Accounting Research Festival 2025

P-ISSN: XXXX-XXXX, E-ISSN: XXXX-XXXX
Website: https://publikasiilmiah.unwahas.ac.id/fra4
Redefining Accounting Education: Balancing Technological Innovation with Ethics and Sustainability

Research Proposal: The Role of Digitalization in Moderating the Influence of ESG and Financial Slack on Company Value (A Study of Mining Companies Listed on the Indonesia Stock Exchange from 2022 to 2024)

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ABSTRACT

Rapid changes in the business environment, globalization, technological advances, and the Covid-19 pandemic require companies to improve their performance and corporate value. In addition to financial factors, non financial practices such as Environmental, Social, and Governance (ESG) and digitalization are key to building investor confidence and corporate reputation. In the era of digitalization 4.0, digital transformation requires companies to improve efficiency, transparency, and ESG implementation more effectively. The mining sector was chosen because its activities have a significant impact on the environment and society, making the implementation of ESG and financial slack management strategic in maintaining corporate sustainability and value. This study aims to reveal how ESG and financial slack shape corporate value and how digitalization strengthens this relationship. The results of this study are expected to provide practical insights for management to improve innovation and sustainability, help investors make more informed decisions, and provide input for regulators in promoting sustainable business practices.

Keywords : ESG, *Financial Slack, Digitalization 4.0, Corporate Value, Mining Sector*.

INTRODUCTION

Significant changes in the business environment accompanied by rapid globalization, advances in information technology, and market fragmentation have created intense competition. In addition, companies are required to improve their financial performance in order to generate good corporate value. Positive corporate value is an important factor for external parties, such as investors and creditors, in making economic decisions.

Otoritas Jasa Keuangan (OJK) noted that the pandemic has not only put pressure on corporate performance, but also increased capital market volatility and hampered national economic growth (Peraturan Otoritas Jasa Keuangan, 2017). Company value is one of the main indicators that reflects the success of management in running the company. High company value shows trust from the market and shows that the main goal of the company, which is to maximize shareholder welfare, has been achieved (Vaniatan & Mukhtaruddin, 2025).

In ESG legitimacy theory, ESG is not only a business strategy but also a strategy to maintain public trust, because companies need to gain social acceptance from the community in order to ensure the sustainability of their business. In Indonesia, the application of ESG principles still faces various obstacles, especially in the mining sector, due to a lack of understanding and difficulties in finding ESG performance indicators. However, studies show that good ESG implementation can contribute positively to a company's financial performance, making it a strategy that is not only sustainable but also financially profitable.

Table 1.1
List of companies with environmental, social, and governance issues or problems Type of Issue Company and Description

No.	ESG Dimension	Company	Description of Issues
A	Environmental		
1	Environmental	PT Harita Group (Nickel Mining)	Recorded hexavalent chromium (Cr^{6+}) concentrations exceeding safe environmental limits; damage to community-owned plantations; pollution of freshwater sources and marine ecosystems; and increased cases of respiratory tract infections among toddlers due to coal dust emissions from coal-fired power plants used in nickel smelting operations.
2	Environmental	PT Wilmar Group (Palm Oil Subsidiary of Wilmar International Tbk)	Involvement in deforestation and pollution of rivers and peatlands in Kalimantan, alongside reported violations of plantation workers' labor rights.
B	Social		
3	Social	PT Freeport Indonesia (Subsidiary of PT Inalum Tbk)	Pollution of the West Mimika River caused by tailings disposal has led to a clean water crisis and various public health problems for surrounding local communities.
4	Social	PT Aneka Tambang Tbk (ANTM)	Mining operations in East Halmahera occur alongside persistently high poverty rates in nearby communities, contributing to social inequality and limited local economic spillover effects.
C	Governance		
5	Governance	PT Wilmar Group	Implicated in a palm oil export corruption case (2025), resulting in the seizure of approximately IDR 11.8 trillion in assets by the Indonesian Attorney General's Office.
6	Governance	PT Investasi Mandiri (Mining Sector)	Subject to a legal dispute valued at approximately IDR 100 billion related to the extension of a mining permit alleged to have been issued unlawfully.

