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Article

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Corporate social responsibility and corporate investments: does research and development intensity matter?

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ABSTRACT

The objective of the study is to investigate the relationship between corporate social and environmental responsibility expenditure, research and development (R&D) intensity, and corporate investment in 47 basic industrial and chemical companies listed on the Indonesian Stock Exchange from 2015 to 2019. The study found a positive correlation between corporate social and environmental responsibility expenditure and R&D intensity and that R&D intensity fully mediates the relationship between corporate social and environmental responsibility expenditure and corporate investment. The results suggest that R&D intensity is crucial in enhancing corporate investment performance. This study contributes to the literature on corporate social and environmental responsibility expenditure, R&D intensity, and investment in emerging markets by providing empirical evidence that R&D intensity plays a key role in boosting corporate investment.

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1. Introduction

Corporate social and environmental responsibility (CSER) expenditures as a business-owned resource may be a means of encouraging investment performance (Samet & Jarboui, 2017; van der Laan Smith et al., 2010; Zhong & Gao, 2017). Its value may reflect the amount of benefit from the use of resources obtained to improve investment performance (Bhattacharyya & Rahman, 2020; Khediri, 2021). CSER expenditure is defined as all funds used by a company for social and environmental purposes, such as contributions to charitable purposes and other social aspects related to a company's ethics towards the social interests of the community, environmental management, prevention of poor environmental quality, improvement and elimination of adverse environmental conditions, costs of reporting environmental conditions and all costs incurred to prevent the existence of poor environmental quality that occurs due to the operation of the company (Bhattacharyya & Rahman, 2020; Clarkson et al., 2004; Garg & Gupta, 2020; Nakamura, 2015; Oware & Mallikarjunappa, 2020; Silva-Gao, 2012).

Prior studies have argued that companies that have high CSER expenditure can be viewed by investors as more resilient in overcoming the risks of social and environmental conditions, so, in the long run, it may improve company performance (Bae et al., 2019; Broadstock et al., 2020; Nguyen Kim, 2024). However, the positive impact of CSER expenditure on investment performance is still unclear. For

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example, Lin et al. (2021) argue that companies that spend a lot on CSER are likely to experience over-investment. Attig et al. (2014) found that sensitivity to investment cash flow decreases with increased CSER. In short, a company's increased focus on CSER is linked to the increase (decrease) in investment cash sensitivity.

Therefore, further testing is needed to determine whether CSER can directly affect corporate investment. Meanwhile, the relationship between CSER expenditure and financial performance is influenced by several factors, such as a company's compliance with regulations (Bhattacharyya & Rahman, 2020); leverage (Bae et al., 2019); information asymmetry (Benlemlih & Bitar, 2016); level of media scrutiny (Borghesi et al., 2014); environmental policies, regulations, and corporate governance structure (Elmagrhi et al., 2018; Ntim & Soobaroyen, 2013) and institutional environment (Chen et al., 2018). In addition to these factors, a company's research and development (R&D) spending also affects the relationship between CSER expenditure and corporate investment.

Chkir et al. (2021) argue that CSER expenditure can improve corporate investment performance and affect the intensity of R&D. McWilliams and Siegel (2000) assert that CSER expenditure and R&D intensity are positively correlated. R&D intensity is important for companies for several reasons. First, R&D is an activity carried out by a company or organization to introduce new products and/or services, improve production processes, find ways to increase production efficiency and productivity and create new innovations in the production process. Second, R&D is needed to increase added value and also as a measure of performance (Chen et al., 2019; Sun, 2015; Yu et al., 2020). Third, R&D is also useful for maintaining a sustainable competitive advantage (Hassanein et al., 2022; Zhang et al., 2014).

Finally, R&D intensity may make a company's technology more flexible and allow the incorporation of customer preferences into the design of manufactured goods to improve customer satisfaction (Gallego-Álvarez et al., 2011). Even though previous studies have been conducted, the relationship between R&D intensity and company performance still does not yield consistent conclusions. For instance, Kim and Kim (2018) conclude that more intensive R&D is correlated with better environmental performance. On the other hand, excessive R&D intensity does not necessarily improve corporate investment but rather may lead to a failure to engage in investment activities (Yu et al., 2020).

In addition, Canace et al. (2017) found that the amount of earnings are not affected by the decrease (increase) in intensity of R&D. Hull and Rothenberg (2008) state that CSER expenditure can drive R&D intensity to improve the performance of firms that focus on innovation. Hassanein et al. (2022) state that managers spend on R&D to increase the sustainability and growth of a company. However, CSER expenditure may also diminish R&D intensity (Yuan et al., 2022).

