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Assessment of Impact of Economic Sustainability on Shareholder Return and Economic Profit of BRICS Industrial Companies Following Digital Transformation Strategy

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Abstract. We investigated the impact of Economic Sustainability (ES) practices of digitally oriented industrial companies in BRICS (Brazil, Russia, India, China, and South Africa) in various horizons. The relevance is underpinned by numerous controversies in the literature on the topic. The sample included 257 industrial companies from BRICS in 2017-2021. Economic profit in the long-term and short-term was measured by Total Shareholder Return (TSR) and Economic Value Added (EVA), respectively. We found that the improvements in resource use, enhancements in the workforce and responsible product development had a positive and significant influence on the TSR of BRICS companies. Conversely, we discovered the negative impact of social practices on companies' EVA. Firms from Brazil and India with stronger ESG practices provided higher returns for shareholders, while there was a significant and negative linkage between ES and EVA for Chinese firms. Cross-industry analysis showed that ESG practices had an additional positive and significant impact on the TSR of firms in the basic materials and technology sectors. However, there was an additional negative and significant impact of ES practices on EVA in consumer cyclical and energy sectors. The novelty is driven by (1) exploring the impact of ESG practices on companies' value at BRICS; (2) considering previously overlooked metrics of TSR and EVA; and (3) applying granular ES metrics instead of aggregated ones.

Keywords: Brazil, Russia, India, China, and South Africa (BRICS) Digital transformation; Economic profit; Environmental, Social, and Governance (ESG); Total shareholder return

1. Introduction

Digital transformation and Economic Sustainability (ES) are two key topics which have recently revolutionized the practices of contemporary businesses (Berawi, 2022; Berawi, 2020). They, taken together, can reinforce sustainable growth of companies' value. This symbiosis is most pronounced in the economies of the BRICS countries (an acronym for Brazil, Russia, India, China, and South Africa). The objective of the study is to investigate the impact of ES practices of BRICS industrial companies, which follow digital transformation strategies, on their economic profit in various horizons. The relevance is underpinned by mixed results in the literature and the lack of studies on the topic. The novelty is driven by considering companies' value on various horizons. It is also underpinned by using granular

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ES metrics instead of consolidated ones widely used in previous research.

Economic sustainability (ES) implies the balance between ecological (E), social (S), and corporate governance (G) practices, as well as the economic efficiency of the firm to ensure the long-term creation of value for all stakeholders. Digitalization has a catalytic effect on ES (Wu and Li, 2023; Pishalkina, Pishalkin, and Suloeva 2022). However, Mingyue, Huihua, and Xinyi (2023) found that digitizing facilitated ES but did not improve environmental performance in China.

Despite an increase in the number of studies exploring the impact of ES on companies' financial performance (FP), the conclusions in these studies are mixed (Lee and Suh, 2022; Friede, Busch, and Bassen, 2015). The first cluster of papers examines the impact of ES on accounting metrics. Positive impacts were identified in approximately 60% of these papers, with the positive linkages being explained by efficiency improvements (Whelan *et al.,* 2021). The negative impacts were argued by the high costs of ESG practices, while benefits were manifested with a lag (Duque-Grisales and Aguilera-Caracuel, 2019). The second cluster of papers investigated the impact of ES on companies' value (market capitalization, Tobin Q, etc.). Around 30% of studies reported positive relationships, 14% - reported negative relationships, and the rest showed mixed results (Whelan *et al.,* 2021). Fatermi, Glaum, and Kaiser (2017), Melinda and Wardhani (2020), and Shrivastava and Anand (2023) reported positive relationships between the strength of ESG practices and Tobin Q. These results were in line with resource and stakeholder theories. Conversely, Lee, Waff and Langfield-Smith (2009), found a negative relationship between the six-factor alpha and the ES performance of firms. It was underpinned by the high cost of ES practices (Lahouel *et al.,* 2019; Velte, 2017). The third cluster of papers considered the linkages between ES practices and metrics derived from a value-based approach. Huang, Li, and Li (2022) found a significant positive relationship between ESG performance and economic value added (EVA) in China. The industrial specifics also have an impact on the ES-FP linkages (Skhvediani, Rodionova, and Kudryavtseva, 2022; Garcia, Mendes-Da-Silva, and Orsato 2017). However, there is a lack of industry-specific research as most studies are cross-industrial. Similarly, the ES-FP relationship depends on the firms' geographical location or level of market maturity (Gonçalves, Louro, and Barros, 2023). Conversely, Friede, Busch, and Bassen (2015), argued that a positive ES-FP relationship was observed almost twice more times in emerging markets than in developed markets. To summarize, despite the growing number of studies regarding the mediating role of digitalization on ES practices followed by improvements in firms' FP, there are still gaps in the literature which need to be resolved.

