enabled companies to channel financial resources toward social welfare and developmental activities in rural areas. Although both PSU and Non-PSU companies have contributed to rural development, Non-PSU firms demonstrated stronger financial participation and wider project involvement. The study highlights the need for more structured, region-specific, and long-term CSR strategies to ensure balanced rural development and effective utilisation of corporate resources in backward and underserved regions.

The study carries important policy, managerial, and developmental implications. First, the findings highlight the growing role of CSR expenditure as a corporate sustainability financing mechanism for rural development. The significant contribution of Non-PSU companies indicates that private sector enterprises can play a crucial role in supporting inclusive growth and local socio-economic development through targeted CSR initiatives. The study also emphasises the need for policymakers and government agencies to encourage more balanced participation of PSU companies in rural development activities, particularly in backward and underserved districts such as Ganjam. Second, the sector-wise analysis suggests that CSR interventions can be made more effective through coordinated and region-specific planning. While PSU companies focused more on agriculture, SHG promotion, and renewable energy, Non-PSU firms concentrated on infrastructure and livelihood development. This complementary

pattern indicates the potential for collaborative CSR models involving government agencies, PSUs, private companies, and local communities to address multiple dimensions of rural development in an integrated manner. Third, the findings may help corporate organisations in designing more strategic CSR policies aligned with Sustainable Development Goals (SDGs), rural welfare, and long-term community empowerment. The study also underlines the importance of monitoring and evaluating CSR expenditure to ensure transparency, accountability, and effective utilisation of corporate resources. For researchers and academicians, the study contributes to the growing literature on CSR, sustainability financing, and rural development in the Indian context.

The present study is limited to CSR expenditure on rural development activities in Ganjam district and is primarily based on secondary data. Future research may extend the analysis to other districts or states to examine regional variations in CSR spending patterns and developmental outcomes. Comparative studies across industries and sectors may also provide deeper insights into the effectiveness of CSR initiatives undertaken by different categories of companies. Further studies can incorporate primary data from beneficiaries, local communities, and implementing agencies to assess the actual social and economic impact of CSR projects at the grassroots level. Researchers may also examine the relationship between CSR expenditure and specific development indicators such as employment generation, poverty reduction, education, healthcare, women's empowerment, and environmental sustainability. In addition, future research may explore the integration of CSR with ESG frameworks, sustainable finance practices, and Sustainable Development Goals (SDGs) to understand the evolving role of corporate institutions in sustainable development. Advanced statistical and econometric techniques can also be applied to measure the long-term effectiveness and efficiency of CSR investments in rural transformation.

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Values in Family Business Research: A Bibliometric Review

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Abstract: Over the past three decades, research on values in family businesses has grown steadily, reflecting increased recognition of how cultural, moral, and entrepreneurial value systems shape firm behaviour and longevity. Studies show that institutional and cultural contexts influence governance and value formation, family firms build sustainability-oriented capabilities, and philanthropic engagement is driven by tradition and spirituality. This study examines the evolution and intellectual structure of research on values in family businesses through a bibliometric analysis. The study analyses 363 publications indexed in the Web of Science database covering the period 1993–2025. Bibliometric techniques including performance analysis, citation analysis, source analysis, authorship productivity analysis, affiliation analysis, and keyword analysis were employed to identify publication trends, influential sources, collaboration patterns, and thematic development. The results indicate a steady expansion of the field with an annual growth rate of 9.05%, with publication activity increasing markedly after 2013 and peaking during 2021–2022. The dataset comprises 124 publication sources, with Family Business Review emerging as the most productive outlet with 54 publications. Collaboration patterns reveal an average of 2.92 authors per article and 42% international collaboration, reflecting the global and networked nature of research in this domain. Keyword analysis highlights dominant themes such as performance, leadership, governance, socioemotional wealth, and entrepreneurship, indicating the central role of values in shaping family firm behaviour and continuity.

1. Introduction

Family businesses represent one of the most influential forms of enterprise worldwide, contributing significantly to economic development, employment generation, and social stability. Unlike non-family firms, these organisations are characterised by the close integration of family values, traditions, and relational orientations within business operations. Such values shape governance structures, strategic choices, and long-term orientations, often influencing how family firms balance economic objectives with social and cultural considerations. Scholars increasingly recognise that the distinctive value systems embedded within family businesses play a crucial role in shaping their organisational behaviour and longevity. Previous research highlights that the value systems of family firms are often shaped by institutional and cultural contexts. These contextual influences affect governance practices, decision-making processes, and the strategic behaviour of family-controlled organisations (Liu, 2021). In particular, values associated with stewardship, social responsibility, and sustainability have been found to influence how family firms pursue long-term growth while maintaining continuity across generations (Tiberius et al., 2021; Giacomini & Jones, 2022). These value orientations often encourage a long-term perspective that prioritises stability, reputation, and legacy, distinguishing family firms from other organisational forms. Another important dimension explored in the literature concerns the relationship between family values and identity formation within family businesses. Studies suggest that identity construction in family firms is closely linked to the negotiation of cultural, familial, and organisational values (Essers et al., 2013). Such values are frequently transmitted across generations through processes

of socialisation and leadership succession. This intergenerational transfer of moral and competence-based values supports transgenerational entrepreneurship, enabling family firms to adapt and innovate while maintaining continuity with their founding principles (Dou et al., 2021).

As the field has evolved, researchers have approached the study of values in family businesses from diverse analytical perspectives. Some scholars have examined how cultural heritage and migration contexts influence the identity and networks of family firms (Hitchcock & Wesner, 2009). Others have explored the role of family-oriented philanthropic traditions in shaping organisational purpose and social engagement (Giacomin & Jones, 2022). Similarly, research has highlighted how value-driven sustainability practices enable family businesses to address environmental and social challenges, particularly in emerging markets (Malik et al., 2022). Values have also been found to influence strategic decisions such as internationalisation strategies (Xu et al., 2020) and organisational resilience during periods of crisis, including the disruptions caused by the COVID-19 pandemic (Bürgele et al., 2023). These diverse research streams collectively demonstrate that values are not merely cultural attributes of family businesses but central drivers of strategic and operational decision-making.

Despite the growing body of literature on values in family businesses, existing research remains fragmented across multiple academic disciplines, including management, entrepreneurship, ethics, and international business. Many studies focus on specific themes such as sustainability, governance, leadership, or succession, often examining values only within the context of these individual topics. As a result, the broader intellectual structure and development of scholarship on values in family businesses remain insufficiently mapped. This fragmentation makes it challenging for researchers to identify major trends, influential studies, and the key contributors shaping this field.

Furthermore, although the family business literature has expanded considerably over the past three decades, relatively few studies have attempted to systematically analyse the evolution of research on values within family firms. In particular, there is limited bibliometric research examining patterns of scientific production, citation dynamics, influential publication sources, and leading scholars in this domain. Bibliometric analysis provides a systematic and quantitative approach to mapping the intellectual landscape of a research field by examining publication patterns, citation networks, and scholarly contributions over time. Such analysis can help consolidate fragmented knowledge, identify influential works, and highlight emerging research directions.

Given the rapid expansion of family business scholarship, a comprehensive bibliometric overview is necessary to better understand how research on values in family businesses has developed over time. This study addresses this need by conducting a bibliometric analysis of publications indexed in the Web of Science database from 1993 to 2025. Using bibliometric techniques and analytical tools such as Bibliometrix and Biblioshiny, the study examines patterns of scientific production, citation trends, leading publication sources, and major contributing authors within this research domain. Accordingly, the study seeks to address the research questions such as how has scientific production on values in family businesses evolved over time?, what are the citation patterns and influential publications shaping this research field? which journals and sources contribute most significantly to the dissemination of research on values in family businesses? who are the leading authors contributing to the development of this research domain?

By addressing these questions, the study contributes to the literature in several ways. First, it provides a systematic mapping of the intellectual landscape of research on values in family businesses over more than three decades. Second, it identifies key publication trends, influential works, and major contributors that have shaped the development of this research area. Third, by consolidating fragmented scholarship across disciplines, the study offers a clearer understanding of how values have been conceptualised and studied within family business research. The findings thus provide useful insights for scholars seeking to advance theoretical and empirical research on the role of values in family businesses.

2. Literature Review

Scholarly interest in family businesses has grown substantially over the past few decades, with increasing attention given to the role of values in shaping organisational behaviour and long-term strategic orientation. Family businesses are often distinguished from other organisational forms by the strong influence of family values, traditions, and relational norms that guide decision-making and governance practices. These values frequently shape how firms balance economic goals with social and cultural responsibilities, thereby influencing their long-term sustainability and continuity (Liu, 2021). One major stream of research focuses on the role of values in governance and strategic orientation within family firms. Studies suggest that family-controlled businesses tend to adopt long-term perspectives rooted in stewardship values, which encourage responsible management, sustainability, and commitment to stakeholders (Tiberius et al., 2021; Giacomini & Jones, 2022). Such value systems often guide strategic decision-making and contribute to organisational stability across generations. A second important research stream examines identity formation and intergenerational value transmission in family businesses. Scholars have emphasised that the identity of family firms is shaped by the interaction between family culture and organisational practices (Essers et al., 2013). Through processes of socialisation and succession, family members transfer moral and competence-related values to subsequent generations, supporting transgenerational entrepreneurship and long-term continuity of the firm (Dou et al., 2021). A third line of research highlights the influence of values on strategic actions and organisational behaviour. Studies have explored how cultural heritage and migration contexts influence family business identity and networking practices (Hitchcock & Wesner, 2009). Other research has examined the role of philanthropic traditions embedded within family values in shaping corporate purpose and social engagement (Giacomini & Jones, 2022). Similarly, value-driven approaches to sustainability have been found to guide environmental and social initiatives in family firms, particularly in emerging economies (Malik et al., 2022). Values also influence strategic decisions such as internationalisation processes (Xu et al., 2020) and organisational resilience during crises such as the COVID-19 pandemic (Bürgel et al., 2023). Although these studies demonstrate the importance of values in family business research, the literature remains fragmented across multiple disciplines, including management, entrepreneurship, ethics, and international business. Most existing studies focus on specific thematic areas—such as sustainability, leadership, governance, or succession—rather than examining the broader intellectual development of research on values in family businesses. Consequently, there is limited understanding of the overall research landscape, including publication trends, influential works, leading authors, and dominant publication outlets within this field. Bibliometric analysis offers a systematic approach for addressing this limitation by mapping the structure and evolution of a research domain through the analysis of scientific publications and citation patterns. To address this gap, the present study conducts a bibliometric analysis of publications on values in family businesses indexed in the Web of Science database between 1993 and 2025. By examining annual scientific production, citation dynamics, key publication sources, and leading authors, the study provides a comprehensive overview of the field's development and identifies potential directions for future scholarship.

