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# THE IMPACT OF SUSTAINABILITY ON FIRM PERFORMANCE AND THE ROLE OF INDUSTRY IN THIS RELATIONSHIP

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**Abstract**

The aim of this paper is to investigate the impact of sustainability on firm performance, along with the moderating role of industry in this relationship. While earlier work has examined the effect of sustainability on firm performance, whether the impact of firms' sustainability efforts on firm performance differs depending on the industry has largely been ignored. This paper aims to fill this research gap by considering the relations between sustainability, firm performance and industry. The firm level data are obtained from Public Disclosure Platform. The hypotheses are tested using hierarchical ordinary least squares (OLS) regression. The findings show that sustainability has a positive impact on firm performance. However, industry does not moderate the relationship between sustainability and firm performance. This study aims to advance the prior research on sustainability by examining whether firms' sustainability practices enhance their performance, and whether industry has an impact on this relationship in an emerging economy.

***Keywords:*** *Sustainability, Firm Performance, Industry*
***JEL Classification:*** *Q5, L2, L6*

# SÜRDÜRÜLEBİLİRLİĞİN FİRMA PERFORMANSI ÜZERİNDEKİ ETKİSİ VE ENDÜSTRİNİN BU İLİŞKİDEKİ ROLÜ

**Öz**

Bu çalışmanın amacı sürdürülebilirliğin firma performansı üzerindeki etkisini ve firma endüstrisinin sürdürülebilirlik ve firma performansı arasındaki ilişkide düzenleyici rolünü incelemektedir. Sürdürülebilirliğin firma performansı üzerindeki etkisi önceki çalışmalarda kapsamlı olarak ele alınmıştır; ancak, firmaların sürdürülebilirlik aktivitelerinin performansları üzerindeki etkisinin firmanın faaliyette bulunduğu endüstriye bağlı olarak değişip değişmediği yeterince incelenmemiştir. Bu çalışma, sürdürülebilirlik, firma performansı ve endüstri arasındaki ilişkileri ele alarak yazındaki bu boşluğu doldurmayı amaçlamaktadır. Çalışmada, Kamuyu Aydınlatma Platformu'ndan firma düzeyinde elde edilen veri regresyon yöntemi ile analiz edilmiştir. Bulgulara göre, sürdürülebilirliğin firma performansını olumlu yönde etkilediği gözlemlenmiştir. Ancak, firma endüstrisinin sürdürülebilirlik ve firma performansı arasındaki ilişkide düzenleyici etkisinin olmadığı sonucuna varılmıştır. Bu çalışma, gelişmekte olan bir ekonomide, sürdürülebilirliğin firma performansına etkisini ve endüstrinin sürdürülebilirlik ve firma performansı arasındaki ilişkide düzenleyici rolünü inceleyerek önceki yazını ilerletmeyi amaçlamaktadır.

***Anahtar Kelimeler:*** *Sürdürülebilirlik, Firma Performansı, Endüstri*
***JEL Sınıflandırması:*** *Q5, L2, L6*

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## 1. Introduction

Firms' sustainability activities enhance their performance and success. These sustainability efforts also contribute to productivity (Wilkinson et al., 2001: 1494). Firms improve their social performance to reduce costs and enhance their operational efficiency. However, there is still a conceptual debate on whether sustainability activities lead to improved firm performance (Ghardallou, 2022; Hull and Rothenberg, 2008: 782; Kumari and Joshi, 2023). In this regard, Gupta and Gupta (2020) state that the relationship between sustainability and firm performance needs more examination. In a bibliometric review, Jadhav and Sarangi (2024) point out that more research on sustainability and performance relationship is needed in emerging economies. In another bibliometric analysis, Feng, Zhu and Lai (2017: 305) emphasize the importance of exploring corporate social responsibility in supply chain management in emerging economies.

Moreover, the examination about under what circumstances the relationship between sustainability and firm performance is stronger is essential (Govindan et al., 2020). Kumari and Joshi (2023) suggest that studies should investigate moderators affecting corporate social responsibility and performance relations. Mangalagiri and Bhasa (2022: 151) state that firms that belong to a specific industry may replicate each other's corporate social responsibility practices. The authors suggest the examination of specific industries and comparison of the impact of such responsibility on performance across several industries. That is, the investigation of specific industries in sustainability research is suggested to capture whether there are differences in sustainability practices and performance consequences (Bakos et al., 2020: 1292; Mitra, 2022). In this sense, it has been suggested that future research should consider industries other than manufacturing to understand whether sustainability practices and their performance consequences have different patterns from the findings observed in manufacturing industry (Frempong et al., 2021; Hermundsdottir and Aspelund, 2022).

