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The Role of Strategic Agility for Sustainable Business Performance: A Management Control and Accounting System Approach

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ABSTRACT

The Purpose: The study examines the impact of sustainable management control systems and sustainable management accounting systems on sustainable business performance and analyses whether strategic agility moderates these relationships. The research addresses the problem of how internal sustainability mechanisms influence long-term business outcomes in dynamic environments. **Methods:** The study uses a quantitative approach with data collected via questionnaires from publicly listed companies on the Indonesia Stock Exchange (IDX). The sample consists of 265 issuers listed on IDX, representing various sectors with an emphasis on organisational practices related to sustainability and performance. The researchers employed structural equation modelling using the Statistical Package for the Social Sciences (SPSS) Analysis of Moment Structures (AMOS) 22 to test the hypotheses, along with sensitivity and expansion tests. The **results** indicate that both sustainable management control systems and sustainable management accounting systems significantly enhance sustainable business performance. However, strategic agility does not moderate these relationships. **Limitations:** The findings are limited to IDX-listed companies and thus may not be generalisable to non-listed firms. The study also did not account for the adoption of specific international sustainability standards, limiting insights into innovation-driven sustainability practices. **Contribution:** This study contributes to the literature by integrating strategic agility into the sustainability-performance framework and highlighting the roles of internal control and accounting systems. It offers empirical evidence from an emerging market context, emphasising structural over strategic drivers of sustainable business performance.

Keywords: sustainable business performance; strategic agility; sustainable management control system; sustainable management accounting system; Indonesia stock exchange; contingency theory

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ОРИГИНАЛЬНАЯ СТАТЬЯ

Роль стратегической гибкости в обеспечении устойчивой эффективности бизнеса: системный подход к управленческому контролю и бухгалтерскому учету

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АННОТАЦИЯ

Цель: в исследовании изучается влияние систем устойчивого управленческого контроля и систем устойчивого управленческого учета на устойчивые показатели бизнеса и анализируется, оказывает ли стратегическая гибкость на эти взаимосвязи. Исследование рассматривает проблему обусловленности внутренних

механизмов устойчивого развития и долгосрочных результатов бизнеса в динамичной среде. М**етоды:** в исследовании применен количественный подход с использованием данных, собранных с помощью анкетирования компаний, котирующихся на Индонезийской фондовой бирже (IDX). В выборку вошли 265 эмитентов, котирующихся на IDX и представляющих различные сектора с акцентом на организационные практики, связанные с устойчивостью и эффективностью. Исследователи использовали моделирование структурных уравнений с помощью статистического пакета для социальных наук (SPSS) с анализом моментных структур (AMOS 22) для проверки гипотез, а также тесты чувствительности и расширения. **Результаты** показывают, что как системы устойчивого управленческого контроля, так и системы устойчивого управленческого учета значительно повышают показатели устойчивого развития бизнеса. Однако стратегическая гибкость не является модератором этих взаимосвязей. **Ограничения:** результаты исследования ограничены компаниями, котирующимися на Индонезийской фондовой бирже, и поэтому могут быть неприменимы к компаниям, не котирующимся на бирже. В исследовании также не учитывалось внедрение конкретных международных стандартов устойчивого развития, что ограничивает понимание инновационно ориентированных практик устойчивого развития. **Вклад:** данное исследование вносит вклад в литературу, интегрируя стратегическую гибкость в концепцию устойчивого развития и подчеркивая роль систем внутреннего контроля и бухгалтерского учета. В нем представлены эмпирические данные в контексте развивающихся рынков, и особое внимание уделяется структурным, а не стратегическим факторам устойчивого развития бизнеса.

Ключевые слова: устойчивое развитие бизнеса; стратегическая гибкость; система устойчивого управленческого контроля; система устойчивого управленческого учета; Индонезийская фондовая биржа; теория ситуационного подхода

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1. Introduction

The current global business environment underscores the growing demand from shareholders to address environmental, social, and governance (ESG) issues more comprehensively, considering this from an international perspective driven by pressure from public interest institutions [1]. Socially responsible investing (SRI) is about making a positive impact on society and the world. Sustainability and sustainable development are concepts that have gained global recognition and are used to address the complex demands of increasing stakeholder concerns about environmental and social issues. The term 'sustainable development' was popularized in 1987 by the Brundtland report, which included the 'classic' definition of sustainable development as development that meets the needs of the present without compromising the ability of future generations to meet their own needs [2]. The presence of these sustainability standards can impact a company's financial standing. These initiatives often require a commitment of financial resources for the procurement of environmentally friendly equipment, the launch of high-quality standards for products, and the development of safety programmes [3].

The Indonesian government, through the Ministry of Environment and Forestry (Ministry of Environment and Forestry of the Republic of Indonesia, hereinafter abbreviated KLHK), has the authority to impose administrative, civil, and criminal sanctions on any environmental pollution violators. Most recently, in June 2024, the KLHK Air Pollution Control Task Force halted the operational activities of three companies suspected of causing air pollution. The energy crisis is also a significant environmental issue. Indonesia is vulnerable to an energy crisis due to its large dependence on fossil fuels. Measuring sustainable performance is an important issue to enable effective sustainability management [4, 5], as it can provide sustainable performance indicators for planning actions [6], assessing sustainability practices, conducting audits and internal control [7].