2. Methods and Method

BRICS is the acronym for five emerging market economies: Brazil, Russia, India, China, and South Africa. We selected these economies because of their rapid growth and active adoption of ES practices (Melo and Lausanne, 2023). However, BRICS countries demonstrate weaknesses in domestic financial markets, emerging economic and social institutions, instability, poverty, and inequality. In such an environment, the benefits of ES practices can be muted and not valued by investors to the same extent as in the developed markets.

The dataset included ESG and financial metrics of 257 industrial companies from BRICS in 2017-2021, which reported the realization of digital transformation strategies (Figure 1). The sample covered about 80% of market capitalization in Brazil, Russia, and South Africa and about 50% and 30% of market capitalization in India and China. The dataset

covered the five years between 2017-2021.

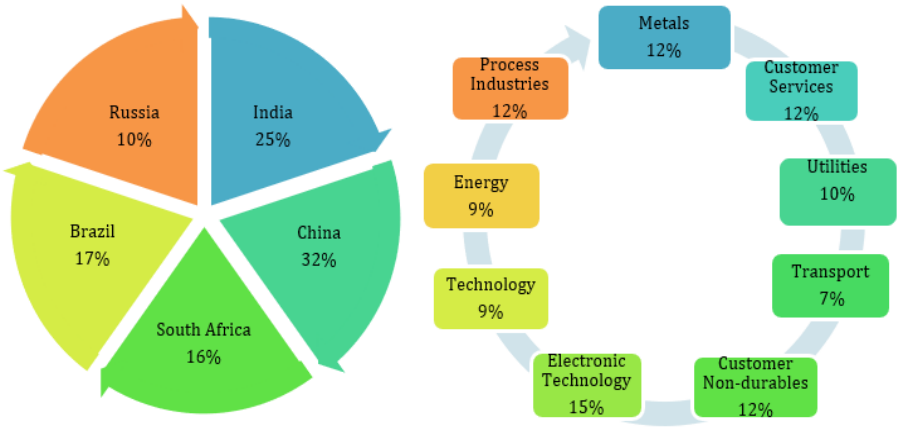

Figure 1 Distribution of sample by geography and industries

We selected total shareholder return (TSR) as the first dependent variable. It reflects the overall financial benefits generated for equity investors. Some studies demonstrated that TSR is preferable to Tobin Q in measuring a firm's value, as the latter can be inflated by underinvestment (Bendle and Butt, 2018). The researchers also selected economic profit spread (EVA spread) as the second dependent variable. It is calculated as Return-on-investment Capital (ROIC) minus Weighted Average Cost of Capital (WACC). EVA motivates companies to improve the efficiency of capital utilization and thus results in a superior value performance (Tortella and Brusco, 2003). Independent variables were ESG scores and their pillars from Refinitiv (Table 1). For EVA spread, we used the firm size (a natural logarithm of sales), the leverage and the size of the investment program (as capital expenditures as a % of total assets) as the control variables (Gonçalves, Louro, and Barros, 2023). For TSR, we used the control variables: (1) the changes in the fundamental value (measured by EBIT margin change); (2) the changes in expectation premiums (measured by enterprise value (EV)/Revenue); and (3) the changes in cash flow yield (measured by the sum of net debt growth, dividend yield and share change) (Olsen, Stelter, and Plaschke, 2005). The selection of TSR and EVA as dependent variables served multiple purposes. Firstly, it contributed to mitigating the impact of accounting adjustments, a consideration often overlooked in existing literature. Secondly, the choice of TSR and EVA helped to close the gap in the literature on the short-term and long-term impact of ESG practices on companies' value. Thirdly, the paper measures the effectiveness of individual sustainable development practices, while the existing literature is limited to the study of aggregated estimates.