Research Methodology

2.2. Research Design

This study adopts a bibliometric research design to systematically analyse the development of scholarly literature on values in family businesses. Bibliometric analysis is a quantitative method widely used to evaluate patterns in academic publications, including scientific productivity, citation structures, and influential contributors within a research field. This approach is particularly suitable for research domains that are interdisciplinary and fragmented, such as studies on values in family businesses, which encompass themes including sustainability, philanthropy, cultural identity, and transgenerational entrepreneurship. By applying bibliometric techniques, the study provides a structured overview of the intellectual development, influential works, and major contributors within this evolving research area.

2.3. Data Source and Search Strategy

The data for this study were retrieved from the Web of Science (WoS) Core Collection, a widely recognised database known for its rigorous indexing standards and comprehensive coverage of high-

quality peer-reviewed literature. The database was selected because it ensures reliable citation information and is commonly used in bibliometric studies.

To identify relevant publications, a keyword-based search was conducted using combinations of terms related to family businesses and values. The primary search string used was:

TS = (“Family Business” OR “Family Firm” OR “Family Enterprise”) AND (“Value*” OR “Family Values” OR “Entrepreneurial Values” OR “Organisational Values”). **

The search was conducted across the title, abstract, and keyword fields to ensure retrieved publications were directly relevant to the topic.

2.4. Time Period

The study covers the period 1993–2025. The starting year, 1993, corresponds to the earliest indexed publication within the Web of Science database that explicitly addressed values in the context of family businesses. Examining literature from this point onward allows the study to capture the full historical development of this research domain over more than three decades. The end year, 2025, reflects the most recent publications available at the time of data collection, thereby providing an up-to-date overview of the field.

2.5. Data Filtering and Final Dataset

The initial search produced a larger set of records. To ensure the relevance and quality of the dataset, several filtering steps were applied. First, only English-language publications were included to maintain consistency in analysis. Second, the document types were limited to articles, early access articles, and conference proceedings, as these forms of publication represent primary scholarly contributions. Third, duplicate records and publications not directly related to the study topic were removed through manual screening of titles and abstracts.

After applying these filtering criteria, the final dataset consisted of 363 documents published between 1993 and 2025 across 124 academic journals.

2.6. Data Processing and Software

The bibliometric data were exported from the Web of Science database in a compatible format and analysed using the Bibliometrix R-package and its web-based interface, Biblioshiny. These tools are widely used in bibliometric research and enable the systematic analysis and visualisation of bibliographic data. The software facilitated the extraction and analysis of key metadata fields, including authors, publication years, keywords, journal sources, and citation counts.

2.7. Analytical Techniques

The study employs several bibliometric techniques to examine the structure and development of research on values in family businesses. First, performance analysis was conducted to evaluate annual scientific production and identify growth trends in the field. Second, citation analysis was used to identify highly influential publications and examine citation patterns within the literature. Third, source analysis was performed to determine the most productive and influential journals publishing research on this topic. Finally, author productivity analysis was conducted to identify leading contributors to the field and assess their scholarly impact.

Through these analytical techniques, the study provides a comprehensive overview of the evolution of research on values in family businesses, highlighting major publication trends, influential works, and key contributors within the academic community.

3. Results and Discussion

3.1. Descriptive Bibliometric Performance

The descriptive bibliometric performance of the dataset reveals a steady expansion of scholarly attention to values in family businesses over the past three decades. The analysis covers 363 publications indexed in the Web of Science database between 1993 and 2025, with an annual growth

rate of 9.05%, indicating a consistent increase in research activity. These publications are distributed across 124 different sources, reflecting the multidisciplinary nature of the topic and the wide engagement of scholars from diverse research areas.

The dataset demonstrates a notable scholarly impact, with an average of 35.26 citations per document, suggesting that studies in this area have contributed substantially to the development of family business scholarship. The presence of 1,185 author keywords and 956 Keywords Plus further indicates a broad thematic scope, encompassing areas such as succession, governance, organisational culture, and entrepreneurship. This diversity highlights the intersection of values with multiple dimensions of family firm research.

Collaboration patterns also reveal the increasingly networked nature of the field. The average number of authors per publication is 2.92, while approximately 42% of the studies involve international collaboration, reflecting the growing globalisation of family business research. Although 44 publications were produced by single authors, the majority of contributions are collaborative works. Research articles dominate the dataset, accounting for 351 documents, which underscores the empirical and theoretical depth of the field.

3.2. Annual Scientific Production

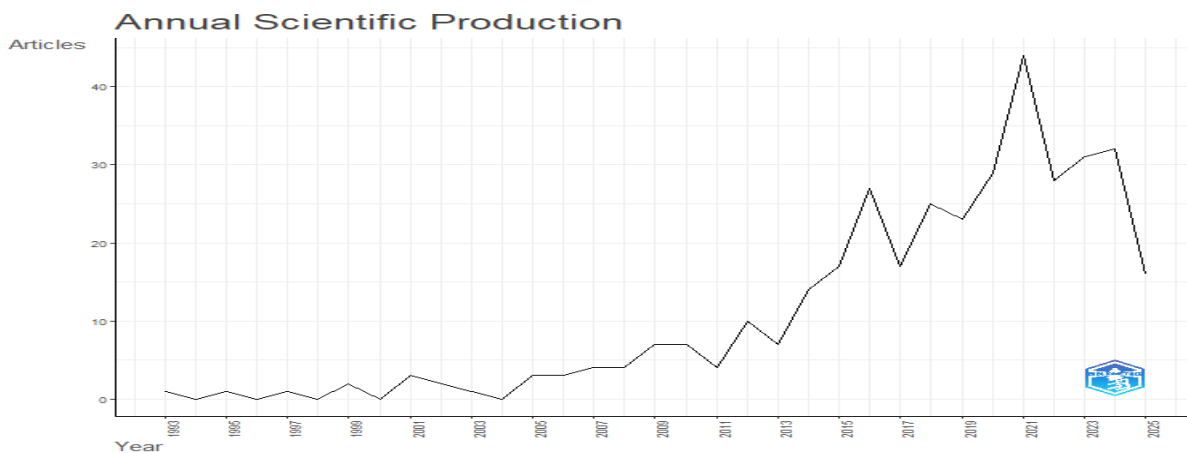


Figure 1: Annual Scientific Production

Source: Authors' work.

Since the increase in scholarly interest and acknowledgement surrounding values in family businesses has been reflected in the overall increase in scientific activity since the early years of this area of research, it can be inferred that from 1993 to early 2000, there were few publications about family business value systems. However, between 2007 and 2013, there was a moderate growth rate before the number of publications increased dramatically within this time frame, leading up to 2021/2022 due to increased emphasis in research and scholarship around succession planning, governance structures, entrepreneurial value systems/founders' values, and family dynamics, respectively. As a result of the surge of research activity during these years, there was a complementary increase in both the volume of research papers submitted and the citation patterns associated with these papers. For example, the dramatic increase in publication activity during this timeframe may be seen as part of a broader increase in interest and attention toward issues such as resiliency, continuity, and value preservation associated with economic and social change within the context of family businesses across the globe. Although 2024 and 2025 experience lower levels of activity compared to other recent years, these years should not be interpreted as a decrease in interest and/or productivity; rather, this apparent decrease in productivity is likely partially attributable to the fact that many articles published during the current year will not yet be fully indexed in larger databases, and therefore lag behind previous-year published articles. There is an obvious trend within this category that indicates an increasingly emerging and growing body of academic literature, as well as increased academic interest and engagement with this body of literature.

3.3. Citation Patterns

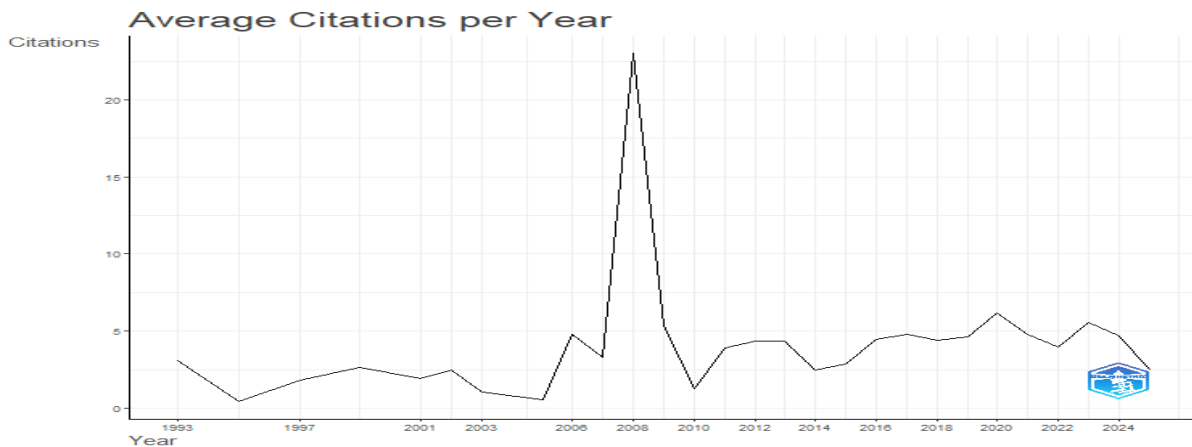


Figure 2: Average Citation Per Year
Source: Authors' work.