Despite the extant research, the results about the impact of corporate sustainability on firm performance are conflicting and inconclusive (Al Hawaj and Buallay, 2022: 62; Jadhav and Sarangi, 2024; Kumari and Joshi, 2023; McWilliams and Siegel, 2000: 608; Ullmann, 1985). For instance, while many studies reveal positive correlation between firm performance and sustainability (Aldossary et al., 2024; Choongo, 2017; Chouaibi et al., 2022; Ghardallou, 2022; Gupta and Gupta, 2020; Laskar, 2018), some others show negative association or no relation (Atan et al., 2018; Aupperle et al., 1985; Hussain et al., 2018; Lahouel et al., 2021; Murray et al., 2006; Rahi et al., 2022). Moreover, while previous research has considered several moderating factors, such as business strategy, firm size, education, tenure, ownership between sustainability and performance (Aldossary et al., 2024; Andries and Stephan, 2019; Ghardallou, 2022; Zarefar et al., 2022), studies, which compare industries in terms of sustainability and performance relationship, are very limited (Al Hawaj and Buallay, 2022; Govindan et al., 2020; Ho and Taylor, 2007). That is, the contradictory outcomes may depend on various factors such as, firms characteristics (e.g., industry, size, age), national context or strategies that firms pursue.

In sum, whether firms' sustainability efforts affect their performance and whether industry has a moderating role in this relationship are not much known. This paper aims to fill this research gap by considering the relations between sustainability, industry and performance in an emerging economy. Accordingly, this paper contributes to literature by examining whether firms' sustainability practices enhance their performance, and whether industry has a moderating impact on this relationship in an emerging economy. By investigating these relations, this paper answers a call for further empirical research about sustainability by considering firms' industry affiliation (Al Hawaj and Buallay, 2022; Frempong et al., 2021; Govindan et al., 2020; Gupta and Gupta, 2020). Specifically, exploring the role of industry enhances the sustainability research by taking the industry into account as a conditional factor (Bakos et al., 2020; Hermundsdottir and Aspelund, 2022; Mangalagiri and Bhasa, 2022). In addition, exploring the impact of sustainability on firm performance in an emerging economy context reveals whether firms' sustainability compliance efforts enhance their performance in such economies, where institutional conditions are weak (Khanna and Palepu, 1997). Considering industry variations allows us to capture differences in implementing sustainability practices and their effects on firm performance (Mitra, 2022).

The remaining of this paper is set out as follows. First, sustainability, firm performance, and industry relationships are discussed; the relevant hypotheses are proposed. Then, the methodology, and the empirical findings are presented. Finally, the results are discussed; limitations, further research directions, and implications are considered.

## 2. Conceptual Framework and Hypotheses

### 2.1. Sustainability and Firm Performance

Sustainability is defined as a system, which persists or survives (Costanza and Patten, 1995: 193). Pezzey (1992: 323, 355) emphasizes production and utility functions of sustainability, and defines sustainability as the non-declining utility or welfare. Wilkinson et al. (2001: 1492) point out that the sustainability concept becomes meaningful when it refers to restoring, maintaining or renewing something specific. Sustainability means different things to different people (White, 2013: 213). Everything can be associated with sustainability (e.g., economies, cities, resources, businesses, development), and it is at the intersection of science and politics (Scoones, 2007, 2016). Sustainability involves environmental and social actions (Peters et al., 2019: 1065). It has been a major component of business strategy in management (Banon-Gomis et al., 2011: 175).

Firms' sustainability efforts lead to long term success and returns. These efforts can contribute to productivity and employee satisfaction (Wilkinson et al., 2001: 1494). Social responsibility, environmental stewardship, and economic prosperity are the three key goals of sustainability. Social responsibility and environmental stewardship lead to economic prosperity, such as profit and economic growth (Placet et al., 2005: 32). Lubin and Esty (2010: 44) argue that sustainability efforts can affect firms' competitiveness and survival. It has also been argued that firms tend to implement sustainability practices when they enhance firms' competitive advantage (Gadenne et al., 2009: 46; Nulkar, 2014: 485).

