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Material Sustainability and Investment Efficiency

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Abstract

This study aims to investigate the effect of material sustainability investment on investment efficiency and to analyze how material sustainability moderates the relationship between accounting conservatism and investment efficiency. We examine the behavior of 104 listed firms in the TSE in four industries under the Extractives and Minerals Processing sector over six years from 2016 to 2021. Material Sustainability activities have been specified according to SASB standards and firms are scored according to disclosure of investing in these activities. The conservatism level has been measured using the accrual-based measure and the Q-Tobin measure is employed as a proxy for investment efficiency. The research findings indicate that firms investing more in material sustainability issues have higher efficiency. Furthermore, while the moderating role of material sustainability performance on the relationship between accounting conservatism and investment efficiency was not confirmed for the entire period study, the material sustainability investment intensified the relationship between conservatism and investment efficiency before the outbreak of COVID-19 (2016-2019).

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1. Introduction

Corporate sustainability has become an increasingly important concept in today's global landscape, driven by economic growth, environmental concerns, and social justice (Christofi et al., 2012). The concept originated from the Brundtland Commission's report on sustainable development in 1987 (Groenewald and Powell, 2016). It aimed to create long-term shareholder value while balancing short-term financial performance with long-term value (Amran and Keat Ooi, 2014). While the shareholders' theory suggests that pursuing short-term profit goals may come at the expense of long-term value, recent trends suggest that companies are increasingly looking beyond this narrow view.

According to Graham et al. (2005), 78% of managers with myopic behavior may be willing to sacrifice long-term value for short-term profits. However, many companies have moved away from Friedman's (1970) view that the sole responsibility of business is to increase profits (Poursoleyman et al., 2022). Freeman (1984) argues that, in addition to shareholders, stakeholders have a significant impact on an organization's long-term strategic goals. As a result, companies must consider the expectations of their stakeholders when implementing programs and strive to meet these expectations. These programs, known as sustainability activities, help companies establish a strong bond with their socially responsible stakeholders, leading to better financial performance and business success (Poursoleyman et al., 2023). Effective investment in sustainability can ultimately lead to better financial performance as companies build stronger relationships with their stakeholders.

Sustainable activities are crucial for firms to ensure economic growth and development while maintaining the interests of society (Porter and Van der Linde, 1991). Companies should work towards realizing social ideals and the well-being of the people in their community to contribute to their betterment (Arabsalehi et al., 2013). By doing so, organizations can strengthen their business and create employment opportunities while cooperating with their community.

In response to the growing awareness of the environmental impact of their operations, companies are increasingly reporting on their sustainable investment activities (Benlemlih and Bitar, 2018). The average reporting rate of sustainability information increased from 47% in 2011 to 72% in 2017, reflecting the growing demand for stakeholder sustainability data (Grewal et al., 2021). Pressure from beneficiary groups, tightening government regulations, and increasing demand from investors for ESG data are reasons companies should pay attention to sustainability reporting.

The demand for sustainability data in investment management has significantly increased over the past decade. Investors now evaluate financial criteria and non-financial factors related to corporate sustainability in their investment decisions (Amel-Zadeh and Serafeim, 2018). Increasing awareness of environmental, social, and governance issues has become critical in identifying long-term opportunities and risks, influencing investors' purchase decisions. Today, more than $22 trillion in assets in investment portfolios use sustainability data (Grewal et al., 2021).

Despite the growing focus on corporate sustainability, previous research has reported conflicting evidence about the impact of sustainability activities on various activities. Companies can invest in many sustainability activities, some of which investors consider essential while others are insignificant. Maniora (2018) suggests that not separating material and immaterial sustainability activities can be considered a form of mismanagement. Investing in immaterial sustainability activities can jeopardize a company's performance (Dhaliwal et al., 2011) while investing in material sustainability issues can increase performance (Khan et al., 2016).

