

**THE EFFECT OF GREEN INNOVATION, ENVIRONMENTAL PERFORMANCE,
AND CARBON EMISSION DISCLOSURE ON THE FIRM VALUE OF BASIC
MATERIALS COMPANIES LISTED ON THE INDONESIA STOCK EXCHANGE
FOR THE 2021 – 2024 PERIOD**

¹Amsal Steven Trian Marpaung

Email: amsalmarpaung@gmail.com

^{2*}Arthur Simanjuntak

Email: as_smjt@rocketmail.com

³Gracesiela Yosephine Simanjuntak

Email: gracesielasimanjuntak@gmail.com

⁴Merry Anna Napitupulu

Email: napitupulumerryanna@gmail.com

^{1,2,3,4}Department of Accounting, Fakultas Ekonomi, Universitas Methodist Indonesia

*Correspondece Author: as_smjt@rocketmail.com

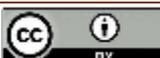
ABSTRACT

This research is conducted to investigate and evaluate the relationship between Green Innovation, Environmental Performance, and Carbon Emission Disclosure on Firm Value in companies operating within the Basic Materials sector listed on the Indonesia Stock Exchange during the 2021–2024 period. The study adopts a quantitative methodology and utilizes purposive sampling to obtain 39 firms that satisfy the predetermined research criteria. Informasi analysis is performed using IBM SPSS Statistics version 26, applying multiple linear regression to assess the interaction patterns among the examined variables. The empirical results indicate varying effects of the independent variables on Firm Value. Individually, Green Innovation shows a statistically significant positive effect on Firm Value among Basic Materials companies. In contrast, Environmental Performance presents a negative and statistically insignificant association with Firm Value. Similarly, Carbon Emission Disclosure demonstrates a negative but insignificant influence on Firm Value. However, when tested simultaneously, the three independent variables jointly exhibit a significant effect on Firm Value. Furthermore, the coefficient of determination analysis reveals that Green Innovation, Environmental Performance, and Carbon Emission Disclosure collectively account for 7.3% of the variation in Firm Value, while the remaining 92.7% is explained by other variables outside the research model. This study contributes to the literature by providing a broader understanding of how corporate environmental initiatives relate to firm value. The findings offer practical implications for investors and corporate management in formulating strategic and well-informed decisions. In addition, both theoretical and practical implications encourage further exploration of the role of Green Innovation, Environmental Performance, and Carbon Emission Disclosure in shaping Firm Value, particularly in the current masa where environmental sustainability has become a critical corporate responsibility.

Keywords: Green Innovation, Environmental Performance, Carbon Emission Disclosure, Firm Value, Basic Materials Sector, Indonesia Stock Exchange.

ABSTRAK

Penelitian ini dilakukan untuk menyelidiki dan mengevaluasi hubungan antara Inovasi Hijau, Kinerja Lingkungan, dan Pengungkapan Emisi Karbon terhadap Nilai Perusahaan pada perusahaan-perusahaan yang beroperasi di sektor Bahan Baku yang terdaftar di Bursa Efek Indonesia selama periode 2021–



2024. Studi ini mengadopsi metodologi kuantitatif dan menggunakan purposive sampling untuk memperoleh 39 perusahaan yang memenuhi kriteria penelitian yang telah ditentukan. Analisis informasi dilakukan menggunakan IBM SPSS Statistics versi 26, dengan menerapkan regresi linier berganda untuk menilai pola interaksi antar variabel yang diteliti. Hasil empiris menunjukkan pengaruh yang bervariasi dari variabel independen terhadap Nilai Perusahaan. Secara individual, Inovasi Hijau menunjukkan pengaruh positif yang signifikan secara statistik terhadap Nilai Perusahaan di antara perusahaan-perusahaan Bahan Baku. Sebaliknya, Kinerja Lingkungan menunjukkan hubungan negatif dan tidak signifikan secara statistik dengan Nilai Perusahaan. Demikian pula, Pengungkapan Emisi Karbon menunjukkan pengaruh negatif tetapi tidak signifikan terhadap Nilai Perusahaan. Namun, ketika diuji secara simultan, ketiga variabel independen tersebut secara bersama-sama menunjukkan pengaruh yang signifikan terhadap Nilai Perusahaan. Lebih lanjut, analisis koefisien determinasi mengungkapkan bahwa Inovasi Hijau, Kinerja Lingkungan, dan Pengungkapan Emisi Karbon secara kolektif menjelaskan 7,3% variasi Nilai Perusahaan, sedangkan sisanya 92,7% dijelaskan oleh variabel lain di luar model penelitian. Studi ini berkontribusi pada literatur dengan memberikan pemahaman yang lebih luas tentang bagaimana inisiatif lingkungan perusahaan berhubungan dengan nilai perusahaan. Temuan ini menawarkan implikasi praktis bagi investor dan manajemen perusahaan dalam merumuskan keputusan strategis dan berdasarkan informasi yang baik. Selain itu, implikasi teoritis dan praktis mendorong eksplorasi lebih lanjut tentang peran Inovasi Hijau, Kinerja Lingkungan, dan Pengungkapan Emisi Karbon dalam membentuk Nilai Perusahaan, khususnya di masa kini di mana keberlanjutan lingkungan telah menjadi tanggung jawab perusahaan yang sangat penting.

Kata Kunci: Inovasi Hijau, Kinerja Lingkungan, Pengungkapan Emisi Karbon, Nilai Perusahaan, Sektor Bahan Baku, Bursa Efek Indonesia.

I. INTRODUCTION

Climate change has become an increasingly urgent global concern, driving substantial transformations in the way companies operate across countries. In 2024, global investment in clean energy reached a record high of USD 2 billion, an amount that is twice as large as investment in the fossil fuel sector. This development reflects a significant shift toward a more sustainable economic paradigm. In this context, the implementation of Environmental, Social, and Governance (ESG) principles is no longer perceived as an optional complement but rather as a strategic necessity for companies seeking to remain competitive and maintain legitimacy in international markets.