The average citation trend for Family Business & Values reflects an inconsistent academic communication within this area until 2008, when we see a significant spike in the number of citations. This spike suggests that in or around 2008, several articles were published, which caused a group of researchers to conduct additional studies that shaped the academic development of the field. The early low citation counts suggest that prior to 2008, the Family Business & Values area was still developing and had limited academic interest. Following this spike in citations beyond 2008, the average citation counts have since stabilised and have increased at a much slower rate because the research has become increasingly diverse, and new themes and topics have been developed in relation to family businesses. The recent decline in average citation counts after 2023 is likely a result of citation lag, where the time has not sufficiently allowed researchers to add to their citations, and the filing and indexing processes of new research articles have not been fully completed. As a result, while the core publications have continued to anchor the Family Business & Values area, the citation contributions have become more evenly distributed over time.

3.4. Source Impact and Journal Relevance

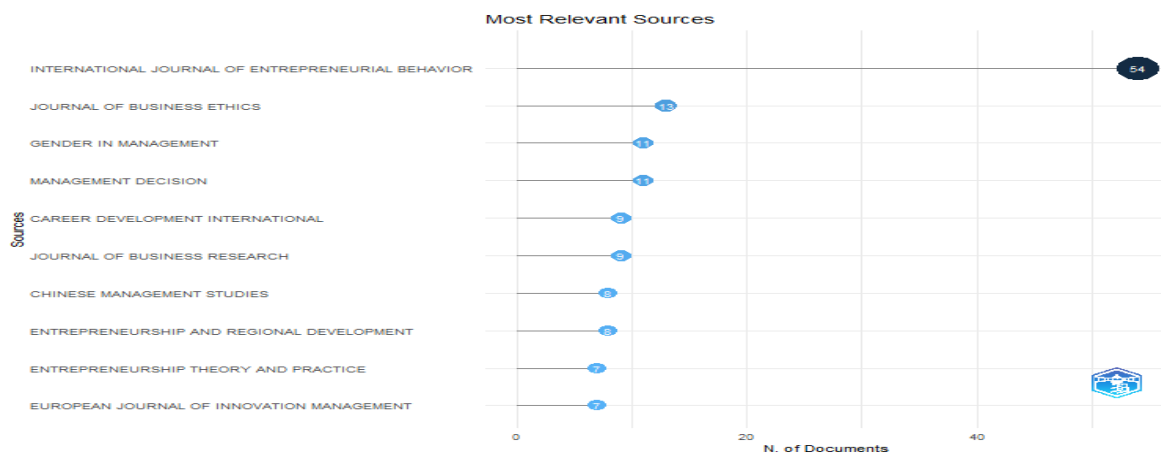


Figure 3: Most Relevant Source
Source: Authors' work.

The Family Business Review has the largest number of articles published about values in family businesses (54), making it the leading source of academic information in this area. The Family Business Review is recognised as the leading site of research results about the dynamics, governance, and transfer of values within families engaged in business activities. The Journal of Family Business Strategy (13), Creativity and Innovation Management (11), and International Journal of Innovation Management (11) were identified as being important for their connection to the key areas of Family Business and Family

Business Strategy, which is supported by the connection of Family Businesses to the Themes of Innovation and Strategic Development. Entrepreneurship is also captured through other academic sources, such as journal articles published in the Journal of Business Research, the Entrepreneurship & Regional Development Journal, and the International Entrepreneurship and Management Journals. It is clear from these findings that the study of family business values is linked with both entrepreneurial behaviours and the performance of family businesses. Overall, the majority of publications are located within a relatively limited number of academic journals. This indicates that there is a strong structure and academic integrity to the overall body of Family Business research, and that Family Business Review serves as the major academic outlet for Family Business-related research.

3.5. Authorship Productivity and Research Networks

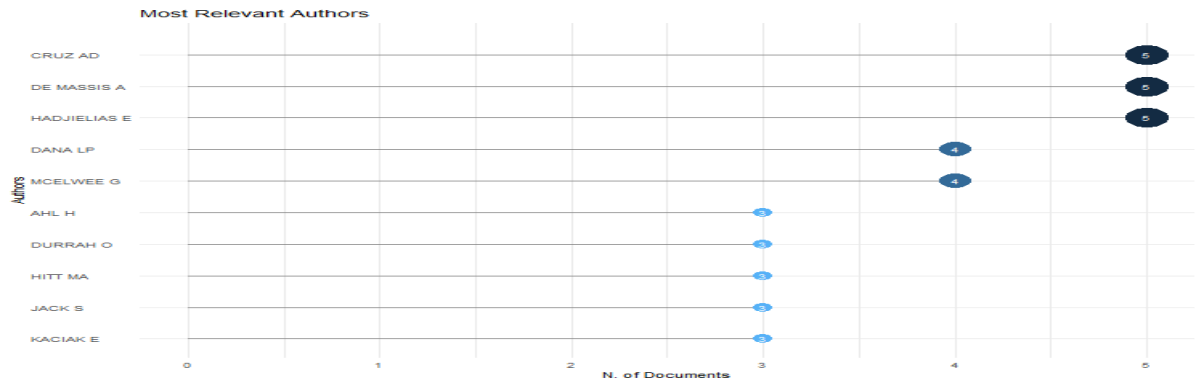


Figure 4: Most Relevant Authors

Source: Authors' work.

The visualisation of research involving family businesses reveals that the productivity of most of its contributors is heavily concentrated among a small number of authors. Cruz A.D., De Massis A., and Hadjielias E. are examples of prominent authors with 5 publications each, and thus hold the most significant impact on shaping value-related knowledge in the family business context. Most of the other authors who have made substantial contributions are listed in terms of mid-level contributors (Zellweger T. and Sharma P. – 4 publications) due to their consistent efforts in furthering both theoretical and empirical knowledge related to family business values. The data show that other authors contributing 2-3 publications can be seen as representing an expanding base of active researchers with increasing levels of collaboration and research activity in the family business area. Overall, these data suggest that there exists a clearly defined group of core authors who are leaders in this field and an expanding network of other contributors to this field, confirming that research related to family business values has developed into a mature and vibrant area of scholarly activity with ongoing levels of sustained interest.

3.6. Authors' Production Over Time

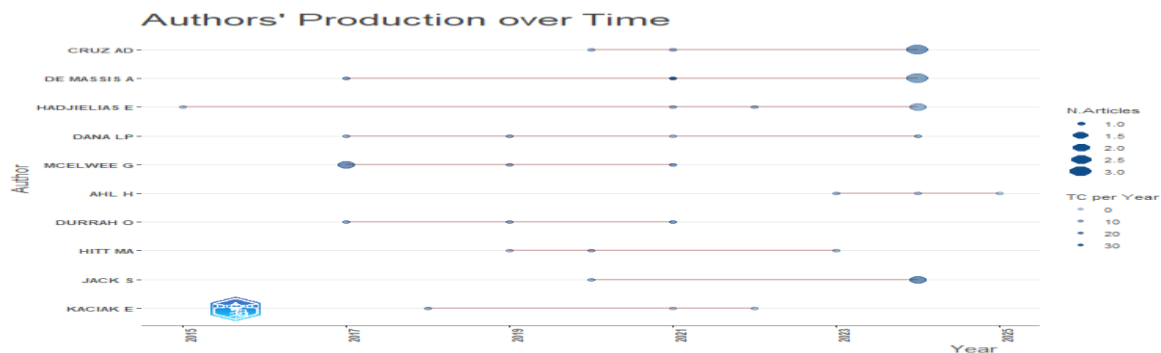


Figure 5: Authors' Production Over Time

Source: Authors' work.

Authors have been producing a body of scholarly work focused on the study of values within family businesses. The results have shown similar trends over the years, demonstrating an increasing interest

and magnitude of growth in the amount of research being done on family business values by different authors. A number of key people (notably, Cruz A.D., De Massis A., and Hadjielias E.) continue to lead the development of family business values; each of these contributors shows significantly increased publication and citation levels, especially in 2023 and 2024. Previous contributors (such as McElwee G.) still have a large citation impact, but because they are less active, this indicates that they were also instrumental in establishing the foundation of the topic. Intermittent contributions from additional authors (such as Dana L.P., Dorrah O., and Kaciak E.) demonstrate additional engagement and diversity of ideas about the field. Overall, the trend shows an increase in collaboration and ideas being developed through the core group of active researchers contributing to the advancement of a theory and empirical knowledge base concerning the transmission of values between family-owned businesses.

3.7. Relevant Affiliations

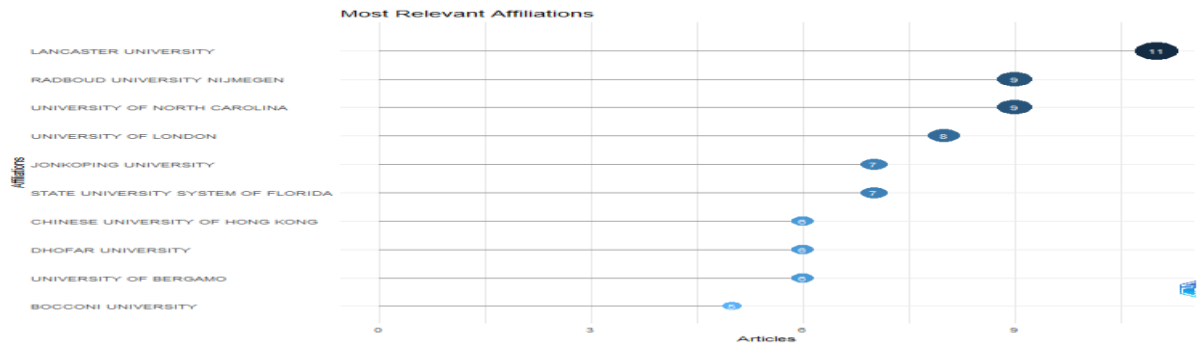


Figure 6: Most Relevant Affiliations

Source: Authors' work.

The analysis of the most cited articles in the value area of family business research indicates the concentration of publications in leading institutions around the world. There is a total of 11 publications from the most influential institution. i.e, Jönköping University, which has established itself firmly as a centre for family business research. In second position are the Free University of Bozen-Bolzano and the University of North Carolina, both with 9 publications each, and they continue to advocate forth with value-based and behavioural issues in the family business area. There are also considerable contributions from the University of London (8), Lancaster University (8), and the European University Institute (7), to signal geographical diversity within the inter-collaboration networks that create this research. This is further emphasised by the number of institutions supplying five to eight documents, indicating that the growth of value-based foundations and increasing inter-institutional collaboration is occurring throughout the United States as well as Europe. In summary, this pattern of distribution confirms that research in the family business area related to values is developing through numerous prominent European and North American centres of excellence and growing interest at an international and interdisciplinary level.