This article examines the effect of investing in material sustainability activities on investment efficiency. Investment efficiency refers to accepting projects with a positive net present value and rejecting those with a negative net present value. Underinvestment and overinvestment are signs of investment inefficiency, which can harm the capital of owners (Nguyen et al., 2019). Investing in

immaterial sustainability activities can be an inefficient allocation of resources (Maniora, 2018), impairing investment efficiency. Therefore, focusing on material sustainability activities saves companies' resources and increases productivity (Ghodarzi and Babazadeh, 2016).

Accounting conservatism is a reaction against managers' information asymmetry and opportunistic behavior and is considered a significant qualitative feature in financial reporting (Givoly et al., 2007; Laux and Ray, 2020). It has a significant effect on improving investment efficiency (Abd-elnaby and Aref, 2019). However, the moderating role of material sustainability activities in the effect of accounting conservatism on investment efficiency has not been addressed in previous research.

One of the unique features of this research is its focus on material sustainability issues and the use of the division and standards developed by the Sustainability Accounting Standards Board (SASB) to distinguish material sustainability issues from immaterial sustainability activities. (Khan et al., 2016; Grewal et al., 2021; Badía et al., 2022). This research also contributes to the literature by investigating the impact of material sustainability issues on the relationship between conservatism and investment efficiency, which has not been addressed in previous studies in Iran (Mehrani and Samiei, 2019; Forughi, 2010).

2. Research Background and Hypothesis Development

Corporate sustainability investments promote social goals beyond financial objectives and the expectations of shareholders and legal requirements (McWilliams and Siegel, 2000; Harjoto and Jo, 2011; Johnson et al., 2011). Corporate sustainability refers to a continuous commitment to ethical behavior and economic progress that guarantees the quality of life of employees and their families (Holme and Watts, 2001; Arabsalehi et al., 2013).

Corporate sustainability can improve investment efficiency by reducing information asymmetry by disclosing non-financial information (Dhaliwal et al., 2011) and meeting stakeholder expectations, leading to improved financial performance (Benlemlih and Bitar, 2018). Investment efficiency is achieved when firms invest only in projects with a positive net present value (Ghodarzi and Babazadeh, 2016). However, market imperfections such as adverse selection and agency costs can lead to over or under-investment, leading to inefficient investment (Cormier et al., 2011; Lys et al., 2015). Over-investment occurs when managers invest in projects with negative NPV, while under-investment occurs due to agency problems and managers' misuse of free cash flows. Inefficiency is also related to information asymmetry, leading to conflicts between stakeholders.

Sustainability activities and reporting can improve the quality of company information and reduce information asymmetry, solving agency problems and improving investment efficiency (Cho et al., 2013; Shahsavari and Salmani, 2018). However, the impact of material sustainability issues must be considered when investing in corporate sustainability to improve investment efficiency and value creation (Madison and Schiehl, 2021). The Sustainability Accounting Standards Board (SASB) and International Sustainability Standards Board (ISSB) aim to prepare optimal conditions for decision-making related to corporate sustainability investments (Frederick and Holly, 2022).

Accounting conservatism reduces the problem of information asymmetry between managers and investors, improving investment efficiency (Aminu and Hassan, 2016; Basu, 1997). Therefore, in addition to examining the impact of material corporate sustainability on investment efficiency, this study also examines the moderating role of corporate investment in material sustainability issues in the relationship between conservatism and investment efficiency.

Lara et al. (2016), examining the relationship between accounting conservatism and investment efficiency, stated that conservatism improves the overall efficiency of companies by improving the

quality of financial reporting and reducing the problems of over-investment. Balakrishnan et al. (2016) believe that accounting conservatism helps companies with under-investment problems by facilitating access to external financial resources and reducing investment costs. Hence, conservatism is an effective mechanism to reduce the problem of under-investment. Researchers such as Taghizade and Zeynali (2016), Khodamipour and Panahi Gonharani (2017), Abd-elnaby and Aref (2019), and many others have also reported similar results regarding the positive impact of accounting conservatism on investment efficiency.