Furthermore, CSER expenditure and R&D intensity may reduce a company's financial risks (Suto & Takehara, 2021). The findings of these studies still demonstrate inconsistencies in the relationship between CSER expenditure, R&D intensity, and corporate investment performance. These findings have prompted researchers to examine how R&D intensity affects the relationship between CSER expenditure and a company's investment performance. A more comprehensive investigation is needed to investigate the relationship between CSER expenditure, R&D intensity, and company investment performance, both directly and indirectly.

The research question for this study is, 'Does R&D intensity mediate the relationship between CSER expenditure and corporate investment?' This study aims to provide empirical evidence of how CSER expenditure affects corporate investment. Previous studies have shown inconsistent results. In addition, this study also aims to examine the role of R&D intensity in mediating the relationship between CSER expenditure and corporate investment. This mediation effect testing provides evidence of how and why mediator variables can affect the relationship between independent and dependent variables.

Our study contributes to the growing body of literature and business practice by providing insights into how the relationship between CSER expenditure and corporate investment may be mediated by R&D intensity. This study differs from Cook et al. (2018) in several ways. First, Cook et al. (2018) examine the relationship between CSER and company performance with mediating variables of investment and innovation. Second, in the context of measurement, Cook et al. (2018) use the Kinder, Lydenberg, Domini Inc. score as a measure of CSER performance and the number of patents as a measure of innovation.

Third, Cook et al. (2018) examine the relationship between CSER, investment, innovation, and company performance from an agency perspective. This study also differs from Fedorova et al. (2022). They examine the effect of innovation disclosure (number of patents and R&D expenses) on market capitalisation using signalling theory as a theoretical basis. The findings of this study may be useful for managers, financial analysts, regulators and investors to understand the role of R&D.

The results of this study show that the intensity of R&D is a factor mediating the relationship between CSER expenditure and corporate investment. In other words, CSER expenditure cannot directly increase a company's investment without the role of R&D intensity. Furthermore, the results of this study can also improve supervision of companies' compliance with regulations regarding the allocation of CSER expenditures derived from the percentage of company profits.

This paper is structured as follows: Section 2 provides the background information about the study. Section 3 presents the theoretical framework. Section 4 contains the literature review and the development of the hypothesis. Section 5 describes the research method. Section 6 presents the empirical results and discussion. Finally, Section 7 summarizes the study and presents the conclusions.

2. Background

While earlier studies have examined the relationship between CSER expenditure, R&D intensity and corporate investment performance, studies examining the role of R&D intensity in influencing the relationship between CSER expenditure and corporate investment have not been extensively explored, particularly in the context of basic and chemical industries and within developing countries such as Indonesia.

R&D is an important source for companies, particularly in the basic and chemical sectors, to gain a competitive advantage (Hull & Rothenberg, 2008). Therefore, the consistency of the results across different industries needs to be re-examined (Padgett & Galan, 2009). The basic and chemical industries provide a good setting to investigate the R&D intensity effect. First, R&D activities are essential for the long-term success of chemical firms. Second, R&D represents one of the most important expenditures in the chemical industry (Sun, 2015).

According to the Ministry of National Development Planning/National Development Planning Agency (Bappenas) of the Republic of Indonesia, the basic and chemical industries comprise a sector that receives priority for government development. This is because these industries can make a significant contribution to the national economy. Basic and chemicals are strategic commodities to be used as raw materials in various other industrial sectors. The basic and chemical industries are the top three major contributors to the performance of the non-oil and gas processing industry sector, playing an important role in the growth of Indonesia's national manufacturing industry (Merdeka.com (Producer), 2022).

In Indonesia, basic and chemical industries are among the most prominent industries that have a very significant environmental impact. Waste from production processes can be harmful to the environment if not managed properly. This is a concern for external stakeholders, particularly investors. As a result, the ability of firms in this industry to conduct CSER activities and to innovate through R&D intensity in the production process largely determines their performance, particularly investment performance.

3. Theoretical literature review

3.1. Resource-based view theory

Resource-based view theory (RBVT) is a model for achieving competitive advantage through the deployment of a firm's resources. Wernerfelt (1984) was the first scholar to introduce the RBVT in 1984. Since then, the strategic management literature has made extensive use of the RBVT as a theoretical perspective (Newbert, 2007). Wernerfelt (1984) asserts that a company's resources are the primary drivers of its success and long-term competitive advantage.