Preceding studies have generally shown a positive impact of sustainability on firm performance. For instance, Aldossary et al. (2024) examine the effect of sustainability (customer engagement) on firm performance and customer satisfaction in S&P 500 firms. The authors find that customer engagement positively affects firm performance and customer satisfaction. Gupta and Gupta (2020) explore the impact of environmental sustainability on various dimensions of firms' performance in India. The results show a favorable impact of sustainability on four performance indicators, such as internal business process performance, financial performance, learning & growth performance and customer performance. Laskar (2018: 583) finds favorable influence of sustainability reporting on company performance in four Asian countries. Alareeni and Hamdan (2020: 1420) show that overall environmental, social and governance disclosure positively influences performance in the US firms. Choongo (2017) shows that environmental and social corporate social responsibility positively affects performance in small and medium enterprises in Zambia. Hermundsdottir and Aspelund (2022) examine how sustainability affects environmental and social innovations, and how these innovations influence firm performance in Norwegian manufacturing firms. Their findings reveal a favorable impact of sustainability on both types of innovations. In addition, environmental innovations enhance firm performance.

However, some other studies depict a negative effect of sustainability on firm performance or mixed evidence. For instance, Mangalagiri and Bhasa (2022: 149) examine the impact of corporate social responsibility on performance in Indian firms. According to the results, while corporate social responsibility has a favorable effect on return on assets (ROA); it does not influence Tobin's Q. Rahi et al. (2022: 302) examine the influence of sustainability on the financial performance of the Nordic financial firms. The authors show a negative association between sustainability practices and performance. Lahouel et al. (2021) find a negative effect of corporate social performance on financial performance in 25 international airline firms. Azmi et al. (2021) reveal a non-linear relation between sustainability activities and performance in banks in emerging economies. Atan et al. (2018: 188) find no relation between sustainability activities and firm performance (return on equity [ROE] and Tobin's Q) in Malaysian firms. Hussain et al. (2018) find no relationship between sustainability parameters and performance (ROA and ROE, Tobin's Q) in US firms. Aupperle et al. (1985: 459) do not find any association between social responsibility and performance (ROA). Murray et al. (2006: 228) find no relationship between social and environmental disclosure and performance in UK firms. Nevertheless, these inconclusive results should not lead to the understanding that sustainability is trivial in firms' competitive advantage. It may boost firm performance in emerging economies. Therefore,

H1: Sustainability has a positive impact on firm performance.

### 2.2. The Moderating Role of Industry in Sustainability and Firm Performance Relationship

Costanza and Patten (1995: 194) argue that one of the issues relates to systems or characteristics of systems that is interested in sustaining. Industry can be one of the characteristics that can be subject of debate in sustainability. However, Pezzey (1992: 347) emphasizes the sectoral sustainability. For instance, Placet et al. (2005: 35) state that cement industry, which is important for infrastructure development in emerging economies, is resource and capital intensive. Cement production consumes energy and produces carbon dioxide emissions. Therefore, the potential climate chance concern in this industry is the driver of sustainability. Some firms may pursue a slow sustainability strategy because of the specific industry characteristics, business processes, or environmental exposure (Lubin and Esty, 2010: 49). In manufacturing industry, the main issues relate to how firms develop, implement and report the sustainability actions. Manufacturing industry has divisions; therefore, these divisions' sustainability activities may be different from each other. Also, manufacturing industry changes quickly that replacing business models for effective sustainability becomes difficult. However, firms in these industries take precautions about environmental and social issues (Al Hawaj and Buallay, 2022: 65). Leonidou et al. (2017: 599) state that firms in more harmful industries are more likely to adopt a green business strategy. In this regard, it has been argued that manufacturing industry is considered as the most harmful sector and therefore, firms are more likely to implement environmental practices compared to other sectors (e.g., services or other) (Mitra, 2022).