Given the above issues, it is important for companies in Indonesia to not only comply with existing regulations but also proactively adopt ESG practices. On the other hand, the availability of excess financial resources, known as financial slack, enables companies to finance new projects, repurchase shares, or invest in technology and innovation. Financial slack can improve a company's ability to implement ESG and create long-term value, but if not managed properly, it can lead to inefficiencies.

Digital transformation and digitization of companies are also key factors in improving operational efficiency, transparency, and more effective ESG management. Digitization can strengthen ESG implementation and moderate the relationship between ESG and company value. However, previous studies have shown mixed results regarding the impact of digitization on company value, depending on the sector and level of information disclosure (Safitri, 2023).

In the context of the mining sector, the implementation of ESG and digitalization has become highly strategic. Mining activities have a significant impact on the environment and surrounding communities, making ESG performance an important indicator for enhancing reputation and investor confidence. In addition, the demands of Industry 4.0 are encouraging companies to utilize digital technology to improve efficiency, transparency, and operational sustainability (Lantip, 2023).

Given these conditions, this study focuses on the relationship between ESG, financial slack, and company value, as well as the role of digitalization as a moderating variable. The research focuses on publicly listed mining companies on the Indonesia Stock Exchange (IDX) during the period 2022–2024, as this period reflects the post-pandemic recovery phase and the latest trends in ESG management, digitalization, and corporate financial policies.

THEORETICAL FRAMEWORK AND HYPOTHESIS FORMULATION

Stakeholder Theory

Stakeholder theory was introduced by Edward Freeman in 1984, emphasizing that companies must pay attention to all stakeholders, not just investors. These parties include employees, customers, the public, the environment, and the community (Vaniatan & Mukhtaruddin, 2025).

Stakeholder theory states that stakeholders can influence and be influenced by the company's goals, policies, and actions. For example, they can limit the use of economic resources, influence company decisions, or control the consumption of products and services produced. Therefore, companies must have the ability to manage differences in interests in order to benefit all stakeholders while maintaining business continuity. The application of good stakeholder principles increases the likelihood of a company achieving its long-term goals. Good relationships with stakeholders not only reflect the company's commitment to sustainability, but also have the potential to increase long-term profitability and customer loyalty.

Agency Theory

Agency theory explains the relationship between management as agents and shareholders and other parties as principals(Kumalasari Subroto & Endaryati, 2024). This theory was introduced by Alchian & Demsetz (1972) and Jensen & Meckling (1976). Agency theory focuses on employment contracts that regulate the rights and obligations of each party with the aim of achieving a balance of benefits. Agency conflicts arise due to differences in interests between management (agents) and capital owners or stakeholders (principals). Some of the issues that arise include:

a. Moral Hazard – Agents do not perform their duties optimally because principals do not have full access to monitor them.

b. Effort Level – Managers without share ownership tend to work with low effort. c. Earning Retention – Managers retain profits to expand the company, rather than for shareholder dividends.

d. Risk Aversion – Managers avoid high risks for the sake of income security, unlike shareholders who can diversify.

e. Time Horizon – Shareholders are long-term oriented, while managers often focus on the short term. In the context of ESG and financial slack, agency theory explains that the allocation of company resources to ESG activities can create potential conflicts between the objectives of managers and shareholders. Large investments in ESG and digitalization can be a burden if not managed efficiently.

Legitimacy Theory

Legitimacy theory was proposed by Guthrie (1989) and explains that companies must obtain legitimacy from society in order to maintain their existence. ESG is considered a strategy for obtaining legitimacy by demonstrating a company's commitment to environmental, social, and governance issues (Wang et al. in Vaniatan and Mukhtaruddin 2025). Companies that obtain public legitimacy tend to be more competitive, attract investors, and increase market value. The transparent implementation of ESG through sustainability reporting also helps companies avoid regulatory sanctions, obtain incentives, and build a good reputation in the global market.