One definition of sustainable competitive advantage is provided by Barney (1991): 'A firm is said to have a sustained competitive advantage when it is implementing a value-creating strategy that is not being implemented simultaneously by any current or potential competitors and when these other firms are unable to duplicate the benefits of this strategy' (p. 102). Barney (1991) provides an overview of four

factors that indicate a firm's capability to establish sustainable competitive advantage: 'valuable, rare, inimitable, and non-substitutable'. In this paper, competitive advantage is defined as investment performance.

According to Hoffman (2000), a sustainable competitive advantage is a long-term benefit from the application of a special and value-adding strategy that is not being used concurrently by any present or potential competitors and whose advantages cannot be duplicated. Resources can be categorised into organisational capabilities, intangible resources and tangible resources (Wernerfelt, 1984). Day and Wensley (1988) emphasise intangible resources as well as tangible resources, such as skills and organisational capabilities. In this paper, the tangible resource is CSER expenditure. Meanwhile, R&D intensity could be viewed as an intangible resource.

The primary determinants of corporate investment performance are the resources possessed by a firm. These resources can remain dominant until the firm employs its capabilities to contribute to a sustainable competitive advantage. Firms that use RBVT strive to use internal resources efficiently and effectively to increase corporate investment performance. The corporate strategy literature commonly uses RBVT to manage and organize resources (Ployhart, 2021). It adopts an inside-out approach that focuses on acquiring and using organizational resources efficiently (Ployhart, 2021).

A firm is said to have a sustained competitive advantage when it implements a value-creating strategy that no current or potential competitor is implementing simultaneously and when other firms cannot duplicate the benefits of this strategy. By improving corporate investment performance, a firm can obtain a competitive advantage and ensure its survival in the market. Therefore, companies can create a sustainable competitive advantage by combining resources - tangible, intangible, and organizational capabilities - in distinctive and long-lasting ways. By combining resources, firms can focus on managing all resource initiatives, making themselves unique to speed up progress (Kamasak, 2017; Nason & Wiklund, 2015).

4. Empirical review and hypothesis development

4.1. CSER expenditure and corporate investment

Corporate Social and Environmental Responsibility (CSER) plays a crucial role in influencing investment decisions, as stated by Maqbool and Hurrah (2020). The argument linking CSER and investment rests on three reasons. Firstly, CSER expenditure indicates available resources that can improve social and environmental relations (Chalissery et al., 2023). Investing in CSER can be a great way for companies to unlock new investment opportunities. By prioritizing expenditure on CSER, businesses can demonstrate their commitment to social and environmental responsibilities, which in turn can attract investors who value sustainability (Erhemjamts et al., 2012; Lin et al., 2021).

Second, investing in CSER can mitigate conflicts between stakeholders during corporate activities (Liu et al., 2021). The availability of company resources from each time period is important in evaluating the increased ability to fund CSER expenditure (Alatawi et al., 2023; Malik et al., 2018). Third, Islam et al. (2021) found that companies with a significant amount of free cash flow tend to invest in activities that have a social purpose. This is done to reduce the gap between stakeholders and balance differences in interests related to investment decision-making. By doing so, companies can harmonize and balance the interests of all stakeholders. (Cook et al., 2018; Islam et al., 2021; Maqbool & Hurrah, 2020; Tosun, 2016).

It has been found in previous studies that companies that engage in Corporate Social and Environmental Responsibility (CSER) tend to make more efficient investment decisions compared to those that do not (Zhong & Gao, 2017). In a study conducted by Bhatnagar et al. in 2023, the impact of CSER expenditure on the financial performance of companies in India was investigated. The study revealed that the relationship between CSER expenditure and firm performance is not linear. According to Elmghaamez et al. (2023), disclosing information related to environmental, social, and governance factors has an impact on accounting performance indicators. A definitive conclusion in either direction is difficult due to its parabolic, U-shaped relationship and inverted U-type pattern, which can be characterised as parabolic.

According to RBVT, CSER can increase the value of a company when managerial entrenchment decreases. Low managerial entrenchment may prevent over-investing activities (Sheikh, 2018). To

summarise, companies that have excess resources can expend some of these resources in useful activities such as CSER activities. The existence of CSER expenditure information illustrates a company's commitment to managing social and environmental problems. This is certainly important information for investors when making investment decisions (Dhaliwal et al., 2011). These positive relationships can be secured through accurate investment decisions. As a result, the relationship between CSER practices can be helpful for companies seeking high returns on future investments.

H1: CSER expenditure has a positive influence on corporate investment.

4.2. CSER expenditure and R&D intensity

RBVT emphasises the importance of a company's resource excellence to gain a sustainable competitive advantage (Peteraf & Bergen, 2003). Resources and capabilities that are precious, scarce and inimitable cannot be readily substituted; therefore, a company can gain a competitive advantage over others in the same market (Barney, 1991). R&D is able to produce intangible resources for making the technology of a company more agile in product design (Zhou et al., 2020). Firms that engage in intensive R&D should have better performance and a greater competitive edge than those that do not (Adu-Ameyaw et al., 2022).

