

Environmental and Social Analysis and Governance (ESG) and Intellectual Capital on Profitability with Stock Price as a Moderating Variable in Mining Companies Listed on the IDX 2021-2024

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ABSTRACT

The profitability of mining companies in Indonesia experienced fluctuations and tended to decline during the 2021–2024 period due to commodity price volatility, rising operational costs, and increasing demands for sustainable business practices. This condition highlights the importance of examining factors that influence profitability, particularly Environmental, Social, and Governance (ESG) performance and Intellectual Capital (IC), while considering the moderating role of stock prices. This study aimed to analyze the effects of ESG and Intellectual Capital on profitability, proxied by Return on Assets (ROA), and to examine whether stock prices moderate these relationships in mining companies listed on the Indonesia Stock Exchange during 2021–2024. This study employed a quantitative research approach using purposive sampling, resulting in a sample of 22 mining companies selected from a population of 63 companies. Secondary data were collected from annual reports and sustainability reports and analyzed using multiple linear regression and Moderated Regression Analysis (MRA) with SPSS version 23. The findings revealed that ESG had a positive and significant effect on profitability. Likewise, Intellectual Capital positively and significantly affected profitability. Simultaneously, ESG and Intellectual Capital significantly explained variations in corporate profitability. However, stock prices were unable to moderate the relationship between ESG and profitability or between Intellectual Capital and profitability. These findings indicate that strengthening sustainability practices and effectively managing Intellectual Capital are essential for improving the financial performance of mining companies, whereas stock price movements do not reinforce these relationships.

INTRODUCTION

The mining sector holds a strategic position in the Indonesian economy because it contributes significantly to Gross Domestic Product, state revenue, exports, and investment (BPS, 2025). Indonesia is also one of the countries with the largest nickel reserves in the world and has abundant reserves of coal, copper, gold, and bauxite (BusinessIndonesia, 2026). This large potential makes the mining sector one of the most attractive sectors for domestic and international investors. However, the characteristics of the industry are capital-intensive, dependent on fluctuations in global commodity prices, and facing environmental risks make the profitability of mining companies highly vulnerable to changes over time (Bisnis.com, 2025). This condition requires companies to not only rely on physical assets, but also optimize intangible assets and sustainability practices as a source of competitive advantage.

This phenomenon is reflected in the performance of mining companies listed on the Indonesia Stock Exchange during the 2021–2024 period. Based on data from the companies' annual reports, several issuers, such as PT Indo Tambangraya Megah Tbk, PT Bukit Asam Tbk, PT Vale Indonesia Tbk, PT Indika Energy Tbk, and PT Krakatau Steel Tbk, experienced a decline in returns. on Return on Assets (ROA) has gradually declined in recent years. This decline was influenced by weakening global commodity prices, rising operational costs, rising production costs, and pressure on company efficiency. (CNBC, 2024; Kontan, 2025; IDNFinancial, 2024; Bisnis.com, 2025) This phenomenon indicates that the increase in company assets has not been fully converted into profits, so the effectiveness of company resource management remains a major challenge.

The mining sector, as a sector closely linked to nature, needs to pay attention to sustainability factors. These include *environmental and social factors*. and *Governance* (ESG). *Environmental* , *Social* , and *Governance* (ESG) is one of the sustainability factors that must be considered because it refers to the environmental, social, and governance impacts of investment decision-making in a business or company (Afthonah & Finatariani, 2024). ESG can also improve long-term financial performance, building company resilience in the face of market changes, regulations, and *stakeholder demands*. (Laksito & Pradana, 2023). Aydoğmuş's findings et (2022) showed that companies with better ESG performance tend to have higher profitability and firm value because they are able to build investor trust, improve operational efficiency, and strengthen the company's reputation. However, this finding is inconsistent with the findings of Shan et al. al. (2024) which shows that implementing ESG in a company results in higher costs incurred in investing.