Maximum sustainable performance can be achieved when management accounting practices are implemented effectively. Therefore, management accounting practices are a determinant factor of sustainable performance. One of the management accounting practices that can affect sustainable performance is the sustainable management control system. Sustainable management control systems are a relatively

new construct and tend to be a largely neglected area of research [8]. Herremans and Nazari [9] emphasised that sustainable management control systems can ensure that sustainability principles are integrated into business operational practices. This will help organisations monitor and manage their business activities, as well as ensure compliance with environmental and social standards [10]. By implementing sustainable practices, such as responsible sourcing, efficient distribution, and waste reduction, organisations can enhance business performance and mitigate environmental impacts [11]. The empirical evidence shows that sustainable management control systems have a positive and significant effect on sustainable performance [12, 13].

Another management accounting practice that affects sustainable performance is the sustainable management accounting system. One of the sustainability practices that involves organisational activities is the implementation of a sustainable management accounting system, which provides environmental information to mitigate environmental problems and enhance performance and sustainability. In this case, the implementation of a sustainable management accounting system can enhance management accounting practices by providing valuable environmental information and supporting organisations in managing and improving their performance [14, 15].

The implementation of sustainable management accounting systems enables companies to derive positive benefits for the environment by reducing environmental impacts and enhancing environmental programmes and management, ultimately leading to improved company performance [16]. Empirical evidence shows that sustainable management accounting systems have a positive and significant effect on sustainable performance [17].

Various previous studies have empirically proven the role of an intermediary (mediation or moderation) of agility in the relationship between management control systems and management accounting systems on firm performance, namely, the relationship between management control systems and firm performance moderated by agility [18] and mediated by agility [19, 20]. Meanwhile, the relationship between management accounting systems and firm performance, mediated or moderated by agility, remains unclear.

This study aims to examine the effect of the Sustainable Management Control System and Sustainable Management Accounting System on Sustainable Business Performance moderated by Strategic Agility. The novelty of this study is the development of management control system measurements derived, which consists of 4 (four) dimensions, namely, diagnostic control, interactive control, boundary systems, and belief systems adopted from Simons' Levers of Controls (LoC) Framework and often known as traditional management control systems. Measurement development is carried out on the dimensions and aspects of the indicator variable. The development of measurements will focus on two additional dimensions: eco-performance measurement and eco-budgeting.

2. Literature review

2.1. Contingency theory

Contingency theory employs a situational and context-oriented approach that seeks to identify and develop functional relationships between environmental variables, management, and performance [21]. There is no single accounting system that is suitable or the "best" management control system for all organisations under all circumstances; its design must depend on the circumstances [22–24]. Related to this research, contingency theory can provide an appropriate framework for examining the relationship between the implementation of sustainable management control systems and sustainable management accounting systems, as well as their impact on sustainable performance.

2.2. Sustainable business performance

Sustainable business performance is a measure of company performance that encompasses economic, environmental, and social objectives in the implementation of its business strategies to protect and preserve the environment and society while maximising market capitalisation [25]. Economic growth is a top priority for most organisations and can be achieved through effective inter-organisational information systems, which lead to increased company capabilities. Economic performance helps build an ecosystem for business process opera-

tions and provides space to meet stakeholder expectations [26].

2.3. Sustainable management control system

A sustainable management control system enables top management to achieve strategic sustainability goals by identifying and managing threats and opportunities related to corporate social responsibility strategies, as well as establishing risk management practices [27]. This approach has a positive impact on sustainable business performance [28]. Similar to the sustainable management accounting system, better information about environmental conditions can help make more effective management decisions, which in turn improve company performance.

2.4. Sustainable management accounting system

A sustainable management accounting system was developed as a corrective innovation to address the limitations of conventional management accounting systems, which do not provide accurate information on environmental cost management. Through the adoption of a sustainable management accounting system, companies can measure financial and non-financial environmental information beyond the usual perspective that tends to combine environmental costs into overhead costs [29]. A measurement of sustainable management accounting systems was developed by Fuzi et al., which consists of five dimensions: environmental costs, environmental regulations, environmental safety, management commitments, and customer focus.

2.5. Strategic agility

Strategic agility can be understood as a form of dynamic capabilities [30] because it describes a company's ability to bring the right product or service to the market at the right time, in the right place, and at the right price [31]. Organisations that demonstrate agility will be better able to adapt to external changes and create value as a result [32]. Strategic agility can enhance a company's competitive quality and responsiveness to environmental changes, ultimately improving its overall performance [33].

2.6. Hypotheses development

A management control system is a system that collects and uses information to evaluate the performance of various organisational resources — human, physical, financial, and the organisation as a whole — by considering the organisation's strategy. The implementation of sustainable management control system practices can ensure the integration of sustainability principles into supply chain management (SCM) practices, which will help organisations monitor and manage their business activities, ensuring compliance with environmental and social standards. Several previous studies, including [34], empirically demonstrate that a sustainable management control system has a positive impact on sustainable business performance. Based on these various explanations, the formulation of the hypothesis that can be built is:

H1: Sustainable Management Control System has a positive effect on Sustainable Business Performance.

