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**Article**

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FINANCIAL ECONOMICS | RESEARCH ARTICLE

# Do sustainable investments propel the national economy? Evidence from manufacturing and service sectors in India

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**Abstract:** This study is conducted to identify the various sustainability initiatives by the Indian manufacturing and service industry, which are listed in BSE 100. Moreover, the present study indicates the impact of sustainability initiatives on financial performance.A comparative analysis has been conducted between the manufacturing and service sectors. The present study is descriptive and causal design. The sample contains 75 firms listed on BSE 100 and data collected from CMIE Prowess IQ. Panel data regression has been used to check the effect of sustainability measures on financial performance. The significant findings of this study are that investing in sustainability measures has a significant impact on the financial performance of the companies in both sectors; however, in the service sector, sustainability has more impact than in the manufacturing industry. The study's implications have been classified into broad categories: academic and managerial implications.

**Subjects: Environmental Economics; Finance; Business, Management and Accounting**

**Keywords: sustainability initiatives; financial performance; panel data regression; BSE 100; manufacturing; service sector**

## 1. Introduction

Sustainability is preserving natural resources for an extended period or an infinite period. Sustainability is often quoted as the company's ultimate vision, but not every manager thinks of it as their ultimate objective. The concept was initially coined in 1987 in the Brundtland Report. The report had mainly two dimensions: People's aspiration for a better society and limitations imposed by nature. Over time the concept was divided into three broad categories: social, environmental, and economical (Chang & Kuo, 2008).

Researchers argued about the changing definitions of sustainability. They then talked about the strong and weak sustainability. However, there should be no concept like strong or weak sustainability, and these should complement each other (Kuhlman & Farrington, 2010). The idea of sustainability was devised in forestry. The word Nachhaltigkeit (the German word for sustainability) was first used in 1713 (Wiersum, 1995).

The concept of value creation through sustainability has been discussed by researchers. They proposed a sustainability model using value creation as a primary endogenous variable to improve the image of small-medium enterprises. As a result, they showed that good governance in SMEs plays a vital role and must reflect acceptable responsibility practices to generate a reputation (Andrés et al., 2019). With regard to sustainability, it was highlighted that the researchers usually

work on significant corporate instead of SMEs and forget that SMEs carry much weight on a country's economy. Sustainability measures are linked to the social, economic, and environmental approaches. Sustainability is used as a strategy; as discussed above, it requires support from top management, leadership, values, and ethics in the corporate culture.

Every stakeholder should embed sustainability as a long-term vision and ensure that everyone should work to achieve that. The right leaders make these policies and accept the standards to ensure sustainability. Management carries it out, for which the commitment of top-level executives is vital. On the contrary, managers must implement these standards, making them as important as leaders. Hence it is clear that the entire organization team must work together to achieve sustainability. Sustainability could be used as a core competency to help the organization get a competitive advantage. The companies working as sustainable have gained benefits like a better client base, goodwill, increased profits, etc.

Sustainability in different sectors acts differently but has the same goal: to use resources to the optimal level for future generations. Environmental sustainability varies from country to country, but with the same purpose, but this is only academic and practical. Various authors have tried to explain it with their perspectives and defined it from different sectors (Goodland & Bank, 1995a) tried to explain environmental sustainability and differentiated it from social and economic sustainability. Economic sustainability and Environmental sustainability are different, but they share a strong link.

Entrepreneurship is considered to be the leading actor in the implementation of an innovative approach toward environmental sustainability. Business Plan Competitions (BPC) play a vital role in being an entrepreneurial support system (Fichter & Tiemann, 2020). They also found out that a few specific features of BPCs positively impact the level of integration of sustainability goals and consideration of start-up business activities. Promoting sustainability in BPC will lead to the high integration of participating entrepreneurs' sustainability activities.

Going green and going lean are strategies the firm uses to reduce the wastages in the processes. Investigations show the influences on the going-green systems by different industry competition levels, executive power, and family ties. It was revealed that green strategy positively influences the growth of a firm, and this gets intensified with the competition's level, power of executives, and ties with family. Firms must adopt these strategies as they provide a competitive advantage (Lartey et al., 2020).

The study explores the dimensions of sustainability measures and corporate financial performance. This relationship was studied in the context of Indian listed firms, and Indian companies listed in BSE 100 were explicitly chosen for this purpose. The influence of various underlying factors of sustainability measures on corporate financial performance was also intended to study. The target population for the study was the companies listed in BSE 100.

The article has been written in this structure, the first section includes a comprehensive literature review, and second section elaborates the methodology adopted by the researchers. Analysis and findings are to be found in the fourth section followed by the discussion and conclusion in the fifth section.

