

Examining the Moderating Effect of a Novel Green Strategy Model on Innovation, Information Systems and Business Performance

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Abstract. This research examines the impact of green strategy, innovation, and information systems on the business performance of 545 Indonesian manufacturing and trading companies based on 2023 survey data. Results of structural equation modeling demonstrate that green innovation negatively affects performance, while green information systems have no significant impact. Additionally, the new green strategy model weakens the influence of innovation but strengthens the effect of information systems. The findings imply that Indonesian companies should optimize elements of the green strategy model that improve coordination and efficiency.

Keywords: New Model of Green Strategy, Green Innovation, Green Information Systems, Business Performance

1. Introduction

Current global business developments reflect complex dynamics influenced by several key factors. Several aspects that need to be considered include innovation, technological transformation, changes in economic policies, and global market dynamics. Information and communication technology development plays a central role in global business transformation (Purnama et al., 2023). Digitalization, artificial intelligence, and blockchain technology are some of the trends that are changing the way companies operate and interact with global markets and with the right strategy will improve company performance. This research mainly aims to determine the influence of green strategy, green innovation, green information systems which can improve a company's business performance.

Indonesia has recorded a solid economic growth from 5.17% on 2018 to 5.31% on 2022, indicating a more robust economic recovery. This could reflect success in managing the pandemic, increased investment, and increased consumer demand.

Various environmental factors can impact the business performance of a company. The first factor is green innovation. Green innovation with an eco-friendly focus involves creating and putting into action novel ideas, technologies, or business models with the goal of minimizing adverse effects on the environment while enhancing a company's business performance. Green innovation covers many areas, from renewable energy to environmentally friendly technologies and sustainable business practices.

Research from (H. Wang et al., 2021), (Singh et al., 2021), and (K. Chandra et al., 2021) shows the positive influence of green innovation on business performance. More positive influences are expected to emerge for the influence of green innovation on business performance through innovation that can reduce waste so that waste processing costs will be reduced. Research from (Putri & Sari, 2019) and (El-Kassar & Singh, 2019) shows that there is no influence of green innovation on business performance.

Creating an eco-friendly information system aimed at enhancing managerial decision-making involves leveraging information technology, as highlighted by (Renaldo, Suhardjo, et al., 2022). The design of system is influenced by individual strategies, impacting aspects such as comprehensive coverage, timely delivery, aggregation, and integration, as noted by (Hutahayan, 2020).

Because it is related to the green concept, the variable implementing green information systems used in research from (Hutahayan, 2020), (Susanto & Meiryani, 2019), and (Sariwulan, 2020) has a positive influence on business performance. By implementing a digitally recorded system, the use of paper and other things will be reduced, thereby reducing waste, and monitoring will be more effective. Research from (Hariyati et al., 2019) shows that green information systems have no influence on company performance.

This research will use a new model of green strategy as a moderating variable (Renaldo & Murwaningsari, 2023). Research from (Olayeni et al., 2021), (Peters et al., 2021), and (Su et al., 2020) shows the positive influence of green strategies on business performance. Adoption of a good environmental strategy will support company performance by implementing energy-saving strategies that will reduce pollution and carbon emissions. This variable is believed to strengthen the influence of all existing variables on the company's business performance. Another reason for selecting the new model of green strategy as moderation (Hasna et al., 2023) is that green strategy, which is synergized with green innovation and green information systems, is expected to be a factor that strengthens its influence on the company's business performance. If these three factors are not regulated in the company's green strategy and are not implemented, then the company's performance cannot be achieved optimally.

The novelty of this research is the development of green strategy measurements which originally used measurements from (Masoumik et al., 2015) which consisted of 3 dimensions, namely (1) pollution prevention dimension with 3 indicators, (2) product stewardship dimension with 4 indicators, and (3) clean technology dimensions with 4 indicators. The weakness of this dimension is that it does not clearly describe readiness for economic changes in changes caused by fast-moving business

dynamics. A good strategy should be able to increase readiness for changes in business dynamics triggered by the phenomenon of fluctuating economic growth. A good strategy supports economic sustainability and global competitiveness. Thus, the addition of the dimensions "Green Management Awareness", "Environmental Leadership", and "Environmental Knowledge Learning" is needed to be able to face the dynamics of business change and its relationship with the environment. The reasons for adding green management awareness are the importance of awareness and understanding of environmental management, management motivation and commitment to maintaining environmental sustainability, changes in attitudes and behavior of companies and consumers, and the impact of changes in the company's environment on other people. So, the proposed novelty is the formation of the "Green Management Awareness" dimension with the addition of four indicators. This green management awareness is an adoption of research from (Wu & Wu, 2014) which in its research gives that the green management awareness component has a positive influence on green management strategy. The next additional dimension is the "Environmental Leadership" dimension used by (Su et al., 2020) with the argument that if a leader can invite employees, it is hoped that they will be more likely to obey and the leader will take the initiative in providing direct direction regarding environmental practices. The last dimension added to the environmental strategy adoption variable is the Environmental Knowledge Learning dimension. This dimension is taken from (Su et al., 2020) which shows that environmental knowledge learning has a positive influence on green strategy. The argument for adding this dimension is to increase environmental awareness and awareness of environmental changes that are currently occurring will affect company performance. Through environmental knowledge learning, companies can increase their understanding of relevant and complex environmental issues.

Given the observed phenomena and variations in research outcomes, delving deeper into the impact of green innovation and green information systems on business performance becomes intriguing, especially with the incorporation of a novel green strategy model as a moderating variable. This research was designed to find out first, whether these green factors will influence the company's business performance. Second, to find out the function of the new model of green strategy as a moderating variable. Additionally, the research incorporates three control variables: eco-efficiency, green culture, and credibility factors to fortify the research model and ensure robustness.

2. Literature Review

2.1. Legitimacy Theory

Legitimacy essentially involves society acknowledging and endorsing a company's existence. The fundamental principle of legitimacy theory revolves around the organization fulfilling the social contract, ultimately earning acknowledgment for its goals. Legitimacy is the comprehensive perception or belief that the actions of an entity conform to the socially constructed framework of norms, values, beliefs, and definitions, making them acceptable and suitable (Ifada et al., 2021).

This legitimacy theory is applied to the green innovation variable, where with superior innovation and prioritizing community needs, a good perspective will emerge for community needs and will increase the company's value in the eyes of the public. Legitimacy theory states that companies need to maintain positive perceptions and acceptance from society and stakeholders to maintain the continuity of their operations. By adopting green innovations that are superior and responsive to society's needs, companies create social legitimacy (Renaldo, Junaedi, et al., 2022). Green innovation may include the development of environmentally friendly products, sustainable production practices, or other steps that support sustainability.

2.2. Resource-Based View Paradigm

According to the Resource-Based View (RBV) theory, achieving sustainable competitive advantage

hinges on specific internal factors or resources within the company, as highlighted by (Junaedi et al., 2023; Renaldo et al., 2023). The central focus of RBV is on the resources and capabilities that play a decisive role in determining a company's performance. These resources, encompassing assets, skills, and abilities, drive the process of empowerment, leading to enhanced competitiveness and the betterment of community welfare. The crux of competitive advantage lies in the resources a company possesses, broadly defined as attributes, organizational processes, assets, information (T. Chandra et al., 2018; Nyoto et al., 2023), and knowledge under the company's control for developing and implementing strategies. Essentially, a company is a synthesis of resources, competencies, and capabilities, and distinctions in these aspects relative to competitors shape its competitive edge, as elucidated by (Hutahayan, 2020).