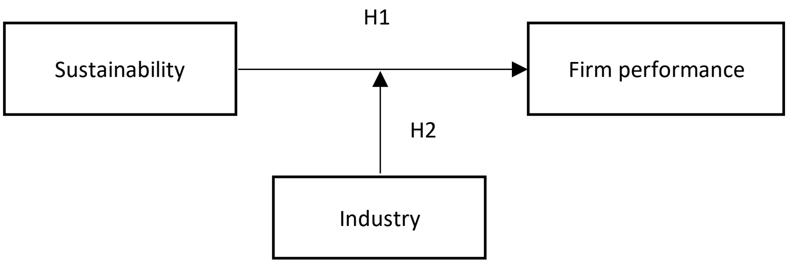
In previous studies, various factors are considered in sustainability and performance relationship. For instance, Andries and Stephan (2019) explore the relation between environmental innovation and performance, and the moderating impact of firm size and motives in this relationship in Flemish firms. Their results depict that environmental innovation enhances performance. Moreover, firm size positively moderates the relation between environmental innovation and firm performance. Ghardallou (2022) explores the effect of corporate sustainability on firms' performance and the moderating role of CEO characteristics in this relationship in Saudi firms. The results depict that corporate social responsibility enhances firms' performance. In addition, CEO education and tenure positively moderate the corporate social responsibility and performance relationship. Sardana et al. (2020) investigate the impact of corporate social responsibility sustainability practices on firm performance and the moderating role of plant capability in this relationship in Indian manufacturing firms. The results depict that environmental sustainability enhances performance; however, supplier sustainability has no influence on performance. Moreover, plant capability positively moderates the link between supplier sustainability and performance. Aldossary et al. (2024) show that business strategy positively moderates the link between sustainability and firm performance in S&P firms. Kuo et al. (2022) examine the impact of sustainability performance on firm performance, and the moderating role of corporate social responsibility in this relationship in transport manufacturing industry. The authors find that sustainability performance positively affects firm performance, and governance pillar of corporate social responsibility moderates this relationship. Zarefar et al. (2022) investigate the influence of sustainability reporting on firm performance and the moderating impact of family ownership on the association between performance and sustainability in Indonesian firms. Their results depict that sustainability has a favorable impact on performance and family firms positively moderates the influence of sustainability on performance.

Several studies have focused on industry variation and comparison across these industries. For instance, Al Hawaj and Buallay (2022: 62) explore the impact of sustainability reporting on firm performance by focusing on various sectors from different countries. The authors show that the influence of sustainability reporting on firm's market performance, financial performance (ROE) and operational performance (ROA) differs across the seven sectors. The effect of sustainability reporting on firm's ROA and ROE is positive in manufacturing sector. Hull and Rothenberg (2008: 786) show that corporate social performance has more favorable impact on financial performance in firms in undifferentiated industries. Feng, Wang and Kreuze (2017: 116) explore how the relation between firms' social responsibility and performance differs across industries in the US. The results show that social responsibility positively affects firm performance in most industries except energy and utility firms. Govindan et al. (2020) investigate the effect of sustainability practices on firm performance in a meta-analysis. The authors also perform a subgroup analysis to examine sustainability and performance relationship by using industry and economy factors. Their results demonstrate a positive relation between sustainability and performance. Moreover, the association is stronger in manufacturing industry than in service industry. Ho and Taylor (2007: 123) reveal that the aggregate social, economic and environmental disclosure is higher for firms in manufacturing industry than other firms in the US and Japan. Some of these studies in the literature consider only manufacturing firms; however, this industry may differ from other industries in terms of the compliance with the sustainability principles and the impact of these implementations on firm performance. Therefore,

H2: Industry positively moderates the relationship between sustainability and firm performance.

Figure 1 shows the proposed model.

Figure 1: **Proposed Theoretical Model**




### 3. Methodology

In this study, the data are obtained from Public Disclosure Platform (PDP, n.d.). Firms' performance reports belong to year of 2023. Sustainability compliance reports of companies, which are issued in 2022, are used. This one-year lag between sustainability and firm performance allows us to assess whether sustainability in the current year influences firm performance in the subsequent year (Tanriverdi and Venkatraman, 2005). There are 391 firms in the sample except the holding companies. (Ethics committee approval is not required.)

Dependent Variable: The dependent variable is firm performance. Common method bias may occur when dependent and independent variables are measured in the same context (Podsakoff et al., 2003). To overcome this limitation, firm performance is operationalized by two objective financial indicators: Return on assets (ROA) and return on equity (ROE) for the year 2023. ROA, which is measured as earnings before interest and tax divided by total assets, is widely used measure of firm performance in the literature (Borda et al., 2017; Carney et al., 2009; Chittoor et al., 2015). ROE (net income divided by total equity), which is the relevant measure for equityholders, is another widely used measure of firm performance (Buchuk et al., 2014; Tanriverdi and Venkatraman, 2005).