## 2. Review of literature

The most critical and challenging environmental problems are global warming and climate change. Our future is affected by these drastic changes. Environmental accounting plays an essential role in assuring the stakeholder's trust. (Nor et al., 2016) have studied the environmental disclosure of 100 companies in Malaysia and its impact on the year's financial

performance in 2011 through an extensive content analysis; mixed results were found between environmental disclosure and financial performance. However, the total environment disclosures are positively related to profit margin; however, the other three dependent variables, ROA, ROE, and EPS, do not show any relations. Studied the concept of environmental sustainability and discussed various aspects like growth, limits, and substitutability. Sustainability plays a vital role in the building; in the present scenario, stakeholders are more inclined toward protecting the environment. The most critical and challenging environmental problems are global warming and climate change. Our future is affected by these drastic changes. Environmental accounting plays an essential role in assuring the stakeholder's trust. (Sokołowski, 2019) studied the energy sector in India and the policies regarding its implementation and effects on climate change regarding conventional energy (black) and renewable energy (green). According to (Dhar et al., 2020), India's steel and cement industries are significant sources of environmental pollution like carbon emission and global warming. They concluded that adequate incentives for achieving India's climate targets follow the current policies. However, dematerialization, reuse and recycling will play a vital role in attaining the globalized target of 1.5 degrees Celsius. A significant result from this study is that incorporating the bottom-up approach to sustainability measures plays a critical role in reducing the economy's intensity.

In their empirical studies, (Earnhart, 2018) found a positive association between corporate environmental performance and financial performance. Many have found negative and mixed relationships between these two variables. The review also helped find the various financial performance and environmental performance measures. (Jayasundara et al., 2019) studied the carbon footprint (CF) and the financial performance of the dairy production farms in Canada and found that carbon footprint and profitability are negatively correlated. (Cortez & Cudia, 2012) studied the product, and process improvements are environmental innovations measured in terms of environmental costs. They suggested that environmental innovation improves financial performance (increases sales, equity, net income, and assets but increases long-term debts). Financial performance positively impacts investments in environmental innovations when there is a weaker coefficient. The regulations play an essential part in environmental sustainability and reporting.

(Pekovic, 2012) studied the environmental standards and their impact on the employees' productivity and found that in the firms which implemented these environmental standards, their employee's experienced high productivity. (Noh, 2019) investigated the impact of corporate green efforts on US public firms' financial performance by using ISO 14000. After analyzing 174 US firms indexed in NYSE and NASDAQ, he concluded a positive association between green certification and financial performance (ROI and Tobin's Q). (Z. Liu, 2020) investigated the association between environmental performance and financial performance using Bloomberg's ESG datasets and found positive relationship between variables is across various companies and industries. Additionally, companies had to be in a strong financial position to adopt these environmental strategies.

(Allouche & Laroche, 2005) investigated the association between CSP and CFP through meta-analysis. The result concluded that, on average, there is a significant impact of CSP on CFP. An important finding stated that accounting-based measures are less affected by the CSP than market-based measures. (Thornton et al., 2013) investigated the effect of socially responsible suppliers on the firm's performance. They concluded that practicing different SRSS may experience financial benefits, especially for MNCs. Moreover, findings also suggested that companies in China and the USA should implement SRSS into the organization's long-term strategy, culture, and operational decisions to gain a competitive advantage.(Quartey & Oguntoye's, 2021) explored how THA (Triple Helix Approach) contributes to understanding and promoting industrial sustainability in Africa using a systematic review approach. The study highlights how

industrial sustainability can contribute to social, economic, and environmental sustainability. It further concludes that maximizing enablers and minimizing barriers that confront possible interconnections and interrelationships between universities, industries, governments, and their intermediaries could be a useful starting point toward the understanding and promoting industrial sustainability in Africa.