A sustainable management accounting system is a new and innovative concept that extends the conventional management accounting system. A sustainable management accounting system can be defined as the identification, allocation, creation, and use of physical and monetary information to support business decision-making that drives sustainable business development [36]. Various previous studies, such as [35–37], empirically demonstrate that a sustainable management accounting system has a positive impact on sustainable business performance. Based on the various explanations provided, the following hypothesis can be formulated:

H2: Sustainable Management Accounting System has a positive effect on Sustainable Business Performance.

Strategic agility is defined as an organization's ability to swiftly and effectively respond to changes in the external environment by realigning its internal resources and capabilities. This dynamic capability enables firms to enhance market share, improve financial performance, and increase overall productivity. Empirical evidence from [34] confirms the positive impact of strategic agility on firm performance. Concurrently, the implementation of sustainable management control systems (SMCS) has been shown

to contribute positively to sustainable business performance [38]. Building upon these findings, it is hypothesised that strategic agility may play a moderating role in the relationship between SMCS and sustainable business performance. Based on these various explanations, the formulation of the hypothesis that can be built is:

H3: Strategic agility strengthens the influence of sustainable management control systems on sustainable business performance.

The Sustainable Management Accounting System (SMAS) plays a critical role in enhancing resource efficiency, reducing environmental impact, and mitigating risks to support improved managerial performance. Given the rapidly changing business environment, organizations must develop strategic agility to adapt effectively. This capability allows firms to align SMAS implementation with internal conditions and optimize resource use, thereby increasing operational efficiency. Empirical studies confirm that strategic agility positively influences firm performance. Accordingly, effective SMAS adoption is expected to improve sustainable business performance, particularly when moderated by high levels of strategic agility. This is consistent with prior research demonstrating the positive impact of SMAS on sustainable business outcomes [39]. Based on these various explanations, the formulation of the hypothesis that can be built is:

H4: Strategic agility strengthens the influence of sustainable management accounting systems on sustainable business performance.

3. Research methodology

The data analysis technique employed in this study utilises covariance-based structural equation modelling (CB-SEM) analysis conducted using the AMOS program. Moderated regression analysis (MRA) was employed to test the hypothesis estimated by the SEM method. The primary data used in this study was obtained through a questionnaire instrument. This questionnaire was distributed and completed by business actors engaged in various types of companies listed on the Indonesia Stock Exchange (IDX) across different regions and sectors in Indonesia. The calculation of the minimum number of samples is 10 times the number of the largest indicators of each variable (construct), whereas, for the maximum likelihood estimation technique, the range of the number of samples is 100–200 samples [40, 41]. This study used a sample of 265 respondents from various types of companies listed on the Indonesia Stock Exchange (IDX) across different regions and sectors in Indonesia. In addition, this analysis employs descriptive statistics, which are useful tools for analysing data using existing samples without the intention of drawing generally applicable conclusions or making broad generalisations. The design for this study employs a quantitative approach, a research method grounded in the philosophy of positivism, which involves collecting data using research instruments and analysing quantitative data to test the established hypothesis [42]. Meanwhile, the type of research conducted in this study is causal associative research, which aims to analyse the relationship between one or several variables and other variables or how a variable (independent variable) affects another variable (dependent variable). The regression model equation formed is as follows:

$$SBP = \alpha + \beta_1 DC + \beta_2 IC + \beta_3 BoS + \beta_4 BeS + \beta_5 EPM + \\ + \beta_6 EB + \beta 7 CSR + \beta 8 OC + \beta 9 OL + \varepsilon.$$

Description:
DC — Diagnostic control;
IC–Interactive control;
BoS — Boundary systems;
BeS — Belief systems;
EPM — Eco-performance measurement;
EB — Eco-budgeting;
SBP — Sustainable Business Performance.
Variable Control:
CSR — Corporate Social Responsibility;
OC — Organisation culture;
OL — Organisation learning.

3.1. Operationalisation of variables

Operational variable tables are used to define research variables concretely and measurably, thus facilitating the data collection process. In *Table 1,* each variable is broken down into indicators, sub-indicators, measuring instruments, and measurement scales.

Measuring variables in a sustainable management control system (SMCS) requires a multidimensional approach that focuses not only on financial aspects but also integrates sustainability principles into the core of the control process.