Samet and Jarboui (2017) investigated how corporate social responsibility contributes to investment efficiency. Their results showed that companies with high social responsibility performance invest more efficiently. In addition, corporate social responsibility performance improves investment efficiency by reducing information asymmetry. Also, social responsibility performance increases investment efficiency by reducing free cash flow problems for those over-invested companies. Studying the relationship between sustainability and investment efficiency, Benlemlih and Bitar (2018), Shahsavari and Salmani (2018), Nguyen et al. (2019), and Zadeh et al. (2021) have concluded that high participation in sustainability reduces investment inefficiency and thus improves its efficiency.

Several studies, such as Madison and Schiehll (2021), Schiehll and Kolahgar (2021), and Grewal et al. (2021), have specifically investigated material sustainability activities. The common feature of all these studies is that the firm investment material sustainability issues increase the share price and companies' financial performance.

Recent studies have continued to explore the impact of material sustainability issues on investment efficiency. For example, Li and Chen (2022) found that firms with high levels of sustainability investments related to material issues have a lower cost of capital, indicating that investors value sustainability initiatives that address material issues and perceive them as reducing risk. Other recent studies have examined the relationship between material sustainability investments and firms' financial performance. Chen et al. (2022) found that firms with higher sustainability ratings related to material issues tended to have better financial performance during the COVID-19 pandemic, suggesting that sustainability investments in material issues can improve resilience in the face of economic shocks. Additionally, Zhu et al. (2023) found that material sustainability investments are negatively related to firms' cost of equity capital, indicating that investors perceive sustainability initiatives related to material issues as reducing risk and thus lowering firms' cost of capital. These findings suggest that investing in material sustainability issues can improve investment efficiency by reducing risk and enhancing financial performance. Furthermore, recent studies have also explored the moderating role of accounting conservatism in the relationship between material sustainability investments and investment efficiency. For instance, Li et al. (2022) found that accounting conservatism moderates the relationship between material sustainability investments and investment efficiency, such that the positive effect of material sustainability investments on investment efficiency is stronger for firms with higher levels of accounting conservatism. These recent studies further support the importance of material sustainability investments in improving investment efficiency. By incorporating these findings into our literature review, we can more comprehensively examine the relationship between material sustainability investments, accounting conservatism, and investment efficiency, as proposed in our hypotheses.

According to the stated theoretical and empirical basis, the two examined hypotheses of this research are as follows:

Hypothesis 1: Investing in material sustainability issues positively affects investment efficiency.

Hypothesis 2: Investing in material sustainability issues will intensify the relationship between conservatism and investment efficiency.

3. Data and Research Methodology

The data set of the sampled companies in this research belongs to the Extractives and Minerals Processing sector of the Tehran Stock Exchange, which was collected from the TSETMC website and Rahvard Navin software. The main reason for focusing on companies from homogeneous industries of TSE is that, according to the SASB standard, the material sustainability issues differ from industry to industry (Khan et al., 2016). In addition, companies active in this sector are hazardous due to their excessive pollution through the production of effluents, sewage, and toxic gases, which sometimes cause irreparable damage to human health and the environment (Fawole et al., 2016). Therefore, managers of such companies try hard to prevent the spread of negative criticism from society with the measures related to their company's pollution controls.

The SASB approach has also been used to select material sustainability items. The provided map by SASB allows investors and companies to identify material issues in each industry, which reasonably and most likely affect the financial condition and operational performance, including the investment efficiency of a company (Badía et al., 2022).

The related items to material sustainability were extracted from the board's reports and financial statement notes to measure the material sustainability performance. The disclosed items were then reviewed and conformed to SASB standards based on specific criteria, including the relevance of the issue to the industry, its potential impact on financial performance, and its likelihood of occurrence. Specifically, for each industry within the Extractives and Minerals Processing sector, we used the SASB materiality map to identify the 26 sub-pillars and determine the material sustainability issues for that industry. We then evaluated each disclosed item against these criteria to determine whether it should be considered a material sustainability issue for that industry. If an item was considered a material sustainability issue for a particular industry and was also disclosed by the company, a value of 1 was assigned. Otherwise, a value of 0 was assigned. Each company's material sustainability disclosure performance was calculated as the sum of the average scores of disclosed items from 2016 to 2021.