Pressure from various stakeholders ranging from institutional investors, consumers, regulators, to civil society groups has compelled companies not only to focus on profit generation but also to consider and be accountable for the environmental and social impacts of their operational activities. A 2024 Morgan Stanley survey indicates that 54% of individual investors plan to increase their allocation to sustainable investments in 2024, while 77% express interest in sustainability based investment instruments. The Basic Materials sector is one of the industries with the most significant environmental impacts in Indonesia. In addition to serving as a fundamental pillar for various downstream industries including automotive, agriculture, construction, textiles, electronics, and pharmaceuticals this sector also contributes substantially to greenhouse gas emissions and environmental pollution. The Basic Materials sector in Indonesia is projected to grow at a Compound Annual Growth Rate (CAGR) of 6.80% during the 2024–2032 period, partly driven by the increasing adoption of environmentally friendly technologies and automation in production processes. However, in 2023, Indonesia's Basic Materials sector experienced negative growth of approximately -0.12% on a year-on-year basis. This decline was attributed to a downturn in global economic conditions and highlights the sector's vulnerability to external economic shocks.

Takalo & Tooranloo (2021) define Green Innovation as efforts to develop products, processes, and business practices that are capable of significantly reducing environmental impacts. Environmental performance reflects the extent to which a company is able to control and minimize the ecological impacts arising from its operational activities. In Indonesia, corporate environmental

performance is assessed through the Corporate Performance Rating Assessment Program in Environmental Management (Program Evaluasi Peringkat Kinerja Industri dalam Pengelolaan Area Hidup PROPER), which is administered by the Ministry of Environment and Forestry. PROPER applies a color-based rating system, ranging from Gold as the highest category, followed by Green, Blue, Red, and Black, which represents the lowest tingkat of environmental performance. Carbon emission disclosure refers to corporate transparency in reporting the amount of greenhouse gas emissions generated from operational activities. Although Financial Services Authority Regulation (POJK) Nomor. 51/ 2017 and Financial Services Authority Circular Letter (SE OJK) Nomor. 16/ 2021 do not explicitly mandate the disclosure of climate targets, both regulations require companies to report the achievement of sustainability targets over the previous three years.

Several prior studies have reported mixed findings. Xie et al (2019) found that Green Innovation has a positive effect on firm value in Cina. In contrast, a domestic study conducted by (Yuliandhari, Saraswati & Safari, 2023) revealed that green innovation does not have a significant positive effect on firm value. Similarly, research on environmental performance has produced mixed results. Some studies report a positive relationship, such as the study conducted by (Trumpf & Guenther, 2017), while others identify a negative or insignificant relationship, as evidenced in the study by (Ulfamawaddah, Junaidi & Wahyudi, 2022). Regarding carbon emission disclosure, (Rahmanita, 2020) found that carbon emission disclosure has a positive effect on firm value. This finding is consistent with the study conducted by (Yuliandhari, Saraswati & Safari, 2023), which reported a significant positive influence of carbon emission disclosure on firm value.

Previous studies have predominantly been conducted in developed countries with regulatory frameworks and market conditions that differ significantly from those in Indonesia. A substantial research gap exists in understanding how sustainability practices particularly Green Innovation, environmental performance, and carbon emission disclosure affect firm value within the context of emerging economies such as Indonesia, especially in the Basic Materials sector, which possesses distinct characteristics. This sector not only faces increasingly stringent regulatory pressures but also encounters structural challenges, including limited access to green technology, high maintenance costs, and competition from imported products. The primary objective of this study is to analyze the effect of Green Innovation, environmental performance, and carbon emission disclosure on the firm value of companies in the Basic Materials sector listed on the Indonesia Stock Exchange during the 2021–2024 period, both partially and simultaneously.

Through this study, it is expected that a deeper understanding will be gained regarding how sustainability practices contribute to the creation of long-term firm value, as well as the contextual factors that may moderate these relationships. More specifically, this study seeks to address the following question: Do companies that invest in green innovation, achieve superior environmental performance, and demonstrate transparency in carbon emission disclosure receive higher valuations from the market? This understanding is particularly important in the context of the transition toward a sustainable economy and the achievement of national and global climate targets.

This study is expected to provide both theoretical and practical contributions. From a theoretical perspective, it contributes to the development of the literature on corporate sustainability, environmental management, and firm valuation by providing empirical evidence from the Indonesian context, particularly within the Basic Materials sector. In addition, this study integrates multiple theoretical perspectives to develop a more comprehensive framework for understanding the mechanisms through which sustainability practices influence firm value.

II. THEORETICAL FOUNDATION AND HYPOTHESES

Stakeholder Theory

Stakeholder Theory was developed by R. Edward Freeman in 1984 as an alternative to the dominant shareholder-centric perspective in strategic management (Mahajan et al., 2023). This theory argues that corporations are not solely responsible to shareholders but also to a broader range of stakeholders who can affect or are affected by the firm's activities. Stakeholders are defined as any

group or individual who can influence or be influenced by the achievement of an organization's objectives (Phillips et al., 2019). Stakeholders can be categorized into two main groups: (1) Primary stakeholders, namely parties that have formal, official, and direct relationships with the firm, such as shareholders, employees, customers, suppliers, creditors, and the government; and (2) Secondary stakeholders, namely parties that are not directly involved in economic transactions with the firm but can influence or be influenced by corporate decisions, such as mass media, activist groups, local communities, and the general public (Thijssens et al., 2015).

Legitimacy Theory is rooted in the sociological concept of a social contract between organizations and society. The theory was developed from the seminal works of (Dowling & Pfeffer (1975) and Lindblom (1994), and has since become a widely used theoretical framework in social and environmental accounting research (Deegan, 2019). Legitimacy Theory posits that firms must operate in accordance with societal values, norms, and expectations in order to be perceived as appropriate and thus maintain their continued existence. In other words, firms seek to assure society that their activities do not deviate from prevailing social values, thereby securing ongoing social support for their operations (Rokhlinasari, 2016). Legitimacy is not an objective attribute inherently possessed by an organization; rather, it is a dynamic social construct that may evolve over time in response to changes in societal expectations. This theory assumes that organizations operate within the boundaries and norms that are considered acceptable by society. When a legitimacy gap exists, defined as a discrepancy between how an organization behaves and how society expects it to behave, organizational legitimacy is threatened. Such legitimacy threats may have serious consequences for business continuity, including reduced stakeholder support, public protests, regulatory intervention, and product boycotts.

The Resource-Based View (RBV), introduced by Barney in 1991, explains that a firm's ability to achieve and maintain a sustainable competitive advantage is largely determined by the quality of its internal resources and capabilities. Competitive advantage emerges when these resources possess characteristics that are valuable, rare, difficult to imitate, and non-substitutable, commonly known as the VRIN attributes. Resources that fulfill these criteria enable firms to generate long-term economic benefits and deliver superior value compared to competitors.