Table 1 Descriptive statistics for dependent, independent and control variables

Variables	Exp. sign	Mean	St. Dev	Min	Max
Dependent variables					
TSR		0.25	0.64	-0.84	6.49
EVA spread		1.40	1.47	0.00	15.66
Independent variables (scores from Refinitiv)					
ESG combined	+	51.50	19.27	1.12	91.57
E-pillar	+	49.74	23.73	0.00	97.97
S-pillar	+	52.32	23.98	1.86	96.83
G-pillar	+	51.91	21.87	0.83	96.61
Resource use	+	54.75	29.31	0.00	99.89
Emissions	+	55.66	26.94	0.00	99.51
Environmental Innovations	+	28.34	31.13	0.00	99.76
Workforce	+	64.94	24.30	0.94	99.93
Human Rights	+	40.67	32.93	0.00	98.54
Community	+	53.97	30.20	1.18	99.92
Product Responsibility	+	50.15	32.40	0.00	99.83
Management	+	49.86	28.80	0.00	99.81
Shareholder	+	48.26	29.02	0.12	99.71
CSR	+	59.16	30.14	0.00	99.91
Control variables					
Size (ln of Sales) (LnS)	+	10.85	0.74	8.71	13.01
Leverage (LEV)	-	0.55	0.25	0.00	3.50
Capex (CPX)	+	0.06	0.04	0.00	0.38
Change in fundamental value (CFV)	+	0.02	3.25	-56.6	50.6
Change in EV/Revenue multiple (CEVR)	+	0.09	0.53	-6.5	4.36
Free Cash Flow Yield (FCFY)	+	1.28	30.6	-249.7	638.6

Source: Refinitiv, Capital IQ

In the study, we test the following hypotheses:

H1. There is a positive impact of the ESG score and its pillars on TSR.

H2. There is a positive impact of ESG score and its pillars on EVA;

H3. The strength of the relationship between TSR or EVA and combined ESG scores (including individual pillars) varies by BRICS countries.

H4. The strength of the relationship between TSR or EVA and combined ESG scores (including individual pillars) varies by industries in BRICS countries.

To test the hypotheses H1 and H2, we ran a series of i-th panel data regressions (equation 1):

$$DV_{n,t} = \alpha + \beta_i ES_{i,n,t} + \sum_{j=1}^{M} \varphi_j CV_{j,n,t} + \varepsilon_{n,t} \quad (1)$$

$DV_{n,t}$ -the dependent variable (EVA spread or TSR);

$ES_{i,n,t}$ is one of the fourteen ESG metrics mentioned in Table 1;

$CV_{j,n,t}$ – the respective control variables which matched DV from Table 1;

n -the number of the firm; **t** – the time period (1,T).

To test the hypothesis H3 we ran the following panel data linear regressions (equation 2):

$$DV_{n,t} = \alpha + \beta ESG_{n,t} + \sum_{j=1}^{M} \varphi_j CV_{j,n,t} + \sum_{k} \gamma_k dC_{k,n,t} + \sum_{t}^{T} \tau_t dT_{n,t} + \varepsilon_{n,t} \quad (2)$$

$dC_{k,n,t}$ - dummy variable reflected the country of operations of each firm, to evaluate the number of dummy variables (k), we ran the Chow test;

$ESG_{n,t}$ – combined ESG score of n-th company at period t;

Finally, to hypothesis H4, we used the following panel data linear regressions (equation 3):

$$DV_{n,t} = \alpha + \beta ESG_{n,t} + \sum_{j=1}^{M} \varphi_j CV_{j,n,t} + \sum_{k} \gamma_k dI_{k,n,t} + \sum_{t}^{T} \tau_t dT_{n,t} + \varepsilon_{n,t} \quad (3)$$

$dI_{l,n,t}$ – dummy variable reflecting the industry of operations of each firm. To select the best specification of each panel regression, we applied the Hausman and Breusch-Pagan tests.