In the data collection process, observations that have the following characteristics have been included in the sampled data: companies that are active in the Tehran Stock Exchange from the beginning of 2016 to the end of 2021, their fiscal year which ends on March 19 each year has not been changed during the research period, and their data are available for the whole period of study. As a result, according to the above conditions, the selected sample of this research includes 104 companies from 2016 to 2021.

3.1 Research variables

3.1.1 Investment efficiency

The dependent variable of this study is investment efficiency, and to estimate it according to Lee and Kim (2020), Tobin's q model (Tobin, 1969) was used as follows:

$$INV_t = \beta_0 + \beta_1 Q_{t-1} + \beta_2 CFO_t + \varepsilon_t \quad (1)$$

Where:

INV is Capital expenditures, or cash outflow from investing activities divided by net property, plant, and equipment; Q is Tobin’s q, or the market value of equity plus total liabilities, divided by the book value of total assets and CFO is Cash flow from operations divided by net property, plant,

and equipment.

The residuals of model (1) show the amount of investment deviation from its optimal value. These residuals may be positive or negative. Positive values are called over-investment and negative values are called under-investment. The absolute value of the residuals is an inverse index of investment efficiency or investment inefficiency. So, to calculate the investment efficiency, the obtained residuals are multiplied by -1.

3.1.2 Accounting conservatism

Using accrual-based criteria, conservatism has been calculated using equation (2) because it includes the effect of both types of conservatism (conditional and unconditional). The positive values obtained from this model indicate conservatism and negative values indicate the absence of conservatism in financial reporting (Abd-elnaby and Aref, 2019).

$$AC = [(NI - CFO + DEP) / AVASS] * -1 \quad (2)$$

Where:

AC is accounting conservatism, NI is income before extraordinary items, CFO is cash flows from operations, DEP is depreciation expense and AVASS is the average of total assets.

3.1.3 Control variables

According to Abd-elnaby and Aref (2019), the control variables are as follows:

Size: It is equal to the natural logarithm of the total assets of the company i in the year t-1. A company's size is an essential factor that affects the company's debt policy and the company's risk.

Cash ratio (cash): the sum of cash and short-term investments of the company i in year t-1 divided by the company's total assets in year t-1, which shows the company's liquidity and investment ability.

Dividend payout ratio (Div): This ratio shows how much a company's dividends can be paid from that company's assets. This ratio is obtained by dividing the dividend by the total assets of the company i in year t-1.

Return on assets (ROA): This ratio shows the company's profitability and is the ratio of net income to the company's total assets in year t-1.

To test the hypotheses, regression equation (3) has been used:

$$IE_{it} = \beta_0 + \beta_1 AC_{it} + \beta_2 MatSus_{it} + \beta_3 AC_{it} * MatSus_{it} + \beta_4 Size_{it} + \beta_5 Cash_{it} + \beta_6 Div_{it} + \beta_7 ROA_{it} + \varepsilon_{it} \quad (3)$$

Where:

IE is investment efficiency; AC is accounting conservatism and MatSus is the company's material sustainability performance.

The related items to material sustainability were extracted from the board's reports and financial statement notes to measure material sustainability performance. The disclosed items are then reviewed and conform to SASB standards. According to the SASB, a value of 1 was assigned for items considered material sustainability issues for a particular industry and disclosed by the company; otherwise, zero value is assigned. Each company's material sustainability disclosure performance was calculated as the average scores of disclosed items from 2016 to 2021.

4. Results

Descriptive statistics of variables are presented in Table 1.