Resources need to exhibit certain characteristics to contribute effectively to a company's competitive advantage: (1) Value: The resource must hold strategic value for both customers and the organization; (2) Scarcity: It should be rare and unique, presenting challenges for competitors to acquire; (3) Imperfect Imitability: Organizations lacking the resource should find it difficult to replicate; and (4) Non-Substitutability: The resource should lack viable alternatives for replacement. In the realm of knowledge-based theory, it underscores that knowledge (scarcity and imperfect imitability), is a crucial resource for gaining a competitive edge in a competitive environment. An organization's capacity to create, distribute, and convey knowledge and information is the key factor in determining its value and establishing the groundwork for sustained competitive advantage in the long run (Hutahayan, 2020).

According to Resource-Based Theory, the emphasis is on internal factors being more pivotal than external ones in attaining a competitive advantage within a company or industry. The ongoing discourse within Resource-Based Theory revolves around how companies can effectively compete and gain a competitive edge by proficiently managing their resources in alignment with their capabilities, as highlighted by (Hutahayan, 2020). In the context of green innovation, there is an optimistic outlook for enhancing a company's business performance. The aspiration is that through the utilization of existing innovations, companies can optimally manage them to achieve profitability and overall success.

2.3. Information Processing Theory (IPT)

The information processing theory serves as an avenue for investigating cognitive development, specifically delving into the intricacies of how information is encoded into memory. The foundational premise is that humans don't merely react to stimuli in their environment; rather, they actively engage in processing the information they encounter. Although experts perceive the mechanisms and functions of the brain as relatively straightforward, the overall robustness of its neural networks and behavioral scope is considerable.

Environmental operations and management heavily rely on information processes. As per the Information Processing Theory (IPT), organizations, functioning as open socio-economic systems, can boost overall performance by enhancing their information processing capabilities and the quality of information. The internal information framework, shaped by digital technologies, mirrors the company's expertise in handling information. Moreover, supply chain platforms act as conduits for information sharing among partners in the supply chain, playing a crucial role as an external source of information. The collaboration of enhanced internal information processing and external supply chain information is considered crucial for fostering sustainable development in manufacturing enterprises, as highlighted by (Y. Li et al., 2020). Hence, following the principles of IPT, this research delves into the integration of environmentally conscious information systems within the dynamic relationship of innovation and strategy. It examines the resulting effects on both economic and environmental performance.

2.4. Research Hypothesis

2.4.1. The Influence of Green Innovation on Business Performance

Green innovation, tied to environmental management initiatives, enhances environmental efficiency. The growth of green products and processes not only reduces waste and costs but also contributes to improved financial and social performance, leading to savings in time, money, and resources (Malik et al., 2021). Previous studies posit that implementing green innovation strategies can create opportunities for enhanced financial and overall business performance (Su et al., 2020). Additional research affirms the positive impact of green innovation practices on organizational performance, such as (H. Wang et al., 2021) elucidate the connection between green innovation practices and organizational performance, while (Singh et al., 2021; Weng et al., 2015) demonstrate that green innovation practices serve as a significant predictor for a company's business performance.

Businesses can boost efficiency and concentrate on creating eco-friendly products and processes through green innovation. This transition enables them to make substantial changes to current operational practices, minimizing their negative environmental effects while also boosting profits. Additionally, green innovation plays a role in creating new products and processes that support environmental restoration, presenting potential competitive benefits (Arsawan et al., 2021). However, there is (Putri & Sari, 2019) suggests results indicating no influence. Legitimacy theory can be used to rationalize the influence of green innovation on environmental performance. Notably, prioritizing innovation and aligning with societal and environmental needs fosters a positive perception of the company within society. This, in turn, enhances the company's value in the eyes of the public through improved business performance. The first hypothesis is:

H₁: Green innovation has a positive influence on business performance

2.4.2. The Influence of Green Information Systems on Business Performance

Green information systems symbolize efforts to stabilize the environment by maintaining the firm's inner environmental management systems that express the desires of different stakeholders (Ahmed et al., 2019). Research (Susanto & Meiryani, 2019) shows that companies have realized and felt the benefits of implementing environmental accounting information systems in realizing their environmental strategies to achieve company business performance. Research from (Arulrajah et al., 2020) shows that green information technology has a positive impact on environmental performance.

Research from (Susanto & Meiryani, 2019) indicate a favorable correlation between green information systems and business performance. (Hutahayan, 2020) offers empirical support, revealing that management (environmental) accounting information systems positively impact internal process performance but exhibit no influence on financial performance. Research from (Liu et al., 2018; Sudarno et al., 2022) put forth a framework grounded in information processing theory to empirically explore the effects of corporate green information systems on environmental performance. These systems play a role in stimulating green innovation within companies, allowing them to capture data across purchasing, sales, manufacturing, and logistics processes. By analyzing this data, companies can derive valuable insights crucial for green initiatives and innovations, ultimately enhancing overall business performance.

The impact of green information systems can be elucidated through the lens of information processing theory. Within the framework of an organization functioning as an open socio-economic system, achieving superior performance is possible through enhancements in information processing capabilities and the quality of information. Effective information processing has the potential to significantly elevate overall business performance. The second hypothesis is:

H₂: Green information system has a positive influence on business performance.

2.4.3. The Influence of Green Innovation on Business Performance with New Model of Green Strategy as a Moderating Variable

Corporate green innovation is very important to improve business performance. Green innovation allows companies to improve environmental sustainability if strengthened by the adoption of a corporate green strategy that supports it. Research from (Su et al., 2020) and (Hariyati et al., 2020) shows that green innovation and green strategy have a positive influence on company performance. However, research from (Saputra, 2020) and (Putri & Sari, 2019) shows that the results have no influence. The company's innovation, supported by the adoption of good strategies, can improve the company's business performance. The company's existing green strategy will be well synergized. This synergy will support the company's green innovation to achieve environmentally friendly innovation so that pollution and waste from the company will be minimal. Good waste management will provide good environmental performance and impact optimal business performance.

When green innovation is integrated with new model of green strategy as a moderating variable, a more complex and in-depth relationship can be created. Green innovation aimed at meeting the needs of society and the environment can improve a company's reputation and create social legitimacy. The integration of green strategies as moderation can strengthen the positive impact of green innovation on reputation and legitimacy. Effective green strategies can provide a framework that reinforces these positive perceptions. The third hypothesis is:

H₃: New model of green strategy strengthens the positive influence of green innovation on business performance.

2.4.4. The Influence of Green Information System on Business Performance with New Model of Green Strategy as a Moderating Variable

A company's green information system can be used to provide efficiency in the delivery of information. Green information systems enable companies to maintain environmental sustainability through the use of the latest technology thereby reducing environmental pollution, as well as providing information about environmental damage before the damage occurs, if strengthened by the adoption of a company's green strategy that supports it, it will improve the company's environmental performance. Research from (Su et al., 2020) and (Liu et al., 2018) shows that green information systems and green strategies have a positive influence on company business performance. One proof that a business strategy is running optimally is the implementation of a system within the company. Regarding environmental considerations, the incorporation of green strategies includes the integration of green information systems. The implemented green information system is expected to bolster the company's long-term business strategies, ultimately contributing to enhanced business performance.

Information processing theory emphasizes the importance of improving an organization's ability to process information. Green information systems can play a key role in improving the efficiency and effectiveness of information processing, especially related to environmental issues. The integration of green strategies as moderation can help ensure that information processing is focused on aspects that support sustainability. The fourth hypothesis is:

H₄: New model of green strategy strengthen the positive influence of green information system on business performance.