3.8. Most Relevant Words

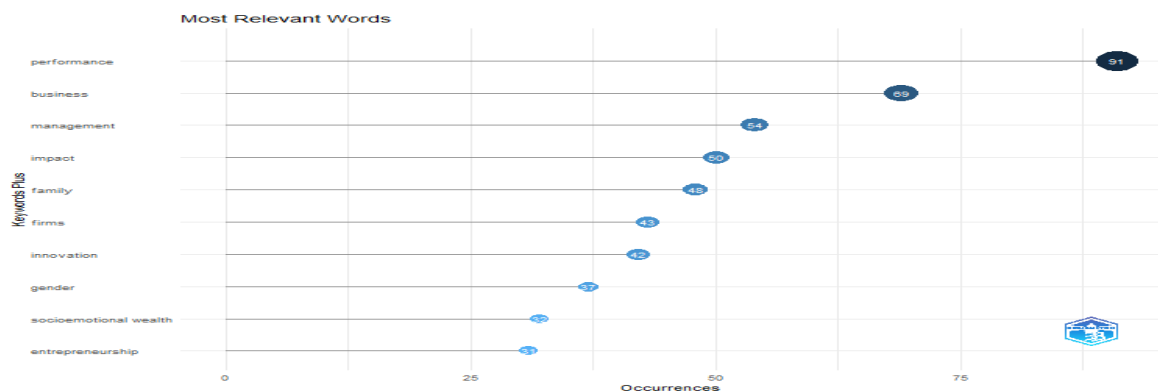


Figure 7: Most Relevant Words

Source: Authors' work.

The visualisation of relevant keywords and topic areas related to research in family business values shows where the key themes lie. The word “performance” (91 times) was the most frequently mentioned keyword, suggesting the majority of literature published on family business values links collections of value systems to performance outcomes, long-term sustainability, and success. Following “performance”, the key topic areas included “leadership” (69), “management” (54), and “impact” (50); therefore, highlighting the importance of value systems towards shaping strategic behaviours, governance structures, and the culture of their organisations. The use of “firm”, “innovation”, and “gender” demonstrates the evolving nature of this field; therefore, linking family value systems with an organisation’s innovation capabilities, the impact of gender on it, and the identity of the family firm. Additionally, terms such as “socioemotional wealth” and “entrepreneurship” are indicative of the theoretical frameworks used to study value-driven decision making. Overall, the patterns indicate a well-established area of study with the foundations of performance, leadership, and governance, but also moving toward an emphasis on innovation, gender-based perspectives, and socioemotional wealth.

3.9. Thematic Map Analysis

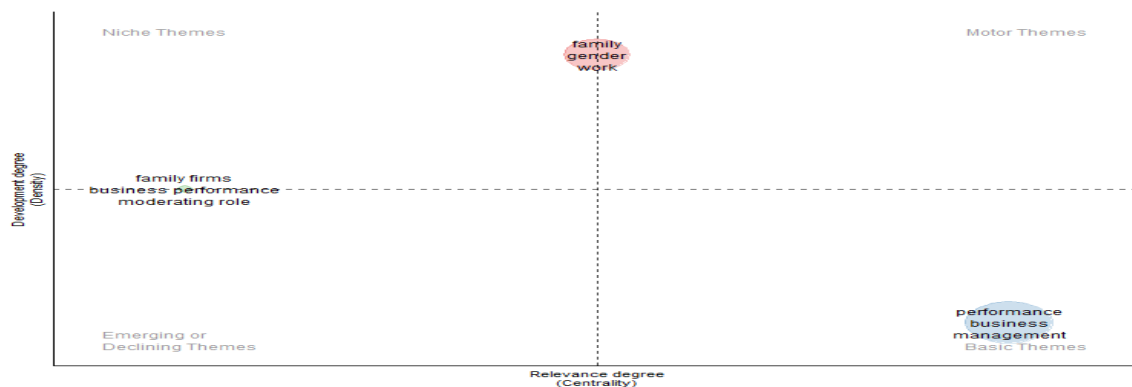


Figure 8: Thematic Map Analysis

Source: Authors’ work.

The thematic map generated from keyword co-occurrence analysis provides insight into the conceptual structure of research on values in family businesses by positioning themes according to centrality (relevance to the field) and density (degree of thematic development). The map is divided into four quadrants representing motor themes, niche themes, basic themes, and emerging or declining themes.

The basic themes quadrant (high centrality, low density) is dominated by the cluster comprising performance, business, and management. These themes represent the conceptual foundation of the literature, indicating that a significant proportion of studies examine the relationship between family values and firm performance, managerial practices, and strategic outcomes. Although these topics are central to the field, their relatively lower density suggests that they remain broad research areas that continue to evolve through integration with other emerging themes.

In the motor themes quadrant (high centrality and high density), the cluster containing family, gender, and work appears as a highly developed and influential research stream. This indicates that recent studies increasingly explore the intersection between family dynamics, gender roles, and work participation within family businesses. The position of this cluster suggests that gender-related perspectives are becoming a significant driver of contemporary research on family business values.

The niche themes quadrant (high density but lower centrality) includes the cluster family firms, business performance, and the moderating role. Themes in this quadrant are internally well developed but relatively specialised within the broader field. This indicates that some research streams focus on examining how specific variables moderate the relationship between family involvement and business performance, offering deeper analytical insights but within narrower contexts.

The emerging or declining themes quadrant shows limited thematic concentration, suggesting that most research topics in this domain are relatively established rather than declining. Overall, the thematic structure reveals that research on family business values is anchored in performance and management

perspectives while increasingly incorporating social and relational dimensions such as gender and family–work dynamics. This pattern reflects the gradual evolution of the field toward a more integrated understanding of how values influence both organisational outcomes and family participation in business activities.

4. Conclusion

This bibliometric study examined the development of research on values in family businesses over the period 1993–2025 using publications indexed in the Web of Science database. The findings show a clear and sustained increase in scholarly output, citation influence, and international collaboration, indicating that the study of values in family businesses has evolved into an established area of research within the broader family business literature. From a theoretical perspective, the study clarifies how the concept of values has been positioned within family business scholarship. The results show that values are closely connected with themes such as firm performance, governance, socioemotional wealth, entrepreneurship, and family identity. This highlights the role of values not only as cultural elements within family firms but also as factors influencing strategic decision-making, organisational behaviour, and intergenerational continuity. From a methodological perspective, the study demonstrates the usefulness of bibliometric techniques for examining the intellectual structure of a research field. By applying performance analysis, citation analysis, source analysis, keyword co-occurrence analysis, and thematic mapping, the study provides a systematic overview of publication trends, influential sources, collaborative patterns, and thematic development within the literature on family business values. This approach offers a structured framework for future scholars seeking to explore emerging topics within the field. From a practical perspective, the findings highlight the importance of values in shaping governance practices, leadership approaches, and long-term sustainability in family businesses. Understanding how family values influence strategic decisions can help business families, advisors, and policymakers support continuity and responsible management across generations.

Overall, the study shows that research on values in family businesses has expanded significantly and continues to evolve through new perspectives and interdisciplinary engagement. Future research could further explore the role of values in different institutional contexts, emerging economies, gender dynamics within family firms, and longitudinal changes in value transmission across generations. Such efforts will contribute to a deeper understanding of how values shape the long-term development of family businesses.

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Integrated Reporting Disclosures of South African Listed Companies: An Assessment in Conformity with International Integrated Reporting Framework

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Keywords

Integrated Reporting; Integrated Reporting Disclosure Index; Content Analysis; JSE-Listed Companies; International Integrated Reporting Framework.

JEL Classification

G34; G38; M41; M48

Abstract: The study aims to construct an Integrated Reporting Disclosure Index (IRDI) based on the content elements of the International Integrated Reporting Framework and examine the extent of integrated reporting practices and framework alignment among JSE-listed South African companies. The study is based on a sample of 40 Johannesburg Stock Exchange-listed South African companies over the period from 2017-18 to 2023-24, comprising 280 firm-year observations. The study adopts a descriptive and exploratory research design using secondary data collected from integrated reports of the selected companies. Content analysis has been employed to assess integrated reporting practices based on the content elements of the International Integrated Reporting Framework. An Integrated Reporting Disclosure Index (IRDI) has been constructed using a systematic scoring approach, while descriptive statistics and pivot table analysis have been used for data summarisation and presentation. The findings indicate a substantial improvement in integrated reporting practices among South African companies during the study period, reflecting increasing alignment with the International Integrated Reporting Framework. The study further reveals relatively stronger disclosure practices in governance and assurance-related elements, while variations continue to exist across different reporting elements and companies. The study highlights the importance of comprehensive integrated reporting practices in enhancing transparency, disclosure consistency, and stakeholder communication among companies.