In addition to ESG, companies also need a competitive advantage to drive health and success indicators (Rinjani, Tuffahati, Mandang, & Yulianto, 2025). One way to achieve this is by optimizing a company's *intellectual capital*. *Intellectual capital*, used effectively and efficiently, can increase profitability by increasing revenue without increasing expenses or costs, or by reducing costs. operational company. (Nurussyifa, 2024) Effective *Intellectual*

Capital Management can also generate *value added* so that it can improve company performance (Hermawan, 2021).

However, research on the relationship between ESG, *intellectual capital*, and profitability still shows inconsistencies. Some studies find that ESG has a positive effect on profitability by increasing corporate efficiency and legitimacy, while others suggest that ESG implementation actually increases operational costs, thereby depressing corporate profits, particularly in capital-intensive sectors like mining. Similar inconsistencies are also found in research on *intellectual capital*, where several studies demonstrate a positive effect on returns on Assets, while other studies show an insignificant or even negative relationship due to the suboptimal utilization of a company's intellectual assets. These differing results indicate that the relationship between ESG, *intellectual capital*, and profitability requires further testing, considering other variables that could strengthen or weaken the relationship.

This shift in investment orientation is particularly relevant for the mining industry, known for its intense natural resource exploitation, high carbon emissions, and various social and environmental risks. The mining industry faces increasing pressure to implement sustainable business practices as a consequence of increasing government regulations, shareholder, community, and international agency demands for environmental management and responsible corporate governance. In Indonesia, the implementation of sustainability principles is strengthened through the Financial Services Authority Regulation on sustainable finance, which requires public companies to submit sustainability reports as a form of transparency to stakeholders. This situation makes ESG no longer merely a reporting instrument, but rather part of a business strategy that determines a company's long-term competitiveness.

Empirical findings regarding the relationship between *Environment and Social and Governance* (ESG), *Intellectual Capital*, and profitability still show inconsistencies, thus leading to no conclusive conclusions. Some studies report that ESG implementation can increase profitability because companies gain social legitimacy, reduce operational risk, improve resource efficiency, and increase investor confidence. Aydoğmuş et al. (2022), proved that ESG performance has a positive effect on profitability and company value, especially through the social and governance dimensions, in line with the results of research conducted by Zilwan. et al. (2024), Prayitno et al. (2024), Romli & Winarso (2024), and Antonius & Ida (2023). In contrast, several studies on Indonesian mining companies indicate that ESG disclosure has not had a significant impact on profitability because the economic benefits of sustainability investments can only be felt in the long term, while implementation costs arise in the current period, as found by Nareswari et al. al. (2025) and Jayanti et al. (2024) which shows that ESG has a negative effect on ROA. These differences in results indicate that ESG effectiveness is strongly influenced by industry characteristics, implementation quality, market conditions, and investor response to sustainability information.

Similar inconsistencies are also found in research on *intellectual capital*. Based on the Resource- Based View, *intellectual capital* is a strategic resource capable of creating sustainable competitive advantage through improving human resource quality, organizational innovation, and business process efficiency. However, empirical evidence shows mixed results. Some studies suggest that *intellectual capital* increases returns on Assets (ROA) through value creation higher added value as in Herlina et al's research al. (2022), Hermawan et al. (2021), Jayanti & Romli (2023), and Kustinah (2022) shows that *Intellectual Capital* has a significant influence on ROA, while other research shows that this influence becomes weak when the company is not able to optimize human capital, structural capital, and capital employed effectively as in the research by Eriana et al. (2024) and Andika & Dewi (2022), who found that *intellectual capital* negatively impacts ROA. Thus, the influence of *intellectual capital* on profitability depends not only on the size of a company's intellectual assets but also on the company's ability to convert these assets into economic value.

Most studies use stock price as the dependent variable or consequence of profitability, while research that considers stock price as a moderating variable in the relationship between ESG and *intellectual capital* on profitability is still very limited. Therefore, there is still academic scope to examine whether market responses, reflected in stock prices, can strengthen or weaken the influence of ESG and *intellectual capital* on corporate profitability.