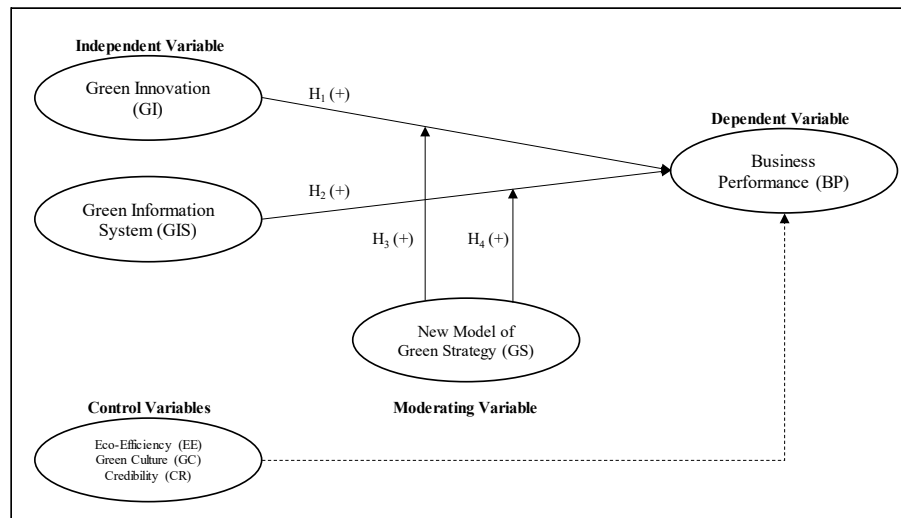


Fig. 1: Research Framework

Based on the hypothesis development that has been carried out, the research framework can be seen in Figure 1. The research framework uses 2 independent variables, 1 dependent variable, 1 moderating variable, and 3 control variables.

3. Research Methodology

3.1. Research Design

This research used causal hypothesis testing through field research, by the normal activities of the sample. The research setting environment is real and non-contrived (Saunders et al., 2023). The period used in this research is 2023, namely cross-sectional because in 2023 we can see business phenomena and green topics are more widely known by companies.

This research employs the company as its unit of analysis, with company representatives deemed competent in addressing research issues. This choice is informed by the need for accurate responses to the questionnaire's statement items, requiring input from knowledgeable company representatives. The data utilized in this study is primarily collected through a questionnaire. The survey instrument utilizes a 6-point Likert scale technique to gauge the variables under investigation.

In carrying out data processing, data validity and reliability testing will be carried out, structural equation analysis, moderation test, hypothesis test, coefficient of determination test, sensitivity test, and expansion test using Structural Equation Modeling (SEM) analysis with reflective indicator models (conditions where the indicators are can reflect latent variables). All testing will use the AMOS application.

3.2. Population dan Sample

The scope of this study encompasses trading and manufacturing companies within Indonesia. According to data from the Central Statistics Agency, the total number of such companies in Indonesia, categorized by the KBLI, is 30,788 (updated year 2021, sourced from <https://www.bps.go.id/indikator/9/200/1/jumlah-perusahaan-ibs-kbli-2020-.html>, accessed 7 November 2023).

Researchers plan to distribute questionnaires to companies, with each item being completed by a qualified individual within the company. The preferred respondents hold positions such as director, operational manager, accounting manager, or financial manager, and possess a minimum of five years of relevant work experience, demonstrating their competence and expertise to provide comprehensive

data for the research (Acquah et al., 2020). Following the guideline proposed by (J. F. Hair et al., 2022), which suggests an observation-to-variable ratio of 10:1, and considering the maximum number of indicators for each variable as 54, the calculated minimum sample size is 540 companies. However, the study opts for a sample size of 545 companies, employing a cluster sampling method. Cluster sampling involves dividing the population into clusters and then randomly selecting entire clusters to include in the study. This method is chosen for its practicality and efficiency, especially when dealing with a large and diverse population. It can reduce costs and logistical challenges associated with data collection.

3.3. Variable Operationalization

The operational definition of each variable, namely green innovation (proxied by indicators in research (Yurdakul & Kazan, 2020)), green information systems (proxied by indicators in research (Liu et al., 2018)), business performance (proxied by indicators in research (Acquah et al., 2020; Xie & Gao, 2017)), new model of green strategy (proxied by indicators in research (Masoumik et al., 2015), (Wu & Wu, 2014), and (Su et al., 2020)) with the addition of 3 new dimensions). The complexity in developing the new model of green strategy variables lies in the elaboration of research articles that have a big influence on green strategy, where researchers ensure that the references have trusted, valid, and reliable sources. The control variables in this research are, Eco-efficiency (proxied by indicators in research (Putri & Sari, 2019) and (Menoni & Morgavi, 2014), green culture (proxied by indicators in research (Machado & Ávila, 2019)), and credibility (proxied by indicators in research (Burgwal & Vieira, 2014)).

3.4. Data Analysis Method

3.4.1. Descriptive Statistics

Descriptive analysis serves the purpose of providing an overall depiction of the research subject. This analysis includes statistical metrics like mean, minimum, maximum, standard deviation, and the count of participants. The investigation will center on both the demographic information of the respondents and their answers to each statement in the questionnaire.

3.4.2. Structural Equation Analysis

A model is formulated according to a specific theory, and Structural Equation Modeling (SEM) is employed to assess its acceptance or rejection, as indicated by (J. F. Hair et al., 2022). SEM is utilized in the context of an existing theoretical framework, and it is not employed to construct a new model in the absence of a pre-established theoretical foundation.

This research will employ the following Structural Equation Modeling (SEM) model:

$$BP = b_1GI + b_2GIS + b_3GIxGS + b_4GISxGS + b_5EE + b_6GC + b_7CR + e$$

Note: BP-Business Performance, GI-Green Innovation, GIS-Green Information System, GS-New Model of Green Strategy, EE-Eco-Efficiency, GC-Green Culture, CR-Credibility, e-Error

In SEM analysis, it is imperative that the research model adheres to established standards before assessing its influence. Prior to evaluating the impact, an initial examination of the primary data is conducted. Validity, which ensures that the measurement aligns with its intended purpose, is assessed with loading factors considered, and those exceeding 0.40, the minimum recommended value in research—are selected for further analysis. The second assessment pertains to reliability, emphasizing the stability and consistency of measurement results for a phenomenon. The commonly used indicators for internal consistency, such as the Cronbach Alpha coefficient or Composite Reliability, are employed, with a recommended threshold of equal to or above 0.60. Additionally, the variance extracted should surpass 0.5 (Putra & Renaldo, 2020; Taherdoost, 2016).

3.4.3. Model Identification

Based on (J. F. H. Hair et al., 2019), the criteria for a good model are as follows.

Table 1. SEM Criteria

Goodness of Fit Index	Cut-off
χ^2	Kecil
Probability	$\geq 0,05$
GFI	$\geq 0,90$
AGFI	$\geq 0,90$
TLI	$\geq 0,90$
CFI	$\geq 0,90$
NFI	$\geq 0,90$
IFI	$\geq 0,90$
RMSEA	0,05-0,08

Source: (J. F. Hair et al., 2022)

To ensure a good model, normality and multicollinearity testing is also needed. The critical value must in range between ± 2.58 (Arbuckle, 2021). The correlation value between variables must not exceed 0.8 (Hafni et al., 2020; Lind et al., 2018).

3.4.4. Hypothesis Test

Testing the influence among all variables will be deemed acceptable if the significance value is less than the α . The α values applicable for this purpose are 10%, 5%, and 1%.

3.4.5. Determination Coefficient Test

The coefficient of determination assesses the appropriateness of the model employed by examining high and low R-squared or adjusted R-squared values. A higher R-squared or adjusted R-squared value indicates the extent of variation in the impact of the independent variable on the dependent variable. The closer the coefficient of determination value is to 1, the more effective the model.

3.4.6. Sensitivity Test

Sensitivity tests were carried out to strengthen the test results in this research, which were carried out by comparing this research model with previous research or measurements. The purpose of the sensitivity test in this research is to see the results of developing new indicators with old indicators, and whether the new measurement indicators can better explain the formation of variables or not (Renaldo & Augustine, 2022).