3. Results and Discussion

Results of testing of hypotheses H1 and H2 are presented in Tables 2 and 3. The best specifications of all models are fixed effects.

Table 2 Analysis of the impact of ESG score and its pillars on TSR.

Variables	Factor	CFV	CEVR	FCFY	F stat
ESG combined	*0.009****	*0.010**	*0.277***	*-0.0001*	*14.91****
E-pillar	*0.006***	*0.010**	*0.278****	*-0.0001*	*14.24****
Resource use	0.005**	0.010	0.226***	-0.0001	14.92***
Emissions	0.003	0.010	0.264***	-0.0001	13.21***
Environmental Innovations	0.003*	0.009	0.264***	-0.0002	13.35***
S-pillar	*0.011****	*0.009**	*0.264***	*-0.0001*	*16.51****
Workforce	0.004*	0.010**	0.266***	-0.0001	13.76***
Human Rights	0.005***	0.010***	0.268***	-0.0001	15.01***
Community	0.005**	0.010*	0.263***	-0.0002	14.34***
Product Responsibility	0.005***	0.009	0.258***	-0.0002	14.79***
G-pillar	*0.0001*	*0.009*	*0.265*	*-0.0001*	*12.72****
Management	-0.0003	0.004	0.166***	-0.0001	4.122***
Shareholder	-0.0003	0.010	0.260***	-0.0001	12.60***
CSR strategy	0.002	0.009	0.263***	-0.0001	12.92***

*p<0.1**p<0.05***p<0.01

The coefficient at ESG combined rating is positive and significant at the 1% level (Table 2). This matches the findings of Lueg and Pesheva (2021) and the assumptions of shareholder and legitimacy theories. The outcome is also in line with the conclusions of Fatermi, Glaum and Kaiser (2017) who reported positive relationships between the strength of ESG practices and the company's market value. Albeit the magnitude of the relationship is small, positive movement of ESG rating at one-unit results only in a 0.01% increase in TSR. This conclusion is in line with that of Gonçalves, Louro, and Barros (2023) who reported weaker relationships between ES and firms' value in emerging markets. The granular analysis indicated that coefficients at the E-pillar and S-pillar scores were positive and significant, while one for the G-pillar was not significant. These findings do not match, however, with those of Melinda and Wardhani (2020) or Friede, Busch, and Bassen (2015) which indicated that in most instances, all individual factor scores E, S and G positively affected firms' value. It can be explained that BRICS companies listed in major exchanges usually achieve high standards of corporate governance, and marginal improvements in this field do not impact TSR. Our finding also did not match with those of Narula, Rao, and Kumar (2023) who studied 220 Indian firms from the year 2018-2020 and found no impact of ESG scores and their components on Tobin Q. The difference in results can be explained by the different time periods in the samples, as well as the fact that TSR is a better measure of value for shareholders than Tobin Q the latter can be affected by accounting manipulations. Among the individual ESG factors, the coefficient at the "resource use score" is positive and significant at the 5% level. It reflects the company's performance and capacity to reduce the use of materials, energy, or water. Also, the coefficient at the environmental innovation factor is positive and significant at the 10% level. Thus, investment in digital "green" technologies is valued by the market as a factor of long-term competitive advantage. The significance of coefficients at S-factors proved our assumptions that investors value improvements in corporate social responsibility. Therefore, H1 is partially proved.