(Chouaibi, 2021) focuses on developing a quantitative measure of the level of innovation to evaluate the impact of innovation on financial performance, taking a sample of 95 firms. The empirical results showed that financial performance depends on the realization of innovation activities and disclosure. The study concludes that encouraging firms to invest in intangible investment to stimulate innovation can lead to sustainable competitive advantage. (Girón et al., 2021) examines the relationship between the reporting activity and firms' economic performance. The paper combines data from the Global Reporting Initiative's (GRI) Sustainability Disclosure Database and the Orbis database from Bureau van Dijk. The study uses two logit models and one regression model based on a sample of 366 large Asian and African companies. The results reveal that operating in the manufacturing sector and having a higher percentage of women directors in the company's management structure is positively related to adopting sustainability reporting and external assurance. And operating in the manufacturing sector leads to better firms' economic performance. The study contributes to the sustainability issues in the context of emerging markets by explaining the driving factors behind it and their linkage with firms' performance. (Alfalih, 2022) investigates the association between sustainable entrepreneurship and social innovations, keeping corporate social performance as a mediating variable. The study applies a structural equation model to the data collected through a questionnaire distributed to 180 SMEs in Saudi Arabia. The results demonstrate a mediating effect from a corporate social performance between sustainable entrepreneurship extrinsic motivation and sustainable entrepreneurship outcome as determinants, and social innovation. This mediating effect seems to be less important for other determinants such as knowledge resource acquirement. The results define a critical pathway for social innovation to facilitate its definition and try to operationalize the process of its generation. In fact, this study provides operationalized approach for social variables. (Carayannis et al., 2014) focuses on the effects of BMI (Business Model Innovation), particularly organizational sustainability, resilience, and excellence. The paper's main aim is to address how organization sustainability and resilience can be achieved with BMI. In addition, the present case shows how BMI can be used to overcome commoditization challenges partly by moving from a BM focused on the trade of goods to a BM focused on the trade of tasks. The results show how manufacturers in developing countries can overcome their dependence on commoditized products and OEM (original equipment manufacturer) manufacturing while maintaining a sustainable ecosystem. Castro & Lopes, (2021) investigated the impact of e-government on sustainable development using a logit model for a sample of 103 countries in the period 2003–to 2018. The results suggest that e-government development is a positive determinant for a country to attain sustainable development, proxied by adjusted net savings, that embraces a country's economic, social and environmental development. This study provides evidence that e-government increases the probability to attain sustainable development mostly in developing and transition economies. The results also suggest that economic growth and gross national income per capita are significant positive influences in sustainable development in the whole sample and those countries with lower age dependency and natural resource rents are more likely to have sustainable development. Cheikh & Noubbigh (2019) looked for reliable measures of the performance of Tunisian firms operating in the new economy. The results obtained, following the different operated regression, indicate the significance of the variables: "book value, BVE;" "return on equity, ROE;" and "return on assets, ROA." The study's outcome proves the failure of classical accounting and financial data in translating firm performance. It further highlights the usefulness of accounting and

financial data in evaluating the performance of firms and the important role of intangible capital information in decision-making. Thus, investors and managers should give particular attention to immaterial components, which allow a better appreciation of the overall performance of firms. Christoforidis & Katrakilidis (2021) investigated the impact of foreign direct investment (FDI) impact on the environmental quality of Central and Eastern European (CEE) countries, examining First- and second-generation panel econometric techniques over the period 1995–to 2014. The results show that FDI has a non-linear impact on the environmental quality, which follows the formation of an inverted U-shaped curve. Although increases in energy consumption result in environmental degradation, the economic growth of CEE countries has a positive effect on their environmental performance as a result of their sustainable development. Dewri (2021) measured the firm value (FV) and return on stock (RoS) by considering corporate governance (CG), financial performance (FP), and refined economic value added (REVA). The GMM estimator's method was applied on the dataset contains 310 firms with 1860 firm years of Dhaka Stock Exchange listed firms during the period 2013 to 2018. The study reveals that CG, FP, and REVA characteristics are significantly conjunct with FV and RoS. Firms, regardless of size, age, and nature, adopting good CG within business management practice can significantly improve FP and continuously generate positive economic value for both firms and shareholders over the period, thus enhance FV and RoS. Moreover, firms confirming continuous growth of FV are able to provide positive RoS to shareholders. Din et al. (2022) investigated the association between sustainable development, adjusted net savings, financial development, economic growth, and resources rent, using the panel ordinary least squares technique and panel generalized method of moments for a yearly panel data of three South Asia emerging economies, during the period of study from 1990 to 2020. The result shows a positive and significant effect of sustainable development goal index, financial development, and economic growth on the adjusted net saving. At the same time, the inflation rate and natural resource rent have a negative and significant effect on sustainable development in South Asian emerging countries. Nikolaou (2017) outline a theoretical framework to comprehensively explain the interrelationship among some mediating components for corporate environmental and financial performance, such as social and environmental responsibility, intellectual capital, innovation, and competitive advantage. The proposed framework provides an approach to connect CSER with financial performance through the view of KBV and IC. This implies many factors which play a critical role between CSER and corporate financial performance. This approach is based on the business case for CSER, which justifies the adoption of CSER as the primary goal of firms to improve financial performance. The contribution of this framework is the connection of CSER with KBV, where firms are constituted in certain places to create essential knowledge for business viability. Knowledge creation assists firms in exploiting innovation opportunities and competitive advantages about their competitors. These business assets could be associated with better financial performance under essential circumstances. Nunes et al. (2019) studied the relationship between networking intensity and the innovation process is investigated to analyze the effect of these networks on firm performance. The results show that firms that are engaged more intensively in knowledge networks increase the likelihood of obtaining higher levels of innovation, leading to better economic performance. These conclusions have strong implications for government innovation policies designed to improve firms' performance and that of the local economy. Younsi & Nafla (2019) investigate the relationship between financial stability, monetary policy, and economic growth in 40 developed and developing countries using annual panel data from 1993 to 2015. Fixed and random effects panel data regression models were fitted to determine the impact of financial stability and monetary policy on economic growth. The results indicate that trade openness, capital account openness, and foreign direct investment positively impact economic growth to a high degree in developed countries. It also indicates a positive and significant impact of research and development on financial development and economic growth in developed countries. The