Independent Variables: Sustainability and industry are the independent variables. To measure sustainability variable, the principles (general, environmental, social, corporate governance) in the compliance reports are used. Each principle is measured through relevant questions and/ or items in sustainability compliance reports. Depending on the way questions asked, answers for the items are coded 1, if the firms take precautions about each item, implement practices, state that they comply with the principles and/or they provide information on that item, 0 otherwise. All the values are summed up to construct the sustainability variable. Firm industry is measured by using a dummy variable (1: manufacturing, 0: other). In the sample, 174 firms operate in manufacturing industry.

Control Variables: Business group affiliation and subsidiary are included as control variables to ensure the robustness of the study. Business group affiliation is measured by using a dummy variable (1: affiliated firms, 0: independent firms). Subsidiary is measured through each firm's number of subsidiaries.

## 4. Results

In this paper, the influence of sustainability on firm performance and the moderating role of industry in the association between sustainability and firm performance have been investigated. The model is analyzed by using the ordinary least squares (OLS) estimator in Stata software (V14.2). Table 1 shows the standard deviations, means, and the correlations between the variables. The correlations are smaller than 0.5, indicating that multicollinearity is not likely to be a problem (Hair et al., 2010).

Table 1: **Descriptive Statistics and Correlations**

| Variable | Mean | S.D. | 1 | 2 | 3 | 4 | 5 | 6 |
|---|---|---|---|---|---|---|---|---|
| 1. ROA | .05 | .14 | 1 | | | | | |
| 2. ROE | .12 | .24 | 0.80* | 1 | | | | |
| 3. Sustainability | 28.06 | 18.17 | 0.07 | 0.16* | 1 | | | |
| 4. Industry | .45 | .50 | -0.03 | -0.16* | 0.21* | 1 | | |
| 5. Affiliation | .47 | .50 | -0.07 | -0.06 | 0.17* | 0.06 | 1 | |
| 6. Subsidiary | 4.20 | 7.68 | 0.01 | 0.04 | 0.29* | -0.11* | 0.09 | 1 |

**Note:** *$p < 0.05$, (2-tailed), N=391

Table 2 presents the results of the regression analysis relating to the influence of sustainability on firm performance and the moderating role of industry in the relationship between sustainability and firm performance for ROA and ROE measures. For both financial measures of the dependent variable, Model 1 includes the control variables (affiliation, subsidiary) and independent variables (sustainability, industry). Model 2 includes the interaction term between sustainability and industry. The VIF values are smaller than 10 and the mean VIF values are not significantly greater than 1; multicollinearity is not likely to be a problem in this study (Hair et al. 2010).

Table 2: **Regression Results**

| | ROA | | ROE | |
|---|---|---|---|---|
| **Variable** | **Model 1** | **Model 2** | **Model 1** | **Model 2** |
| Affiliation | -0.023<br>(0.015)<br>[0.112] | -0.024<br>(0.015)<br>[0.101] | -0.039<br>(0.024)<br>[0.104] | -0.037<br>(0.024)<br>[0.121] |
| Subsidiary | -0.000<br>(0.001)<br>[0.718] | -0.000 (0.001)<br>[0.798] | -0.001 (0.002)<br>[0.465] | -0.001<br>0.002<br>0.395 |

Table 2 (Continued): **Regression Results**

| Variable | ROA Model 1 | Model 2 | ROE Model 1 | Model 2 |
|---|---|---|---|---|
| Sustainability | 0.001*<br>(0.000)<br>[0.085] | 0.000<br>(0.001)<br>[0.411] | 0.003***<br>(0.001)<br>[0.000] | 0.004***<br>(0.001)<br>[0.000] |
| Industry | -0.013<br>(0.015)<br>[0.397] | -0.030<br>(0.028)<br>[0.280] | -0.097***<br>(0.025)<br>[0.000] | -0.061<br>(0.046)<br>[0.182] |
| Sustainability x Industry | | 0.001<br>(0.001)<br>[0.458] | | -0.001<br>(0.001)<br>[0.356] |
| _cons | 0.048*** | 0.055*** | 0.101*** | 0.087*** |
| $R^2$ | 0.013 | 0.015 | 0.069 | 0.071 |
| Adj $R^2$ | 0.003 | 0.002 | 0.060 | 0.059 |
| RMSE | 0.14 | 0.14 | 0.23 | 0.23 |
| F | 1.29 | 1.14 | 7.17*** | 5.93*** |
| VIF (mean) | 1.11 | 2.65 | 1.11 | 2.65 |

**Note:** Standard errors in parentheses, p values in square brackets,
* p < 0.1, ** p < 0.05, *** p < 0.01, N = 391

According to the results, in model 1, sustainability has a significant positive impact on firm performance (ROA: β = 0.001, p < 0.1; ROE: β = 0.003, p < 0.05). Therefore, Hypothesis 1 is supported. In model 2, industry does not moderate the relationship between sustainability and firm performance; hypothesis 2 is not supported (ROA: β = 0.001, n.s.; ROE: β = -0.001, n.s.).