Resource-Based View (RBV) Theory

RBV theory (Wernerfelt, 1984 in Paulus and Murdapa 2016) emphasizes the importance of utilizing internal company resources to create competitive advantage. Internal resources include assets, capabilities, competencies, organizational processes, information, and knowledge that companies can control to implement strategies. RBV emphasizes that for resources to be superior and sustainable, they must be valuable, rare, not perfectly imitable, and not replaceable. Unique and specific core competencies enable companies to create sustainable competitive advantages. In the context of digitalization, ESG, and financial slack, RBV emphasizes that proper resource management can improve operational efficiency, innovation, and company value.

Environmental, Social, and Governance (ESG) Performance

As public awareness of social and environmental issues increases, companies are not only required to seek profits, but also to pay attention to the impact of their operations on the environment and society. The Indonesian government, through the OJK, requires issuers to provide sustainability reports that cover economic, social, and environmental aspects in accordance with POJK No. 51/POJK.03/2017.

ESG scores are also disclosed in the Katadata ESG Index (KESGI), which is an independent assessment conducted by the Katadata Insight Center to evaluate the sustainability performance of public companies listed on the Indonesia Stock Exchange and several state-owned enterprises (SOEs) that contribute significantly to the Indonesian economy. KESGI is based on the main data source of sustainability reports that are publicly available on the company's website, with the following steps:

1. Data collection
2. Standardization of units and conversion of categorical indicators into numerical ones
3. Normalization
4. Standardization of scores to a scale of 0-100
5. Handling of missing values
6. Aggregation of indicator scores into sub-aspect and aspect scores
7. Aggregation of aspect scores into Katadata ESG Index scores with weighting
8. Calculation of the final Katadata ESG Index score Sector

The mining, plantation, food and beverage, transportation and logistics, chemical, energy, and hospitality sectors use the following formula:

Katadata ESG Indeks (KESGI) = 50 % Environment + 30 % Social + 20 % Governance Financial Slack Financial slack is the excess cash or financial resources of a company after operational needs have been met (Bradley et al., 2011). Financial slack is used to deal with uncertainty, fund innovation, and sustainable activities (Rafailov, 2018; Pasaribu, 2021). There are three types of financial slack: 1. Available: Cash reserves for unexpected needs.

2. Recoverable: Liquid assets such as inventory and securities.
3. Potential: Potential income from future activities, such as an increase in stock prices.

Digitalization

Digitalization is the application of digital technology to accelerate, simplify, and expand access to information, both financial and non-financial (Fritzsch et al., 2021). Digitalization improves transparency, operational efficiency, decision-making, and company competitiveness (Sari & Prihandini, 2025; Bo & Li, 2025). Digital technologies include big data, AI, blockchain, cloud computing, and other digital platforms, which help companies convey information to investors in real-time and reliably.

Company Value

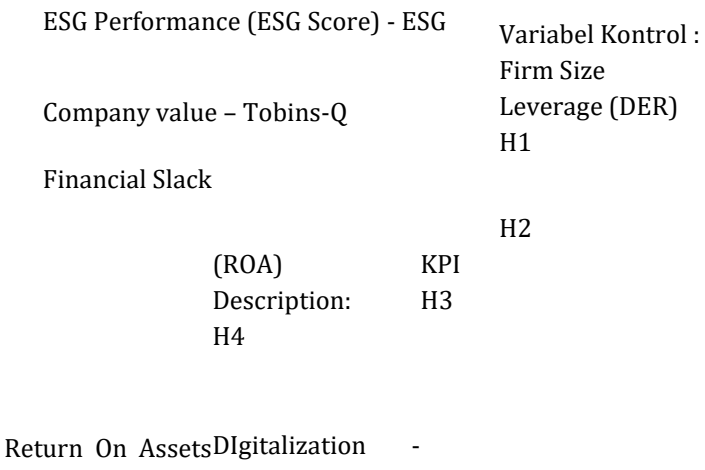
Company value is investors' perception of a company's ability to manage resources to generate profits and increase shareholder wealth. One alternative used in assessing company value is Tobin's Q. This ratio is a very valuable concept because it shows the current financial market's estimate of the return on every dollar of incremental investment. Tobin's Q is calculated by comparing the ratio of a company's market value to its book value. The formula is as follows:

$$Q = (EMV + D) / (EBV + D)$$

Theoretical Framework

This study analyzes the effect of ESG (Environmental, Social, and Governance) and financial slack on the value of mining companies listed on the IDX, with digitalization (TID) as a moderating variable and firm size, leverage (DER), and profitability (ROA) as control variables. ESG reflects the application of sustainable principles that can increase company value, while financial slack indicates the availability of flexible financial resources to deal with uncertainty and investment opportunities. Digitalization is expected to strengthen the effectiveness of ESG and the utilization of financial slack in increasing company value. Control variables are used to avoid bias and ensure the accuracy of the analysis.

Figure 1.1
Theoretical Framework



ESG (Environmental, Social, and Governance) Performance and Company Value

ESG performance reflects a company's responsibility towards the environment, society, and good governance. Based on signaling theory, ESG disclosure sends a positive signal to investors that the company is committed to sustainability, thereby enhancing the company's image and value. Meanwhile, legitimacy theory explains that ESG disclosure helps companies gain public support and maintain investor confidence, especially when profitability declines.

In addition, the implementation of good corporate governance strengthens transparency and accountability, reduces agency risk, and increases stakeholder trust. Previous studies (Zheng and Bu 2024; Farrel and Fajar 2025) also show that ESG has a significant positive effect on company value. **H1: ESG performance has a positive effect on company value.**

Financial Slack and Company Value

Financial slack is excess financial resources that can be used to fund strategic activities beyond operational needs. These funds provide flexibility for companies in dealing with uncertainty, supporting

sustainable investment, and social and environmental activities . Companies with high financial slack have a greater ability to increase company value through productive policies and investments (Solikhin et al., 2022). Research (Maria Sofina Pasaribu, 2021) shows that financial slack has a significant positive effect on financial performance.

H2: Financial slack has a significant positive effect on company value.

ESG Performance and Company Value Moderated by Digitalization

ESG performance reflects a company's commitment to sustainable practices that have a positive impact on the environment, society, and governance. Based on legitimacy theory and stakeholder theory, companies with good ESG performance will gain social legitimacy, investor trust, and competitive advantage, which ultimately increases company value. However, the influence of ESG on company value is not always consistent due to capital constraints and negative practices such as greenwashing (Lyu et al., 2025).

Digitalization acts as a factor that strengthens this relationship. The use of digital technologies such as big data, IoT, and AI improves efficiency, transparency, and real-time monitoring of ESG activities, thereby strengthening reputation and market trust (Zheng & Bu, 2024). Previous studies have shown that digitalization can strengthen the positive impact of ESG on company value.

H3: Digitalization moderates the positive relationship between ESG and company value.

Financial Slack and Company Value Moderated by Digitalization

The existence of financial slack can support companies in investing in sustainable activities. When companies have adequate financial reserves, they can be allocated to improve reputation, operational efficiency, and maintain good relationships with stakeholders without sacrificing financial stability.

Digitalization strengthens the relationship between financial slack and company value. Digital technology enables companies to manage financial resources more efficiently, improve accountability, and accelerate data-driven decision-making. Digitalization also makes it easier for companies to report ESG performance transparently, thereby increasing legitimacy among consumers and investors. Companies with high financial slack that effectively implement digitalization will increase their corporate value, as they are able to leverage financial flexibility for innovation and sustainability.

This is in line with the Resource-Based View (RBV) Theory, which states that a company's competitive advantage depends on its ability to manage resources that are valuable, rare, inimitable, and non substitutable. Financial slack is a strategic resource because it provides financial flexibility to fund investments, innovations, and sustainable initiatives supported by the use of digitalization technology so that the utilization of these resources can be more efficient through data analysis, automation, and technology-based decision making. Companies with high financial slack and effective digitalization will strengthen innovation, efficiency, and financial performance, which will increase the value of the company. Based on this explanation.

H4: Digitalization moderates the positive relationship between financial slack and company value.