R&D expenditure drives significant growth opportunities that can be indicated by a low level of leverage and a high proportion of short-term debt (Bah & Dumontier, 2001). Porter and Kramer (2006) state that CSER can be a source of competitive advantage for companies. This is because it may facilitate external knowledge to generate innovations and drive a firm's ability to utilise and exploit knowledge obtained from external sources (Luo & Du, 2014). Companies that are committed to engaging in more CSER can have a positive effect on forms of support from stakeholders by encouraging the company to achieve long-term goals by providing higher R&D intensity (Cook et al., 2018).

It has been shown in previous studies that the relationship between CSER and R&D intensity remains unclear (Ginesti et al., 2023; Hu & Zhang, 2023). Most previous studies have shown a positive association. For instance, McWilliams and Siegel (2000) argue that CSER expenditure is a mechanism that can be used for product differentiation; therefore, the amount of CSER expenditure can also affect the amount of investment value used for R&D. Gallego-Álvarez et al. (2011) found that the bidirectional relationship between CSER and R&D does not provide significant evidence; CSER has a positive influence on R&D, but not vice versa.

H2: CSER expenditure has a positive influence on R&D intensity.

4.3. Mediating effect of R&D intensity

R&D intensity is viewed as a form of capital investment that results in enhanced knowledge, leading to product and process innovation (Padgett & Galan, 2009). Furthermore, R&D intensity refers to the supply of various types of tangible or intangible resources, such as funding resources, technology resources and professional R&D staff. From RBVT, investing significant amounts of valuable and limited resources is beneficial for enhancing process efficiency and introducing new products. This assists businesses to gain long-term competitive advantages and sustain outstanding performance (Ruiqi et al., 2017). Decisions about R&D intensity are important for businesses looking to gain lasting competitive advantages (Kumari & Mishra, 2019; Ruiqi et al., 2017; Yu et al., 2020).

Indeed, R&D intensity can contribute to improving a company's innovation by improving production processes and product quality, which, in the long term, can meet the expectations of stakeholders (Sun, 2015). However, for some businesses with limited resources, high R&D intensity is costly and risky (Hassanein et al., 2022). R&D intensity contributes to CSER, such as the use of recycled materials and sustainable processes (Padgett & Galan, 2009).

The effect of R&D intensity on firms' future performance is always a vital issue (Hassanein et al., 2022). The ability to innovate is the main determinant of a company's long-term success (Suto & Takehara, 2021) and can be categorised under organisational capability according to RBVT. Ruiqi et al. (2017) argue that companies are investing more in R&D to facilitate developing technology capabilities and gain leading advantages. This competitive edge allows companies to create value through sustainable and

predictable cash flows (Sheikh, 2018). Suto and Takehara (2021) argue that R&D intensity is essential if a company is to survive in a dynamic, competitive environment, which is usually accompanied by highly unpredictable results. Moreover, due to greater uncertainty about performance, innovation-oriented firms face higher risk premiums or greater financial constraints on capital markets, *ceteris paribus*.

Although an increase in the intensity of R&D can cause business performance to decline in the short term, in the long run, R&D intensity can help companies to increase the competitive advantage of products and services, as well as increase sales and market value (Chen et al., 2019). Al-Shammari et al. (2021) examine the effect of CSER on the financial performance of 137 companies listed on the S&P 500. Their findings indicate that the intensity of R&D increases the impact of CSER on financial performance. If CSER expenditure is seen as a means of signaling trust, it could alleviate uncertainty about a company's future cash flows and improve transparency. Therefore, CSER expenditure not only reduces a company's financial risks but also may increase innovation through R&D and corporate investment.

H3: R&D intensity fully mediates the relationship between CSER expenditure and corporate investment.

5. Research method

5.1. Sample

This study used a sample of all basic and chemical industry companies listed on the Indonesia Stock Exchange (IDX) from 2015 to 2019. During this period, 70 companies were categorized in the basic and chemical industries. Of these 70 companies, only 47 had complete data related to social, environmental, and R&D expenditures. Ultimately, the number of observations was 235. Table 1 presents the sampling selection.

5.2. Variable measurement

5.2.1. Dependent variable

Table 2 presents the measurement of variables. The dependent variable is corporate investment, which is measured by the sum of yearly growth in property, plant and equipment, plus growth in inventory, plus R&D expenditure, all deflated by the lagged book value of assets (Chen et al., 2017). Cook et al. (2018) argue that better information-related social and environmental issues are expected to improve and accelerate decision-making and increase the capacity for effective corporate investment.