3.4.7. Expansion Test

The expansion test was carried out to see the influence of the dimensions of the research variables. Which variable-forming dimensions will provide the best results in the research model. The expansion test is carried out on new variables. The formula for expansion test is:

$$BP = b_1PP + b_2PS + b_3CT + b_4GMA + b_5EL + b_6EKL + b_7EE + b_8GC + b_9CR + e$$

Note: BP-Business Performance, PP-Pollution Prevention, PS-Product Stewardship, CT-Clean Technology, GMA-Green Management Awareness, EL-Environmental Leadership, EKL-Environmental Knowledge Learning, EE-Eco-Efficiency, GC-Green Culture, CR-Credibility, e-Error

4. Results

4.1. Respondent Characteristics

Table 2. Results of Analysis of Respondent Characteristics

Gender	Total	Percentage	Experience	Total	Percentage
Male	433	79%	5-10 years	384	70%
Female	112	21%	11-15 years	113	21%
Total	545	100%	16-20 years	27	5%
			More than 20 years	21	4%
Age	Total	Percentage	Total	545	100%
25-30 years	160	29%			
31-40 years	237	43%	Firm Age	Total	Percentage
41-50 years	119	22%	5-10 years	102	19%
More than 50 years	29	5%	11-15 years	148	27%
Total	545	100%	16-25 years	142	26%
			26-40 years	90	17%
			41-60 years	41	8%
Position	Total	Percentage	More than 60 years	22	4%
Low Manager	122	22%	Total	545	100%
Middle Manager	223	41%			
Senior Manager	101	19%			
Director	99	18%	Green Strategy Adoption	Total	Percentage
Total	545	100%	Not yet adopted	157	29%
			Want to adopt	204	37%
			Already adopted	184	34%
			Total	545	100%

Source: Data processing results, 2023

Based on the analysis of respondent characteristics, it appears that the male gender (Renaldo & Murwaningsari, 2023) dominates the respondents in this study, aged 31-40 years. Positions are dominated by middle manager positions with 5-10 years of experience. Companies are predominantly 11-15 years old and 37% are willing to adopt a green strategy.

Table 3. Results of Descriptive Statistical Analysis

No	Variable	Min	Max	Mean	Stdev
1	Business Performance	1	6	4.791	0.988
2	New Model of Green Strategy	1	6	4.838	0.981
3	Green Innovation	1	6	4.796	0.999
4	Green Innovation System	1	6	4.784	1.015
5	Eco-Efficiency	1	6	4.832	1.003
6	Green Culture	1	6	4.813	0.984
7	Credibility	1	6	4.785	0.994

Source: Data processing results, 2023

The minimum value for all variables is 1, and the maximum value for all variables is 6. Meanwhile, the standard deviation values are all below the mean value, which means the data follows a normal distribution because it has a small standard deviation.

4.2. Validity and Reliability Test

Table 4. Validity and Reliability Test Results

Variable	Dimensio n	Std Loading	Construct Reliability	Variance Extracted	Informatio n
Business Performanc e	Y1	0.932	0.965	0.873	Valid and Reliable
	Y2	0.948			
	Y3	0.907			

Variable	Dimensio n	Std Loading	Construct Reliability	Variance Extracted	Informatio n
	Y4	0.950			
Green Strategy	M1	0.808	0.945	0.740	Valid and Reliable
	M2	0.865			
	M3	0.805			
	M4	0.916			
	M5	0.863			
	M6	0.899			
Green Innovation	X1.1	0.876	0.932	0.775	Valid and Reliable
	X1.2	0.883			
	X1.3	0.881			
	X1.4	0.882			
Green Information System	X2.1	0.862	0.888	0.725	Valid and Reliable
	X2.2	0.843			
	X2.3	0.850			
Eco Efficiency	C1.1	0.860	0.875	0.700	Valid and Reliable
	C1.2	0.841			
	C1.3	0.809			
Green Culture	C2.1	0.878	0.917	0.734	Valid and Reliable
	C2.2	0.852			
	C2.3	0.847			
	C2.4	0.849			
Credibility	C3.1	0.659	0.909	0.501	Valid and Reliable
	C3.2	0.696			
	C3.3	0.681			
	C3.4	0.738			
	C3.5	0.725			
	C3.6	0.708			
	C3.7	0.706			
	C3.8	0.741			
	C3.9	0.732			
	C3.10	0.686			

Source: Data processing results, 2023

The indicator is considered valid as the standard loading value exceeds 0.7. Each variable demonstrates reliability, as indicated by construct reliability values surpassing 0.7. The validity of each variable is affirmed, with variance extracted values exceeding 0.5.

4.3. Model Identification Results

Table 5. Model Identification Test Results

Criteria	Cut-off	Result	Information
CMIN	Small	1307.417	Fit
Prob	≤ 0.050	0.050	Fit
GFI	Close to 1	0.880	Marginal Fit
AGFI	Close to 1	0.860	Marginal Fit
TLI	Close to 1	0.961	Fit
CFI	Close to 1	0.965	Fit
NFI	Close to 1	0.937	Fit
IFI	Close to 1	0.965	Fit
RMSEA	Under 0,05	0.046	Fit

Source: Data processing results, 2023

From the 9 existing criteria, 7 meet the requirements. Meanwhile, the other 2 criteria are in the marginal fit position, which means they almost meet the criteria with a difference not far from the standard criteria (Arbuckle, 2021). A total of 7 criteria have met the requirements, this indicates a model that is reliable in hypothesis testing. Meanwhile, the remaining 2 requirements are in the marginal fit position, this is to see the suitability of the model, where the numbers are also large, so the model can still be used. Based on these results, SEM analysis with the SPSS AMOS application can be carried out using special criteria.

Data normality testing shows a critical ratio value of 1.583, where this value is still in the range of ± 2.58 . This shows that the data meets the assumptions of normality in a multivariate manner. The results of the multicollinearity test are attached in table 6.

Table 6. Correlation Test Results

	<i>BP</i>	<i>GS</i>	<i>GI</i>	<i>GIS</i>	<i>EE</i>	<i>GC</i>	<i>CR</i>
BP	1						
GS	0.767	1					
GI	0.715	0.798	1				
GIS	0.686	0.765	0.781	1			
EE	0.668	0.718	0.734	0.748	1		
GC	0.686	0.758	0.753	0.759	0.776	1	
CR	0.614	0.681	0.724	0.723	0.679	0.724	1

Source: Data processing results, 2023

Based on the results of correlation testing, all correlation values are below 0.8, which means the model from this research does not experience multicollinearity problems.

4.4. Hypothesis Testing

Below are attached the hypothesis testing results using SPSS AMOS.

Table 7. Hypothesis Test Results

Model 1 $\rightarrow$ BP = -0.582GI + 0.189GIS + 1.402GS - 0.006GIxGS + 0.003GISxGS + 0.106EE + 0.028GC - 0.079CR

Model 2 $\rightarrow$ BP = 0.251GI - 0.205GIS + 0.815GS - 0.011GIxGS + 0.001GISxGS + 0.170EE - 0.044GC - 0.158CR

Variable	Hypothesis	Model 1 (with Novelty)		Model 2 (without Novelty)	
		Estimate	Sig.	Estimate	Sig.
GI	+	-0.582	0.000***	0.251	0.205
GIS	+	0.189	0.142	-0.205	0.199
GS	+	1.402	0.000***	0.815	0.000***
GI x GS	+	-0.006	0.000***	-0.011	0.000***
GIS x GS	+	0.003	0.013**	0.001	0.203
EE		0.106	0.002***	0.17	0.278
GC		0.028	0.245	-0.044	0.444
CR		-0.079	0.009***	-0.158	0.020**
Squared Multiple Correlations		0.948		0.841	

Significant at 5%, *Significant at 1%. Note: BP-Business Performance, GI-Green Innovation, GIS: Green Information System, GS-New Model of Green Strategy, EE-Eco-Efficiency, GC-Green Culture, CR-Credibility

Source: Data processing results, 2023

4.5. Coefficient of Determination Test

The squared multiple correlations value is 0.948. This means that changes in business performance of 94.8% can be explained by changes in the variables green innovation, green information systems, new model of green strategy moderating factors, control of eco-efficiency, green culture, and credibility. Meanwhile, the remaining 5.2% is influenced by other factors outside the model. The coefficient of determination value of 94.8% is very high. This is due to interactions in the research model. This is a natural result if the research model uses a moderating variable because there is a multiplication between the moderating variable and each independent variable (Gujarati, 2015).