Population and Sample

According to Sugiyono (2016:80), population is a generalization area consisting of objects or subjects that have certain qualities and characteristics determined by researchers to be studied and then conclusions are drawn. The population in this study is all mining companies listed on the Indonesia Stock Exchange (IDX) during the period 2022–2024. Based on data obtained from www.idx.co.id and green.katadata.co.id, there are 96 mining companies listed on the IDX.

However, not all companies in the population publish sustainability reports, which are one of the main criteria in this study. Therefore, the researcher used purposive sampling, which is a technique for determining samples based on certain considerations or criteria (Sugiyono, 2017). This technique was chosen so that the companies selected as samples truly have data relevant to the research variables, namely Environmental, Social, and Governance (ESG) performance, financial slack, company value, and level of digitalization.

Table 1.2
Sample Selection Criteria

Criteria	Companies
Mining companies listed on the IDX for the period 2022–2024	96
Companies that consistently published annual reports and sustainability reports during the 2022–2024 period 35	35
Companies with complete data related to research variables (ESG, financial slack, company value, and digitalization indicators)	35
Number of observations (35 companies × 3 years of research)	105

After selecting samples according to the proposed criteria, a total of .. company samples were obtained. The following are the names of the companies that are the objects of this study:

Tabel 1.3
Sample list

No	Nama Perusahaan	kode saham
1	PT Bayan Resources Tbk	BYAN
2	PT Astrindo Nusantara Infrastruktur Tbk.	BIPI
3	PT Baramulti Suksessarana Tbk.	BSSR
4	PT Bumi Resources Tbk	BUMI
5	PT Darma Henwa Tbk	DEWA
6	PT Delta Dunia Makmur Tb	DOID
7	PT Dian Swastatika Sentosa Tbk	DSSA
8	PT Golden Energy Mines Tbk	GEMS
9	PT Harum Energy Tbk	HRUM
10	PT Indika Energy Tbk	INDY
11	PT Indo Tambangraya Megah Tbk	ITMG
12	PT Resource Alam Indonesia Tbk	KKGI
13	PT Mitrabara Adiperdana Tbk	MBAP

14	PT Samindo Resources Tbk	MYOH
15	PT Perdana Karya Perkasa Tbk	PKPK
16	PT Bukit Asam Tbk	PTBA
17	PT Petrosea Tbk	PTRO
18	PT TBS Energi Utama Tbk	TOBA
19	PT Alfa Energi Investama Tbk	FIRE
20	PT RMK Energy Tbk	RMKE
21	PT Adaro Minerals Indonesia Tbk	ADMR
22	PT Sigma Energy Compressindo Tbk	SICO
23	PT Black Diamond Resources Tbk	COAL
24	PT Hillcon Tbk	HILL
25	PT Prima Andalan Mandiri Tbk	MCOL
26	PT Golden Eagle Energy Tbk	SMMT
27	PT Adaro Energy Indonesia Tbk	ADRO
28	PT Aneka Tambang Tbk	ANTM
29	PT Vale Indonesia Tbk	INCO
30	PT Ifishdeco Tbk	IFSH
31	PT Kapuas Prima Coal Tbk	ZINC
32	PT Cita mineral Investindo	CITA
33	PT Merdeka Copper Gold	MDKA
34	PT Archi Indonesia Tbk	ARCI
35	PT Bumi Resources Minerals Tbk	BRMS

Source : www.idx .co.id (processed data)

RESEARCH METHOD

Data Collection Methods

The data used in this study is secondary data, which is data obtained indirectly through third parties or published sources. The secondary data in this study is sourced from various official documents, such as: 1. Annual reports and sustainability reports of mining companies listed on the Indonesia Stock Exchange (IDX) for the period 2022–2024.

2. Annual financial reports obtained from the companies' official websites or through the portal www.idx.co.id
3. ESG score data taken from company sustainability reports and supporting sources such as Refinitiv Eikon, Bloomberg, and green.katadata.co.id.
4. Digitalization indicator data (digitalization KPI) taken from disclosures of company digital activities in annual reports, including information on ICT spending, digital transformation programs, digital infrastructure, and automation initiatives.
5. Academic literature, scientific journals, and other relevant supporting sources to strengthen the theoretical basis of the research.