5.2.2. Independent variable

The independent variable is CSER expenditure. It is defined as all expenditures on social and environmental protection to prevent, reduce and control social and environmental conditions, impacts and

Table 1. Sample selection.

Criteria	N
Number of basic and chemical industries listed on IDX	70
Number of companies with incomplete data	(23)
Number of samples per year	47
Final sample (5 years x 47 companies)	235

Table 2. Variable measurements.

Variable	Measurement
CSER expenditure	Amount of monetary social and environmental expenditures of a firm that is self-reported in annual and/or sustainability reports (Januarti et al., 2019).
R&D intensity	The ratio of R&D expenditure to total revenues (Gallego-Álvarez et al., 2011).
Corporate investment	The sum of the yearly growth in property, plant and equipment, plus growth in inventory, plus R&D expenditure, all deflated by the lagged book value of assets (Chen et al., 2017).
Profitability	ROA = net income divided by total assets (Faisal et al., 2023).
Sales	Amount of sales for the firm (Faisal et al., 2023).

hazards, in addition to disposal, treatment, sanitation and clean-up expenditures (Kim & Kim, 2018). It is also characterised as the CSER expenditure value reported in a company's sustainability and annual reports in the form of direct or indirect financial rewards that do not represent transactions in goods and services and are used for social or environmental purposes (Januarti et al., 2019).

CSER expenditures are a more appropriate measure of CSER activities and commitments than the disclosure of CSER information (Bose et al., 2020). The CSER expenditures support a valuable criterion to create a competitive advantage; according to Barney (1991), an invaluable resource has to facilitate the firm to implement strategies that improve the firm's efficiency and effectiveness. The CSER expenditures carry rare and inimitable criteria. The CSER expenditures incurred by the firm are exclusively initiated by the firm to attract and retain corporate investment to drive its stability and growth.

5.2.3 Mediating variable

The mediating variable is R&D intensity. Previous studies have shown a link between CSER expenditure, R&D intensity and corporate investment performance. R&D intensity is seen as a form of investment for improving knowledge, leading to product and process innovation, and enabling businesses to improve their productivity (McWilliams & Siegel, 2000; Padgett & Galan, 2009). CSER expenditure has the potential to create shareholder value through innovation (Gallego-Álvarez et al., 2011).

Fedorova et al. (2022) found that innovation has a positive impact on the market capitalisation of the largest Russian firms. Kim and Kim (2018) argue that the R&D intensity allows company to find an effective way to use raw materials and thereby reduce the costs of raw material and waste disposal. It can also lead businesses to find more productive ways to convert waste into marketable products and thereby increase profits.

5.2.4. Control variables

In this study, profitability and sales were used as control variables. Unused resources belonging to the company are used to measure liquid resources that are not linked to liabilities. Companies that have more resources have the flexibility to use social and environmental activities based on greater profits (Tewari & Bhattacharya, 2022). Profitability is measured using return on assets (ROA) to show how much money a company makes by generating a net profit by using the assets it owns. ROA can demonstrate the performance of a corporation by generating a net profit (Faisal et al., 2018). Companies with high visibility (high sales) have increased incentives and resources to reduce the risk of environmental damage from their operations. Large firms also have great capacity to shape positive perceptions among the public and key stakeholders; their CSER engagement initiatives are a form of corporate responsibility (Faisal et al., 2018; Le et al., 2023; Silva-Gao, 2012).

5.3. Model specification

Multivariate regression analysis was employed to test H1 and H2. The purpose of this analysis was to investigate how independent variables affect a dependent variable. Additionally, this analysis helps in determining the intensity and direction of the relationship between these variables. The regression equations are as follows:

$$\text{Corporate investment}_{t+1} = \alpha + \beta_1 \text{CSER expenditure}_t + \beta_2 \text{profitability}_t + \beta_3 \text{sales}_t + \varepsilon \quad (1)$$

$$\text{R\&D intensity}_t = \alpha + \beta_1 \text{CSER expenditure}_t + \beta_2 \text{profitability}_t + \beta_3 \text{sales}_t + \varepsilon \quad (2)$$

H3 was tested using path analysis, which is a technique that allows us to examine causal relationships between variables using regression methods. Essentially, we used path analysis to investigate how different variables within a system are interconnected. We specifically looked at the effect of two predictors (CSER expenditure and R&D intensity) on a criterion variable (investment). In mediation, we hypothesize that the relationship between the independent variable and the dependent variable is indirect and is influenced by a third variable called the mediator. When we include the mediator in a regression analysis model with the

Table 3. Descriptive statistics.