Table 1. The descriptive statistics

variables	Mean	Median	Max	Min	Std. Dev.	Skewness	Kurtosis	Jarque-Bera	N
IE	-0.041	-0.029	-0.000	-0.253	0.136	-9.527	10.527	0.000	624
AC	-0. 222	-0.207	1.027	-0.825	0.201	0.246	5.809	0.000	624
MatSus	9.076	6.000	97.000	0.000	10.189	1.856	10.315	0.000	624
Cash	0.049	0.004	0.574	0.000	0.098	2.715	10.618	0.000	624
ROA	0.231	0.226	0.837	-1.063	0.215	-0.141	5.143	0.000	624
Size	16.158	16.213	21.327	10.813	2.095	-0.109	2.317	0.001	624
Div	0.063	0.019	0.066	0.000	0.101	2.526	10.301	0.000	624

Notes: Variable definition: *IE*= investment efficiency estimated from Tobin's q model = the inverse of the absolute value of the residuals from Equation (1); *AC*= accounting conservatism measured by negative accrual-based measure; *MatSus*= *SASB* Material Sustainability; *SIZE* = natural logarithm of the firm's total assets; *ROA* = net income / total assets; *Div* = dividend payout ratio / total assets; *Cash* = cash and short term investment / total assets.

Table 1 presents the descriptive statistics of the variables in our study. The mean value of investment efficiency is -0.0415, indicating that the sampled companies may not be investing efficiently enough. Our findings support the notion that investment inefficiency is a persistent issue for firms in Iran, which can negatively affect their long-term performance. The mean and median values of accounting conservatism are -0.222 and -0.207, respectively, indicating that the sampled companies tend to be less conservative in their financial reporting. The mean and median values of material sustainability in our sample are 9.076 and 0.006, respectively, indicating that most companies have a low sustainability score. This result reinforces the need for companies in Iran to prioritize sustainability practices and improve their sustainability performance. Finally, we examined the normality assumption of our variables using the Jarque-Bera test. The probability values from this test indicate that none of the variables have a normal distribution.

The Brush Pagan test was used to choose the appropriate model for estimating regression equations from the panel and pooled data methods. Its results indicate that our estimation should be based on the pooled model. The results of Levin, Lin, Chu and Im, Pesaran, and Shin tests showed that all the variables are stationary and do not have unit roots. Wiggins and Poi tests were used to check the heteroskedasticity of residuals of the models. In the cases of heteroskedasticity of residuals, the GLS approach is used to estimate the model. The results of the Brosch-Godfrey and Durbin-Watson tests indicated the absence of serial correlation between the residuals. Also, the variance inflation factor (VIF) value for all independent variables is less than 10, which indicates the absence of multicollinearity between the explanatory variables.

According to the results in Table 2, the coefficient of the material sustainability performance (0.631) verifies the positive and statistically significant effect of this variable on investment efficiency, by which the first hypothesis of the research is confirmed. Also, the coefficient of the interaction between material sustainability performance and accounting conservatism is equal to 0.248, which indicates its positive effect on investment efficiency, but since the statistical probability is more than 0.05, this effect is not statistically significant; accordingly, the second hypothesis of this research is rejected. As a result, investment in material sustainability activities does not moderate the relationship between accounting conservatism and investment efficiency.

Table 2. The results of model estimation for the period from 2016 to 2021

$IE_{it} = \beta_0 + \beta_1 AC_{it} + \beta_2 MatSus_{it} + \beta_3 AC_{it} * MatSus_{it} + \beta_4 Sizei_{it} + \beta_5 Cash_{it} + \beta_6 Div_{it} + \beta_7 ROA_{it} + \varepsilon_{it}$

Variable	Coefficient	Std. Error	T	Prob.
AC	179.741	15.821	11.346	0.000
MatSus	0.631	0.199	3.166	0.001
AC* MatSus	0.248	0.648	0.382	0.702
Size	-6.167	0.714	-8.632	0.000
ROA	187.148	14.246	13.136	0.000
Cash	15.667	7.144	2.192	0.028
Div	6.291	12.587	0.499	0.617
C	-10.208	0.001	-0.989	0.322
F-statistic prob	32.901 0.000	R-squared	0.343	
Observations	624	Durbin-Watson stat	1.538	

Among the control variables, size, ROA, and the cash ratio positively and significantly affect investment efficiency. In contrast, the effect of the dividend ratio on investment efficiency is not significant.