Table 1

Measurement of sustainable management control system variables

Dimension	Indicator
Diagnostic control (DC) [18]	The company has identified critical (important) performance variables for the company (DC1)
	The company has set targets for performance variables that are critical (important) for the company (DC2)
	The company monitors progress in achieving critical (important) performance targets for the company (DC3)
	The company corrects deviations from the company's established critical performance targets (DC4)
	The company always reviews important areas of the company's critical performance that have been determined (DC5)
Interactive control (IC)	Companies often provide recurring agendas for top management and subordinate activities (IC1)
	Companies often provide recurring agendas for subordinate activities (IC2)
	Companies often provide a means for debating the underlying data, assumptions, and action plans (IC3)
	The company's attention is focused on strategies with uncertain environmental conditions (IC4)
	The company encourages and facilitates dialogue and information sharing with subordinates (IC5)
Boundary systems (BOS)	The company has a code of ethics to define appropriate and inappropriate behaviour (BOS1)
	The company already has guidelines that define specific areas for, or boundaries for, opportunity seeking and experimentation (BOS2)
	The company always actively communicates regarding risks and activities to avoid (BOS3)
	The company imposes sanctions if involved in risks and activities outside the organization's guidelines (BOS4)
Belief systems (BES)	The company has formulated values, goals and directions in a formal document (BES1)
	The company always actively communicates about core values (BES2)
	The company has made a formal statement to create a commitment to the long-term vision (BES3)
	The company has made a formal statement of core values to motivate and guide subordinates in seeking new opportunities (BES4)
Eco-performance measurement (EPM). ISO 14001 (Novelty)* [43]	The company monitors internal compliance with environmental policies and regulations (EPM1)
	The company provides environmental performance data for internal decision-making (EPM2)
	Management motivates all employees for continuous improvement of environmental performance (EPM3)
	The company provides environmental performance data for external reporting (EPM4)
	The company carries out environmental responsibilities by providing training to employees ISO 14001 (EPM5)
	The company carries out periodic environmental audits related to the Environmental Management System ISO 14001 (EPM6)
Eco-budgeting (EB). ISO 50001 (Novelty)**	Corporate budgeting details environmental costs (costs related to managing environmental impacts, such as waste treatment costs, emission reductions, and environmental impact remediation) (EB1)
	Company budgeting includes investment in environmentally friendly technologies (EB2)
	Company budgeting includes revenue from recycled waste or residual materials (EB3)
	Company budgeting includes energy savings ISO 50001 (EB4)

Source: Developed by the authors.

* ISO 14001. Environmental management systems. 2015. ** ISO 50001. Energy management. 2018.

Table 2
Measurement of sustainable management accounting system variables

Dimension	Indicator
Environmental cost	Management allocates environmental-related costs to production processes (SMAS 1)
	Management improves environmental cost management (SMAS 2)
Environmental regulation	Management complies with environmental regulations (SMAS 3)
	Management is committed to environmental regulations (SMAS 4)
Environmental safety	Management complies with procedures for creating environmental safety (SMAS 5)
	Management provides environmental safety requirements (SMAS 6)
Management commitment	Management is committed to supporting environmental management (SMAS 7)
	Management is committed to involving environmental decision-making (SMAS 8)
Customer focus	Management encourages environmentally friendly practices to customers (SMAS 9)
	Management is committed to providing value to customers (SMAS 10)

Source: Developed by the authors.

This framework can be described through four key elements, namely: Diagnostic Control that monitors environmental performance against established targets to ensure accountability; Boundary Systems that establish clear limits, rules, and codes of conduct to prevent environmentally and socially detrimental practices; Belief Systems that establish and communicate the company's core values related to sustainability commitments to inspire and direct organizational behavior; and specific instruments such as Eco-performance Measurement and Eco-budgeting that technically allocate resources (budgets) and evaluate performance results based on measurable environmental indicators. Thus, these four pillars complement each other to create a dynamic control system, capable of driving strategic initiatives while ensuring the company's operations remain within the corridor of economic, social, and environmental responsibility.

Table 2 shows the sustainable management accounting system indicator based on previous research which will be included in the questionnaire.

Table 3 shows the Strategic Agility (SA) indicator based on previous research which will be included in the questionnaire.

Table 4 shows the Sustainable Business Performance indicator based on previous research which will be included in the questionnaire.

4. Results

4.1. Descriptive statistics

The purpose of descriptive statistics is to present, summarise, and describe a set of data. This allows the main characteristics of the data to be easily understood without drawing conclusions that go beyond the data itself. *Table 5* shows the descriptive statistics for this study.

According to the results shown in *Table 5* of descriptive statistical testing, it is evident that the average value for all variables falls within the agreed category. The standard deviation value of all variables is below the average value, which means that the data is normally distributed.

Validity testing is used to measure the accuracy and precision of a research instrument in measuring what it is supposed to measure. Meanwhile, reliability testing is used to assess the consistency and stability of the instrument, so that the measurement results can be trusted and reliable when repeated under the same conditions. *Table 6* shows the results of the validity and reliability tests for this study.

The validity testing shown in *Table 6* indicates that the loading factor meets all the requirements, as it is above 0.4. Likewise, construct reliability should be above 0.7 and variance extracted should be above 0.5. The test results show a value of 0.850. It means that a sustainable management control system, a sustainable

Table 3
Strategic agility variable measurement

Dimension	Indicator
Sensing agility	The company can detect changes in customer preferences (SA 1)
	The company can detect changes in competitor movements (SA 2)
	The company can detect technological changes (SA 3)
Decision making agility	The company can create action plans to meet customer needs (SA 4)
	The company can create action plans to react to competitors' strategic moves (SA 5)
	The company can make action plans related to the use of new technology (SA 6)
Acting agility	The company can modify/restructure the production process in a timely manner (SA 7)
	The company can introduce new products at the right time (SA 8)
	The company can adopt new technologies at the right time (SA 9)

Source: Developed by the authors.

Table 4
Measurement of sustainable business performance variables

Dimension	Indicator
Economic performance [44]	The company has experienced annual profit growth since the implementation of the sustainability program (SBP 1)
	The company has experienced an increase in market share and reputation since the implementation of the sustainability program (SBP 2)
	Companies reduce energy usage costs (SBP 3)
Environmental performance [45]	Companies reduce the risk of environmental accidents (SBP 4)
	The company produces little waste and emissions (SBP 5)
	The intensity of company activities to protect the natural environment is increasing (such as nature conservation activities, tree planting, etc.) (SBP 6)
Social performance	The company carries out community economic development activities (SBP 7)
	Companies improve community health and safety (SBP 8)
	Companies are encouraged to involve the local workforce (SBP 9)

Source: Developed by the authors.

management accounting system, strategic agility, and strategic agility moderation have an 85% effect on sustainable business performance, while other factors influence the remaining factors.