Variables	n	Minimum	Maximum	Mean	Std. Deviation
Social expenditure (million rupiahs)	235	980.93	87,014.42	4,418.59	9,468.92
Environmental expenditure (million rupiahs)	235	142.57	72,970.00	6,501.12	12,818.73
R&D intensity (million rupiahs)	235	24.03	78,685.00	216.80	166.95
Corporate investment (million rupiahs)	235	133.58	46,875.12	3,496.31	7,372.28
Profitability	235	0.00	0.67	0.08	0.08
Sales	235	21,671.00	31,025.00	27,470.00	2,013.00

Notes: social expenditure=amount of monetary social expenditure; environmental expenditure=amount of monetary environmental expenditure; R&D intensity=ratio of R&D expenditure to total revenues; corporate investment=the sum of the yearly growth in property, plant and equipment, plus growth in inventory, plus R&D expenditure, all deflated by the lagged book value of assets; profitability is measured by ROA=net income divided by total assets; sales=amount of sales.

independent variable, we can see that the effect of the independent variable is reduced and the effect of the mediator remains significant. The models of the regression equations in this study are as follows:

$$\text{R\&D intensity}_t = \alpha + p_2 \text{ CSER expenditure}_t + \varepsilon_1 \quad (3)$$

$$\text{Corporate investment}_{t+1} = \alpha + p_1 \text{ CSER expenditure} + p_3 \text{ R\&D intensity} + \varepsilon_2 \quad (4)$$

where p_2 = path coefficient CSER expenditure and R&D intensity, p_1 = path coefficient corporate investment and CSER expenditure, p_3 = path coefficient corporate investment and R&D intensity, $\varepsilon_{1,2}$ = error or residual.

6. Empirical results and discussion

6.1. Descriptive statistics

Table 3 presents the descriptive statistics of the variables. In general, the conclusion can be drawn that companies in the basic and chemical industries tend to contribute more to environmental (mean = 6,501.12 million rupiahs) than to social (mean = 4,418.59 million rupiahs) expenditures. This result shows that on average, companies included in the basic and chemical industries spend more CSER money on environmental aspects. These results are consistent with findings from previous studies that have concluded that companies classified as sensitive industries, such as basic and chemical, conduct and disclose more CSER activities compared to companies from non-sensitive sectors (Faisal et al., 2018; Purwantini et al., 2023).

Table 3 also shows that the average variable R&D intensity is 216.80 million rupiahs with a large standard deviation of 166.95 million rupiahs. These results indicate that the variation in R&D intensity in the basic and chemical industries is relatively high. The high variation indicates that companies in the basic and chemical industries are not fully valuing this expenditure as a form of future investment to enhance innovation and competitiveness (Padgett & Galan, 2009). Likewise, for the corporate investment variable, the descriptive statistical results show that the mean value is 3,496.31 million rupiahs and the standard deviation is 7,372.28 million rupiahs. According to these findings, investment performance varies significantly between companies in the same industry.

6.2. Correlation matrix

The following is a summary of the Pearson correlation matrix results of the variables. It can be observed that the independent variables have a correlation coefficient of less than 0.50, which suggests that there is no issue with multicollinearity. The outcomes demonstrate a strong and positive relationship between CSER expenditure, R&D intensity, and corporate investment. On the other hand, among the control variables, only the sales variable has a significant correlation with the dependent variables (Table 4).

6.3. Regression analysis

Table 5 displays the results of the regression tests conducted on hypotheses H1 and H2. After analyzing Equation 1, it was found that CSER expenditure does not have a significant impact on corporate

Table 4. Pearson correlation matrix.

	1	2	3	4	5
CSER expenditure	1	0.348**	0.170**	0.041	0.272**
R&D intensity	0.348**	1	0.202**	−0.055	0.335*
Corporate investment	0.170**	0.202**	1	0.072	0.283**
Profitability	0.041	−0.505	0.072	1	0.069
Sales	0.272**	0.335**	0.283**	0.102	1

Notes: **statistically significant at 0.01 (two-tailed); *statistically significant at 0.05 (two-tailed).
1=CSER expenditure; 2=R&D intensity; 3=corporate investment; 4=profitability; 5=sales.

Table 5. Regression analysis results.