Firm resources are generally classified into three main categories. Physical capital resources refer to tangible assets, including technology, production facilities, equipment, and geographical advantages. Human capital resources encompass employee skills, experience, knowledge, training, and relational networks. Organizational capital resources involve formal structures and systems such as planning and reporting mechanisms, coordination and control processes, as well as informal relationships both within the organization and with external stakeholders.

Within the sustainability discourse, Hart (1995) extended the traditional RBV by incorporating environmental considerations through the Natural Resource-Based View (NRBV). This framework integrates ecological dimensions into the RBV perspective, emphasizing that environmentally oriented capabilities can also function as strategic resources that contribute to long-term competitive advantage (McDougall et al., 2019).

Green Innovation may be conceptualized as a strategic asset that fulfills the VRIN attributes valuable, rare, inimitable, and non-substitutable. From the value perspective, Green Innovation contributes to cost efficiency through reduced energy and material consumption, creates opportunities in environmentally oriented market segments, lowers exposure to regulatory pressures, and strengthens corporate image. In terms of rarity, effective Green Innovation is not easily found across firms because it depends on a distinctive integration of technological expertise, research and development capacity, an innovation-supportive organizational culture, and strong leadership commitment. Regarding inimitability, the intricate and path-dependent nature of innovation processes makes it difficult for competitors to fully comprehend and replicate the mechanisms through which such innovations are generated. Finally, although substitute solutions may be available for certain environmental initiatives, the unique configuration of Green Innovation, firm-specific capabilities, and complementary organizational assets tends to be difficult to replicate in an equivalent manner, thereby

reinforcing its strategic value.

Signaling Theory, originally introduced by Spence (1973) in the context of labor market studies, explains how parties possessing superior information (insiders) can credibly convey that information to parties with limited information (outsiders) in situations characterized by information asymmetry (von Deimling et al., 2022). In the context of capital markets, corporate management, as insiders, possess more comprehensive knowledge regarding the firm's quality, potential, and risks compared to investors and other external parties as outsiders. Within the framework of environmental disclosure, Signaling Theory posits that firms can convey information related to their environmental performance as a signal to the market regarding managerial quality, commitment to sustainable practices, and the firm's long-term prospects. Firms with superior environmental performance and strong sustainability practices are more likely to disclose such information to stakeholders as a means of differentiating themselves from companies with lower environmental performance (Sartika, 2024).

Firm Value

Firm value constitutes a central concept in corporate finance as it reflects the overall economic worth of a company. Essentially, firm value illustrates how investors evaluate the effectiveness of a firm's performance, which is commonly reflected in stock price fluctuations within the capital market (Indriyani, 2017). From a financial perspective, firm value can be interpreted as the present value of future cash flows that are expected to accrue to shareholders over time. A higher firm value signals that the company is perceived to possess favorable growth prospects, the capacity to generate sustainable earnings, effective risk management, and the ability to enhance shareholder wealth.

Green Innovation

Green Innovation, which is also known as environmental or eco innovation, refers to diverse forms of innovation aimed at supporting sustainable development by minimizing adverse environmental impacts and improving the efficiency and responsibility of resource utilization (Takalo et al., 2021). The scope of this concept is broad, covering initiatives such as the creation of environmentally friendly products, the adoption of cleaner production technologies, and the development of more structured environmental management practices.

According to Tolliver et al. (2021), Green Innovation encompasses both hardware- and software-based innovations related to eco-friendly products and processes. This includes advancements in energy saving technologies, pollution control, waste recycling, eco design, and environmental management systems within corporations. Therefore, Green Innovation should not be understood solely as tangible technological improvements, but also as the development of managerial practices, organizational systems, and strategic approaches that promote environmental sustainability.

Environmental Performance

Environmental performance refers to the measurable outcomes of a firm's efforts to manage environmental aspects related to its operational activities (Friede et al., 2015). This concept reflects the extent to which a firm is able to control environmental impacts, comply with applicable environmental regulations, and achieve established environmental targets. Ilinitch (1998), as cited and further developed in Li, Y., Dai, J., and Cui, L. (2020), defines environmental performance as a multidimensional concept that encompasses a firm's level of compliance with environmental regulations, its ability to reduce pollution beyond minimum standards, the effectiveness of the systems and processes used to manage environmental aspects, and the linkage between environmental performance and financial performance. This definition emphasizes that environmental performance is inherently multidimensional, extending beyond regulatory compliance to include voluntary initiatives that exceed minimum requirements.

Carbon Emission Disclosure

Carbon emission disclosure refers to the degree of transparency and completeness of information disclosed by firms regarding greenhouse gas (GHG) emissions generated from their operational activities. Such information is typically published through annual reports, sustainability reports, disclosures to the Carbon Disclosure Project (CDP), or other reporting platforms. Kurnia et al.

(2020) explain that carbon disclosure constitutes a form of corporate communication to stakeholders regarding greenhouse gas emissions, carbon management strategies, and various carbon-related risks and opportunities. This disclosure includes not only quantitative data on emission levels but also qualitative information such as corporate strategies, emission reduction targets, and governance aspects related to carbon emission management.

Conceptual Framework

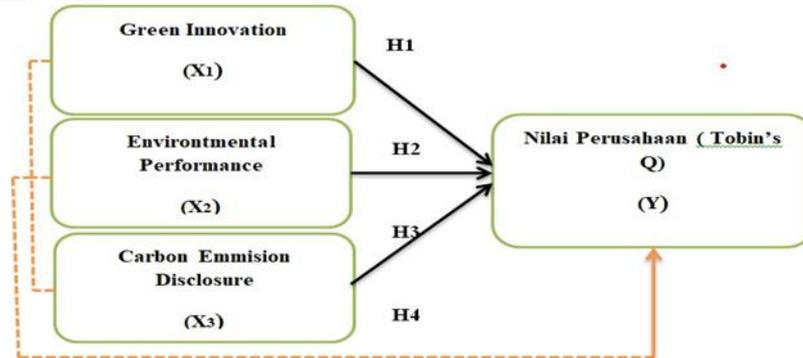


Figure 1. Conceptual Framework

The conceptual framework of this research is presented in the figure above. It serves as a foundation to illustrate the structure and direction of the study. The framework outlines the proposed relationships between the independent variables Green Innovation (X_1), Environmental Performance (X_2), and Carbon Emission Disclosure (X_3) and the dependent variable, Firm Value (Y).