main findings confirm the importance of real, financial, and monetary variables and bank solidity and their significant impacts on financial stability and economic development. Tiba & Frikha (2020) used the simultaneous equations panel data models to check for the nexus between the four pillars of sustainable development for 26 African countries from 1990–to 2013. The main conclusion is the existence of feedback causality among the economic, social, ecological, and the institutional pillar. Our findings record the fact that these four pillars can be seen as interrelated rings that are all required to reach sustainability. Setó-Pamies (2013) studied the role of women directors in CSR as driving forces and their contributions behind the sustainable development and impact of gender diversity on CSR. Using ROE as a control variable he suggested that gender diversity and control variable profitability ROE positively impact the talent of females and play a vital part in implementing social responsibility and sustainable practices. Bilbao-terol et al. (2019) investigated that by how integrating CSR valuation with financial performance could be a measure of sustainability. The TOPSIS methodology has been to transform the score of CSR and financial ratios. One hundred eighteen companies have been evaluated. Environment, community involvement, business behavior, human rights, human resources, and governance have been included as CSR measures. Lin et al. (2018) studied the impact of CSR determinants on the financial performance of the firms in Taiwan, the results showed that no single dimension of CSR has a positive relationship with the stock price. In terms of book market value, product and resources management have been valued high by BM firms, but growth firms value diversity and labor rights.

Lozano & Reid (2018) studied the role of the investors in the sustainable generation mix model by interviewing major investors in European Asset Manager Company and found that the integration of renewable technologies for the viability of utilities in the future. The finding suggested that investors act a very important part in the foundation of electricity generation; however, the stakeholders must be willing to help develop and adopt a sustainable generation mixes model. Park et al. (2018) investigated the relation between CSR and the firm's value and whether the social ties between internal and external directors affect the association. On average, CSR has a positive association with performance. Yoon et al. (2018) employed ESG scores to evaluate the CSR measurement; they found that CSR activities positively impact the Firm's value; another governance strategy creates a more significant impact on the firm's market value. They also recommended that the government plays a significant role in implementing CSR initiatives. Reimsbach et al. (2018) investigated the political connection and government ownership that affects CSR implementation. They found that politely embedded firms are more likely to issue CSR reports and perform better. CSRP is negatively associated with financial performance. Sial et al. (2018) gender diversification and the firm's performance is studied in this research, and CSR mediates the relationship between the firm's performance and gender diversity. Board room diversity positively impacts the firm's value, and CSR positively mediates the relationship. Artiach et al. (2010) explored the drivers of sustainability in the Dow Jones sustainability index of the US and the incentives that could be gained by investing in sustainability. The result indicated that firms investing in sustainability could achieve more growth in ROE, than conventional firms. However, CSP firms could not get more cash flows or lower leverage firms than other firms.

Lee & Hu, (2018) investigated the association between CSR, Corporate reputation, and CFP by using CFP as a mediating variable. Secondary data have been used, and it has been collected from reputed institutes of 15 countries and 273 firms from 2011–2017. This study's control variables are the size of the firm, the growth rate of sales, interest coverage ratio, age, and industry. The result suggested that CR has been positively related to CFP and CSR; furthermore, CFP increases CSR and is found to have a mediating effect on CR and CSR. (Marti et al., 2015) investigated the impact of corporate social strategies on corporate financial performance using companies of Stoxx Europe 600 and Stoxx Europe sustainability index from 2007–2010. The

result indicated that by implementing strategy related to CSR, the level of economic development of the country and the size of the firm determine the CFP, furthermore investing in R&D affects the ROE; on the other hand, effected Tobin's Q is affected by the financial slack, which indicates that companies investing in sustainable development observe great financial benefits or better CFP. (Minutolo et al., 2019) examined the relationship between ESG score and performance of firm has been measured by Tobin's Q and ROA by analyzing the 467 firms from the S&P 500 from 2009–2015. ESG impacts on Tobin's Q have been most significant for the large corporation measured by sales compared to ESG's effects on Tobin's Q and ROA. (Ali, Salman, Parveen et al., 2020) Found that the eco-consumerism significantly impact the financial performance (ROA).

(Ali, Salman, Yaacob et al., 2020) conducted a questionnaire study and found that banks' environmental and financial performance are being positively affected by the internal and external green supply chain management practices.