Conceptually, the use of stock prices as a moderating variable has a strong theoretical basis through *Signaling Theory*. ESG disclosure and a company's ability to manage *Intellectual Capital* are positive signals regarding the company's future prospects. However, the effectiveness of these signals depends heavily on how investors respond to the information provided by management (Gumanti, 2009). This response is reflected in stock price movements, representing market expectations regarding the company's prospects. Rising stock prices indicate increased investor confidence, allowing the company to gain better access to funding, lower capital costs, and greater flexibility in implementing sustainable business strategies (Velte, 2021). Conversely, if the market does not respond positively, the economic benefits of ESG and *Intellectual Capital implementation* may not optimally increase the company's profitability. Therefore, stock price theoretically deserves to be positioned as a moderating variable in this research model.

Based on this description, the aim of this study is to analyze the influence of *Environment, Social and Governance* (ESG) and *Intellectual Capital* on the profitability of mining companies listed on the Indonesia Stock Exchange for the 2021–2024 period, and to test whether stock prices can moderate the relationship between ESG and *Intellectual Capital* on profitability. The research results are expected to contribute to the development of *signaling theory*. *Theory* and Resource- Based View, while providing empirical evidence regarding the importance of integrating sustainability aspects, intellectual assets, and market response in improving a company's financial performance.

RESEARCH METHODS

This study uses a quantitative method with a descriptive research design to test the causal relationship between *Environment*, *Social and Governance* (ESG), *Intellectual Capital*, profitability, and stock price as moderating variables. A quantitative approach was chosen because it can explain the relationship between variables through hypothesis testing based on numerical data analyzed using inferential statistical techniques. This study uses secondary data obtained through documentation techniques. The data are sourced from annual reports, report) and sustainability report report) published by the Indonesia Stock Exchange and each company. The population used in this study were mining sector companies listed on the Indonesia Stock Exchange (IDX) during the observation period of 2021–2024. The study population consisted of 63 mining companies listed on the Indonesia Stock Exchange during the period of 2021–2024. The sample was obtained through a sampling technique using purposive sampling. The process obtained 22 companies with a period of observation for 4 years, resulting in 88 samples. This study used analysis tools with IBM SPSS Statistics 23 software.

Hypothesis testing was conducted using multiple linear regression analysis to examine the direct effect of ESG and *Intellectual Capital* on profitability. Furthermore, Moderated Regression Analysis (MRA) to test the role of stock prices as a moderating variable. MRA is conducted by forming interaction variables between ESG and stock prices and between *Intellectual Capital* and stock prices.

RESULTS AND DISCUSSION

This study used 22 mining companies listed on the Indonesia Stock Exchange during the 2021–2024 period, resulting in 88 observation units. Descriptive statistics were used to provide an overview of the characteristics of the research variables, including *Environment*, *Social and Governance* (ESG), *Intellectual Capital* (IC), Stock Price, and Profitability (ROA). This analysis is essential to determine data trends, levels of variation, and the distribution of each variable before hypothesis testing.

Table 1. Descriptive Statistics of Research Variables

Variables	Minimum	Maximum	Average	Standard Deviation
ESG (%)	28.57	98.41	70.18	-
<i>Intellectual Capital</i>	0.05	44.92	7.26	6,846
Stock Price (Rp)	29	121,000	5,256	15,604
ROA	-0.146	0.454	0.074	

Source: Data processed from SPSS 23 based on the company's annual report (2026).

Based on Table 1, the average ESG disclosure rate for mining companies reached 70.18%, indicating that most companies have implemented sustainability practices at a relatively good level. However, there is still significant variation between companies. The highest ESG score was 98.41%, while the lowest was 28.57%. This difference indicates that ESG implementation among mining companies in Indonesia is not yet fully uniform.

Intellectual Capital variable shows an average value of 7.26 with a standard deviation of 6.846, reflecting variations in companies' ability to create added value through intellectual assets. The highest value is 44.92, while the lowest is 0.05. This variation indicates that mining companies have varying levels of intellectual capital management efficiency, particularly in the utilization of human resources, structural capital, and capital used to create economic value.

The stock price variable had an average of Rp5,256 with a standard deviation of Rp15,604, indicating a fairly high level of data dispersion. This difference illustrates that capital market conditions provide different assessments of the prospects of each mining company. The highest stock price was Rp121,000, while the lowest was Rp29.