4.6. Moderation Test

The moderation test shows that 2 modes have a significant influence, namely new model of green strategy moderation with the variables green innovation and green information systems. The outcomes of this moderation fall under the pure moderation category, as the variable acts as a moderator in the relationship between the independent and dependent variables. This occurs when the moderating variable solely interacts with the independent variable, without becoming a partially independent variable affecting the dependent variable.

4.7. Sensitivity Test

This test uses measurements before adding the novelty dimension to the new model of green strategy variable (Renaldo & Augustine, 2022). The sensitivity (Table 7), where this model does not use novelty, the test results show that no hypothesis is accepted. The coefficient of determination test shows a squared multiple correlations value of 0.841, which is smaller than the value of the coefficient of determination in the first model test which uses the element of novelty. This smaller value indicates that a model that uses novelty can explain business performance better than a model that does not have novelty.

4.8. Expansion Test

Table 8. Expansion Test Results

$$BP = 0.092 PP + 0.173 PS + 0.216 CT + 0.306 GMA - 0.090 EL + 0.151 EKL + 0.127 EE + 0.034 GC + 0.028 CR$$

Variable	Prediction	Estimate	Sig.
PP	+	0.092	0.004***
PS	+	0.173	0.000***
CT	+	0.216	0.000***
GMA ^a	+	0.306	0.000***
EL ^a	+	-0.090	0.147
EKL ^a	+	0.151	0.091*
EE		0.127	0.002***
GC		0.034	0.239
CR		0.028	0.232
Squared Multiple Correlations		0.710	

^aNovelty Dimension

*Significant at 1%, **Significant at 5%, ***Significant at 1%. Note: BP-Business Performance, PP-Pollution Prevention, PS-Product Stewardship, CT-Clean Technology, GMA-Green Management Awareness, EL-Environmental Leadership, EKL-Environmental Knowledge Learning, EE-Eco-Efficiency, GC-Green Culture, CR-Credibility

Source: Data processing results, 2023

The expansion test result show that from the six variable dimensions of new model of green strategy, followed by three control variables, it appears that the dimensions of pollution prevention, product stewardship, clean technology, green management awareness, and environmental knowledge learning have a good positive influence on business performance. There are two new dimensions to the new

model of green strategy variable that can measure business performance well, namely green management awareness and environmental knowledge learning.

The coefficient of determination test also shows good results, namely 71% of changes in business performance can be influenced by pollution prevention factors, product stewardship, clean technology, green management awareness, environmental leadership, environmental knowledge learning, eco-efficiency, green culture, and credibility. Meanwhile, the remaining 29% was impacted by factors beyond those incorporated into the research model.

5. Discussion

5.1. The Influence of Green Innovation on Business Performance

Contrary to the findings of (Zulkifli et al., 2023), (Rachmawati, 2023), (Hariyati et al., 2020), (Su et al., 2020), and (H. Wang et al., 2021), green innovation does not negatively impact business performance. In general, green innovation tends to have a positive rather than negative influence on business performance. Investing in long-term green innovation can improve operational efficiency, reduce long-term costs, and expand market share by attracting more environmentally conscious consumers. However, this is because the companies in the sample are dominated by companies aged 11-15 years as much as 27%. To run a sustainable business, this age is still relatively young so the application of investment for environmentally friendly innovation purposes is still unable to provide an appropriate return on capital. Some other arguments for negative impacts include the high initial costs of adopting green technology innovations, changes in the supply chain that may be difficult to implement, or regulatory uncertainty.

Implementing green innovation requires employee training or recruiting workers who have special skills in that field. This adaptation process can result in temporary disruptions in productivity and require additional investment in employee development. Then, changes in regulations or government policies that support green innovation can affect business strategy and require rapid adjustments. Some companies consider this uncertainty as an additional risk that can affect business performance. So, choose to avoid this risk so as not to experience large losses.

The research findings diverge from the Resource-Based View theory, as green innovation has failed to enhance the business performance of the company. Although green innovations have been adopted, their implementation has not been effective. Factors such as a lack of support from management, employee resistance, or a lack of understanding of how to integrate green innovation into daily business operations can play a role.

From the analysis of respondents' responses, it is known that the level of perception of developing products using fewer materials, developing production processes that are less polluting than alternatives, investing in research and development to reduce environmental impacts, and the utilization of new techniques in product promotion to reduce environmental effects is currently limited. This also causes low business performance which can be seen from respondents' perceptions of the statement that the increase in the company's market share, growth in the company's gross profit, decrease in the company's energy consumption costs, and an increase in the percentage of profits obtained from new products in the last three years are also of low value. From this, it can be concluded that respondents are less aware of or understand the benefits of sustainable practices in product development innovation. This lack of knowledge or understanding can result in a low perception of its positive impact on business performance. There are implementation barriers to implementing environmentally friendly practices, such as difficulties in creating cleaner production processes or adopting new techniques in product promotion. This causes a low perception of its effectiveness.

The methodology used in this research has not succeeded in proving the positive influence of green innovation on business performance. The research sample can only reach the manager level. It was difficult for researchers to reach the director level who had more experience than managers. This will result in test results that are still not in line with the researcher's expectations, so that the interpretation

will conflict with theory, but this will be good input for subsequent research.

5.2. The Influence of Green Information Systems on Business Performance

Green information systems positively influence business performance, albeit with a modest impact. This aligns with the findings of (Hutahayan, 2020) but contradicts the research of (Renaldo & Augustine, 2022), (Susanto & Meiryani, 2019), (Liu et al., 2018), and (Fuji et al., 2019). These systems enhance operational efficiency through resource optimization, energy conservation, and waste reduction. Although the impact is not felt immediately, over time, these efficiencies can result in long-term cost savings.

Adoption of green information systems can improve a company's image in terms of social and environmental responsibility. Although this does not directly affect financial performance, it can increase customer trust and expand market share among consumers who are more environmentally conscious. As many as 56% of respondents understand green information systems, and it is believed that most of the samples have used a system in managing company data, both financial and non-financial data (Rifai et al., 2023). Even though it may not have an immediate impact, investing in green information systems can provide long-term benefits, particularly by enhancing a company's competitiveness in a market that is progressively attuned to environmental considerations.

Seeing that the age of the company is dominated by 11-15 years, which is still considered a young company, the company has not yet received the maximum benefit from implementing this green information system. Young companies focus more on initial growth, customer acquisition, and product development. At this stage, investment in green information systems is not yet a top priority because companies may be more focused on their basic operations.

The research findings align with the information processing theory, as they demonstrate that the introduction of green information systems positively influences business performance, albeit not to a significant extent. Implementing green information systems can increase efficiency in information processing, data management, and internal communications. This can help companies make decisions more quickly and precisely. Green information systems can improve the accuracy and quality of information used in decision-making. With more accurate information, companies can make better decisions, which in the end can support business performance even if it doesn't have a big impact.