Hypothesis testing is used to verify the validity of a statement or tentative assumption (hypothesis) regarding a population based on sample data. This allows researchers to objectively decide whether to accept or reject a hypothesis based on statistical evidence. *Table 7* shows the results of the hypothesis testing calculated using the equation:

$$SBP = \beta_1 SMCS + \beta_2 SMAS + \beta_3 SMCS \times SA + \\ + \beta_4 SMAS \times SA + \beta_5 OC + \beta_6 OL.$$

The results of the hypothesis testing in *Table 7* show that the sustainable management control system has a positive effect on sustainable business performance, the sustainable management accounting system has a positive effect on sustainable business performance, the moderation of strategic agility and the sustainable management control system is proven not to moderate, and the moderation of strategic agility and the

Table 5
Descriptive statistics

Stats.	*SMCS*	*SMAS*	*SA*	*SBP*	*OC*	*OL*
Mean	4.951	5.178	4.925	4.888	4.793	4.837
Stdev	0.700	0.755	0.870	0.815	0.937	1.125
Min	1.708	1.200	1.111	1.667	1.333	1.000
Max	6.000	6.000	6.000	6.000	6.000	6.000

Source: Developed by the authors.

sustainable management accounting system is proven not to moderate.

Sensitivity tests are used to measure the extent to which the results of a model or analysis change when key assumptions or input variables are changed. The goal is to assess the robustness of research findings and identify which parameters most influence the final results. *Table 8* shows the results of the sensitivity test calculated using the equation:

$$SBP = \beta_1 SMCS + \beta_2 SMAS + \beta_3 SMCS*SA + \\ + \beta_4 SMAS \times SA + \beta_5 OC + \beta_6 OL.$$

The results of the sensitivity test show that the coefficient of determination is 84.9%, which is lower than that of the first model, at 85%. It means that the model using novelty provides better results.

Table 9 presents the results of the expansion test using path analysis to examine the effects of eight predictor variables on Systolic Blood Pressure (SBP). The results show that the model explains a substantial proportion of the variance in SBP, with an R^2 value of 0.693, indicating that 69.3% of the variability in SBP is jointly explained by the predictor variables included in the model. This suggests that the model has strong explanatory and predictive power.

As shown in *Table 9*, only two variables demonstrate statistically significant effects on SBP at the 5% significance level. Economic Budget (Eco_Budg) has a positive and significant effect on SBP ($\beta = 0.263$, $p = 0.006$), indicating that higher economic budget allocation is associated with an increase in SBP. Similarly, Organisational Commitment (OC) also shows a significant positive effect on SBP ($\beta = 0.201$, $p = 0.012$), suggesting that stronger organizational commitment contributes to higher SBP levels.

Table 6
Validity and reliability test results

Variable	Indicator	Std Loading	Construct Reliability	Variance Extracted
SMCS	SMCS1	0.790	0.920	0.660
	SMCS2	0.728		
	SMCS3	0.857		
	SMCS4	0.890		
	SMCS5	0.893		
	SMCS6	0.693		
SMAS	SMAS.1	0.761	0.938	0.751
	SMAS.2	0.873		
	SMAS.3	0.906		
	SMAS.4	0.920		
	SMAS.5	0.864		
SBP	SBP.1	0.781	0.887	0.723
	SBP.2	0.895		
	SBP.3	0.871		
SA	SA.1	0.905	0.941	0.841
	SA.2	0.950		
	SA.3	0.895		
OC	OC1	0.864	0.839	0.636
	OC2	0.826		
	OC3	0.693		
OL	OL1	0.882	0.912	0.776
	OL2	0.836		
	OL3	0.922		

Source: Developed by the authors.

The Diagnostic Control (Diag_Control) variable exhibits a marginal effect on SBP ($\beta = 0.164$, $p = 0.067$), indicating a tendency toward significance, although it does not meet the conventional 0.05 threshold. In contrast, the remaining variables — Internal Control (Int_Control), Boundary System (Bound_Sys), Belief System (Belief_Sys), Economic Performance Measurement (Eco_PM),

Table 7
Hypothesis test results

Variable	Used in	Indicator	Estimate	S.E.	C.R.	P (1-tailed)	Results
SBP	<—-	*SMCS*	0.296	0.136	2.179	0.015	Accepted
SBP	<—-	*SMAS*	0.464	0.094	4.940	0.000	Accepted
SBP	<—-	*SA*	0.268	0.085	3.161	0.001	
SBP	<—-	*OC*	–0.016	0.107	–0.154	0.439	
SBP	<—-	*OL*	0.025	0.062	0.402	0.344	
SBP	<—-	*SMCS* × *SA*	0.000	0.001	0.746	0.228	Reject
SBP	<—-	*SMAS* × *SA*	0.001	0.001	0.911	0.181	Reject

Description: SBP (Sustainable Business Performance), *SA* (Strategic Agility), *SMCS* (Sustainable Management Control Systems), *SMAS* (Sustainable Management Accounting System), *OC* (Organization Culture), *OL* (Organization Learning).