1. Introduction

In the contemporary business environment, corporate reporting has emerged as a vital mechanism for communicating organisational performance, accountability, and value creation to stakeholders. Traditionally, corporate disclosures were predominantly confined to financial statements, emphasising historical financial performance and shareholder returns. However, over time, conventional financial reporting began to face increasing criticism for its inability to capture non-financial dimensions such as environmental performance, governance quality, social responsibility, risk management, and long-term sustainability prospects (Eccles & Krzus, 2010; Jensen & Berg, 2012). The growing expectations of investors, regulators, and other stakeholders consequently intensified the demand for a more comprehensive and forward-looking reporting framework. In response to these limitations, sustainability reporting and other forms of non-financial disclosures gradually gained prominence across the global corporate landscape. Although these reporting practices expanded the scope of corporate communication, they often remained fragmented and disconnected from financial reporting processes, thereby limiting stakeholders' ability to understand how organisations create value over time (de Villiers et al., 2014). The need for a more integrated and holistic reporting approach consequently led to the emergence of Integrated Reporting (IR), which seeks to combine financial and non-financial information into a single, coherent framework reflecting an organisation's strategy, governance, performance, and future outlook. The development and global promotion of Integrated Reporting was significantly advanced by the International Integrated Reporting Council through the introduction of

the International Integrated Reporting Framework (IIRF). The framework emphasised integrated thinking and advocated disclosure practices centered on long-term value creation through multiple capitals, namely financial, manufactured, intellectual, human, social and relationship, and natural capital (IIRC, 2013). Integrated Reporting thus represented a transition from isolated disclosure practices toward a connected reporting model capable of improving transparency, accountability, and stakeholder engagement. Among all countries, South Africa has been widely recognised as the pioneer and global leader in the adoption and institutionalisation of Integrated Reporting practices. The evolution of corporate governance reforms through the King Reports substantially transformed the reporting landscape in the country. In particular, the release of the King III Report in 2009 marked a significant turning point by advocating integrated reporting for companies listed on the Johannesburg Stock Exchange (JSE) under the “Apply or Explain” approach. Unlike traditional reporting systems, the framework encouraged organisations to present an integrated and holistic account of financial and non-financial performance within a single report. Subsequently, the King IV Report further strengthened governance and reporting practices by shifting towards an “Apply and Explain” approach and emphasising outcomes-based governance principles centered on ethical culture, effective control, legitimacy, and good performance (IoDSA, 2009; IoDSA, 2016). Despite South Africa’s globally acknowledged leadership in integrated reporting adoption and its relatively mature reporting environment, the existence of a mandatory reporting regime does not necessarily guarantee uniformity in disclosure practices and framework alignment across companies. Considerable variations may still exist in terms of reporting comprehensiveness, disclosure depth, and adherence to the content elements prescribed under the International Integrated Reporting Framework. In this context, examining the extent of integrated reporting practices among South African companies becomes an important area of investigation, particularly in understanding how effectively organisations align their reporting practices with internationally accepted integrated reporting principles. Against this backdrop, the present study attempts to construct an Integrated Reporting Disclosure Index (IRDI) based on the content elements of the International Integrated Reporting Framework and examine the extent of integrated reporting practices and framework alignment among JSE-listed South African companies. By evaluating reporting disclosures across major content elements over the study period, the research seeks to contribute to the growing body of literature on integrated reporting practices within one of the world’s most advanced integrated reporting environments. Hence, the study seeks to answer the following research questions:

- **RQ1:** In what manner can an Integrated Reporting Disclosure Index (IRDI) be constructed based on the content elements of the International Integrated Reporting Framework?
- **RQ2:** What is the extent of alignment between the integrated reporting practices of JSE-listed South African companies and the International Integrated Reporting Framework?

The present study is guided by the following objectives:

- To construct an Integrated Reporting Disclosure Index (IRDI) based on the content elements of the International Integrated Reporting Framework.
- To examine the extent of integrated reporting practices and alignment with the International Integrated Reporting Framework among JSE-listed South African companies.

2. Review of Literature

The evolution of corporate reporting practices has considerably altered the way organisations communicate with stakeholders regarding their financial and non-financial performance. Conventional financial reporting models were frequently criticised for concentrating primarily on historical financial outcomes while providing limited information regarding sustainability, governance practices, environmental responsibility, and long-term value creation capabilities of organisations (Eccles & Krzus, 2010; Jensen & Berg, 2012; Dumay et al., 2016). As stakeholder expectations expanded beyond purely financial considerations, sustainability reporting and ESG disclosures gradually emerged as important components of corporate communication (George et al., 2016; Bidari & Djajadikerta, 2020). Nevertheless, the separate presentation of financial and sustainability information often resulted in fragmented reporting structures that constrained stakeholders’ understanding of the interrelationship between strategy, governance, performance, and value creation processes (Abeysekera, 2013; Girella et al., 2019). Consequently, Integrated Reporting (IR) emerged as a more comprehensive reporting

approach aimed at integrating financial and non-financial information within a single, connected reporting framework. The development of integrated reporting was significantly strengthened by the International Integrated Reporting Council through the introduction of the International Integrated Reporting Framework (IIRF), which emphasised integrated thinking and long-term value creation through multiple capitals (IIRC, 2013). The theoretical foundations of integrated reporting have also been supported by several established theories, including stakeholder theory, agency theory, legitimacy theory, and institutional theory (Jensen & Berg, 2012; de Villiers et al., 2014; Adams et al., 2016; Vitolla et al., 2020). Stakeholder theory suggests that organisations are increasingly expected to address the information needs of diverse stakeholder groups rather than focusing solely on shareholders (Freeman, 1984). Similarly, agency theory advocates that broader and more transparent disclosures can reduce information asymmetry and agency conflicts between management and stakeholders (Jensen & Meckling, 1976; Frias-Aceituno et al., 2014). Institutional theory further explains how regulatory frameworks, professional norms, and market pressures encourage organisations to adopt similar reporting practices, particularly in environments where integrated reporting has gained formal institutional support (DiMaggio & Powell, 1983; Vaz et al., 2016). Within the global integrated reporting landscape, South Africa occupies a uniquely significant position due to its pioneering role in institutionalising integrated reporting practices. The implementation of the King III Report in 2009 represented a major turning point in corporate reporting by recommending integrated reporting for companies listed on the Johannesburg Stock Exchange (JSE) under the “Apply or Explain” approach. Subsequently, the King IV framework further reinforced integrated thinking and outcomes-based governance practices through the “Apply and Explain” model. As a result, South Africa became one of the earliest and most prominent jurisdictions where integrated reporting evolved from a voluntary communication mechanism into a strongly institutionalised reporting practice (Solomon & Maroun, 2012; de Villiers et al., 2014; Cheng et al., 2014). Owing to this distinctive reporting environment, South Africa has remained a major focus of integrated reporting research relating to disclosure quality, reporting practices, governance, value relevance, and stakeholder communication (Haji & Anifowose, 2016; Setia et al., 2015; Maroun & Prinsloo, 2020). Prior studies have extensively explored various dimensions of integrated reporting, including disclosure quality, determinants of adoption, firm performance implications, and framework implementation practices (Manes-Rossi et al., 2020; Raimo et al., 2020; Vitolla et al., 2020; Busco et al., 2019). While several studies observed that integrated reporting enhances transparency, stakeholder engagement, and value relevance (Knauer & Serafeim, 2014; Serafeim, 2015; Baboukardos & Rimmel, 2016), others argued that the existence of a mandatory or institutionalised reporting regime does not necessarily ensure uniformity in disclosure practices and substantive reporting alignment across firms (Ahmed Haji & Hossain, 2016; Buallay et al., 2020; Melloni et al., 2017). Therefore, despite South Africa’s advanced integrated reporting environment, evaluating the actual extent of reporting practices and alignment with the International Integrated Reporting Framework continues to remain an important area of academic and practical inquiry. In this context, the present study attempts to contribute to the growing body of integrated reporting literature by examining the disclosure practices of JSE-listed South African companies through the construction of an Integrated Reporting Disclosure Index (IRDI) based on the content elements prescribed under the International Integrated Reporting Framework.

3. Research Methodology

3.1. Scope of the Study

The present study examines the extent of integrated reporting practices and framework alignment among JSE-listed South African companies. The study focuses on the Top 40 companies listed on the Johannesburg Stock Exchange (JSE) over the period from 2017–18 to 2023–24. The Integrated Reporting Disclosure Index (IRDI) has been developed based on the content elements prescribed under the International Integrated Reporting Framework (IIRF) to assess the extent of disclosure practices followed by the sample companies.

3.2. Sources of Data

The study is based entirely on secondary data collected from integrated reports, annual reports, sustainability reports, and corporate disclosures published on the official websites of the selected

companies. Relevant literature, research articles, reports, and regulatory publications relating to integrated reporting have also been referred to for conceptual and methodological understanding.

3.3. Sample Design and Sample Size

The sample of the study comprises the Top 40 JSE-listed South African companies selected on the basis of market capitalisation, representing some of the largest and most prominent corporates operating within the South African economy. These companies were further selected based on the availability and consistency of integrated reporting disclosures throughout the study period. Since large listed companies are generally characterised by stronger stakeholder visibility, greater regulatory scrutiny, and relatively advanced reporting practices, the selected sample provides an appropriate setting for examining the extent of integrated reporting practices and framework alignment. The study employs balanced panel data consisting of 280 firm-year observations covering seven consecutive financial years from 2017-18 to 2023-24. South Africa has been selected for the study due to its globally recognised position as one of the earliest adopters of integrated reporting practices under the King governance framework.

3.4. Construction of Integrated Reporting Disclosure Index (IRDI)

The Integrated Reporting Disclosure Index (IRDI) has been constructed using the technique of content analysis based on the disclosure items derived from the International Integrated Reporting Framework (IIRF). The development of disclosure indices has been widely adopted in prior integrated reporting studies for assessing the extent and comprehensiveness of reporting practices (Haji & Anifowose, 2016; Kılıç & Kuzey, 2018; Pistoni et al., 2018; Vitolla et al., 2020). Accordingly, the present study develops a customised IR disclosure index suitable for the objectives and data setting of the study. Although the IIRF provides broad guiding principles and content elements for integrated reporting, the disclosure framework adopted in the present study does not represent an exact reproduction of the original framework. Certain content elements have been merged owing to conceptual similarities, while selected disclosure aspects have been further classified into specific sub-elements to improve analytical comprehensiveness. Additionally, certain important reporting aspects, such as assurance disclosures, have been incorporated separately to provide a more comprehensive assessment of integrated reporting practices. The construction of the disclosure index has therefore been guided both by the IIRF and prior integrated reporting literature. The IRDI comprises seven major disclosure elements, namely Organisational Overview, External Environment, Governance, Strategy and Resource Allocation, Performance, Outlook, and Assurance. Further, these seven disclosure categories have been classified into 26 specific disclosure sub-elements designed to capture the depth, comprehensiveness, and extent of integrated reporting disclosures among the sample companies. The annual integrated reports of the selected companies have been systematically examined using visual content analysis. The scoring framework has been designed using both weighted and non-weighted disclosure approaches, depending upon the nature of disclosure items. Certain indicators have been evaluated using a binary scale ranging from 0 to 1, while selected qualitative disclosure items have been assessed using a three-point scale ranging from 0 to 2 in order to capture differences in reporting depth, transparency, and disclosure comprehensiveness (Branco & Rodrigues, 2008; Hossain & Hammami, 2009; Pistoni et al., 2018). A score of “1” has been assigned where a disclosure item is present and “0” where it is absent. In selected cases, a higher score of “2” has been awarded where the disclosure demonstrates comparatively superior reporting quality and greater informational detail. Based on the scoring structure, Organisational Overview and Strategy & Resource Allocation carried a maximum score of 6 each, Governance and Performance carried 5 and 6 points respectively, External Environment and Outlook carried 4 points each, while Assurance carried a maximum score of 2. Accordingly, the maximum attainable disclosure score for a company in a particular financial year was 33. Thereafter, average disclosure scores were computed to determine the overall extent of integrated reporting practices and framework alignment among the selected South African companies.