A well-designed green information system can help companies respond more quickly to changes in the business environment, be they market changes, regulations, or other factors that affect company operations. Green information system integration can improve the flow of information between departments and business units. This can create better coordination across the organization, which is an important element in information processing theory. Even though it doesn't have a big impact, green information systems can help reduce operational costs, for example by reducing paper or energy use. These cost savings can make a positive contribution to business performance. Flexible and adaptive green information systems can help companies adapt to changes in technology and market needs which can increase competitiveness and business continuity.

For a system to be deemed reliable, it should generate information conducive to informed decision-making, thereby enhancing the efficacy of business processes. Information systems form part of intangible assets and require skilled managerial backing to enhance internal process performance. This reasoning explains the observed absence of empirical support for the correlation between innovation strategy, information systems, and financial performance (Hutahayan, 2020).

Examining the feedback from participants unveils that the company maintains a dedicated department for environmental affairs, and information on eco-friendly practices is easily accessible within the system. Furthermore, the company possesses an advanced database for tracking and monitoring environmental issues. Despite these factors, the overall score remains low, indicating that these measures have not yet translated into an enhancement of the company's business performance.

5.3. New Model of Green Strategy Moderates the Influence of Green Innovation on Business Performance

The new model of green strategy does not strengthen the positive influence of green innovation on business performance. This is not aligned with research from (Petera et al., 2021), (Su et al., 2020), and (Hutahayan, 2020). Some companies adopt green strategies as marketing and branding efforts to encourage substantial green innovation. If a green strategy is more about branding and not supported by deep innovation, the positive impact on business performance may be limited. Implementing green innovation often involves major changes in business processes, technology, and corporate culture. If companies experience difficulties in implementing these innovations effectively, the new model of green strategy may not appropriately amplify their positive impacts.

Green innovation requires large investments in research and development. Companies generally have difficulty getting financial support for green innovation in the early stages, so new model of green strategy do not provide a significant boost to business performance. Some green innovations face market uncertainty and slow consumer adoption, such as electric cars, solar panels, and environmentally friendly products. If a green strategy is not balanced with a strong understanding of market needs and preferences, companies will find it difficult to optimize the positive impact of green innovation.

The test outcomes deviate from the Resource-Based View theory as the collaboration between green innovation and a novel green strategy model has failed to enhance the company's business performance. Although there is synergy between green innovation and new model of green strategy, success in improving business performance depends on the extent to which both are implemented effectively. There are challenges in integrating the two holistically or in managing such synergies, such as differences in the way business performance is measured in the context of RBV research and theory. The Resource-Based View (RBV) theory suggests that possessing distinctive and valuable resources and capabilities can provide a competitive advantage. Shifts in the business environment may impact the relationship between the synergy of green innovation and the innovative model of a green strategy, potentially impeding enhancements in the company's business performance.

It will take longer to see a significant positive impact from the synergy between green innovation and new model of green strategy on business performance. If research focuses on a relatively short period, long-term impacts may not yet be visible.

Looking at participants' feedback, it's evident that implementing eco-friendly management tactics, advocating for environmental preservation, and educating the public about environmental matters, alongside companies urging stakeholders to collectively back initiatives that reduce pollution and waste, are currently undervalued. This shows that respondents lack awareness or understanding of environmentally friendly management strategies and the importance of environmental protection. Educational campaigns or better communications could help improve their understanding. Environmentally friendly management strategies have been adopted facing challenges in implementation or execution that may hinder their effectiveness. Factors such as a lack of resources, changes in organizational culture, or technical obstacles may affect a company's ability to effectively execute the strategy.

To increase the synergy between the two, companies can consider education and awareness about environmentally friendly management strategies. Companies also need to identify and overcome implementation barriers that may exist to demonstrate the short- and long-term economic benefits of environmentally friendly practices. Companies need to ensure that environmental protection is integrated as an important part of their business strategy by involving and communicating with stakeholders to support joint environmental protection efforts.

5.4. New Model of Green Strategy Moderates the Influence of Green Information Systems on Business Performance

The new model of green strategy strengthens the positive influence of green information systems on business performance. This is aligned with research from (Peters et al., 2021), (Su et al., 2020), and (Liu et al., 2018), but contradicts research from (Saputra, 2020) and (Hutahayan, 2020). A green strategy integrated with a green information system can increase overall operational efficiency. The use of information systems and green technology can optimize business processes, reduce energy consumption, and minimize waste, which will ultimately increase efficiency and reduce operational costs. Green strategies can level up impact on a company's picture in the eyes of consumers and other stakeholders. The combination and synergy of a green strategy with a transparent and effective green information system can help build trust and improve a company's reputation in the market.

Green information systems require innovation in technology and business processes. The integration of new models of green strategy with green information systems encourages companies to innovate to create more environmentally friendly solutions. This innovation provides a long-term competitive advantage. Green strategies that involve compliance with environmental regulations can help reduce legal and reputational risks. Green information systems can help companies track and comply with environmental standards, making them more resilient to regulatory changes and related risks. New model of green strategy and green information systems that are well implemented can increase employee satisfaction and engagement, where employees who are more satisfied and involved tend to contribute more positively to the company's overall productivity and performance.

Well-implemented models of green strategy and green information systems can yield additional benefits by positively impacting employee satisfaction and engagement. Employees who find satisfaction and engagement in their work environment are more inclined to contribute positively to the overall productivity and performance of the company. This underscores the broader positive impact of integrating environmentally conscious practices into both strategic frameworks and information systems.

The research findings align with the information processing theory, suggesting that the updated model of a green strategy amplifies the beneficial effects of green information systems on business performance. New models of green strategy that are integrated with green information systems can increase operational efficiency. Better information processing, including environmentally friendly data management and reporting, contributes to overall business performance. Green information systems improve the quality and accuracy of information available for decision-making. This ensures that decisions taken are based on reliable information, which can support the achievement of business goals.

Adaptive green information systems can help companies respond more quickly to changes in the business environment, including changes in environmental regulations. The ability to respond to market dynamics can increase a company's competitiveness. Green information systems integration facilitates smoother information flow between departments and business units thereby improving coordination across the organization, which is an important element in information processing theory.

New model of green strategy supported by timely and accurate information can improve a company's ability to make better decisions. This helps in selecting measures that support business sustainability and performance. Green information systems can also help companies manage energy and resource consumption more efficiently. More efficient use of resources can help reduce operational costs and improve business performance, especially those that are environmentally friendly. Finally, green information systems improve internal and external communication about a company's environmentally friendly initiatives. Clear and open information can build a positive picture in the eyes of stakeholders.

About positive image, this is also aligned with legitimacy theory. The positive image generated by environmentally friendly practices, such as green strategy and green information systems, can increase company acceptance by stakeholders. Stakeholders, including consumers, investors, and society, tend to support companies that are considered to have sustainable and environmentally friendly practices. In

legitimacy theory, companies tend to seek legitimacy from their environment. By implementing environmentally friendly practices, companies can gain additional legitimacy from the public and other interested parties. This positive image allows the company to reduce reputation risks that may arise due to environmentally unfriendly practices. This creates a safeguard against potential negative impacts on a company's image and reputation.

Gaining legitimacy is significantly influenced by corporate leaders who endorse sustainable initiatives and convey the company's dedication to social and environmental responsibility. This can also be seen in respondents' responses to the statement that leaders collaborate to increase environmental innovation, leaders invite employees to be involved in environmental activities, and leaders take the initiative in providing direct direction towards environmentally friendly sustainable practices, which is the highest score on the environmental leadership dimension, which is an element of novelty in this research.

The responses of other respondents who gave high scores were on the environmental knowledge learning dimension, namely the company integrates environmental knowledge within the company, the company coordinates employees in developing environmental knowledge, and the company manages environmental knowledge within the company, where these three indicators are also elements of novelty in this research. Statements on the green awareness dimension such as the company making rules to turn off water when not in use and the company implementing the 6R culture and habits (Reduce, Reuse, Recycle, Repair, Refuse, and Rethink) also give the highest score on this dimension and are also new.