## 5. Conclusion

In this paper, the influence of sustainability on firm performance and the moderating role of industry in the association between sustainability and firm performance have been investigated. The results indicate that sustainability enhances firm performance. However, industry has no role in compliance with the sustainability principles and firm performance relationship. The favorable impact of sustainability on firm performance is in line with the results, which have been shown in the previous literature. For instance, Aldossary et al. (2024) find that customer engagement positively affects firm performance and customer satisfaction in S&P 500 firms. Chouaibi et al. (2022: 46) demonstrate that sustainability practices positively influence firm performance in the UK and German firms. Ghardallou (2022) depicts that corporate social responsibility increases performance in Saudi firms. Gupta and Gupta (2020) show that environmental sustainability has a favorable impact on four performance indicators in Indian firms. Alareeni and Hamdan (2020: 1420) show that overall environmental, social and governance disclosure positively influences performance in US firms. Choongo (2017) shows that environmental and social corporate social responsibility positively influences performance in small and medium enterprises in Zambia.

The insignificant moderation impact of industry on the association between sustainability and firm performance contradicts with the findings of the previous work. For instance, Al Hawaj and Buallay (2022: 62) show that sustainability reporting enhances firm's ROA and ROE in manufacturing sector. Govindan et al. (2020), in a meta-analysis, reveal that the positive relation between sustainability and performance is stronger in manufacturing industry than in service industry. Ho and Taylor (2007: 123) reveal that the aggregate social, economic and environmental disclosure is higher for firms in manufacturing industry than other firms in the US and Japan. Feng, Wang and Kreuze (2017: 116) show that social responsibility positively affects firm performance in most industries except energy and utility firms in the US. This contradictory finding suggests that more work, which compares industries in terms of sustainability and performance relationship, is needed in emerging economies to get a better understanding of whether sustainability consequences differ across industries.

This work contributes to literature by examining whether firms' sustainability practices enhance their performance, and whether industry has a moderating impact on this relationship in an emerging economy. By investigating these relations, this paper answers a call for further empirical research about sustainability by considering the firms' industry affiliation (Al Hawaj and Buallay, 2022; Frempong et al., 2021; Govindan et al., 2020; Gupta and Gupta, 2020). Specifically, exploring the role of industry enhances the sustainability research by taking the industry into account (Bakos et al., 2020; Hermundsdottir and Aspelund, 2022; Mangalagiri and Bhasa, 2022). In addition, exploring the impact of sustainability on firm performance in an emerging economy context reveals whether firms' sustainability compliance efforts enhance their performance in emerging economies, where institutional conditions are weak (Khanna and Palepu, 1997). The results confirm the importance of compliance with the sustainability principles in firm performance in an emerging economy. The findings also reveal that sustainability is important for firms, irrespective of their industry. In sum, this paper allows us to understand whether the impact of sustainability on firm performance differ between manufacturing firms and other ones operating in various industries.

The results of the present research have some implications for emerging economy firms. Firms in such economies should pay attention to sustainability principles as compliance with these enhance their performance. In terms of operating in different industries, firms should meet the requirements for a better environment, and accordingly better performance. In sum, practitioners from all industries should encourage the implementation of such practices (Chouaibi et al. 2022; Gupta and Gupta, 2020).

There are limitations in this paper, which can open new avenues for further research. First, this paper considers only industry as a moderating variable. Future studies can focus on different moderating factors, such as firm size, type etc. (Gupta and Gupta, 2020). Scholars may also consider other industries, such as tourism, agriculture, energy etc. to capture sustainability and its consequences (Kyrgiakos et al., 2023; Perez Leon, 2024; Sueyoshi and Goto, 2014). Second, this study is conducted in a single emerging economy. Therefore, future studies can consider other emerging economies to explain the proposed relations for the generalization of the findings (Almulhim et al., 2024; Songling et al., 2018; Zarefar et al., 2022). Future studies may also consider various types of firms, such as small and medium enterprises or qualitative research and a longitudinal study to understand sustainable development better (Rahi et al., 2022; Rosamartina et al., 2022; Torugsa et al., 2012).

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