Hypothesis Development

The Effect of Green Innovation (X_1) on Firm Value (Y)

Green Innovation represents a firm's ability to design and implement products, processes, and managerial practices that substantially minimize environmental harm. The formulation of this hypothesis is anchored in the Resource-Based View (RBV) framework proposed by Barney (1996), which asserts that sustainable competitive advantage and enhanced firm performance originate from the possession and effective deployment of resources that meet the VRIN criteria valuable, rare, difficult to imitate, and non-substitutable. When Green Innovation capabilities fulfill these VRIN attributes, they function as strategic assets that enable firms to build long-term competitive advantage (Fabiola & Khusnah, 2022). Empirical evidence further reinforces this argument. In their study titled "The Effect of Green Innovation and Financial Performance on Competitive Advantage and Firm Value (2015–2020)", Fabiola and Khusnah (2022) report that green innovation exerts a positive influence on firm value. Drawing upon the RBV perspective, which conceptualizes green innovation as a strategic resource capable of generating sustained competitive advantage, together with supporting empirical findings that indicate a positive association, this study proposes the following hypothesis: green innovation has a positive effect on firm value.

H1: Green Innovation has a positive effect on Firm Value.

The Effect of Environmental Performance (X_2) on Firm Value (Y)

Environmental Performance can be regarded as an intangible strategic resource that has the potential to increase firm value by fostering sustainable competitive advantage. It reflects a firm's tangible accomplishments in managing the environmental consequences of its operational activities. In contrast to environmental disclosures that may be symbolic in nature, environmental performance represents concrete and verifiable actions, particularly within the Indonesian context through the PROPER assessment program. From the perspective of Stakeholder Theory, firms that exhibit strong environmental performance are perceived as more capable of fulfilling the expectations of diverse stakeholder groups, including regulators, local communities, environmental organizations, customers, and investors who demonstrate growing concern for sustainability-related issues (Hariati et al., 2015). This theoretical argument is supported by empirical evidence from Shella and Franco (2021) in their

study entitled “*The Effect of Green Accounting Implementation and Environmental Performance on the Firm Value of Manufacturing Companies Listed on the Indonesia Stock Exchange (2018–2020)*”, which concludes that environmental performance has a positive influence on firm value. Furthermore, Legitimacy Theory emphasizes that responsible environmental behavior is essential for maintaining a firm’s social legitimacy or social license to operate. By aligning corporate activities with societal values and environmental norms, firms can strengthen public acceptance and long-term operational continuity. Based on the combined perspectives of Stakeholder Theory and Legitimacy Theory, which highlight the importance of effective environmental performance in building positive stakeholder relationships, together with rational considerations such as cost efficiency, improved operational effectiveness, enhanced corporate reputation, better access to capital, and sustained social legitimacy, as well as consistent empirical findings, this study proposes that environmental performance positively affects firm value.

H2: Environmental Performance has a Positive effect on Firm Value The Carbon Emission Disclosure (X_2) on Firm Value (Y)

Carbon emission disclosure represents the extent to which a firm demonstrates transparency and accountability in reporting its greenhouse gas (GHG) emissions as well as climate-related information. Within the framework of Signaling Theory, detailed and transparent carbon reporting functions as a credible signal to the market regarding a firm’s quality, risk management capability, and commitment to sustainability. Firms that voluntarily provide extensive carbon-related disclosures tend to convey positive attributes to investors and other stakeholders. Empirical evidence also supports this argument. Dila and Aryati (2023), in their study entitled “*Analysis of Intellectual Capital, Carbon Emission Disclosure, and Managerial Ownership on Firm Value,*” find that carbon emission disclosure significantly influences firm value. The practice of carbon disclosure implies the presence of robust internal mechanisms to measure, monitor, and manage emissions effectively. Moreover, transparent carbon reporting contributes to reducing information asymmetry between management and investors. As climate-related risks are increasingly recognized as financially material, investors place substantial importance on information regarding a firm’s carbon footprint, regulatory exposure, and strategies for addressing transition risks. A decrease in information asymmetry may consequently lower the firm’s cost of capital (Tsang, Frost, & Cao, 2023). Based on these theoretical and empirical considerations, it is therefore expected that carbon emission disclosure positively affects firm value.

H3: Carbon Emission Disclosure has a Positive Effect on Firm Value

The Simultaneous Effect of Green Innovation (X_1), Environmental Performance (X_2), and Carbon Emission Disclosure (X_3) on Firm Value (Y)

The three variables Green Innovation, Environmental Performance, and Carbon Emission Disclosure do not operate independently but rather constitute interrelated components of a comprehensive sustainability strategy. In practice, firms with a strong commitment to sustainability typically implement multiple initiatives simultaneously or sequentially, in which each initiative reinforces and complements the others. From the perspective of Stakeholder Theory, a comprehensive sustainability approach that addresses the diverse interests of multiple stakeholders simultaneously is more effective in securing their support. Investors value innovation, local communities assess tangible environmental performance, and regulators prioritize transparency. By fulfilling these three dimensions, firms are able to strengthen relationships with all stakeholder groups. Based on Legitimacy Theory, environmental actions that encompass multiple dimensions generate stronger legitimacy. Firms that engage in innovation (reflecting proactiveness), demonstrate strong environmental performance (reflecting tangible outcomes), and provide transparent disclosure (reflecting accountability) are more likely to obtain a robust social license to operate. Approaches that focus on a single dimension tend to be perceived as symbolic or insufficient, whereas multidimensional approaches signal a more authentic commitment. From the Resource-Based View perspective, the combination of capabilities in innovation, environmental management, and transparency can create synergistic effects. Green Innovation capabilities can enhance environmental performance; strong environmental performance

provides a credible foundation for disclosure; and transparent disclosure generates feedback that stimulates continuous innovation and performance improvement. This positive cycle may produce a stronger competitive advantage compared to situations in which these elements operate in isolation. Based on an integrated theoretical framework combining the Resource- Based View, Stakeholder Theory, Legitimacy Theory, and Signaling Theory, together with Configuration Theory, and supported by logical arguments regarding complementarity and synergy, enhanced credibility, completeness, threshold effects, and risk diversification, as well as robust empirical evidence from meta-analyses and longitudinal studies demonstrating that comprehensive sustainability approaches outperform single-practice strategies, it is therefore expected that the combination of Green Innovation, Environmental Performance, and Carbon Emission Disclosure will simultaneously have a positive effect on firm value compared to individual practices alone.