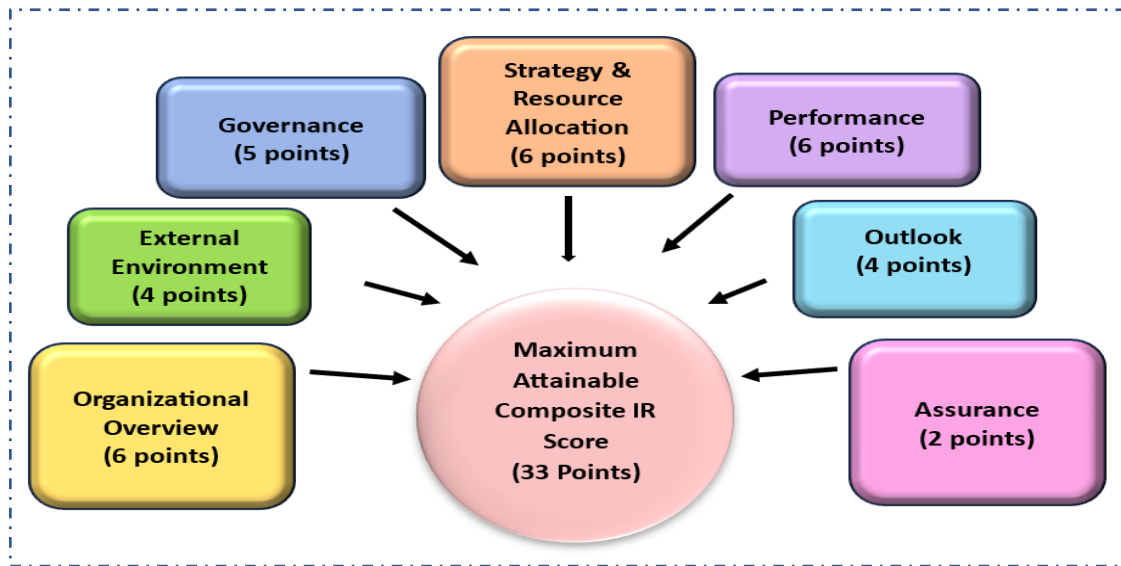


Figure 1- Integrated Reporting Quality Scores
Source: Authors' work.

Table 1: Content Elements and Sub-Elements of Integrated Reporting (IR) Index

PARTICULARS	SCORE
A. ORGANISATIONAL OVERVIEW	6
1. Mission & Vision Statement	2
<i>i. No Statement</i>	0
<i>ii. Mission/Vision</i>	1
<i>iii. Both Mission and Vision</i>	2
2. Value & Culture	2
<i>i. No mention</i>	0
<i>ii. General Comments on Ethical Values and Culture</i>	1
<i>iii. Code of conduct and list of values mentioned along with general comments</i>	2
3. Ownership & Operating Structure	1
<i>i. No mention</i>	0
<i>ii. Structure described</i>	1
4. Principal activities, markets, products, services	1
<i>i. No specification</i>	0
<i>ii. Activities/markets/products/services listed</i>	1
B. EXTERNAL ENVIRONMENT	4
1. Legal, Commercial, Social, Environmental, Political Environment	1
<i>i. No specification/mention</i>	0
<i>ii. Mentioned</i>	1
2. Key Risks & Opportunities	2
<i>i. Nothing specified</i>	0
<i>ii. Risks/Opportunities disclosed</i>	1

PARTICULARS	SCORE
iii. <i>Both risks and Opportunities were disclosed</i>	2
3. Material Issues/determination, impact on creating/preserving values	1
i. <i>No material issue discussion</i>	0
ii. <i>Disclosure of material issue/determination of creating/preserving value considered</i>	1
C. GOVERNANCE	5
1. Leadership structure, diversity, & skill set of those charged with governance	2
i. <i>Nothing mentioned</i>	0
ii. <i>Members of the BoD/Committees listed</i>	1
iii. <i>Members of the BoD/Committees are listed along with their experience and skills</i>	2
2. Specific processes utilised to monitor strategic decisions	1
i. <i>No actions are determinable from narratives</i>	0
ii. <i>Determinable actions</i>	1
3. Executive pay/bribery & corruption norms/political lobbying/ tax strategy	1
i. <i>No mention</i>	0
ii. <i>Mentioning of Executive pay/bribery & corruption norms/political lobbying & tax strategy</i>	1
4. Responsibility taken by those in charge of governance	1
i. <i>No mention</i>	0
ii. <i>List of responsibilities taken by the BoDs</i>	1
D. STRATEGY & RESOURCE ALLOCATION	6
1. Short, Medium, Long-term Objectives	1
i. <i>No mention</i>	0
ii. <i>Strategic objectives with/without a time frame stated</i>	1
2. Implementation plan wrt Business Model	1
i. <i>No mention</i>	0
ii. <i>Specific actions taken/planned are described</i>	1
3. Effect on key capital/risk management arrangements	2
i. <i>Not Mentioned</i>	0
ii. <i>Any one arrangement disclosed</i>	1
iii. <i>Both arrangements were elaborately disclosed</i>	2
4. Stakeholders' consultation & formulating strategies	2
i. <i>No specific details</i>	0
ii. <i>Stakeholders identified</i>	1
iii. <i>Engagement avenues described</i>	2
E. PERFORMANCE	6
1. Key Performance Indicators	1
i. <i>No fixed performance measures</i>	0

Integrated Reporting Disclosures of South African Listed Companies: An Assessment in Conformity
with International Integrated Reporting Framework

PARTICULARS	SCORE
ii. <i>KPIs or equivalent</i>	1
2. Disclosure of positive and negative effects on the capitals	2
i. <i>No consideration for the 6 capitals</i>	0
ii. <i>Any/Few of the 6 capitals taken into consideration</i>	1
iii. <i>All of the 6 capitals taken into consideration</i>	2
3. Stakeholder's relationships and organisations' response toward their legitimate needs	1
i. <i>No Provision</i>	0
ii. <i>Formation of Stakeholder's Relationship Committee with a list of steps taken to meet their needs</i>	1
4. Linkage with past, current, and Outlook performance	1
i. <i>No linkage provided</i>	0
ii. <i>Linkage provided</i>	1
5. Comparison against regional/ industry benchmarks	1
i. <i>No benchmarks</i>	0
ii. <i>Benchmarks used</i>	1
F. OUTLOOK	4
1. Management's expectations	1
i. <i>No such statement</i>	0
ii. <i>Expectations described</i>	1
2. Likely operating context	1
i. <i>No express consideration given</i>	0
ii. <i>Future context discernible from narrative</i>	1
3. Real risk with extreme consequences	1
i. <i>No mention</i>	0
ii. <i>Provided</i>	1
4. Key assumptions, possible risks	1
i. <i>No consideration given</i>	0
ii. <i>Mentioned</i>	1
G. ASSURANCE	2
1. Mandatory Audit/ Review/ Internal Audit	1
i. <i>No assurance</i>	0
ii. <i>Mandatory audit/ review/ internal audit</i>	1
2. Disclose the individuals involved in the preparation and review of the report	1
i. <i>No Disclosure</i>	0
ii. <i>Mentioned</i>	1
MAXIMUM SCORE (A+B+C+D+E+F+G)	33

Source: Self-compiled.

The above table presents the Integrated Reporting Disclosure Index (IRDI) framework developed for the study based on the content elements of the International Integrated Reporting Framework (IIRF). The index comprises seven major disclosure categories and 26 sub-disclosure elements with a maximum attainable composite score of 33.

4. Results and Discussion

4.1. Reliability Analysis of the IRQ Index

To ensure the reliability and consistency of the disclosure framework adopted in the study, the self-constructed Integrated Reporting Disclosure Index (IRDI) based on visual content analysis has been subjected to reliability assessment (Guthrie et al., 2004; Nguyen et al., 2021). Since the disclosure index has been developed using the content elements of the International Integrated Reporting Framework (IIRF) and the data collection process involved manual examination of integrated reports, establishing the dependability of the measurement instrument becomes essential (Haji & Anifowose, 2016; Nguyen et al., 2021).

In this regard, Cronbach’s Alpha has been employed to examine the internal consistency of the disclosure index for the 40 sample South African companies. The reliability analysis has been conducted based on six major disclosure elements, namely Organisational Overview, External Environment, Governance, Strategy and Resource Allocation, Performance, and Outlook. Although the IRDI comprises seven content elements, the Assurance component has been excluded from the reliability analysis due to the absence of variability in disclosure scores across the sample companies and study period.

Table 2: IRQ Index Reliability Statistics

Cronbach’s Alpha	No. of Items
0.925	6

Source: Self-compiled.

A Cronbach’s Alpha value above 0.90 indicates excellent reliability and strong internal consistency among the items (Nunnally, 1978; George & Mallery, 2003). Since the obtained alpha coefficient is 0.925, the IRQ Index is considered highly reliable and suitable for further statistical analysis.