Profitability, as measured by Return on Assets (ROA), averaged 0.074, or 7.4%. The maximum ROA value was 45.4%, while the minimum value was -14.6%. This finding indicates that mining companies' ability to generate profits from their assets varies widely.

Classical Assumption Test Results

Classical Assumption Test	Model 1 (Without Moderation)	Model 2 (With Moderation)	Information
Normality	0.200	0.033	Model 1 meets the normality assumption, but Model 2 does not meet the normality assumption.
Multicollinearity	1,142 (ESG) 1,142 (IC)	1,420 (HS*ESG) 2,128 (HS*IC)	There is no multicollinearity
Heteroscedasticity	The scatterplot points in the data distribution are spread out and do not form a particular pattern.	The scatterplot points in the data distribution are spread out and do not form a particular pattern.	There is no heteroscedasticity
Autocorrelation	DW = 1.597 $1.59 < 1.597 < 1.699$	DW = 1,820 $1.75 < 1.820 < 2.25$	There are no signs of autocorrelation

Source: SPSS 23 output results, 2026

In Model 2 (with moderation), a violation of the normality assumption was found, so a *bootstrapping procedure* was performed to obtain more robust parameter estimates. *Bootstrapping* was used because the residuals were not normally distributed, allowing the parameter estimates to remain interpretable. This approach is commonly used when the residual distribution is not perfectly normal, but the model can still be estimated consistently.

Results of Multiple Linear Regression Analysis

Model 1 t-Test Results

<i>Variable</i>	<i>T</i>	<i>Sig .</i>	Information
ESG	2,588	0.011	Significant
IC	4,104	0,000	Significant

Source: SPSS 23 output results, 2026

F-Test Results for Model 1

<i>Variable</i>	<i>F</i>	<i>Sig .</i>	Information
<i>Regression</i>	17,711	0,000	Significant

Source: SPSS 23 output results, 2026

Bootstrap Test Results of Model 2

<i>Variable</i>	<i>Lower</i>	<i>Upper</i>	Information
HS*ESG	-0.002	0.003	Not significant (does not moderate)
HS* IC	-0.006	0.065	Not significant (does not moderate)

Source: SPSS 23 output results, 2026

Influence *Environment, Social and Governance (ESG)* towards Profitability

Test results hypothesis show that *Environment, Social and Governance (ESG)* has an impact positive and significant to profitability company mining companies listed on the Indonesia Stock Exchange for the 2021–2024 period , so that hypothesis First accepted . The results show that the more tall level corporate ESG disclosures , increasingly high ability company in produce proxied profit through Return on Assets (ROA). The ESG regression coefficient is valuable positive of 0.004 indicates that improvement quality ESG implementation and disclosure is followed by an increase profitability company.

Findings This show that ESG implementation is not Again viewed as just fulfillment obligation regulations, but has become part from a business strategy that is capable create mark economy for company. Disclosure information about aspect environmental , social , and governance give signal positive to investors, creditors , regulators and stakeholders interest other that company own commitment to sustainability business. These conditions capable increase reputation company, strengthening investor confidence, reducing risk operational, as well as expand access to source funding so that impact on increasing profitability.

If associated with *Signaling Theory*, results study This show that ESG is signals sent management to the market regarding quality management company. Company with level high ESG disclosure perceived have better governance good , compliance to more regulations high, and more capabilities Good in manage risk environmental and social information the reduce information asymmetry between management and investors so that increase market confidence in prospects company. Trust that in the end push efficiency operational, strengthening connection with stakeholders interests, and improve performance finance

company.

In the sector mining , ESG implementation has a more significant meaning important compared to sector other Because activity operational company in a way direct related with exploitation source Power nature , use energy , emissions carbon , waste mining , safety work , and connection with communities around the operational area . Therefore that , the company is capable of manage aspect environmental , social , and governance in a way more Good tend own level greater risk low compared to a company that only achievement - oriented profit term short. Decrease risk that in the end give contribution to improvement profitability company . In general empirical, results study This support study Zilwan et al. (2024), Prayitno et al. (2024), Saputra et al. (2025), and Romli & Winarso (2024) that state that ESG has an impact positive to profitability company.