H4: Green Innovation, Environmental Performance, and Carbon Emission Disclosure simultaneously have a positive effect on Firm Value.

III. RESEARCH METHODOLOGY

Research Approach and Design

This research adopts a quantitative research design with a causal associative framework. Quantitative methodology emphasizes theory testing by operationalizing research variables into measurable numerical indicators and analyzing the data using statistical procedures (Nurlan, 2019). The causal associative approach is applied to investigate cause-and-effect relationships among variables, where independent variables function as determinants and the dependent variable represents the outcome influenced by those determinants (Rachman et al., 2016).

Within this framework, the study examines the extent to which Green Innovation, environmental performance, and carbon emission disclosure, as independent variables, affect firm value as the dependent variable. The analysis focuses on companies within the Basic Materials sector listed on the Indonesia Stock Exchange during the 2021–2024 period.

Research Population and Sampling Framework

The population of this research consists of all firms within the Basic Materials sector listed on the Indonesia Stock Exchange (IDX) throughout the 2021–2024 period. To determine the research sample, this study employs a purposive sampling technique. Purposive sampling refers to a sampling method in which units are selected based on specific criteria or considerations established by the researcher (Sugiyono, 2019). This method is utilized because not every company within the population fulfills the characteristics required for the analysis. Accordingly, only firms that satisfy the predetermined criteria and are deemed relevant to the objectives of the study are included as research samples.

Operational Variable Definitions

Green Innovation (Independent Variabel)

As cited in Agustia et al. (2019), green innovation is measured by the number of disclosed indicators divided by the total number of green innovation indicators.

$$GI = \frac{\text{The Number of Disclosed Indicators}}{\text{Total Number of Green Innovation Indicators}}$$

Environmental Performance (Independent Variable)

As cited in Sari and Sutopo (2023), environmental performance can be measured using PROPER scores ranging from 1 to 5.

1	Black
2	Red
3	Blue
4	Green
5	Gold

Carbon Emission Disclosure (Independent Variabel)

As cited in Damas et al. (2021), carbon emission disclosure can be measured by dividing the number of disclosed items by the total number of disclosure items, which consists of 18 items.

$$\text{CED} = \frac{\text{The Number Of Disclosed Items}}{\text{Total Number of Disclosure Items (18)}}$$

Firm Value (Dependent Variable)

As cited in Kansil et al. (2021), firm value can be measured using Tobin's Q, calculated as the total market value plus total liabilities divided by total assets.

$$\text{Tobins Q} = \frac{\text{Total MV} + \text{Total Liabilities}}{\text{Total Asset}}$$

Statistical Analysis Procedures

The collected data are analyzed using statistical techniques with the support of IBM SPSS Statistics version 26. The analysis process is carried out through several sequential stages. First, descriptive statistics are applied to provide an overview of the characteristics of the research variables. Second, classical assumption tests are performed to ensure that the regression model meets the required assumptions. These tests include the normality test, multicollinearity test, heteroscedasticity test, and autocorrelation test, followed by multiple linear regression analysis. Third, hypothesis testing is conducted to evaluate the proposed relationships. This stage consists of the simultaneous significance test (F-test), the partial significance test (t-test), and the coefficient of determination (R^2) analysis.

IV. RESULT AND DISCUSSION

Result

Descriptive Statistic

Table 1. Descriptive Statistic (After Outlier)

	N	Minimum	Maximum	Mean	Std. Deviation
Green Innovation	146	.2500	1.0000	.511986	.2261602
Environmental Performance	146	1.0000	5.0000	2.589041	1.3218129
Carbon Emission Disclousure	146	.3889	.9444	.676180	.1274165
Nilai Perusahaan	146	.3400	1.9900	.953562	.3921114
Valid N (listwise)	146				

The Green Innovation variable is based on 146 observations, with a minimum value of 0.2500. The mean score recorded for this variable is 0.511986, accompanied by a standard deviation of 0.2261602, indicating a moderate level of data dispersion. Environmental Performance is also measured using 146 observations, with the lowest value observed at 1.0000. The average value of this variable is 2.589041, while the standard deviation reaches 1.3218129, suggesting a relatively high variation in environmental performance among the sampled firms. The Carbon Emission Disclosure variable comprises 146 observations, with values ranging from a minimum of 0.3889 to a maximum of 0.9444. The mean value is 0.676180, and the standard deviation is 0.1274165, indicating a relatively low level of dispersion around the mean. Firm Value is measured using 146 observations, with a minimum value of 0.3400. The average firm value is 0.953562, and the standard deviation is 0.3921114, reflecting variability in firm valuation across the sample.

Clasical Assumption

Normality Tests

Table 2. Normality Tests

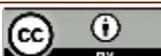


Table 2. One-Sample Kolmogorov-Smirnov (After Outlier)

		Unstandardized Residual
N		146
Normal Parameters ^{a,b}	Mean	0E-7
	Std. Deviation	.37350596
Most Extreme Differences	Absolute	.102
	Positive	.102
	Negative	-.066
Kolmogorov-Smirnov Z		1.233
Asymp. Sig. (2-tailed)		.095
a. Test distribution is Normal.		

From Table 2 Based on the normality test results, the Kolmogorov-Smirnov value is 0.102 with a significance level of 0.95. Because the significance value is greater than 0.05, the residual value is declared to be normally distributed. The number of data points (N) is 146, with an unstandardized residual mean of 0.0000000 and a standard deviation of 0.37350596. The highest extreme value (Most Extreme Differences) for Absolute is 0.102, with a Positive value of 0.102, while for Negative it is -.066. These results support the assumption of normality required in regression analysis.