4.2 Extent of Integrated Reporting (Year-wise Analysis)

Table 2: Year-wise Average IR Compliance Scores

Year	Organisational Overview	External Environment	Governance	Strategy & Resource Allocation	Performance	Outlook	Assurance	Overall IR Quality
2017-18	0.423	0.575	0.790	0.488	0.492	0.500	1.00	0.609
2018-19	0.456	0.650	0.830	0.598	0.592	0.638	1.00	0.681
2019-20	0.583	0.838	0.885	0.773	0.767	0.825	1.00	0.810
2020-21	0.667	0.906	0.950	0.875	0.892	0.931	1.00	0.889
2021-22	0.746	0.956	0.965	0.971	0.946	0.975	1.00	0.937
2022-23	0.813	0.988	0.975	0.979	0.975	0.988	1.00	0.959
2023-24	0.833	0.981	0.965	0.975	0.967	0.988	1.00	0.958
Total	0.646	0.842	0.908	0.808	0.805	0.836	1.00	0.835

Source: Self-compiled.

Table 2 presents the year-wise average Integrated Reporting (IR) compliance scores of the Top 40 South African companies during the period from 2017-18 to 2023-24 across all seven disclosure elements. The results indicate a steady and substantial improvement in integrated reporting practices throughout the study period. The overall IR compliance score increased significantly from 0.609 in 2017–18 to 0.958 in 2023–24, reflecting a strong enhancement in the level of alignment with the International Integrated Reporting Framework (IIRF). The disclosure element Organisational Overview, which primarily focuses on the company’s mission, vision, ownership structure, and principal activities, demonstrates a gradual increase in disclosure score from 0.423 in 2017–18 to 0.833 in 2023–24.

Although the improvement remains consistent over the years, the disclosure level under this category continues to be relatively lower compared to the other reporting elements, suggesting further scope for enhancement in communicating organisational background and strategic identity. The External Environment element records a substantial increase from 0.575 in 2017–18 to 0.981 in 2023-24, indicating that South African companies increasingly emphasise disclosures relating to legal, social, environmental, commercial, and risk-related factors affecting organisational value creation. Similarly, Governance disclosures exhibit consistently high compliance scores throughout the study period, increasing from 0.790 in the initial year to 0.965 by 2023-24. This reflects the strong governance orientation prevailing within the South African corporate reporting environment, particularly with respect to board structure, leadership accountability, executive oversight, and monitoring mechanisms. A remarkable improvement is also observed in the disclosure element Strategy and Resource Allocation, where the average score increased from 0.488 in 2017–18 to 0.975 in 2023–24. The findings suggest that companies have progressively strengthened disclosures relating to strategic objectives, resource deployment, stakeholder engagement, and long-term planning. Likewise, the Performance element demonstrates considerable progress, rising from 0.492 to 0.967 during the study period, indicating enhanced disclosure of KPIs, value creation processes, stakeholder responsiveness, and comparative performance measures. The Outlook category also portrays significant advancement, with disclosure scores increasing from 0.500 in 2017–18 to 0.988 during the last two financial years of the study period. This indicates growing emphasis on future-oriented disclosures, anticipated business conditions, strategic uncertainties, and potential organisational risks. Further, the Assurance element records a perfect disclosure score of 1.00 throughout the study period, highlighting the strong emphasis placed by South African companies on audit, review, and report credibility mechanisms. Overall, the results reveal that South African companies demonstrate a high and progressively improving level of integrated reporting compliance across all major disclosure elements. The consistently rising trend in IR scores indicates increasing institutionalisation of integrated reporting practices within the South African corporate environment. Further, the stabilisation of disclosure scores during the later years of the study period suggests that many firms may have approached a relatively mature stage of reporting alignment under the existing framework.

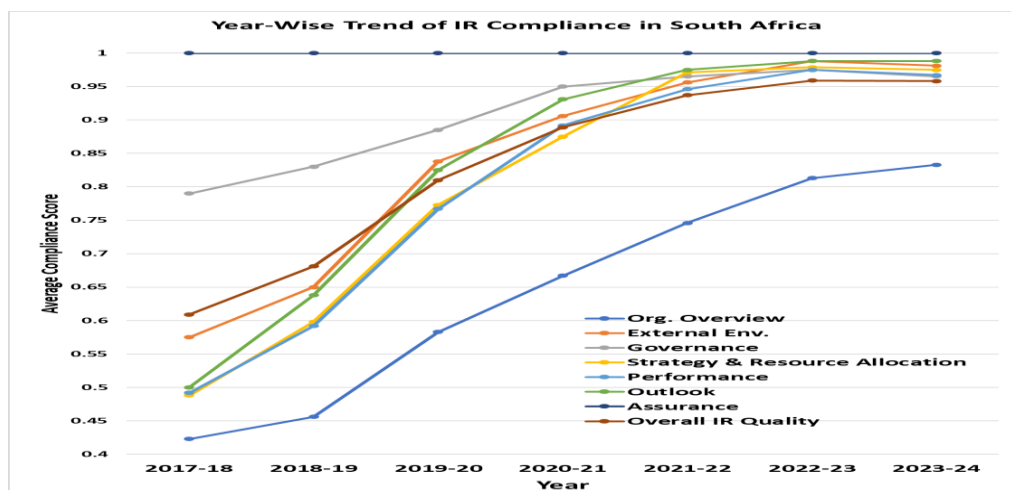


Figure 2: Year-Wise Trend of IR Compliance in South Africa
Source: Self-compiled.

Figure 2 presents the year-wise trend of Integrated Reporting (IR) compliance scores of the Top 40 South African companies across the seven disclosure elements considered under the study. The figure also depicts the movement in the overall IR disclosure score during the period from 2017–18 to 2023–24. An overall rising trend can be observed across almost all the reporting elements, reflecting continuous improvement in integrated reporting practices and increasing alignment with the International Integrated Reporting Framework (IIRF). A comparatively sharper improvement is particularly visible during the period between 2018–19 and 2021–22, where most disclosure categories experienced substantial growth. Elements such as Organisational Overview, External Environment,

Strategy and Resource Allocation, Performance, and Outlook demonstrate consistent upward movement throughout the study period, indicating enhanced comprehensiveness and transparency in corporate disclosures. In contrast, the Governance category maintained relatively high disclosure levels across all the years, while the Assurance element consistently recorded a perfect score of 1.00, reflecting strong emphasis on report credibility and audit-related practices among South African companies. Further, the overall IR disclosure score increased significantly from 0.609 in 2017–18 to nearly 0.96 during the later years of the study period, after which the trend appears to stabilise. This stabilisation may indicate that integrated reporting practices among South African companies have gradually reached a relatively mature stage under the prevailing reporting framework.

4.3 Content Element-wise Average IR Compliance Scores

Table 3 Element-wise Average Integrated Reporting Compliance Scores of South African Companies from 2017-18 to 2023-24

IR Content Elements	Average Score	Standard Deviation	Rank
Assurance	1.00	0.00	1
Governance	0.91	0.07	2
External Environment	0.84	0.17	3
Outlook	0.84	0.19	4
Strategy & Resource Allocation	0.81	0.20	5
Performance	0.80	0.17	6
Organisational Overview	0.65	0.15	7

Source: Self-compiled.

Table 3 provides the average compliance scores of each Integrated Reporting (IR) content element for the sample South African companies during the period from 2017–18 to 2023–24. Along with the average scores, the table also presents the standard deviation and ranking of each disclosure element, thereby offering a comparative understanding of the disclosure priorities and reporting patterns followed by the companies. Among all the disclosure categories, assurance records the highest average score of 1.00 with zero standard deviation, indicating complete uniformity in disclosure practices throughout the study period. The absence of variation suggests that assurance-related disclosures are consistently maintained by all the sample companies. This may largely be attributed to the strong regulatory and governance environment prevailing in South Africa, particularly under the influence of the King IV framework, which emphasises accountability, transparency, audit practices, and credibility of corporate reporting. As a result, disclosures relating to audit, internal review, and report verification appear to have become a standardised reporting practice among South African listed companies. The Governance element secures the second-highest rank with an average score of 0.91 and comparatively low variation. The findings reflect the strong governance orientation embedded within the South African corporate system, where disclosures relating to board composition, leadership structure, diversity, executive oversight, and governance responsibilities are extensively emphasised. The results are consistent with prior studies that highlight South Africa's well-established governance and disclosure environment, shaped by the King governance codes and integrated reporting practices (Baboukardos & Rimmel, 2016; Setiany et al., 2019). The disclosure elements External Environment and Outlook both report relatively high average scores of 0.84, indicating considerable emphasis on contextual and forward-looking disclosures by South African companies. However, Outlook demonstrates slightly greater variability across firms compared to External Environment disclosures. The relatively stronger performance of the External Environment category suggests that companies increasingly recognise the importance of communicating economic, environmental, social, and risk-related conditions influencing organisational value creation. Similarly, the high score under Outlook reflects growing attention towards future-oriented disclosures relating to strategic priorities, expected business conditions, risks, and opportunities. Such reporting practices support stakeholder understanding and contribute towards reducing information asymmetry within the corporate reporting process (Vitolla et al., 2020; Eccles & Krzus, 2018). The Strategy and Resource Allocation element occupies the fifth position with an average disclosure score of 0.81 and moderate variability among firms. The findings indicate that companies have progressively improved disclosures relating to strategic objectives, stakeholder engagement,

resource utilisation, and implementation plans. This reflects increasing alignment of corporate reporting practices with the principles advocated under the International Integrated Reporting Framework (Haji & Anifowose, 2016; Kannenberg & Schreck, 2019). Likewise, the Performance element records an average score of 0.80, accompanied by a relatively low standard deviation, suggesting fairly consistent reporting practices across companies. The disclosure practices under this category indicate increasing emphasis on qualitative and quantitative performance indicators, stakeholder responsiveness, value creation outcomes, and benchmarking against industry standards. The findings support earlier studies, which observed that South African companies actively communicate performance-related information to address stakeholder expectations and improve reporting transparency (Atkins & Maroun, 2015; Baboukardos & Rimmel, 2016). In contrast, Organizational Overview records the lowest average score of 0.65 among all the disclosure elements, despite exhibiting comparatively lower variability. The relatively weaker score suggests that disclosures relating to mission, vision, ownership structure, organisational background, and principal activities are often presented in a brief or generalised manner. Prior literature has similarly indicated that foundational organisational disclosures frequently receive comparatively less emphasis than strategic or governance-related reporting sections (Rinaldi et al., 2018; Lai et al., 2016). Overall, the findings indicate that South African companies demonstrate stronger compliance in structured and regulation-oriented disclosure areas such as assurance, governance, and performance, whereas comparatively lower emphasis is placed on narrative and foundational disclosure components. Although the reporting environment in South Africa reflects a high level of integrated reporting maturity, the results suggest that additional improvements in certain disclosure areas may further strengthen the comprehensiveness and balance of integrated reporting practices.