Influence *Intellectual Capital* to Profitability

Test results hypothesis second show that *Intellectual Capital* influential positive and significant to profitability company mining , so that hypothesis second accepted . Regression coefficient of 0.135 indicates that improvement efficiency intellectual capital management give contribution positive to increase in Return on Assets (ROA). Coefficient value the even more big compared to ESG coefficient, so that show that intellectual capital is one of the determinant main profitability company in study This.

The results show that capable companies manage knowledge, competence employees , systems organization, technology, innovation , and business processes in a way effective will produce mark add more value high. Added value the increase efficiency use asset company so that capable produce more profit big. In other words, success company No only determined by assets physical abilities , but also by abilities company optimize asset No intangible assets.

Findings This in harmony with *Resource-Based View Theory* which explains that superiority competitive company originate from ability utilise source valuable , rare , difficult power imitated , and not easy replaced . *Intellectual Capital* fulfil characteristics the Because consists of on knowledge , experience , ability innovation , culture organization , system information , as well as quality source Power different people in every company . When intellectual capital managed optimally , the company capable create efficiency operational , improving productivity , speed up innovation, as well as produce decision more business Good so that profitability increased. Research results This strengthen in line with various study previously like research conducted by Herlina et al. (2022), Hermawan et al. (2021), Jayanti & Romli (2023), and Kustinah (2022) which shows existence influence positive *Intellectual Capital* against Profitability.

The Influence of ESG and *Intellectual Capital* in a way Simultan to Profitability

Testing simultaneous show that *Environment, Social and Governance* (ESG) and *Intellectual Capital* in a way together influential significant to profitability company mining , so that hypothesis third accepted. The Adjusted R Square value of 27.8% indicates that second variables the in a way simultaneous capable explains 27.8% of the variation

profitability, whereas the rest 72.2 % is influenced by other factors outside the research model.

Findings the indicates that profitability company No only influenced by factors financial conventional , but also influenced by a combination of practice sustainability and capability company manage asset intellectual . ESG provides contribution through improvement management risk , compliance to regulation , and improvement trust stakeholders interests . While that is , *Intellectual Capital* increase internal company efficiency through optimization source Power humans , innovation , and management knowledge organization.

Research result this also shows that success company mining in increase profitability need balance between management asset tangible assets and assets No intangible assets. ESG strengthens connection company with environment external through improvement legitimacy social and investor confidence, while *Intellectual Capital* strengthen internal company capabilities in create mark plus through innovation and efficiency organization.

Findings the strengthen conclusion study that improvement profitability company mining No only determined by commodity market conditions or ability produce income, but also influenced by the quality implementation sustainability and capability company managing intellectual capital in a way effective . This result support research by Antonius & Ida (2023) which shows that ESG and *Intellectual Capital* are together influential to performance finance company.

The Role of Stock Prices as Variables Moderation to The Relationship between ESG and *Intellectual Capital* on Profitability

Moderated Regression Analysis (MRA) testing was carried out For know whether price share capable strengthen or weaken influence *Environment, Social and Governance* (ESG) towards profitability company mining . Based on results analysis use method *bootstrapping*, variables moderation between ESG and price share No show significant influence on Return on Assets (ROA). Likewise with *Intellectual Capital*, price share No capable moderate connection between *Intellectual Capital* and profitability. With Thus , H_4 states that price share moderate the relationship between ESG and *Intellectual Capital* profitability rejected. The result indicates that change price share No change strength connection between implementation of ESG and *Intellectual Capital* with profitability company mining.

Findings This show that benefit ESG implementation towards profitability more Lots originate from improvement quality internal company operations compared to from change reflected market perception through price shares . In other words, the company still get benefit economy from implementation of ESG even though price share experience increase or decline . This show that practice sustainability has become part from operational strategy company and not fully depending on the response term short investors in the capital market. Findings this also shows that improvement intellectual capital quality give impact direct to improvement profitability without influenced by conditions price share company. This is

Because benefit More *Intellectual Capital* Lots felt through improvement productivity internal through improvement competence source Power human, effectiveness system organization, innovation technology, as well as ability company in create mark plus.