Table 3 Analysis of impact of ESG score and its pillars on EVA spread

Variables	Factor	LnS	LEV	CPX	F stat
ESG combined	*-0,008**	*2,501****	*-1,224****	*3,180***	*21,27****
E-pillar	*-0.005*	*2.497****	*-1.239****	*3.247***	*21.11****
Resource use	-0.003	2.489***	-1.260***	3.212*	21.60***
Emissions	-0.003	2.495***	-1.279***	3.270*	21.71***
Environmental Innovations	-0.002	2.473***	-1.288***	3.141*	21.41***
S-pillar	*-0,007**	*2,493****	*-1,246****	*3,300***	*21,36****
Workforce	-0,007***	2,158***	-1,244***	3,418**	23,11***
Human Rights	-0.001	2.452***	-1.304***	3.239*	21.35***
Community	-0.002	2.458***	-1.283***	3.228*	21.29***
Product Responsibility	-0.001	2.454***	-1.294***	3.185*	21.28***
G-pillar	*-0.002*	*2.421****	*-1.256****	*3.197**	*20.53****
Management	-0.001	2.392***	-1.241***	2.583*	15,58***
Shareholder	-0.003	2.453***	-1.285***	3.184*	21,59***
CSR strategy	-0.002	2.467***	-1.343***	2.792*	21,49***

*p<0.1**p<0.05***p<0.01

EVA spread is a gauge of short-term FP of the firm as it measures the efficiency of capital use and the effectiveness of risk management. The coefficient at ESG combined score is negative and significant at 10% level (Table 3). This matches the conclusions in studies (Duque-Grisales and Aguilera-Caracuel, 2019) and confirmed our assumptions that in short-term social initiatives increased the company's expenses leading to decrease in profit. The latter was not compensated by decrease in cost of funding and this led to the reduction of firm's value. Across pillars only S-score is a significant and negative predictor of EVA. On BRICS level this conclusion, however, contradicts that of Huang, Li, and Li (2022) who reported a positive relationship between all E, S, and G factors and EVA for Chinese companies. This controversary indicates that the nature of ES-FP relationship significantly varies across BRICS participants. On individual factor level improvements of efficiency in workforce had a negative impact on EVA. We attributed these results to the social issues in BRICS countries while high cost to overcome those muted ROCE in short-term. Thus, the hypotheses H2 is rejected. In turn, we performed cross-country analysis (Table 4) by running the regression (2). Fixed effect model is found to be the best specification.

Table 4 Cross-country analysis of impact of ESG scores on TSR and EVA

Variables	TSR		EVA	
	Factor	St. Dev	Factor	St. Dev
ESG combined	0.010***	(0.003)	-0.009*	(0.005)
Brazil (dummy)	0.012*	(0.007)	-0.001	(0.007)
Russia (dummy)	0.003	(0.004)	0.004	(0.015)
China (dummy)	0.007	(0.004)	-0.018***	(0.007)
India (dummy)	0.024***	(0.007)	N/a	N/a
CFV	0.009*	(0.008)	N/a	N/a
CEVR	0.264***	(0.085)	N/a	N/a
FCFY	-0.0001	(0.001)	N/a	N/a
LnS	N/a	N/a	2.492***	(0.466)
LEV	N/a	N/a	-1.258***	(0.452)
CPX	N/a	N/a	3.136*	(1.685)
Time fixed effects	Yes		Yes	
F-stat	11.62***		17.12***	
R^2	0.07		0.08	