Multicollinearity Test

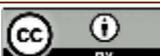
Table 3. Multicollinearity Test After Outlier

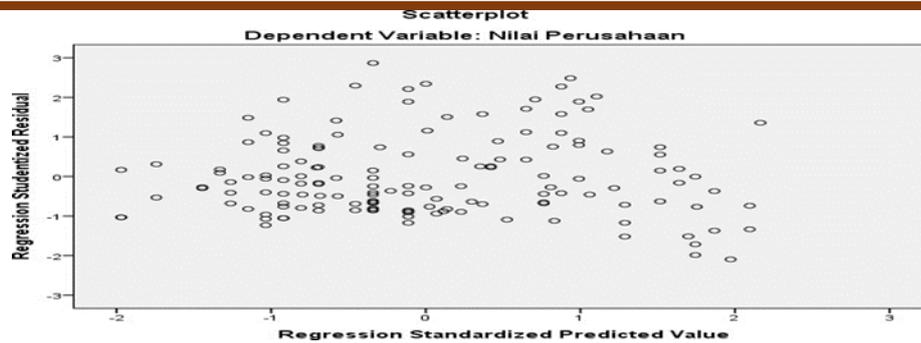
Model	Unstandardized Coefficients		Standardized Coefficients	t	Sig.	Collinearity Statistics	
	B	Std. Error				Tolerance	VIF
(Constant)	.848	.169		5.009	.000		
Green Innovation	.778	.250	.449	3.108	.002	.307	3.259
Environmental Performance	-.049	.042	-.165	-1.169	.244	.320	3.126
Carbon Emission Disclosure	-.245	.271	-.080	-.903	.368	.822	1.216
a. Dependent Variable: Nilai Perusahaan / Firm Value							

Based on Table 3, the Green Innovation variable exhibits a Tolerance value of 0.307 and a Variance Inflation Factor (VIF) of 3.256. Environmental Performance shows a Tolerance value of 0.320 with a corresponding VIF of 3.126. Meanwhile, Carbon Emission Disclosure records a Tolerance value of 0.822 and a VIF of 1.216.

These findings indicate that the regression model does not experience multicollinearity problems. All Tolerance values exceed the minimum acceptable threshold and are relatively close to one, suggesting that the independent variables are not highly correlated with each other. A higher Tolerance value reflects a lower level of linear association among explanatory variables. In addition, the VIF values for all independent variables remain well below the commonly accepted cut-off point, further confirming the absence of multicollinearity. Given that the VIF is calculated as the reciprocal of the Tolerance value (1/Tolerance), the results demonstrate that the regression model satisfies the classical assumption of no multicollinearity and is therefore appropriate for further hypothesis testing.

Heteroscedasticity Test





Picture 1. Scatterplot Pattern (After Outlier)

Based on the results of the heteroscedasticity test using a scatterplot graph after handling outliers, it can be seen that the data points are scattered randomly above and below the zero line and do not form a specific pattern. In addition, no more extreme points deviating significantly from the data distribution were found. This indicates that the residual variance is constant, so it can be concluded that the regression model meets the assumption of homoscedasticity and that heteroscedasticity does not occur.

Autocorrelation Test

Table 4. Durbin-Watson Test after di outlier

Model	R	R Square	Adjusted R Square	Std. Error of the Estimate	Durbin-Watson
1	.304 ^a	.093	.073	.3774308	.873
a. Predictors: (Constant), Carbon Emission Disclosure, Environmental Performance, Green Innovation					
b. Dependent Variable: Firm Value					

Based on the results of the autocorrelation test using the Durbin–Watson method after handling outliers, a Durbin–Watson value of 0.873 was obtained. This value is below 2, indicating positive autocorrelation in the regression model. This autocorrelation is thought to be influenced by the time series nature of the data, so that the residuals between periods are correlated. However, the regression model is still used in this study because the focus of the analysis is to test the effect of independent variables on company value, and the autocorrelation that occurs is a common characteristic of time series financial data.

Multiple Linear Regression Analysis

Table 5. Multiple Linear Regression Analysis

Model	Unstandardized Coefficients		Standardized Coefficients	t	Sig.
	B	Std. Error	Beta		
(Constant)	.848	.169		5.009	.000
Green Innovation	.778	.250	.449	3.108	.002
Environmental Performance	-.049	.042	-.165	-1.169	.244
Carbon Emission Disclosure	-.245	.271	-.080	-.903	.368

1. The constant value of 0.848 indicates that when all independent variables—Green Innovation, Environmental Performance, and Carbon Emission Disclosure—are held constant at zero, the predicted value of Firm Value is 0.848.

2. The regression coefficient for Green Innovation (β_1) of 0.778 suggests that a one-unit increase in Green Innovation, assuming the other independent variables remain unchanged, is associated with an increase of 0.778 in Firm Value.
3. The regression coefficient for Environmental Performance (β_2) of -0.49 implies that a one-unit rise in Environmental Performance, while holding the remaining variables constant, corresponds to a decrease of 0.49 in Firm Value.
4. The regression coefficient for Carbon Emission Disclosure (β_3) of -0.245 indicates that, ceteris paribus, a one-unit increase in Carbon Emission Disclosure is associated with a decline of 0.245 in Firm Value.

Hypothesis Test

Partial Test (F Test)

The F-test is used to evaluate whether all independent variables incorporated in the regression model jointly influence the dependent variable. When the F significance value exceeds 0.05, it indicates that the independent variables do not have a statistically significant simultaneous effect on the dependent variable. Conversely, a significance value below 0.05 suggests that the independent variables collectively exert a significant influence on the dependent variable. The outcomes of the simultaneous significance test are presented in the following table:

Table 6. Simultaneous F test

	Model	Sum of Squares	df	Mean Square	F	Sig.
1	Regression	2.065	3	.688	4.833	.003 ^b
	Residual	20.228	142	.142		
	Total	22.294	145			

a. Dependent Variable: Firm Value

b. Predictors: (Constant), Carbon Emission Disclosure, Environmental Performance, Green Innovation

Based on the results presented in the table, the F-statistic is 4.833 with a significance value of 0.003. Since this significance level is below the 0.05 threshold, the null hypothesis is rejected. Accordingly, it can be concluded that Green Innovation, Environmental Performance, and Carbon Emission Disclosure jointly exert a statistically significant influence on the Firm Value of companies in the Basic Materials sector.

Coefficient Of Determination Test

Table 7. Determination Coefition (R^2)

Model	R	R Square	Adjusted R Square	Std. Error of the Estimate	Durbin-Watson
1	.304 ^a	.093	.073	.3774308	.873

a. Predictors: (Constant), Carbon Emission Disclosure, Environmental Performance, Green Innovation

b. Dependent Variable: Firm Value

Based on the table above, the coefficient of determination indicates an R Square value of 0.93, while the Adjusted R Square is reported at 0.73, equivalent to 7.3%. This result suggests that Green Innovation, Environmental Performance, and Carbon Emission Disclosure collectively explain 7.3% of the variation in firm value. The remaining 92.7% of the variation in firm value is attributable to other factors that are not incorporated into the regression model

Discussion

The Impact of Green Innovation on Firm Value

The results of the hypothesis testing indicate that Green Innovation exerts a positive and statistically significant influence on Firm Value. The regression coefficient for the Green Innovation variable is positive, and its significance level is 0.002, which is below the 0.05 threshold. Therefore, H1 is supported, meaning that Green Innovation has a positive and significant effect on the Firm Value of companies in the Basic Materials sector. These findings are consistent with the study conducted by Fabiola and Khusnah (2022), entitled "*The Effect of Green Innovation and Financial Performance on Competitive Advantage and Firm Value in 2015–2020*", which also concluded that green innovation

positively affects firm value.