In perspective *Signaling Theory*, ESG is signal positive given management to investors regarding quality of governance company, concern to environment, as well as not quite enough answer social company. However, the results study show that price share No strengthen effectiveness signal said. This is indicates that investors do accept ESG information as relevant information , but reflected investor response in price share No in a way direct influence ability company produce profit. With Thus, the influence of ESG on profitability more nature direct through improvement efficiency operational, management risk, and increase legitimacy company than through capital market mechanisms.

Based on *the Resource- Based View Theory* , *intellectual capital* is a strategic resource capable of creating sustainable competitive advantage. The added value generated from utilizing intellectual capital will increase the efficiency of a company's asset utilization, resulting in higher profitability. Because this influence originates from the company's internal mechanisms, its existence is independent of stock price changes, which more often reflect investors' perceptions of market conditions.

Research result This in line with research conducted by Alfarizzi , et al. (2024) which shows that ESG is not influential significant to price stocks and research Probahudono et al. (2021) who showed that *Intellectual Capital* No influential to change price share company.

Implications of Research Results

In a way overall, results study show that ESG and *Intellectual Capital* are two contributing factors to improvement profitability company mining. ESG provides contribution through improvement quality of governance , management risk environment , as well as deeper relationship Good with stakeholders interests . On the other hand , *Intellectual Capital* increase efficiency operational through optimization source Power human capital , structural capital , and innovation processes company.

However Thus, research This find that price share Not yet capable functioning as variables moderation in connection the findings . This show that mechanism creation profitability in the company mining more influenced by the company's fundamental factors compared to the market perception reflected in price shares . With Thus , the company No can depend on increase price share as strengthening factors benefit ESG implementation as well as management *Intellectual Capital* to improvement profitability.

From the perspective academic, results study This strengthen *Signaling Theory* and *Resource-Based View Theory* , however with emphasis that capital market mechanisms do not always become track main in explain connection between ESG, *Intellectual Capital* , and profitability . ESG is proven functioning as signal positive for stakeholders interests that have an impact direct to improvement performance company , whereas *Intellectual Capital* proven become source Power strategies that improve superiority competitive company. However, the

price share No capable strengthen second connection the so that function expected moderation in study This No proven in a way empirical.

From the side practical, results study give implications that company mining need increase quality implementation of ESG in sustainable and optimized management *Intellectual Capital* as the main strategy in increase profitability. Focus company should directed at improving efficiency operational, innovation, quality source Power human resources, transparency of governance, and sustainability environment than only improvement - oriented price shares in the capital market. For investors, the results study show that evaluation to prospects company should No only based on movement price shares , but also consider quality ESG implementation and capabilities company in managing intellectual capital as indicator sustainability performance finance companies in the future.

CONCLUSION AND SUGGESTIONS

This study aims to analyze the influence of *Environment, Social and Governance* (ESG) and *Intellectual Capital* on profitability with stock price as a moderating variable in mining companies listed on the Indonesia Stock Exchange for the 2021–2024 period. The results show that ESG has a positive and significant effect on profitability, indicating that the better the implementation and disclosure of environmental, social, and governance aspects, the better the company's profitability performance. Furthermore, *Intellectual Capital* also has a positive and significant effect on profitability, indicating that effective intellectual asset management can improve a company's ability to create added value and generate profits. Simultaneously, ESG and *Intellectual Capital* have been shown to have a significant effect on profitability, indicating that the implementation of sustainability practices and optimization of intellectual capital are important factors in improving the financial performance of mining companies.

However, this study found that stock prices were unable to moderate the relationship between ESG and *intellectual capital* on profitability. These results indicate that the influence of ESG and *intellectual capital* on profitability is direct and independent of changes in stock prices in the market. This finding confirms that increased profitability in mining companies is more determined by the quality of implementation of sustainability practices and intellectual capital management than by market perceptions reflected in stock prices. Therefore, companies need to make ESG and *intellectual capital* part of their long-term business strategy to create sustainable financial performance.

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