4.4. Company-wise Analysis of Integrated Reporting Compliance

Table 4 List of Top 10 South African Companies by overall IR Compliance (2017-18 to 2023-24)

Rank	Company	Overall IR Compliance Score (IRQ)
1	British American Tobacco PLC	0.9870
2	Sanlam Ltd	0.9654
3	Nedbank Group	0.9524
4	Mondi PLC	0.9481
5	Old Mutual Ltd	0.9307
6	Vodacom Group Ltd	0.9264
7	Mr. Price Group Ltd	0.9177
8	Woolworths Holding Ltd	0.9048
9	Aspen Pharmacare Holdings Ltd	0.8788

Source: Self-compiled.

Table 4 presents the top 10 South African companies exhibiting the highest overall Integrated Reporting (IR) compliance scores during the study period. The findings reveal that companies such as British American Tobacco PLC (0.9870), Sanlam Ltd (0.9654), and Nedbank Group (0.9524) demonstrate exceptionally high levels of alignment with the International Integrated Reporting Framework (IIRF). The superior disclosure performance of these firms reflects the existence of comparatively advanced reporting mechanisms, strong governance structures, and greater emphasis on transparency and stakeholder communication. Other companies, including Mondi PLC, Old Mutual Ltd, and Vodacom Group Ltd, also report significantly high compliance scores, indicating consistent adoption of integrated reporting principles within the South African corporate environment. The presence of large and highly visible multinational firms among the top-ranked companies suggests that organisations operating under stronger institutional pressure, broader stakeholder scrutiny, and extensive regulatory oversight are more likely to adopt comprehensive disclosure practices (Vitolla et al., 2020; Kannenberg & Schreck, 2019). Further, companies such as Woolworths Holdings Ltd, Aspen Pharmacare Holdings Ltd, and Naspers Ltd also maintain relatively strong reporting performance, despite recording comparatively lower scores than the leading firms. The disclosure practices of these companies may be influenced by increasing expectations relating to ESG reporting, stakeholder accountability, and long-term value communication within sectors such as retail, healthcare, and technology. Overall, the top-ranked companies represent comparatively mature adopters of integrated reporting practices and serve as

important benchmarks for disclosure standards and reporting alignment within the South African corporate sector (Setiany et al., 2019).

Table 5: List of Bottom 10 South African Companies by overall IR Compliance

Rank	Company	Overall IR Compliance Score (IRQ)
31	Anglo American PLC	0.7489
32	Glencore PLC	0.7446
33	Discovery Holdings Ltd	0.7359
34	RMB Holdings Ltd	0.7229
35	Kumba Iron Ore Ltd	0.7100
36	Remgro Ltd	0.7056
37	Impala Platinum Holdings Ltd	0.6840
38	NEPI Rockcastle PLC	0.6537
39	Reinet Investment SCA	0.6494

Source: Self-compiled.

Table 5 highlights the bottom 10 South African companies on the basis of overall Integrated Reporting (IR) compliance scores, indicating comparatively lower levels of alignment with the International Integrated Reporting Framework (IIRF). Among the sample companies, FirstRand Ltd records the lowest overall disclosure score of 0.5974, followed by Reinet Investments SCA (0.6494) and NEPI Rockcastle PLC (0.6537). The relatively weaker scores suggest that the reporting practices of these firms remain more compliance-oriented and comparatively less integrated in terms of non-financial disclosures, governance communication, and long-term value creation narratives (Haji & Anifowose, 2017; Rinaldi, Unerman & de Villiers, 2018). Interestingly, certain large resource-oriented companies such as Impala Platinum Holdings Ltd (0.6840) and Anglo-American PLC (0.7489) also appear within the lower-ranked category. Existing literature has frequently observed that firms operating within extractive and mining industries tend to concentrate more on operational and financial disclosures, while comparatively limited attention is provided towards forward-looking information, sustainability narratives, and multi-capital reporting practices (de Villiers, Rinaldi & Unerman, 2014; KPMG, 2022). Similarly, diversified holding companies, including Remgro Ltd (0.7056) and RMB Holdings Ltd (0.7229), also demonstrate modest levels of IR compliance. One possible explanation may be the complexity involved in integrating consistent disclosures across diversified business segments and subsidiary structures (Lai, Melloni & Stacchezzini, 2017). Mining-based organisations such as Kumba Iron Ore Ltd (0.7100) and Glencore PLC (0.7446) also continue to exhibit comparatively weaker disclosure performance, supporting earlier findings that extractive industries often lag behind in narrative sustainability and integrated reporting disclosures (Eccles & Krzus, 2018). Further, Discovery Holdings Ltd, despite maintaining a strong market presence, records a comparatively lower disclosure score of 0.7359 when compared with other firms within the financial services sector. This may indicate that strong market positioning or innovative business operations alone do not necessarily translate into advanced integrated reporting maturity and comprehensive framework alignment (Vitolla et al., 2020). Overall, the findings suggest that although integrated reporting practices have gained substantial acceptance in South Africa, considerable variations in disclosure comprehensiveness and reporting maturity continue to exist across companies and industries.

5. Findings

- The overall Integrated Reporting (IR) compliance score of South African companies increased significantly from 0.61 in 2017–18 to 0.96 in 2023–24, reflecting an overall growth of nearly 57% during the study period.
- Organisational Overview disclosures showed continuous improvement, with the average score rising from 0.42 in 2017–18 to 0.83 by 2023–24.
- The External Environment element recorded considerable enhancement over the years, improving from 0.58 in 2017–18 to 0.99 in 2022–23, followed by a marginal decline to 0.98 in 2023–24.

- Governance-related disclosures exhibited consistently high compliance levels, progressing from 0.79 in 2017–18 to 0.975 in 2022–23, before slightly declining to 0.965 in the final year of the study.
- The disclosure score for Strategy and Resource Allocation increased substantially from 0.49 in 2017–18 to 0.98 in 2023–24, indicating stronger strategic and stakeholder-oriented reporting practices.
- A notable improvement was also observed in the Performance element, where the average disclosure score increased from 0.49 during 2017–18 to 0.97 by 2023–24.
- Outlook disclosures demonstrated remarkable progress throughout the study period, increasing from 0.50 in 2017–18 to 0.99 during the last two years of analysis.
- The Assurance category maintained a perfect disclosure score of 1.00 across all years, reflecting uniform assurance and audit-related reporting practices among the South African companies.
- Element-wise average IR compliance scores reveal that Assurance achieved the highest average score (1.00), followed by Governance (0.91), External Environment (0.84), Outlook (0.84), Strategy & Resource Allocation (0.81), and Performance (0.80), whereas Organisational Overview reported the comparatively lowest average score of 0.65.
- Among the Top 10 South African companies in terms of overall IR compliance, British American Tobacco PLC secured the highest score (0.9870), followed by Sanlam Ltd (0.9654) and Nedbank Group (0.9524).
- Companies such as Mondi PLC (0.9481), Old Mutual Ltd (0.9307), Vodacom Group Ltd (0.9264), Mr. Price Group Ltd (0.9177), and Woolworths Holdings Ltd (0.9048) also demonstrated consistently strong integrated reporting compliance throughout the study period.
- Within the bottom-ranked companies in terms of overall IR compliance, FirstRand Ltd recorded the lowest score (0.5974), followed by Reinet Investments SCA (0.6494), NEPI Rockcastle PLC (0.6537), and Impala Platinum Holdings Ltd (0.6840).

6. Conclusion

The increasing emphasis on transparency, accountability, and long-term value creation has significantly transformed corporate reporting practices, leading to the growing adoption of Integrated Reporting (IR) across the global business environment. In this context, South Africa has emerged as one of the leading jurisdictions in institutionalising integrated reporting practices through the King governance frameworks and the International Integrated Reporting Framework (IIRF). Accordingly, the present study examined the extent of integrated reporting practices and framework alignment among the Top 40 JSE-listed South African companies during the period from 2017–18 to 2023–24. For this purpose, an Integrated Reporting Disclosure Index (IRDI) was constructed based on the major content elements prescribed under the IIRF. The study employed content analysis, descriptive statistics, and pivot table analysis to assess the disclosure practices of the sample companies. The findings reveal a substantial improvement in integrated reporting disclosures over the study period, indicating increasing alignment with integrated reporting principles and integrated thinking practices. Disclosure areas such as Assurance, Governance, External Environment, and Outlook demonstrated comparatively stronger compliance levels, whereas Organisational Overview and certain strategy- and performance-related disclosures reflected comparatively lower reporting depth. The study further observed that large, internationally visible, and institutionally strong companies generally exhibited higher levels of reporting maturity and framework alignment compared to firms operating in extractive industries and diversified holding structures. The study highlights the importance of strengthening strategic, forward-looking, and value-creation-oriented disclosures to improve the comprehensiveness and consistency of integrated reporting practices. Although South Africa continues to remain one of the most advanced integrated reporting environments globally, variations in disclosure quality across companies indicate that the process of achieving fully integrated and balanced reporting practices is still evolving. The study carries important practical implications for regulators, policymakers, corporate managers, and reporting professionals. The findings highlight the importance of strengthening integrated thinking, improving strategic and forward-looking disclosures, and encouraging more balanced communication across all IR content elements. Further, the study emphasises the necessity of moving beyond mere compliance-based disclosures towards more meaningful, connected, and value-oriented reporting practices. Overall, the study concludes that South Africa continues to remain one of the most advanced

integrated reporting environments globally. Nevertheless, the existence of variations in disclosure comprehensiveness across firms indicates that the journey towards fully integrated, balanced, and stakeholder-oriented reporting practices is still evolving.

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