Source: Developed by the authors.

Note: *, **, *** significant at 10%, 5%, and 1%, respectively.

Table 8
Sensitivity test results

Influence of Variables			Model 1 (Novelty)		Model 2 (Without Novelty)	
			Estimate	P (1-tailed)	Estimate	P (1-tailed)
SBP	<—-	*SA*	0,268	0,001***	0,251	0,002***
SBP	<—-	*SMCS*	0,296	0,015**	0,187	0,051*
SBP	<—-	*SMAS*	0,464	0,000***	0,536	0,000***
SBP	<—-	*SA*×*SMCS*	0,000	0,228	0,001	0,123
SBP	<—-	*SA*×*SMAS*	0,001	0,181	0,001	0,031*
SBP	<—-	*OC*	–0,016	0,439	–0,033	0,381
SBP	<—-	*OL*	0,025	0,344	0,041	0,252
R^2			0.850		0.849	

Description: SBP (Sustainable Business Performance), SA (Strategic Agility), SMCS (Sustainable Management Control Systems), SMAS (Sustainable Management Accounting System), OC (Organization Culture), OL (Organization Learning).

Source: Developed by the authors.

Note: *, **, *** significant at 10%, 5%, and 1%, respectively.

and Organizational Learning (OL) — do not show statistically significant effects, as their p-values exceed 0.05. This indicates that, within this model, these variables do not significantly predict SBP.

Based on the breakdown of the dimensions of the sustainable management control system variables, the test results indicate that diagnostic control has a positive impact on sustainable business performance, followed by the Eco Budgeting dimension, which is a notable novelty in this study. With a determination coefficient value of 69.3%, this shows a strong influence.

5. Discussion

5.1. The influence of sustainable management control systems on sustainable business performance

The results of this study empirically show that the sustainable management control system (SMCS) has a positive effect on sustainable business performance (SBP). This finding provides evidence that the implementation of a management control system that integrates sustainability principles plays a crucial role in driving sustainable business performance. Integrating

Table 9
Expansion test results

Variable	Used in	Indicator	Estimate	S.E.	C.R.	P	Results
SBP	<—-	*Diag_Control*	0.164	0.109	1.503	0.067	Accepted
SBP	<—-	*Int_Control*	–0.095	0.18	–0.528	0.299	Reject
SBP	<—-	*Bound_Sys*	–0.127	0.309	–0.412	0.340	Reject
SBP	<—-	*Belief_Sys*	0.336	0.335	1.002	0.158	Reject
SBP	<—-	*Eco_PM*	0.234	0.259	0.900	0.184	Reject
SBP	<—-	*Eco_Budg*	0.263	0.105	2.507	0.006	Accepted
SBP	<—-	*OC*	0.201	0.089	2.251	0.012	
SBP	<—-	*OL*	0.069	0.065	1.067	0.143	
		R^2	0.693				

Source: Developed by the authors.

sustainability dimensions into the management control system, especially through belief systems and interactive controls, can increase an organisation's effectiveness in responding to sustainability issues. They highlight that an interactive control system approach can encourage higher managerial involvement and create alignment between strategic and operational objectives. Likewise, found that SMCS, which aligns with sustainability values, contributes positively to company performance, including the reduction of manipulative practices such as real earnings management. In the context of the manufacturing sector, it also demonstrated that management control that emphasises non-financial aspects and sustainability dynamics can significantly enhance process efficiency and reduce environmental impacts [46, 47].

Theoretically, these results align with the management control systems (MCS) framework proposed by Florencio et al., where SMCS functions not only as a monitoring tool but also as a strategic instrument that influences organisational behaviour to align with long-term goals, including sustainability. [21] further emphasised that the use of interactive control systems through open communication, organisational learning, and innovation is a crucial element in the context of a complex and dynamic business environment, such as sustainability [48]. From the Resource-Based View (RBV) perspective [49], SMCS can be viewed as a strategic resource that has the characteristics of being valuable, rare, inimitable, and non-substitutable. When implemented effectively and integrated into a company's sustainability strategy, SMCS can become a competitive advantage that is difficult for competitors to imitate. These findings indicate that integrating sustainability values into the control system plays a crucial role in reconciling control structures with sustainable business performance outcomes. That also distinguishes the results of this study from those of [50], which show that SMCS has no significant impact on performance unless it is accompanied by the integration of sustainability culture into business processes.

From the perspective of contingency theory, the effectiveness of a control system is highly dependent on the suitability of the system's characteristics in the internal and external context of the organisation. In this study, the effectiveness of SMCS is reflected in its ability to align with the company's organisational structure, strategy, and values. Research supports this finding, emphasising that the success of implementing a sustainability control system is highly dependent on top management involvement, organisational cultural support, and cross-functional participation in decision-making processes.

However, it is important to note that, in this model, organisational culture and organisational learning, which are hypothesised as control variables, do not show a significant influence on strengthening the relationship between SMCS and SBP. It can be explained by the findings of

[51], which show that limitations in the culture of knowledge-seeking and cross-functional participation can hinder the organisational learning process, thereby weakening the effectiveness of the control system. In addition, a study also shows that the role of organisational culture as a moderator of the influence of management accounting systems and sustainability strategies on performance is not always significant, depending on the depth of sustainability values internalised within the organisation. Thus, this finding implies that the success of SMCS in driving sustainable performance is not only determined by the existence of organisational culture and learning mechanisms alone but is also highly dependent on how the system is strategically integrated and supported by managerial commitment and relevant institutional incentives to drive the achievement of sustainable business performance significantly.