From the three dimensions of novelty, it is proven that the added indicator scores provide the highest scores compared to previously existing indicators. This means that the development of dimensions and indicators from this research has been successful in measuring the new model of green strategy. The addition of new dimensions and indicators has reflected important aspects of the new model of green strategy that were not previously represented. This new indicator is more relevant and provides a more holistic understanding of the new model of environmentally friendly green strategy. Research that can adapt its dimensions and indicators to reflect recent developments or changes in the business context can be more sensitive to the dynamics inherent in green strategy.

5.5. The Influence of Pollution Prevention on Business Performance

Pollution prevention positively affects business outcomes, a correlation supported by the findings of (Masoumik et al., 2015). Implementing pollution prevention practices helps companies comply with applicable environmental regulations. Regulatory compliance can reduce legal and sanction risks, which can have a negative impact on business performance. Pollution prevention efforts often involve improving operational efficiency. More efficient use of resources can reduce production costs and optimize energy use, contributing to better business performance.

Engaging in pollution prevention can contribute to creating a favorable image among consumers, investors, and other stakeholders for companies. A good reputation can increase customer trust and loyalty, as well as support business growth. This supports the legitimacy theory. Implementing pollution prevention practices can also encourage innovation in production processes and products. Firms that engage in sustainability innovation can gain a competitive edge and set themselves apart from competitors in the market.

The most prominent aspect within this dimension is the company's effort to limit the utilization of hazardous or toxic materials in its products. Such reduction is frequently aligned with both environmental standards and regulations pertaining to product safety. The company's success in achieving this shows a high level of compliance with applicable standards and regulations. This step has a positively raise on the environment by reducing the product's ecological footprint. Companies that take steps to minimize hazardous materials can play an important role in preserving natural resources and balancing ecosystems.

5.6. The Influence of Product Stewardship on Business Performance

Business performance is positively influenced by product stewardship, a correlation supported by the findings in (Masoumik et al., 2015) research. Product stewardship practices help companies comply with applicable environmental and product safety regulations. Compliance with regulations can avoid legal sanctions and increase stakeholder trust.

Product stewardship encourages efficiency in the resources use and can help companies optimize production processes. Using more efficient materials can reduce production costs and increase financial sustainability. Awareness of product stewardship can encourage innovation in product development. Companies can create products that are safer, greener, and more durable, giving them a competitive advantage.

The strongest indication in this statement is that companies jointly shoulder the responsibility to minimize the environmental footprint of products throughout the entire value chain. Companies that do this across the value chain demonstrate full involvement in every stage of product production and distribution. This includes raw material selection, production processes, distribution, and final product management. Implementing shared responsibility includes collaboration with suppliers and business partners in the value chain. This can create strong and mutually beneficial relationships with parties involved in product supply and distribution.

5.7. The Influence of Clean Technology on Business Performance

The positive influence of clean technology on business performance aligns with the findings of (Masoumik et al., 2015) research. Clean technologies are designed to improve operational efficiency. This reduces production costs, increases productivity, and optimizes resource use, all of which contribute to better business performance. Clean technologies include solutions to reduce energy consumption. By adopting this technology, companies can reduce their operational energy costs, having a positive impact on financial sustainability.

Clean technologies help companies reduce greenhouse gas emissions and other environmental impacts. Cutting emissions not only cultivates a more favorable image but also aids companies in meeting progressively stringent environmental regulations. This aligns with the principles of legitimacy theory. The adoption of clean technologies increases corporate compliance with environmental regulations. This helps avoid legal sanctions and negative reputations that may result from regulatory violations.

The highest respondent statement in this dimension is that the company develops sustainable future competencies. This statement shows that the company is not only focused on sustainability now but is also developing competencies for the future. This reflects a far-sighted vision and readiness to face challenges and opportunities that may arise. Sustainable development of future competencies includes innovation and the ability to adapt to environmental changes, whether in terms of technology, consumer needs, or regulatory changes. This is the key to maintaining and increasing competitiveness.

5.8. The Influence of Green Management Awareness on Business Performance

Business performance is positively affected by awareness of green management, a finding consistent with the research conducted by (Wu & Wu, 2014). Awareness of green management encourages companies to look for efficient ways to use energy and resources. This can reduce operational costs and increase efficiency, leading to a favorable influence on overall business outcomes. Companies that are aware of green management are more likely to comply with environmental regulations. This compliance not only reduces legal risks but can also prevent sanctions and costs associated with regulatory violations.

Effective green management creates a great image for consumers and other stakeholders. Modern consumers tend to support companies that adopt environmentally responsible business practices.

Stakeholders, including investors and society, often provide greater support to companies that are aware of green management. This can create good relationships with influential parties.

The respondent's response with the highest score was the statement that the company made rules to turn off the water when not in use. This shows that respondents consider it important to adopt simple but effective measures to reduce water consumption. This reflects a high awareness of issues regarding environmental friendliness and sustainability. If companies make it a rule to turn off water when not in use, this can encourage active employee participation in water conservation practices. Employee awareness and compliance with these rules can create a greater impact.

5.9. The Influence of Environmental Leadership on Business Performance

Business performance is not impacted by environmental leadership, a result that contradicts the research carried out by (Su et al., 2020). Implementing environmentally-based initiatives requires high initial investments. Some leaders argue that the long-term benefits of environmental leadership are not immediately visible in financial performance, so they have less direct impact on business results. The impact of environmental leadership can vary between industries. Some industries benefit more than others. Therefore, conclusions about its impact on business performance may depend on the specific sector or industry.

Respondents' responses to leaders specifically recognizing green business innovation had the lowest scores. Respondents assessed that leaders in organizations did not pay special attention or recognition to green business innovation. Leaders have not made sustainability a priority or explicitly recognized the contribution of green innovation. Another cause could be that there is a lack of clarity in communication from the leadership about the importance of green business innovation. Leaders who do not communicate their support for green initiatives lead to a lack of appreciation from employees

5.10. The Influence of Environmental Knowledge Learning on Business Performance

Business performance is positively affected by gaining knowledge in environmental matters, a conclusion consistent with the findings of (Su et al., 2020) research. Increasing environmental knowledge encourages environmentally friendly innovation. Employees who understand the environmental effect of their business activities are more likely to develop innovative, environmentally friendly solutions, increasing the competitiveness and sustainability of the business. Increasing knowledge about environmentally friendly practices can help companies improve operational efficiency. Implementing these practices can reduce operational costs, optimize resource use, and increase profitability.

Good knowledge of environmental regulations helps companies comply with legal requirements. This can reduce the legal risks and costs associated with breaches, creating a more stable operational environment. Companies that demonstrate strong environmental knowledge tend to have a better reputation with consumers and stakeholders. This positive image can increase consumer trust and loyalty. This is also aligned with legitimacy theory.

The respondent's response with the highest score was in the statement that the company coordinates employees in developing environmental knowledge. Respondents felt there was effective coordination in developing environmental knowledge. This reflects the company's efforts to ensure that sustainability and environmental education initiatives are implemented in a coordinated and structured manner. Coordination in developing environmental knowledge can create an environmentally friendly organizational culture. This shows that companies do not only see environmentally friendly activities as an individual responsibility, but as a joint effort involving all employees.

5.11. The Influence of Eco-Efficiency on Business Performance

Enhancing eco-efficiency positively impacts business performance, although this contradicts the

research carried out by (Putri & Sari, 2019). Eco-efficiency focuses on the efficient use of natural resources, energy, and materials. By optimizing these resources use, companies can reduce operational costs, increase efficiency, and achieve financial benefits. Eco-efficiency principles lead to reduced waste, emissions, and resource consumption. This can reduce company operational costs, including waste and energy management costs.