The Effect of Environmental Performance on Firm Value

The hypothesis testing results indicate that Environmental Performance has a negative regression coefficient, with a significance value of 0.244, which exceeds the 0.05 threshold. Since the probability value is greater than the level of significance, H2 is rejected. This implies that Environmental Performance does not have a statistically significant effect on the Firm Value of companies in the Basic Materials sector. In other words, although the coefficient direction is negative, the relationship is not statistically meaningful. These findings contradict the study conducted by Shella and Franco (2021), entitled “*The Effect of Green Accounting Implementation and Environmental Performance on the Value of Manufacturing Companies Listed on the IDX in 2018–2020*”, which reported that environmental performance positively influences firm value.

The Effect of Carbon Emission Disclosure on Firm Value

The results of hypothesis testing indicate that Carbon Emission Disclosure has a negative and statistically insignificant effect on Firm Value among Basic Materials companies listed on the Indonesia Stock Exchange during the 2021–2024 period. The regression coefficient for Carbon Emission Disclosure is -0.245 , with a significance level of 0.368. Since the probability value exceeds the 0.05 significance threshold, the effect of Carbon Emission Disclosure on Firm Value is not statistically significant. These findings suggest that variations in the level of carbon emission disclosure do not meaningfully influence firm value within the Basic Materials sector over the observed period. This result contrasts with the study conducted by Dila and Aryati (2023), entitled “*Analysis of Intellectual Capital, Carbon Emission Disclosure, and Managerial Ownership on Company Value*,” which reported a positive relationship between carbon emission disclosure and firm value.

The Effect of Green Innovation, Environmental Performance, and Carbon Emission Disclosure on Firm Value

The F-statistic obtained is 4.833 with a significance value of 0.003. Since this probability level is below the 0.05 threshold, the null hypothesis is rejected. Therefore, it can be concluded that Green Innovation, Environmental Performance, and Carbon Emission Disclosure jointly exert a statistically significant influence on Firm Value in the Basic Materials sector during the 2021–2024 period. These findings suggest that the three variables should not be viewed in isolation. Instead, they represent interconnected components of a broader and integrated sustainability strategy that collectively contributes to firm value.

Conclusion and Suggestion

Conclusion

1. Green Innovation is found to have a positive and statistically significant partial effect on the Firm Value of Basic Materials companies listed on the Indonesia Stock Exchange during the 2021–2024 period. Accordingly, the first hypothesis of this study is accepted.
2. Environmental Performance exhibits a negative and statistically insignificant partial effect on the Firm Value of Basic Materials companies listed on the Indonesia Stock Exchange for the 2021–2024 period. Therefore, the second hypothesis is rejected.
3. Carbon Emission Disclosure shows a negative and statistically insignificant partial influence on the Firm Value of Basic Materials companies listed on the Indonesia Stock Exchange during the 2021–2024 period. Thus, the third hypothesis is rejected.
4. When examined simultaneously, Green Innovation, Environmental Performance, and Carbon Emission Disclosure collectively have a statistically significant effect on the Firm Value of Basic Materials companies listed on the Indonesia Stock Exchange for the 2021–2024 period. Consequently, the fourth hypothesis is accepted.
5. The results of the coefficient of determination analysis indicate that Green Innovation, Environmental Performance, and Carbon Emission Disclosure jointly explain 7.3% of the variation in Firm Value, while the remaining 92.7% is attributable to other factors not included in the regression model.

Suggestion**For Future Researchers**

- Extend the research period to 5-7 years to obtain a more comprehensive picture of the long-term effects of environmental variables on company value.
- Add other independent variables such as eco-efficiency, corporate governance, company size, profitability, or leverage, considering that the R^2 value is only 7.3%, which indicates that there are still many other factors that affect Firm Value.
- Expand the research sample to other sectors such as manufacturing, energy, or mining to compare how sustainability practices affect Firm Value in various industries.

For Company Management

- Increase investment in green innovation because it has been proven to have a significant positive impact on Firm Value. Companies can allocate more R&D budgets to develop environmentally friendly products, energy-efficient technologies, and sustainable production processes
- Strengthen communication and transparency regarding sustainability practices to stakeholders through more comprehensive sustainability reports, considering that environmental performance and carbon emission disclosure have not yet shown a significant positive impact.
- Integrate ESG strategies into the company's vision and mission as a whole, not only as compliance but as a long-term competitive advantage.

For Investors

- Consider green innovation as an important indicator in investment decisions, as companies with strong green innovation tend to have higher Firm values.
- Conducting more in-depth fundamental analysis that not only focuses on financial aspects, but also integrates ESG factors into investment assessments to identify long-term opportunities.
- Being cautious in interpreting PROPER scores and carbon disclosure as the sole indicators of environmental performance, as based on this study, they have not shown a significant impact on Firm Value. Investors need to look at the quality of implementation, not just disclosure.