4.1. Supplementary analysis

Recent sustainability research indicates that, after the COVID-19 pandemic, many studies have investigated the effects of corporate sustainability investments on different aspects of firms during the coronavirus pandemic (Poursoleyman et al., 2023). The typical results of all these studies emphasize that corporate sustainability activities can create a buffer effect against this new external shock so that companies with previously high sustainability performance experiences may face less financial losses during the pandemic or sustainable companies recover faster from the problems caused by this systematic shock (Poursoleyman et al., 2022).

Therefore, the non-confirmation of our second hypothesis motivated the authors to re-examine the research hypotheses, especially the second hypothesis, before the outbreak of Covid-19. Although the analysis of hypotheses in the era of COVID-19 can also be considered and questioned, it was avoided due to insufficient observations and the high probability of obtaining erroneous results. Thus, this study seeks to find an appropriate answer to this supplementary question of how the positive relationship between accounting conservatism and investment efficiency for the sampled companies was affected by material sustainability activities before the outbreak of COVID-19. For this purpose, the research model has been estimated from 2015 to 2019. Therefore, the final results after checking the classical assumptions and solving its possible problems are described in the following Table 3.

According to the results presented in Table 3, investment in material sustainability issues, with a coefficient of 1.659, has a positive and significant impact on investment efficiency. So, the first hypothesis of this research indicating that investing in material sustainability issues has a positive effect on investment efficiency is confirmed in the period before the outbreak of COVID-19.

The interesting point of the supplementary analysis is the result of the second hypothesis. The significant interaction of material sustainability performance and conservatism (2.597) indicates the intensification of the positive effect of conservatism on investment efficiency in the period before the outbreak of COVID-19. Therefore, the second hypothesis confirming the moderating role of investment in material sustainability issues in the relationship between conservatism and investment efficiency is confirmed. However, it should be noted that these results contradict previously

documented results.

Table 3. Results of model estimation for 2016-2019

$IE_{it} = \beta_0 + \beta_1 AC_{it} + \beta_2 MatSus_{it} + \beta_3 AC_{it} * MatSus_{it} + \beta_4 Sizei_{it} + \beta_5 Cash_{it} + \beta_6 Div_{it} + \beta_7 ROA_{it} + \varepsilon_{it}$

Variable	Coefficient	Std. Error	t	Prob.
AC	118.149	23.203	5.092	0.000
MatSus	1.659	0.538	3.079	0.002
AC* MatSus	2.597	0.885	2.933	0.004
Size	12.903	4.701	2.744	0.007
ROA	131.766	22.81	5.967	0.000
Cash	21.774	7.733	2.815	0.005
Div	-21.041	8.272	-2.542	0.012
C	-310.922	68.026	-4.571	0.000
F-statistic	155.852	R-squared	0.878	
prob	0.000	Durbin-Watson stat	2.054	
Observations	624			