After going through an extensive literature review related to sustainability initiatives and financial performance, the following gaps have been identified. The objectives of the study include developing a conceptual model incorporating the dimensions of sustainability measures and corporate financial performance. The key objectives of the present study are:

(1) To identify the key sustainability measures and parameters of financial performance regarding selected Indian companies which are indexed in BSE 100,
(2) To examine the impact of sustainability measures on financial performance (ROE, ROA, and EPS) and
(3) To compare the impact of sustainability measures on financial performance between manufacturing and services organizations.

The sustainability initiatives are broadly classified into three aspects: Environment sustainability, social sustainability, and economic sustainability. We have measured sustainability from these three aspects. To examine the impact of sustainable investment on financial performance, this study uses panel data regression as there are 75 companies in the sample with different characteristics. The results of this study have various managerial implication and academic implication.

## 3. Data and methodology

### *Sampling method*

For this study, the data of Bombay Stock Exchange(BSE 100) listed firms, the top index in the Indian Stock Market, have been collected for 11 years, starting from 2009 to 2019. The index consists of the top 100 firms selected based on entire market capitalization from the eligible universe. Out of the sample of 100 firms, 25 firms with missing data of any variable or year have been excluded from getting a balanced panel.VAIDYA, (2019) have also used BSE 100 as the sample. Only those industries were selected where the number of firms was at least two or more to determine the sector for study. So, out of all the industries, only twelve industries were left and thus, selected. The data set consists of top-performing companies registered under its act 1956, making it a more reliable data set. The results can be generalized for companies listed under the act 1956. Two panels were created one for manufacturing and the other for services; the manufacturing panel consisted of 50 companies, and the service panel consisted of 25 companies. Chouaibi, (2021) in his research using the data of 95 public companies for the analysis, and he generalized the results afterward. Shrivastav & Kalsie, (2017) collected the data from Nifty 50 to uncover the relationship between corporate governance and financial performance. To observe the relationship between sustainable investments and stock performance Raja, (2018), BSE 100 is the sample.

***Descriptions of variables***

| Variables | Sub variables | Definitions |
|---|---|---|
| Social sustainability | Social and community | The investments in the society and community uplift society and give something back. |
| | Staff welfare and training | They are training staff about being responsible for society. |
| | Donations | They are giving charity to the non-profit organization or the others in need. |
| Economic sustainability | Employee's utilization ratio | They are using the employees in an optimum manner to enhance their productivity and cost-saving. |
| | Research and development | Investing in the R&D to improve the sustainability measures in the organization |
| Environment sustainability | Environment and pollution investment | Investing in the control policy to make the company more sustainable sound and protect the environment. |
| Financial performance | Return of equity (ROE) | The measure of printability is based on equity, more precisely on shareholder's equity. (ROE = profit after tax/market capitalization*100) |
| | Return of Assets (ROA) | It shows the percentage of how profitable is the assets in generating revenue. |
| | Earnings per share (EPS) | It is a measure of profitability calculated by dividing the profit by outstanding share. |

***The regression equations used the estimation***

**ROE = α1(S&C) +α2(S&WT) +α3(R&D) +α4(E&P) +α5(E&U) +α6(Do)+©**

**ROA = α1(S&C)+α2(S&WT)+α3(R&D)+α4(E&P)+α5(E&U)+α6(Do)+©**

**EPS = α1(S&C)+α2(S&WT)+α3(R&D)+α4(E&P)+α5(E&U)+α6(Do)+©**

The regression analysis is used to check the relationship between two and more than two variables or determine independent variables' dependency on the dependent variables. It is a classical statistical technique used in secondary data analysis to check the cause-and-effect relationship between variables. The advantages of regression are that it indicates the significant relationship between variables. Secondly, it also shows the strength of relationships. The present study uses regression analysis to measure the impact of sustainability measures on financial performance. The data consists of various cross-sectional and time-series datasets. Hence the panel regression is the most suited for the analysis. We used fixed and random effects panel data regressions for this study. Abolarinwa et al. (2020) used panel data regression to identify the relationship between growth strategies and financial performance, using the data of 190 companies from Nigerian stock index. The panel data regression has been used by different scholars and academicians as it gives a holistic view of the data and the results

are very comprehensive. Nguyen et al. (2022) used the panel data regression in order to identify the relationship between corporate social responsibility and financial performance of the Vietnamese firms. Kasoga, (2020) studied the relationship between the intellectual capital and financial performance using the secondary data of manufacturing and service industries in Tanzania. The researcher has used the panel data regression in order to identify the relationship between the variables. Imhanzenobe, (2020) studied the relationship between Managers' financial practices and financial sustainability in the Nigerian manufacturing companies,the panel data of 17 companies from 2008 to 2016 has been constructed and panel data regression has been used to empirically test the hypotheses.