Variables	Coefficient	t	p-value
Equation 1: Corporate investment _{t+1} = $\alpha + \beta_1$ CSER expenditure _t + β_2 profitability _t + β_3 sales _t + ϵ			
Constant	13.698	8.387	0.000**
CSER expenditure	0.101	1.690	0.092
Profitability	1.432	1.284	0.200
Sales	0.181	3.925	0.000**
$R^2 = 0.094$; Adj $R^2 = 0.082$; $F = 7.957$; p -value = 0.000** N=235			
Equation 2: R&D intensity _t = $\alpha + \beta_1$ CSER expenditure _t + β_2 profitability _t + β_3 sales _t + ϵ			
Constant	13.177	7.042	0.000**
CSER expenditure	0.271	3.986	0.000**
Profitability	−2.425	−1.907	0.058*
Sales	0.112	2.121	0.035*
$R^2 = 0.102$; Adj $R^2 = 0.091$; $F = 8.772$; p -value = 0.000** N=235			

Notes: **statistically significant at 0.01 (two-tailed); *statistically significant at 0.05 (two-tailed).

Table 6. Path analysis results.

Variable	Coefficient	t	p-value	Adjusted R ²
Equation 3: R&D intensity _t = α + p ₂ CSER expenditure + e ₁				
Constant	15.542	10.859	0.000**	0.070
CSER expenditure	0.292	4.301	0.000**	
Equation 4: Corporate investment _{t+1} = α + p ₁ CSER expenditure + p ₃ R&D intensity + e ₃				
Constant	17.152	13.970	0.000**	0.050
CSER expenditure	0.167	1.667	0.097	
R&D intensity	0.170	2.988	0.003**	

Note: **statistically significant at 0.01 (two-tailed); *statistically significant at 0.05 (two-tailed).

investment. As a result, H1 has been rejected. However, the results of Equation 2 indicate that CSER expenditure has a positive and significant effect on R&D intensity, thereby supporting hypothesis H2. These findings are in line with the path analysis results presented in Table 6.

The outcomes of the path analysis presented in Table 6 suggest that there is a noteworthy impact of CSER expenditure on CSER expenditure (Equation 3). Additionally, R&D intensity has a positive influence on corporate investment (Equation 4). As a result, these discoveries illustrate that R&D intensity acts as a complete mediator in the relationship between CSER expenditure and corporate investment. Thus, H3 is supported.

6.4. Path analysis

This study explores the connection between corporate social and environmental responsibility (CSER) expenditures and corporate investment, as well as the relationship between research and development (R&D) intensity and corporate investment. In addition, it examines the mediating role of R&D intensity in the relationship between CSER expenditures and corporate investment, utilizing the RBVT. The findings reveal that R&D intensity plays a mediating role in the link between CSER expenses and corporate investment. This implies that policymakers should consider R&D intensity as one of the important resources when developing strategies to increase business investment. The conclusions derived from this study can also help decision-makers appreciate the significance of innovation, which can be advantageous to important business stakeholders.

In our study, we investigated the direct relationship between CSER expenditure and corporate investment. Our findings suggest that CSER expenditure does not have an impact on corporate investment.

While previous research has established that CSER expenditure can enhance a company's overall performance, there has been limited research in the area of investment performance. The difference in results from previous studies can be attributed to various factors. For instance, CSER expenditure may be considered as costs that can reduce the profits of a company.

CSER expenditures are often viewed as a way for companies to enhance their philanthropic reputation and personal benefits (Attig et al., 2014). There are differences in CSER expenditure depending on the strength of enforcement mechanisms in institutional environments. Positive economic values drive CSER expenditure in countries with strong enforcement, while in countries with low enforcement like Indonesia, CSER expenditures are viewed negatively by investors (Bhattacharyya et al., 2019). We suspect that the reason for the absence of influence is the ineffectiveness of corporate investments in these undertakings. Therefore, companies tend to postpone the management of the expenses of the CSER. These findings suggest that the expenditure on CSER can serve as a tool to monitor the quality of corporate investment. Stakeholders can use information on CSER expenditure as a factor to evaluate the effectiveness of an investment.

Upon examining the relationship between R&D intensity and corporate investment, we found that R&D intensity has a positive effect on corporate investment as we had predicted. This suggests that a company's level of innovation in various business fields can be assessed by the intensity of R&D. Such a high level of innovation may be seen as a promising signal for future investment by investors. Moreover, R&D intensity can be used to indicate a firm's stable financial position in carrying out its operational activities and allocating resources for modernizing its operations.

According to Fedorova et al. (2022), product innovation and marketing information presented in annual reports have a positive impact on a company's market capitalization. Product innovation is often considered tangible evidence of a company's innovative power. The introduction of a new product or the upgrading of an existing product has a direct impact on a company's profit and investor reactions. Our analysis indicates that R&D intensity plays a crucial role in mediating the relationship between CSER expenditure and corporate investment. The results support our hypothesis that companies with higher CSER expenditures are more profitable and valuable for future investments because they have greater innovation capabilities via higher R&D intensity.