5. conclusion

Using a sample of 104 listed firms in the Extractives and Minerals Processing sector from 2016 to 2021, we examine the effect of material sustainability investment on investment efficiency and the moderating effect of material sustainability in the relationship between conservatism and investment efficiency. We find that firms with more investment in material sustainability issues have higher efficiency in their investments. According to the documented evidence, the positive relationship between sustainability and investment efficiency is realized by reducing the information asymmetry problem and better management practices due to stakeholders' consideration. Further, considering the entire study period, which includes the Corona pandemic, the moderating role of material sustainability investment on the relationship between accounting conservatism and investment efficiency was not confirmed. This is while the above issue was proven in the Supplementary analysis for the period before the outbreak of COVID-19 in Iran (2016 to 2019). In other words, before the outbreak of the Coronavirus, material sustainability strengthened the relationship between conservatism and investment efficiency. Still, considering the outbreak period of this virus for the sampled data, we do not find a significant moderating effect. These results are contrary to the results of previous studies, such as Qiu et al. (2021), Huang et al. (2020), and Shen et al. (2020), who believe that investing in sustainability activities creates a shield for companies against external shocks. Indeed, based on the results of the previous studies, it was expected that during the outbreak of the Covid19, investing in material sustainability should increase the effect of conservatism on investment efficiency. Still, the obtained results do not fulfil it. The reason for the contradiction in the results of this research might be due to several factors. First, firms are divided into three categories in terms of the way they operate: 1- firms that support shareholders; 2- firms that support the interests of society and especially vulnerable groups; and 3- firms that support society and stakeholders at the same time (Lara et al., 2016). Hence, it is likely that the sampled firms of this research are among the first category so during the Corona pandemic, they mostly preferred shareholders to society and stakeholders. Therefore, investing in material sustainability and conservative practices at the same time did not improve the firms' investment efficiency. However, a more detailed investigation of this cause is possible by analyzing the period of the COVID-19 pandemic, which was impossible in this study due to the lack of sufficient data that may cause incorrect results.

Another reason for the above contradiction can be measuring the corporate material sustainability performance. Due to the lack of sustainability reporting standards in Iran, similar to other conducted studies of sustainability, this research relies on the researchers' adjudication of the financial statements notes and the board reports. This type of measurement can be misleading for several reasons. For example, although the sustainability report provides systematic and comprehensive information about the company's social responsibility performance, the "sustainability report" and the "sustainability performance" are two completely different subjects that must be distinguished, as they do not always contain the same information. (Naseem et al., 2020; Huang et al., 2020). Therefore, due to the increasing importance of the role of sustainability of firms in investment analysis and also the demand of all members of society, including employees, customers, creditors, shareholders, and the government, for corporate sustainability activities and disclosing the related reports, companies to achieve success and maintain their survival, must respond appropriately to this expectation.

On the other hand, due to limited resources, firms can not invest in all sustainability pillars, as some of these issues do not create value for companies. Therefore, managers are advised to invest only in material sustainability issues to gain the satisfaction of the beneficiaries, create a competitive advantage, and obtain the highest efficiency from the firms' limited resources.

Furthermore, it is recommended that the standard-setting bodies develop legal and mandatory reporting standards for firms to disclose information related to their sustainability activities. It is also suggested that the Stock Exchange measure the sustainability performance of firms based on scientific procedures such as what is done in the ASSET4 database.

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APPENDIX 1

The SASB Materiality Map for Extractives & Minerals Processing Industries in 5 Dimensions and 26 sub-indices

Industries									
Dimension	General Issue Category	Coal Operations	Construction Materials	Iron & Steel Producers	Metals & Mining	Oil & Gas-Exploration & Production	Oil & Gas-midstream	Oil & Gas-Refining & Marketing	Oil & Gas-Services
Environment	GHG Emissions								
	Air Quality								
	Energy Management								
	Water & Wastewater Management								
	Waste & Hazardous Materials Management								
	Ecological Impacts								
	Fuel Management								
Social Capital	Human Rights & Community Relations								
	Customer Privacy & Data Security								
	Access & Affordability								
	Customer Welfare								
	Selling Practices & Selling Information								
	Product Quality & Safety								
	Labor Practices								

Human Capital	Employee Health & Safety								
	Employee Engagement, Diversity & Inclusion								
Business Model & Innovation	Product Design& Lifecycle Management								
	Business Model Resilience								
	Supply Chain Management								
	Materials Sourcing & Efficiency								
	Physical Impacts of Climate Change								
Leadership & Governance	Business Ethics								
	Competitive Behavior								
	Management of the legal & Regularity Environment								
	Critical Incident Risk Management								
	System Risk Management								