Panel data regression is different from the regular time series and cross-sectional. It allows the control over the unobserved heterogeneity to be constant over time. The panel data regression can utilize a one-way error model, unlike OLS.(Chouaibi, 2021) used regression to analyze the relationship between innovation and financial performance.

**4. Fixed effects model (FEM)**

The fixed-effect model (FEM) formulation assumes that differences across units can be captured in differences in the constant term. It is believed that in the FE model, the slope coefficients are constant for all firms, but the intercept changes across the firms.

**5. Random effects model (REM)**

The fixed-effects model has inference with conditions on the particular cross-sectional units sampled; an alternative formulation is the (REM) Random effect model. The model is more efficient than FEM if it assumes that firm effects are randomly distributed across firms.

## 6. Results

***Descriptive analysis for nature of business***

| Nature of Business | Frequency | N | Percent |
|---|---|---|---|
| SERVICES | 307 | 25 | 33.33 |
| MANUFACTURING | 517 | 50 | 66.7 |
| Total | 824 | 75 | 100.0 |

(Sources: Compiled by Researcher)

There are 25 companies in the services sector and 50 companies in the manufacturing sector. This makes the total count to 75 companies. The assumptions of panel data regression have also been checked before running OLS. And every assumption of panel data regression has met the criteria. The test of multi-co linearity has been matched with VIF (variance inflation factor). The values for every variable have come under 10, indicating no multi-co linearity in the data. The value of Durban-Watson is in the range of 1.5 to 3, which suggests that there is no autocorrelation in the data. The following tables indicate the results of assumptions of panel data regression.

## 7. Assumptions of panel data regression

The followings are the assumption tested for the panel data analysis:

### *Unit root test for (stationarity)*

| Variables | Levin, Lin & Chu t | Im, Pesaran and Shin W-stat | ADF—Fisher Chi-square | PP—Fisher Chi-square | Level |
|---|---|---|---|---|---|
| Donation | **0.000** | **0.000** | **0.000** | **0.000** | **0** |
| Employee's utilization ratio | **0.0000** | **0.0230** | 0.7606 | 0.9992 | **0** |
| Social and community expenses | 0.6091 | 0.8716 | **0.0399** | **0.0033** | **1** |
| Staff & welfare training | **0.0000** | **0.0000** | **0.0000** | **0.0000** | **1** |
| Research & development | **0.0000** | **0.0000** | **0.0000** | **0.0000** | **0** |
| Environment and pollution expenses | 0.6190 | **0.0068** | 0.3064 | **0.0000** | **1** |
| ROE | **0.0000** | **0.0001** | **0.0308** | **0.0000** | **0** |
| ROA | **0.0000** | **0.0000** | **0.0000** | 0.9763 | **0** |
| EPS | **0.0024** | 0.1254 | 0.0660 | **0.0120** | **1** |

### *Test of multi-co linearity: Centered VIF*

| Variables | VIF (<10) |
|---|---|
| Social and community expenses | 1.376030 |
| Staff and welfare training expenses | 3.252820 |
| Research and development expenses | 7.057925 |
| Environment and pollution expenses | 2.982240 |
| Employee's utilization ratio | 3.983440 |
| Donations | 4.588956 |

The value of Centred VIF is less than ten, which indicates the data do not have multi-co linearity.

### *Test of Heteroskedasticity*

| Variables | Breusch-Pagan LM (Statistic) | Probability. |
|---|---|---|
| ROE | 7228.614 | 0.000 |
| ROA | 5722.904 | 0.000 |
| EPS | 6421.953 | 0.000 |

***Test of auto-correlation***

| Variables | Durbin-Watson stat |
|---|---|
| ROE | 2.238886 |
| ROA | 2.412783 |
| EPS | 2.777302 |

As all the assumptions of panel data regression were met. We now move forward with the results of panel data regression.

***Results of panel data regression***

| | Manufacturing Sector | | | Service Sector | | |
|---|---|---|---|---|---|---|
| **Variables** | **ROE (FE)** | **ROA (FE)** | **EPS (FE)** | **ROE (RE)** | **ROA (RE)** | **EPS (RE)** |
| S & C | 0.000142* | 0.028125* | −0.001024 | 0.002434* | 3.53E-05 | −0.001399 |
| S & W | 0.000699* | −3.13E-05 | −0.004504 | 0.000290* | 0.000567* | −6.78E-05 |
| R & D | −1.52E-05 | −0.016593 | −0.000853 | 4.08E-05 | −0.000689* | 0.000647 |
| E & P | 0.001007 | 0.039423 | −0.040000 | −0.001767 | −0.004963* | −0.021050* |
| EU | 0.021664 | −5.012083 | 0.273928 | 0.007334 | 0.004425 | −0.005953 |
| Do | 0.001539 | −0.286070 | −0.034049 | −0.000347 | −0.004304* | 0.011793 |
| C | 4.473825 | 215.8369 | 113.8520 | 3.591442 | 12.99204 | 43.16383 |
| R squared | 0.1340 | 0.018 | 0.0090 | 0.4096 | 0.5563 | 0.038 |
| Durban Watson | 1.7760 | 1.1354 | 0.1316 | 1.609 | 0.3373 | 0.6427 |
| Probability | 0.0000 | 0.1544 | 0.5887 | 0.000 | 0.0000 | 0.0672 |