Our study found that R&D intensity acts as a full mediator (indirect only) between CSER expenditure and corporate investments, which supports the RBVT. The ability of resources to innovate is a competitive advantage and a strategic step in calculating the risks of social and environmental accountability performance activities.

To achieve optimal investment performance, both CSER expenditure and R&D intensity are essential. It is important to establish a positive relationship between CSER expenditure and the intensity of R&D as a measure of innovation. Companies may adopt corporate responsibility principles in their products, processes, and production practices, which could require changes in applied technologies. As a result, they may incur R&D spending (Bansal, 2005; Husted & Allen, 2007). CSER can also be a source of opportunities for innovation by using social, environmental, or sustainability factors to create new products, services, processes, and marketplace spaces.

7. Summary and conclusion

7.1. Implications

This study explores how corporate social and environmental responsibility (CSER) expenditure affects corporate investment performance, with a focus on the role of research and development (R&D) intensity in mediating this relationship. The research findings indicate that CSER expenditure does not have a direct impact on corporate investment. However, the study highlights that a combination of CSER expenditure and R&D intensity can encourage increased corporate investment. Companies that believe that CSER expenditure reduces R&D intensity may face low investment performance. The study also found that R&D intensity has a positive impact on corporate investment. This suggests that a company's ability to innovate is a crucial factor in determining its investment performance.

Finally, the research indicates that R&D intensity plays a mediating role in the relationship between CSER expenditure and corporate investment. Therefore, managers should consider innovation in-depth

when developing strategies to improve business investment. The findings of this study have both theoretical and practical implications. First, it enriches the literature by providing empirical evidence on the relationship between CSER expenditure, R&D intensity, and corporate investment in industry-specific contexts, such as the basic and chemical industries in Indonesia. R&D programs are a type of innovation that can improve process efficiency and product innovation, helping companies establish competitive advantages and maintain long-term performance.

Second, the practical implications of these findings in the context of basic and chemical industries are that R&D intensity is a factor that greatly influences investment performance. These industries produce more raw materials that will be used by other industries and require significant resources in their production processes, so they need innovation strategies to manage and use existing resources. By continuously innovating in product development, the basic and chemical industries can maintain their performance. Decision-makers can use these results as a benchmark to develop regulations that encourage basic and chemical industries to optimize R&D intensity, improve the quality of their products, and ultimately improve the performance of companies and the country's economy.

7.2. Limitations and future research

This study has certain limitations that may affect the conclusions drawn about the relationship between CSER expenditure, R&D intensity, and corporate investment. Firstly, the data on CSER expenditure from companies in the basic and chemical industries is limited, which may not provide a comprehensive understanding of CSER practices and their impact. Secondly, this paper does not take into account the effect of firm size, which inhibits a direct comparison of the relationship between CSER expenditure, R&D intensity, and corporate investment with firm size. Therefore, this study cannot investigate how differently sized firms perceive and allocate resources towards CSER activities, R&D strategies, and investment decisions.

To address certain limitations, future research can explore the interdependent connection between CSER expenditure and R&D intensity. This study is crucial as CSER expenditure and R&D intensity do not have a direct link to CSER-oriented products and processes. Therefore, comprehending the relationship between CSER expenditure and R&D intensity, as explained by Padgett and Galan (2009), is vital. By investigating how strategic benefits are achieved through CSER expenses, we can support its impact on investment fund allocation.

Secondly, conducting longitudinal studies can provide insights into the evolving nature of CSER expenditure, R&D intensity, and corporate investments over time. This will help assess how changes in CSER expenditure influence innovation initiatives and subsequent investment decisions. Lastly, comparing CSER practices, R&D patterns, and investment strategies across various regions or countries with different regulatory frameworks and cultural contexts can provide a better understanding of the mutual relationship between these variables.

Authors' contributions

Conceptualisation—F.F., S.R., I.J. and C.J.; Methodology—F.F., S.R. and C.J.; Software—F.F., S.R., I.J. and M.S.; Validation—F.F. and S.R.; Formal analysis—S.R., I.J.; Investigation—F.F., S.R., I.J., C.J.; Resources—F.F., S.R., C.J., and I.J.; Data curation—S.R., F.F.; Writing original draft—F.F., S.R., C.J., and I.J.; Review and editing—F.F., C.J., and I.J.

Disclosure statement

No potential conflict of interest was reported by the author(s).

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Data availability statement

The data that support the findings of this study are available on request from the corresponding author.

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