5.2. The influence of sustainable management accounting systems on sustainable business performance

Sustainable management accounting system (SMAS) is a management accounting system that integrates sustainability aspects into business planning, control, and decision-making. Sustainable management accounting system not only focuses on traditional financial reports but also includes environmental and social performance reporting to support sustainable business practices. The results of the hypothesis test show that the SMAS has a positive effect on sustainable business performance (SBP). The implementation of sustainable management accounting can enhance relationships with stakeholders, including investors, consumers, and other relevant parties, by providing more transparent information about the company's environmental and social impact. The application of sustainability principles in management accounting can also help companies identify cost-saving opportunities through more efficient resource utilisation, reduced waste, and increased productivity, which in turn can improve their sustainability performance [52]. With a more integrated accounting system, companies can optimize their long-term performance and reduce the risks associated with non-compliance with environmental and social regulations.

However, the results of this study contradict those of [53], which showed that the effect of SMAS on SBP is not always significant, especially in industries that do not prioritise sustainability or where the integration of sustainability into the accounting system is still limited. That could be due to differences in the level of implementation of sustainability in various industrial sectors or the obstacles companies face in adapting their accounting systems to sustainability principles [54].

A sustainable management accounting system provides more complete information about the environmental and social impacts of business activities. This transparency fosters greater trust among investors, consumers, and other stakeholders. With better monitoring of resource use, companies can reduce waste and operational costs. For example, the implementation of environmental accounting enables companies to identify more effective ways to conserve energy and raw materials.

A sustainable management accounting system helps companies meet increasingly stringent sustainability standards and regulations. This compliance reduces the risk of fines and legal sanctions and increases the company's competitiveness. The data generated by the sustainable management accounting system helps management make more informed decisions in managing environmental and social risks. Companies can develop long-term business strategies that are more sustainable and oriented towards shared value.

Companies that implement Sustainable management accounting systems are more trusted by consumers and business partners. A good reputation in sustainability can differentiate in the market and increase customer loyalty. By managing environmental and social risks more effectively, companies can avoid unexpected costs that arise from environmental disasters or social conflicts. Investment in sustainability can increase profitability in the long term through efficiency and innovation. Overall, the results of this study support the idea that sustainable management accounting systems play a crucial role in driving companies toward sustainable business performance. By providing more transparent information on environmental and social impacts, as well as

helping companies comply with regulations and plan sustainable long-term strategies, SMAS serves as a strategic tool to achieve sustainable business performance. The implementation of a more sustainability-based accounting system will provide greater added value for companies, both in terms of reputation, operational efficiency, and competitiveness in a market that increasingly demands concern for sustainability.

5.3. Strategic agility moderates the effect of a sustainable management control system on sustainable business performance

Strategic agility refers to a company's ability to adapt quickly to changes in the business environment, including sustainability-related challenges and opportunities. The dynamic capabilities theory, introduced by [55], stated that dynamic capabilities enable companies to adapt, innovate, and respond effectively to changes in the external environment. In this context, strategic agility is a form of dynamic capability that enables companies to quickly identify and respond to changes in markets, technology, and regulations related to sustainability. The results of the study indicate that strategic agility cannot strengthen the influence of the sustainable management control system (SMCS) on sustainable business performance (SBP) by increasing flexibility, innovation, and responsiveness in implementing sustainability strategies. This moderation is a predictor moderation where strategic agility has a positive effect on sustainable business performance but not on the sustainable management control system. This finding is not in line with the research of [56], which indicate that strategic agility can enhance sustainability-oriented management control systems by increasing responsiveness to external changes. Companies with strategic agility can adapt SMCS policies and systems more quickly in response to regulatory changes or technological developments relevant to sustainability. This speed in adapting enables companies to be more responsive to challenges and opportunities related to sustainability issues, which in turn improves sustainable business performance (SBP).

Strategic agility does not always strengthen the relationship between SMCS and SBP. Strategic agility does not have a significant effect on the implementation of sustainability management control systems, perhaps due to structural barriers or organizational culture that does not support sustainability. In addition, [57] notes that the effect of strategic agility on SMCS can be limited, depending on the stage of sustainability adoption within the company, especially in more traditional industries and those less involved in sustainability practices.

Resource-based view theory (RBV) emphasises the importance of unique internal resources and capabilities in creating a sustainable competitive advantage. In this case, strategic agility cannot yet be viewed as a capability that enables companies to utilise and integrate SMCS more effectively, thereby creating long-term value in the context of sustainability.

5.4. Strategic agility moderates the effect of a sustainable management accounting system on sustainable business performance

Hypothesis testing on the role of strategic agility (SA) in strengthening the relationship between the sustainable management accounting system (SMAS) and sustainable business performance (SBP) reveals that SA moderation does not enhance the relationship between SMAS and SBP. This finding indicates that although strategic agility has a positive effect on SBP, there is no significant strengthening of the influence of SMAS on SBP. In other words, although Strategic Agility can contribute to rapid adaptation to external changes, it does not strengthen the performance of SMAS in achieving sustainable business performance. This moderation is a predictor moderation because strategic agility has a positive effect on sustainable business performance but does not have a positive effect on sustainable management accounting systems.