REFERENCES

- Agustia, D., Sawarjuwono, T., & Dianawati, W. (2019). The mediating effect of environmental management accounting on green innovation–firm value relationship. *International Journal of Energy Economics and Policy*, 9(2), 299–306
- Ambarita, I. M., Purba, D. S., & Sinaga, M. H. (2022). Pengaruh Profitabilitas, Likuiditas Dan Leverage Terhadap Ketepatan Waktu Penyampaian Laporan Keuangan (Studi Empiris Pada Perusahaan Pertambangan Yang Terdaftar Di Bursa Efek Indonesia Periode 2018 - 2020). *Jurnal Ilmiah Accusi*, 4(1), 1–15. <https://doi.org/10.36985/jia.v4i1.341>
- Cohen, J. R., & Simnett, R. (2015). CSR and assurance services: A research agenda. *Auditing: A Journal of Practice & Theory*, 34(1), 59–74.
- Damas, D., El Maghviroh, R., & Indreswari, M. (2021). Pengaruh eco-efficiency, green innovation dan carbon emission disclosure terhadap nilai perusahaan dengan kinerja lingkungan sebagai moderasi. *Jurnal Magister Akuntansi Trisakti*, 8(2), 85–108.
- Dila, R., & Aryati, T. (2023). Analisis intellectual capital, carbon emission disclosure dan managerial ownership terhadap nilai perusahaan. *Jurnal Ekonomi Trisakti*, 3(1), 1309–1318.
- Fabiola, V. P., & Khusnah, H. (2022). Pengaruh green innovation dan kinerja keuangan pada competitive advantage dan nilai perusahaan tahun 2015–2020. *Media Mahardhika*, 20(2), 295–303.
- Fajriah, A. L., Idris, A., & Nadhiroh, U. (2022). Pengaruh pertumbuhan penjualan, pertumbuhan perusahaan, dan ukuran perusahaan terhadap nilai perusahaan. *Jurnal Ilmiah Manajemen dan Bisnis*, 7(1), 1–12.
- Friede, G., Busch, T., & Bassen, A. (2015). ESG and financial performance: Aggregated evidence from more than 2000 empirical studies. *Journal of Sustainable Finance & Investment*, 5(4),

210–233.

- Indriyani, E. (2017). Pengaruh ukuran perusahaan dan profitabilitas terhadap nilai perusahaan. *Akuntabilitas: Jurnal Ilmu Akuntansi*, 10(2), 333–348.
- Ginting, A. T. R., Ginting, M. C., Sagala, F., & Simanjuntak, A. (2025). The Effect of Environmental Disclosure and Environmental Performance on Profitability in Companies in The Consumer Goods Industry Sector That Listed on The Indonesia Stock Exchange Period 2020-2023. *Jurnal Ilmiah Accusi*, 7(1), 69-81
- Kurnia, P., Darlis, E., & Putra, A. A. (2020). Carbon emission disclosure, good corporate governance, financial performance, and firm value. *The Journal of Asian Finance, Economics and Business*, 7(12), 223–231.
- Li, Y., Dai, J., & Cui, L. (2020). The impact of digital technologies on economic and environmental performance in the context of Industry 4.0: A moderated mediation model. *International Journal of Production Economics*, 229, 107777.
- Mahajan, R., Lim, W. M., Sareen, M., Kumar, S., & Panwar, R. (2023). Stakeholder theory. *Journal of Business Research*, 166, 114104.
- McDougall, N., Wagner, B., & MacBryde, J. (2019). An empirical explanation of the natural-resource-based view of the firm. *Production Planning & Control*, 30(16), 1366–1382.
- Nadeak, H. I., Simanjuntak, A., Sagala, F., & Ginting, M. C. (2025). Factors That Influence Green Accounting and Its Effect on Firm Value In Companies Green Award Winners Industry Award-Winning Companies Listed On The Indonesian Stock Exchange Period 2019-2023. *Jurnal Ilmiah Accusi*, 7(1), 37-54.
- Phillips, R. A., Barney, J. B., Freeman, R. E., & Harrison, J. S. (2019). Stakeholder theory.
- Sapulette, S. G., & Limba, F. B. (2021). Pengaruh penerapan green accounting dan kinerja lingkungan terhadap nilai perusahaan manufaktur yang terdaftar di BEI tahun 2018–2020. *Kupna Akuntansi: Kumpulan Artikel Akuntansi*, 2(1), 31–43.
- Sinaga, P., Simanjuntak, A., Sagala, F., & Ginting, M. C. (2025). The Effect of Environmental, Social and Governance Disclosure on Firm Value in Energy Sector Companies Listed on The Indonesia Stock Exchange in The 2021-2023 Period. *Jurnal Ilmiah Accusi*, 7(1), 113-124
- Sipayung, T., Zulfikar, M. K., & Tarigan, W. J. (2023). Pengaruh Likuiditas Dan Struktur Modal Terhadap Profitabilitas Perusahaan (Studi Kasus Perusahaan Pabrik Semen Yang Terdaftar Di Bursa Efek Indonesia Periode 2018-2022). *Jurnal Ilmiah Accusi*, 5(2), 146-155
- Sugiyono. (2019). *Metode penelitian kuantitatif, kualitatif, dan R&D (Edisi revisi)*. Alfabeta.
- Takalo, S. K., & Tooranloo, H. S. (2021). Green innovation: A systematic literature review. *Journal of Cleaner Production*, 279, 122474.
- Tarigan, W. J. (2021). *Buku Ajar Akuntansi Lingkungan*. Global Aksara Pres.
- Tarigan, W. J., & Purba, D. S. (2020). Pengaruh Likuiditas Terhadap Perubahan Struktur Modal Pada Sektor Industri Barang Konsumsi Yang Terdaftar Di Bursa Efek Indonesia. *Jurnal Ilmiah AccUsi*, 2(2), 81-95
- Thijssens, T., Bollen, L., & Hassink, H. (2015). Secondary stakeholder influence on CSR disclosure: An application of stakeholder salience theory. *Journal of Business Ethics*, 132(4), 873–891.
- Tolliver, C., Fujii, H., Keeley, A. R., & Managi, S. (2021). Green innovation and finance in Asia. *Asian Economic Policy Review*, 16(1), 67–87.
- Trumpp, C., & Guenther, T. (2017). Too little or too much? Exploring U-shaped relationships between corporate environmental performance and corporate financial performance. *Business Strategy and the Environment*, 26(1), 49–68.
- Tsang, A., Frost, T., & Cao, H. (2023). Environmental, social, and governance (ESG) disclosure: A literature review. *The British Accounting Review*, 55(1), 101149.
- Ulfamawaddah, U., Junaidi, J., & Wahyudi, I. (2022). Pengaruh environmental performance dan environmental cost terhadap nilai perusahaan dengan profitabilitas sebagai variabel intervening pada perusahaan pertambangan sub sektor batu bara yang terdaftar di Bursa Efek Indonesia tahun 2016–2020. *JAKU (Jurnal Akuntansi & Keuangan Unja)*, 7(3), 132–143.

Von Deimling, C., Eßig, M., & Glas, A. H. (2022). Signalling theory. In Handbook of Theories for Purchasing, Supply Chain and Management Research (pp. 445–470). Edward Elgar Publishing.