**(FE/RE: The results of Fixed Effect/Random Effect)(Significance: 5%)**

**8. Results related to manufacturing sector**

- ROE = **0.0001(S&C) +0.0006(S&WT)** −1.52E(R&D) +0.001(E&P) +0.0216(E&U) −0.0015(Do)+©
- ROA = **0.028(S&C)**-3.1E(S&WT)-0.016(R&D)+0.039(E&P)-5.012(E&U)-0.286(Do)+©
- EPS = −0.0010(S&C)-0.0045(S&WT)-0.0008(R&D)-0.040(E&P)+0.273(E&U)-0.0340(Do)+©

Social and community expenses and staff welfare and training significantly impact the ROE in the manufacturing sector with values of coefficients 0.0001 and 0.0006, respectively. It has been recommended that the manufacturing industry should invest in social sustainability, unlike the findings of Marti et al. (2015), who found a positive relationship between R&D and ROE. R square, Durban Watson, and probability values are 0.1340, 1.77, and 0.000, respectively, which means the model is fit per R square. There is no multi-co linearity as the Durban Watson is within range. Only social and community expenses significantly impact the ROA. Analysis has revealed that R square, Durban Watson, and probability values are 0.012, 1.13, and 0.154, respectively. No sustainability measures have any significant impact on the EPS in manufacturing sectors. Still, the analysis has revealed that the value of R square, Durban Watson, and probability are 0.0090, 0.131, and 0.588, respectively.

On the contrary, Lee and Hu's (2018) findings suggested a positive relation between CSR and financial performance. Which is something that can be analyzed further? Social sustainability has a significant impact on the financial performance of manufacturing, especially accounting-based

variables. It wouldn't be wrong to invest in social sustainability to improve the accounting-based financial performance that has been measured by ROI and ROE.

### 9. Results related to services sector

- ROE = **0.0024(S&C) +0.0002(S&WT)** +4.08E(R&D) −0.0017(E&P) +0.0073(E&U) −0.00034(Do)+©
- ROA = 3.53E(S&C)+**0.00056(S&WT)-0.0006(R&D)-0.0049(E&P)**+0.0044(E&U)-**0.0043**(Do)+©
- EPS = −0.0013(S&C)-6.78E(S&WT)+0.0006(R&D**)-0.0210(E&P)**-0.0059(E&U)+0.0117(Do)+©

Social and community expenses and staff welfare and training have a statistically significant impact on the ROE with 0.002 and 0.0002 coefficient values; however, the other variables have no significant impact. R square, Durban Watson, and probability values are 0.4096, 1.60, and 0.000. Staff welfare and training, research and development, environment and pollution, and donations significantly impact the ROA with coefficients 0.0005, −0.0006, −0.004, and −0.004, respectively. Marti et al. (2015) also found a positive relation between R&D and ROE. R square, Durban Watson, and probability values are 0.5563, 0.33, and 0.000. Our findings match the findings of Y. M. Lee and Hu (2018). They also found a positive relation between CSR investments and financial performance. Only environment and pollution significantly impact the EPS with a value of coefficient −0.02; however, the other sustainability measures have no significant impact on the EPS. R square, Durban Watson, and probability values are 0.038, 0.64, and 0.067. It could be said that every variable of sustainability impacts the different financial performance variables. It could easily be said that service sector organizations have been positively affected by sustainability. Adoptions of sustainability practices could increase the financial soundness of this sector and the economy.

### 10. Discussion/ conclusion

In the present study, panel data regression was used to understand how Sustainability initiatives influence the financial performance of manufacturing and service companies.