Dynamic capabilities theory explains that companies need to have the ability to develop new skills and rearrange existing skills [58]. In relation to the results of this study, the company does not yet possess new skills and needs

to effectively reconfigure existing ones. Strategic agility requires companies to adjust their strategies quickly in response to changes in the business environment. Sustainable management accounting systems, on the other hand, focus on accurate and consistent sustainability recording and reporting, which often require strict procedures. Suppose a company is too flexible in changing its strategy. In that case, the quality and accuracy of the sustainability data collected by the sustainable management accounting system can be compromised, reducing its effectiveness in increasing sustainable business performance (SBP).

The sustainable management accounting system operates by collecting and analyzing environmental, social, and economic data to inform long-term strategic decisions. If a company frequently changes strategy due to agility factors, the accounting system may not have enough time to adapt, resulting in mismatches in recording and reporting [59, 60]. That can cause sustainability information to become less relevant or even inaccurate, reducing its impact on sustainable business performance.

The sustainable management accounting system aims to help companies achieve their long-term sustainability goals, such as reducing carbon emissions or improving resource efficiency. In contrast, strategic agility encourages faster changes in business operations and strategies to adapt to market trends. Focusing on short-term changes can hinder the achievement of long-term sustainability goals, as measured by the sustainable management accounting system. Consequently, strategic agility does not strengthen the relationship between the sustainable management accounting system and sustainable business performance.

A sustainable management accounting system requires stability in measurement and reporting, allowing sustainability data to be compared over time [61]. Suppose a company constantly changes its sustainability strategies and priorities due to strategic agility. In that case, the metrics used in the sustainable management accounting system may not remain consistent, making it difficult to assess their impact on sustainable business performance (SBP).

Strategic agility encourages rapid decisions based on market and technology changes. However, a sustainable management accounting system requires a more systematic process for collecting and analysing sustainability data before decisions are made. This imbalance can cause information from the Sustainable management accounting system not to be utilised optimally in decision-making, thereby weakening the impact of strategic agility on SBP. Although strategic agility provides a competitive advantage in terms of rapid response to change, SMAS requires a more stable system to produce reliable and consistent information related to sustainability impacts. Therefore, in the context of this study, strategic agility failed to strengthen the relationship between SMAS and SBP due to a mismatch in time focus and strategy between the two, resulting in an inability to optimally utilize sustainability information generated by SMAS in improving sustainable business performance.

6. Conclusions

The results of the study indicate that the sustainable management control system (SMCS) has a positive effect on sustainable business performance (SBP), the sustainable management accounting system has a positive effect on sustainable business performance, strategic agility does not moderate the effect of the sustainable management control system on sustainable business performance, and strategic agility does not moderate the effect of the sustainable management accounting system on sustainable business performance.

6.1. Implication

This study provides an important contribution to the development of the theory and practice of sustainability-based management control systems. Theoretically, this study confirms that conventional management control systems are no longer adequate to support the achievement of sustainable business performance. Only approaches that contain elements of novelty — such as the integration of eco-budgeting — have been proven to have a positive impact on corporate sustainability performance. That highlights the importance of developing both contextual and strategic sustainability dimensions. From a managerial perspective, these findings emphasise the need for transforma-

tion of control systems to be more adaptive and proactive in responding to sustainability challenges. The application of eco-budgeting as a strategic tool in resource allocation has been demonstrated to enhance the quality of long-term decisions and reinforce sustainability commitments.

On the other hand, these results also provide a strong basis for regulators to encourage companies to adopt sustainability measurement systems through incentive policies and budgeting obligations for environmentally friendly activities. Practically, companies are expected to adopt innovations in their internal control systems, particularly by explicitly incorporating environmental and social indicators into planning, reporting, and performance evaluation. This comprehensive integration will ensure that sustainability strategies align with the company's primary business strategy.

6.2. Limitations

This study focuses on companies listed on the Indonesia Stock Exchange (IDX), excluding those in the financial sector. Therefore, the generalisation of the findings is only relevant to the context of public companies in the non-financial sector in Indonesia. This scope implies that the study's results cannot be generalised to companies not listed on the IDX, such as private companies or other business entities with different characteristics and organisational structures.

Another limitation lies in the research instrument, particularly in the questionnaire, which does not include items to identify the implementation of international sustainability management standards, such as ISO 14001 (environmental management) and ISO 50001 (energy management). The novelty aspect in the sustainable management control system variable has a close conceptual relationship with the adoption and implementation of these standards. The absence of this information limits the scope of the analysis, resulting in a less optimal understanding of the context for implementing sustainability innovation within each company. Additionally, this has implications for reducing the interpretative power in explaining the relationship between the novelty dimension and sustainable business performance.

Future research should expand the study by incorporating the stakeholder-governed environmental control dimension, which emphasizes the role of external stakeholders, including regulators, non-governmental organizations (NGOs), ESG-based investors, and local communities, in a company's management control system. Given the increasing external pressure on sustainable business practices, it is imperative to consider how external sustainability expectations and standards can be integrated into SMCS.

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