*p<0.1**p<0.05***p<0.01

Table 4 shows that companies from Brazil and India with stronger ESG practices provided higher TSR. There is no such effect for firms from Russia, China, and South Africa. For India, the obtained results can be explained by the country's low reliance on natural resources extraction, the significant share of ES-sensitive investors, and (3) the mix of domestic issuers in financial markets from sectors which gain value from EC practices (e.g., IT, pharma, textiles). For Brazil, the softer reaction of TSR on EC practices is underpinned by higher countries' reliance on the "brown" natural resources' extraction and lower country ESG rating than India. On the contrary, Russia and South Africa have the highest share of natural resource industries among issuers. Lastly, China has severe ES issues and high investments in EC driven by the tightening of EC regulation and promoting ESG practices. All these resulted in no impact of ES practices on TSR. Table 4 also indicates the significant and negative linkage between ES and EVA for Chinese firms. This can be attributed to the issues indicated above. Thus, the hypothesis 3 cannot be rejected. The results for the Chinese market still contradict the findings of Huang, Li, and Li (2022). Additionally, our findings contradicted those of Narula, Rao, and Kumar (2023) for the Indian market. These variances can be explained by differences in the period of sampling or differences in the dependent variables but still require further investigation.

To prove hypothesis 4, we ran a cross-industrial analysis (Table 5). Chow test showed that the sample is not homogeneous for such industries as basic materials, consumer cyclical and non-cyclical, energy, industrials, technology, and utilities.

Table 5 Cross-industry analysis of the impact of ESG scores on TSR and EVA

Variables	TSR		EVA	
	Factor	St. Dev	Factor	St. Dev
ESG combined	0.010***	(0.003)	-0.010**	(0.005)
Basic materials	0.015***	(0.005)	0.0003	(0.011)
Consumer cyclical	0.011	(0.009)	-0.027**	(0.011)
Consumer non-cyclical	0.006	(0.005)	-0.012	(0.011)
Energy	0.005	(0.007)	-0.017**	(0.008)
Industrials	0.010	(0.007)	-0.004	(0.006)
Technology	0.013*	(0.007)	-0.010	(0.015)
CFV	0.009*	(0.008)	N/a	N/a
CEVR	0.263***	(0.086)	N/a	N/a
FCFY	-0.0001	(0.001)	N/a	N/a
LnS	N/a	N/a	2.466***	(0.473)
LEV	N/a	N/a	-1.218***	(0.454)
CPX	N/a	N/a	3.176*	(1.666)
Time fixed effects	Yes		Yes	
F-stat	11.76***		17.29***	
R2	0.07		0.08	

*p<0.1**p<0.05***p<0.01

ES practices have an additional positive and significant impact on TSR in basic materials and technology sectors (Table 5). These industries, on the one hand, are not "brown" in nature but, on the other hand, have material issues related to environmental and social practices. Addressing these issues can, in turn, have a positive impact on the long-term efficiency and performance of companies in these sectors. Our findings agreed with those of Skhvediani, Rodionova, and Kudryavtseva (2022) who found a significant positive relationship between ES practices and the market value added of companies in the technology and industrial sectors. We also found additional negative and significant impacts of EC practices on EVA in consumer cyclical and energy sectors. In a consumer cyclical industry where competition among players is high, it is difficult to transfer costs due to EC practices to consumers in the short-term. Respectively, the energy sector, as the

brown industry, requires significant costs to alleviate negative ESG practices while the companies are "price takers" on the commodity market. Thus, the hypothesis H4 cannot be rejected. Our findings agree with those of Skhvediani, Rodionova, and Kudryavtseva (2022) or Garcia, Mendes-Da-Silva, and Orsato (2017) who found the strongest FP-ES relationship for the companies from high-carbon-intensive industries.

4. Conclusions

We studied the impact of EC practices of industrial companies from BRICS on their economic profit in various horizons. We found that the long-term improvements in resource use and environmental innovations, enhancements in the workforce; and responsible product development practices had a positive influence on the TSR of BRICS companies. There was a negative impact of ES, particularly S-practices, on companies' EVA. We also proved that the strength of relationships between ES factors and value metrics in various horizons varied across countries and industries. The limitations of the study include the absence of addressing the issues related to the U-shaped link between ES and companies' value, as well as the constraints posed by the limited sample size and the number of years used in modeling. Additional ESG factors granularity and deeper focusing on key ES topics for each country and industry are required. These limitations will be addressed in further studies.

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