Data Analysis Methods

This study uses quantitative analysis with the help of Stata 17 software to process and analyze data. The analysis methods used include the following stages:

Descriptive Statistical Analysis

Descriptive statistical analysis is used to describe the characteristics of the research data, such as maximum, minimum, mean, median, and standard deviation values. The purpose of this analysis is to provide an overview of the variables used in the study, namely ESG performance (ENV, SOC, and GOV), Financial Slack, Digitalization, and Company Value (Tobin's Q).

Panel Data Regression Analysis

Panel data is a combination of cross-sectional data (between companies) and time series data (between years), thus providing richer and more in-depth information. The advantages of using panel data include the ability to:

1. Overcome unobserved individual heterogeneity.
2. Increase the number of observations, so that the estimation results are more efficient.
3. Enabling the detection of intertemporal dynamics.
4. Reducing estimation bias that often occurs in single cross-sectional or time series models (Widarjono, 2018).

Panel Data Regression Methods

There are three main approaches in panel data regression analysis, namely:

1. Common Effect Model (CEM)

   This model assumes that there are no differences between individuals or over time. Estimation is performed using the OLS method without considering individual effects (Widarjono, 2018). 2. Fixed Effect Model (FEM) This model takes into account individual effects between companies, which are reflected in differences in intercepts. FEM is used if there are indications of heterogeneity between units (Widarjono, 2018).
2. Random Effect Model (REM)

   This model considers differences between individuals as part of a random error term. REM is suitable for use if the sample of companies is considered to be randomly selected from the population (Widarjono, 2018).

Selection of Panel Regression Model

The selection of the best model is carried out through a series of tests, namely:

a. Chow test : comparing CEM and FEM.

b. Hausman test : comparing FEM and REM.

c. Lagrange Multiplier (LM) Test : compares REM and CEM.

The best model is selected based on the test results with a significance level of 5% ($\alpha = 0.05$).

Classical Assumption Test

The classical assumption test is conducted to ensure that the regression model meets the Best Linear Unbiased Estimator (BLUE) criteria. This test includes:

a. Normality test using the Jarque-Bera test.

b. Heteroscedasticity test using the Glejser test.

c. Multicollinearity test using the Variance Inflation Factor (VIF) and tolerance values. d. Autocorrelation test (optional) if there are indications of correlation between residuals in different time periods.

Hypothesis Testing

The basic regression model used in this study is as follows:

$$\mathbf{TOBINQ = \alpha + \beta 1\ ENS + \beta 2\ SOS + \beta 3\ GS + \beta 4\ ESG + e}$$

Hypothesis testing was conducted through:

a. The t-test (partial) to determine the effect of each independent variable on the dependent variable.

b. The F-test (simultaneous) to determine the overall effect of the independent variables on the dependent variable.

c. Coefficient of Determination (Adjusted R^2) to see how much of the variation in company value is explained by ESG variables, financial slack, and digitization.

d. If the data indicates endogeneity issues, the Two-Stage Least Squares (2SLS) estimation model can be used as a follow-up approach (Wooldridge, 2012; Zahid et al., 2020).

Moderating Regression Analysis (MRA)

To test the role of digitalization (DIT) as a moderating variable, the Moderating Regression Analysis (MRA) method with an interaction model is used. This analysis aims to identify whether digitalization strengthens or weakens the influence of ESG and financial slack on company value. The regression model is formulated as follows:

$$\mathbf{TOBINQ = \alpha + \beta 1\ ENS + \beta 2\ SOS + \beta 3\ GS + \beta 4\ ESG + \beta 5\ KPI\text{-}D + \beta 6\ ENS^{*}\ KPI\text{-}D + \beta 7\ SOS^{*}\ KPI\text{-}D + \beta 8\ GS^{*}\ KPI\text{-}D + \beta 9\ ESG^{*}\ KPI\text{-}D + e}$$

If the interaction coefficient is significant ($p < 0.05$), then the digitalization variable is proven to act as a moderating variable.

RESEARCH SCHEDULE

Activity	Time Implementation
Proposal preparation	November 2025
Data collection	Desember 2025
Data analysis	Januari 2025
Final report writing	Februari 2025

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