Focus on Eco-Efficiency encourages innovation in products and services that are more environmentally friendly. Products designed with environmental efficiency in mind can appeal to consumers who are increasingly concerned with sustainability issues. Companies that implement Eco-Efficiency can build a more positive picture in the eyes of consumers, investors, and other stakeholders. This reputation can be a valuable asset and increase consumer trust. This is also aligned with legitimacy theory.

The highest response from respondents was in the company's statement about expanding product durability. Respondents responded that it was important for companies to increase the durability of their products. This may reflect an appreciation of the need for products that can last a long time or have a longer life cycle. Products with good durability can increase consumer satisfaction. Consumers are more satisfied with products that not only last but also minimize their need to replace products regularly. Eco-efficiency can improve this.

5.12. The Influence of Green Culture on Business Performance

Green Culture does not influence business performance. The findings don't align with the research conducted by (C. H. Wang, 2019). Some studies argue that although green culture can have positive values, its impact on business performance is more difficult to measure directly. Factors such as marketing strategy, product innovation, and operational management are considered more significant in determining business performance. If a company has a green culture but does not translate these values into concrete actions that influence business performance, there will be a gap between rhetoric and reality. This may lead to the view that Green Culture does not directly contribute to business outcomes.

The participants rated the company lowest in terms of having a culture that promotes environmental awareness and values influencing societal behavior towards sustainable development. Respondents felt that there was a gap between the values and culture implemented by the company in terms of sustainability and the real actions visible to society. There is a mismatch between the rhetoric and the actions taken by the company. Low perception also reflects the lack of clarity in the company's communication regarding its culture of awareness and environmentally friendly values to the community. If the message is not conveyed clearly or is not translated into concrete action, society cannot feel the positive impact. There are also challenges in implementing sustainability values in concrete actions. This can be caused by factors such as limited resources, lack of understanding, or internal resistance to change.

5.13. The Influence of Credibility on Business Performance

Credibility lowered business performance. The findings don't align with (Burgwal & Vieira, 2014; K. Li et al., 2020). If a company builds its credibility on promises it cannot keep or policies that are not well implemented, this can reduce consumer trust and negatively impact business performance. If companies engage in controversial practices that do not align with consumer values or expectations regarding sustainability or ethics, the company's credibility can be eroded and impact business performance.

A lack of transparency in reporting sustainability information or business practices can harm a company's credibility. Consumers and stakeholders may provide negative assessments if they feel that the information provided is not honest or complete. Inadequate responses to crises, whether they relate to environmental, social, or economic issues, can harm a company's credibility. A poor response to a

crisis can create long-term impacts on consumers' views of a company. In an era where consumers are increasingly concerned with environmentally friendly issues, a company's credibility regarding its environmentally friendly practices can be a determining factor in consumer decisions. If consumers doubt credibility, this can influence their purchasing decisions.

It is important to remember that credibility can contribute to good or bad depending on the company's practices and policies. In situations where credibility has a negative impact, companies need to conduct an in-depth evaluation of their business practices and sustainability strategies and make the necessary changes to restore and repair their reputation. The form of evaluation can be an in-depth evaluation of the company's sustainability policy. Is the policy consistent and well-implemented? Are there discrepancies between values and practices visible in policy? Companies also need to evaluate the extent to which they are transparent in conveying sustainability-related information to stakeholders. Are sustainability reports complete, clear, and verifiable? How does the company respond to requests for information or questions from the public? This evaluation can help companies bring a better understanding of how credibility affects business performance. Additionally, the results of this evaluation can help companies make necessary changes to improve credibility and advance sustainability efforts in their businesses.

Respondents' responses to statements about participation in the voluntary environmental initiatives supported by the Department of Energy had the lowest scores. Respondents were less aware or less informed about environmental initiatives supported by the Department of Energy. Lack of knowledge about the program or lack of communication from the company may be the cause of low participation. Respondents also did not see clear benefits or positive impacts from participating in the initiative. If the benefits are not explained well or are not considered relevant, respondents do not feel motivated to participate. To increase participation, companies can take steps such as increasing communication and education about environmental initiatives, providing incentives or rewards for participation, ensuring transparency regarding benefits and positive impacts, and ensuring that initiatives are integrated with overall company values and goals. Further evaluation of respondents' responses can provide deeper insights to identify the factors underlying the lowest scores and formulate appropriate improvement strategies.

6. Conclusion, Implication, Limitation, and Recommendation

6.1. Conclusion

In conclusion, this study provides empirical evidence that green strategies can play a pivotal role in amplifying the business performance impacts of environmental initiatives like green information systems, whereas the effect is less clear for green innovation. The findings suggest that the adoption of novel green strategies should focus on efficiency, coordination, and knowledge sharing to maximize performance gains.

The updated understanding emphasizes the need for a nuanced and context-specific approach to incorporating green practices. It highlights the intricate relationships between green innovation, green information systems, and the new model of green strategy, encouraging businesses to tailor their strategies to maximize positive outcomes for overall business performance.

6.2. Research Implications

The new model of green strategy has the greatest impact on business performance. Strengthen and further develop the company's new model of green strategy by identifying the key elements of this strategy that provide a positive impact and maintaining or improving these aspects. Companies focusing on green strategies that have a big impact can help companies optimize resource use and reduce operational costs. This can lead to increased financial sustainability and profitability of the company.

The contribution of this research to theory with the novelty of the new model of green strategy can be used for subsequent research, especially in the fields of trading and manufacturing. Green

management awareness and environmental knowledge learning can provide strong theoretical contributions in the future. Then, the new model of green strategy strengthens the influence of green information systems on business performance. Integration of new model of green strategy with green information systems can help improve company operational efficiency. Process automation and resource optimization can reduce operational costs and increase productivity. Implementing a new model of green strategy that is strengthened by a green information system help companies lowered their environmental impact. Better monitoring and management of energy consumption, waste, and natural resources can lead to more sustainable business practices.

6.3. Limitations

There are several limitations in this research, including respondents not understanding the statements of each indicator asked about in the questionnaire, but this obstacle has been overcome through communication by researchers both directly and indirectly. There are difficulties in getting the right model when using the SPSS AMOS application because several constraints and testing stages are required to get a model that meets the criteria. The novelty dimension in the new model of green strategy variable, namely environmental leadership, still does not show a significant influence on business performance. A total of 5 hypotheses were rejected in this research. Rejection of the hypothesis can be caused by the influence of third-party variables that are not properly controlled. Limited control over these external factors can influence the trustworthiness of research results. There are still test results that have a negative influence, even though in theory they should have a positive influence. Better samples and measurements are needed to get positive test results.

6.4. Recommendation

Based on the research results, several suggestions can be given, including suggestions for academics and future research to expand the research sample to cover a wider group. Additionally, it can be useful to obtain direct feedback from respondents to gain further insight into the research results. Future researchers can use better dimensions and indicators to increase their impact on business performance. The research direction can be in the form of developing green strategy indicators, business performance, or other variables such as industry type, prior green experience, etc. Then future research can use other statistical tests that can provide insights that can provide broader interpretations.

Suggestions for companies, ensuring that green strategies are directly linked to the company's business goals and mission. This can help create synergy between sustainability practices and achieving business goals. Companies need to consider optimizing the use of company resources, including energy, raw materials, and labor. Implement practices that can increase efficiency and reduce waste.

Suggestions for policy contributions and research results can be used to support or advocate for the creation of more stringent or innovative environmental policies that support sustainability goals. This may include regulations regarding emissions, habitat protection, or sustainable business practices. Propose or support policies that incorporate environmentally friendly and sustainable materials into the educational curriculum. Increasing people's understanding of literacy (Suhardjo et al., 2023) and sustainability issues can form a generation that cares more about the environment.

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