### 11. Economic sustainability

The study propounds that **the employee Utilization ratio** doesn't seem to significantly impact any financial parameters in manufacturing or service organizations. Consequently, improving the utility of a firm's workers will have no effect on its equity or assets. Moreover, from earning per share perspective, it won't be advisable to invest in optimizing the processes and workforce. **Research and Development** don't seem to have any significant impact on any of the financial variables in the manufacturing sector. Furthermore, it has been found to negatively impact Return on Assets in the service sector. These results are contrary to what has been observed by Chouaibi, (2021), who proposes that innovation activities have a significant impact on the financial performance of the firms. In addition, the study claimed that research and development work in emerging economies would eventually help achieve profitability in terms of equity and assets. Similar findings are observed in the study Nunes et al.(2019), which suggests that innovation strategy help improve a firm's performance. Thus, the management will be discouraged from investing in innovations and development work if they prioritize leverage from purchased assets.

### 12. Environmental sustainability

As per the findings, investing in the environment and pollution doesn't affect any financial metrics in the manufacturing sector, including return on assets, return on equity, and earnings per share. Thus, environmental compliance will not have a significant impact on the company's assets, equity, or shares.The case could be made that in the long-run, the managers' decision of spending on environmental compliance would hinder their company's ability to compete against other firms that do comply with environmental regulations. The managers would thus be advised against such investment.However, the results contrast with the findings of Din et al. (2022). The study suggests that it is important to develop strategies for environmental protection.

### 13. Social sustainability

**Social and community expenses** turn out to be an essential factor affecting Return on Equity in Manufacturing and Service firms. It also has a positive impact on Return on Assets for manufacturing firms. These results match findings of Siminica et al. (2019). As a result, managers in both industries across the nation can focus on raising capital through shareholders by building goodwill around expenditures on community welfare. These findings are similar to the ones observed by Artiach et al. (2010). Furthermore, managers in the manufacturing sector looking to make the most of their assets can invest in community development. A similar finding is observed for **staff and welfare training** in both industries. The ROE of a firm has been found to be positively impacted by spending on developing the workforce. On the other hand, ROA and EPS showed no effect. These findings differ from Minutolo et al. (2019)& Siminica et al. (2019). According to their work, CSR/ESG impacts on ROA are positive. This is obvious since higher-skilled workers will make the process more efficient and thereby increase the profits by reducing costs. Consequently, companies raising capital through shareholders must develop their workforce and train them to handle more complex tasks. Conversely, donations have no effect on the performance of the firms in both sectors. Thus, expanding the business on the charity front isn't a sound strategy. In fact, Donations have been found to negatively affect the ROA in service sectors. As such, managers in service industries need to think twice about the performance of their assets before donating to charitable institutions. In the end, it can be concluded that investing in sustainability measures has a significant impact on the financial performance of the companies in both sectors **(supported by** Ukko et al. (2019)) however, in the service sector, sustainability has more impact as compared to the manufacturing industry. Overall, it can be said that Sustainability practices do not harm the companies' competitive advantage. Still, they help build investors' trust Fernández and guadaño (2015).

### 14. Academic and managerial implications

Based on this study, policy implications are also offered since the study was based on firms from India. This research helps contribute to academia by reporting the impact of sustainability variables on financial performance in developing economies. Besides, this study adds to the existing literature by comparing manufacturing and service firms' response to implementing sustainable strategies.

The findings will assist top management to understand the crucial sustainability areas where it would be beneficial to put more emphasis on appropriate decision-making to improve the overall financial performance of the firm. The current study has been able to achieve following key objectives to analyze the relationship between sustainable initiatives, including

- Employee utilization ratio
- Research & development
- Environment and Pollution investment
- Staff welfare and training expense
- Donation
- Social and community expense

Financial metrics, including

- ROA
- ROE
- EPS

Findings from this study will assist policymakers in creating frameworks around sustainability parameters and, therefore, help them improve their financial performance. Accordingly, management should pay more attention to areas, such as ROA, ROE, and EPS, which have a positive and significant impact on financial profitability. The findings suggest that manufacturing companies should invest in the parameters suggested by this study in order to improve their financial

performance. Additionally, they will be aware of which investments will have a negative effect on performance, and so they can avoid making such decisions. In contrast to the manufacturing sector, however, the services sector could improve its financial performance by implementing more sustainability measures. Nevertheless, managers need to be cautious with investments that have a negative impact on the performance.

All the variables of sustainability measures to assess their impact on the overall sample's financial performance consisting of 75 firms from BSE 100. The robustness of the data has been checked, and complete results have been provided. The relationship between sustainability measures and corporate performance has been examined, as well as a comparison between the manufacturing and service industries. A panel data regression approach can provide researchers working on sustainability with an empirically tested model. They can also test their conceptual models using secondary data extracted from CMIE data Prowess IQ. Researchers who work with panel data can gain some insights regarding the different constructs of prowess IQ as well.

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**Author's contributions**
The initial idea was conceived by MYJ, and the experiments were designed by SF. The searching of the databases, statistical analysis, and software design was performed by MH. The work was drafted by LL and revised critically by YJ. All authors read and approved the final manuscript.

**Availability of data and materials**
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