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The Influence of Sustainability-Driven Budgeting on Operational Efficiency and Competitive Advantage

Eko Wiji Pamungkas [1], Dini Fitriani[2]
[1,2] Sekolah Tinggi Ilmu Ekonomi Wibawa Karta Raharja

Email: ekowiji.stiewibawakartaraharja@gmail.com

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ABSTRACT

Global pressure for sustainable business practices has encouraged firms to integrate sustainability principles into their budgeting systems as part of strategic management. Sustainability-driven budgeting is increasingly viewed not merely as a compliance mechanism, but as a potential driver of operational efficiency and competitive advantage. This study aims to examine the effect of sustainability-driven budgeting on operational efficiency and competitive advantage, as well as to test the mediating role of operational efficiency in this relationship. A quantitative explanatory survey design was employed. Data were collected from 210 managerial respondents directly involved in budgeting and strategic decision-making processes and analyzed using Partial Least Squares Structural Equation Modeling. The results reveal that sustainability-driven budgeting has a positive and significant effect on operational efficiency. Operational efficiency, in turn, significantly influences competitive advantage. Mediation analysis confirms that operational efficiency partially mediates the relationship between sustainability-driven budgeting and competitive advantage. These findings indicate that sustainability-oriented budgeting practices can generate strategic value by enhancing internal efficiency while strengthening firms' long-term competitive positioning. This study contributes to the literature on business sustainability by highlighting budgeting as a core managerial mechanism and offers practical insights for managers in designing performance-oriented and sustainability-based budgeting policies.

Keywords: *competitive advantage, operational efficiency, sustainability-driven budgeting, sustainable management, strategic budgeting*

INTRODUCTION

Global pressure toward sustainable business practices has driven a paradigm shift in corporate management, particularly in financial and operational decision-making. Firms are no longer evaluated solely on short-term financial performance, but increasingly on their ability to consistently integrate environmental, social, and governance (ESG) considerations into business strategy. This shift positions sustainability as an integral component of corporate management systems rather than a merely normative commitment or symbolic reporting activity (Blazey & Lelong, 2022; Wang et al., 2022). Within this context, corporate budgeting has evolved from a conventional cost-control tool into a strategic instrument that guides organizational behavior toward long-term sustainable objectives.

Sustainability-driven budgeting has emerged as an approach that explicitly embeds sustainability principles into budgeting processes, including planning, resource allocation, and performance evaluation. This approach emphasizes that budgeting decisions should not only prioritize financial efficiency but also account for environmental impacts, social responsibility, and accountable governance. Green budgeting and sustainability-centered budgeting are viewed as mechanisms to ensure

that corporate sustainability commitments are genuinely internalized in day-to-day operational decisions, including cost management, process investments, and organizational capability development (Isi et al., 2022; Nurdianti et al., 2025). Accordingly, sustainability-driven budgeting has the potential to reshape how firms optimize resources and manage operational processes.

From a managerial perspective, firms often face challenges in balancing operational efficiency demands with sustainability agendas that are frequently perceived as additional cost burdens. However, strategic management and managerial accounting perspectives suggest that integrating sustainability into budgeting systems can, in fact, enhance efficiency by reducing waste, optimizing processes, and improving cost-control transparency (Pamungkas et al., 2023; Safriani et al., 2025). By embedding ESG considerations into budgeting decisions, firms are encouraged to allocate resources more selectively and with a long-term value orientation. Consequently, operational efficiency is reframed not merely as short-term cost savings but as the organization's ability to generate optimal outputs while minimizing negative environmental and social impacts.

Empirical evidence indicates that sustainability practices integrated into internal management systems can contribute to improved operational performance and competitive positioning. Wang et al. (2022) demonstrate that firms aligning green strategies with operational systems tend to achieve more stable sustainable success and competitive advantage. Similarly, Nohong et al. (2024) find that green financial management practices are positively associated with sustainable competitive advantage in the Indonesian corporate context. Nevertheless, much of this literature conceptualizes sustainability at the strategic or policy level, without explicitly examining the role of budgeting as an operational mechanism that translates sustainability commitments into actionable resource allocation decisions.

More specifically, the relationship between sustainability-driven budgeting and operational efficiency remains underexplored from a structural perspective. Budgeting represents a critical nexus between strategy formulation and operational implementation, where sustainability commitments are translated into concrete resource allocation decisions. Alawaed et al. (2024) show that effective budgeting systems play a crucial role in supporting sustainable competitive advantage through production optimization and cost control; however, sustainability is not explicitly positioned as a core budgeting dimension in their analysis. Likewise, Eichholz et al. (2024) emphasize the importance of the budgeting planning function in enhancing organizational resilience and competitive advantage, yet do not examine the explicit integration of sustainability orientation within budgeting practices.

From a strategic management standpoint, operational efficiency is widely recognized as a key mechanism for building long-term competitive advantage. Firms that manage their processes efficiently not only achieve cost advantages but also gain strategic flexibility to respond to market dynamics and stakeholder expectations (Bari et al., 2022; S et al., 2025). In the sustainability context, operational efficiency serves as a bridge connecting environmental and social commitments with economic value creation. However, most prior studies focus on the direct relationship between sustainability and competitive advantage, while paying limited attention to the internal mechanisms that mediate this relationship.

The research gap addressed in this study lies in the scarcity of quantitative research that models sustainability-driven budgeting as a latent managerial construct and structurally examines its relationship with operational efficiency and competitive advantage. For instance, Nohong et al. (2024) identify a positive association between green financial management and sustainable competitive advantage but do not test operational efficiency as a mediating mechanism. Similarly, Alawaed et al. (2024) highlight the importance of budgeting systems for sustainable competitive advantage without explicitly integrating sustainability as a core budgeting orientation. Eichholz et al. (2024) focus on budgeting in crisis and resilience contexts but do not simultaneously model sustainability orientation, operational efficiency, and competitive advantage within a unified framework.

These limitations indicate the need for an analytical approach capable of capturing both direct and indirect relationships among sustainability-driven budgeting, operational efficiency, and competitive advantage within an integrated model. Structural Equation Modeling using the Partial Least Squares approach is well suited for this purpose, as it enables the modeling of complex latent relationships and the examination of mediation effects in managerial contexts, particularly when constructs are multidimensional and theory-development oriented (Sarwono & Handayani, 2021). This approach allows for a deeper understanding of not only whether sustainability-driven budgeting influences competitive advantage, but also how this influence operates through improvements in operational efficiency.

Accordingly, this study aims to analyze the effect of sustainability-driven budgeting on operational efficiency, examine the influence of operational efficiency on competitive advantage, and test the mediating role of operational efficiency in the relationship between sustainability-driven budgeting and competitive advantage. The study is expected to contribute theoretically to the literature on business sustainability and strategic management by positioning budgeting as a key operational mechanism. From a practical perspective, the findings are anticipated to provide managerial insights for designing sustainability-oriented budgeting policies that not only meet ESG expectations but also strengthen operational efficiency and long-term competitive advantage.

METHODS

Research Design

This study adopts a quantitative approach with an explanatory survey design to examine the causal relationships among the managerial constructs under investigation. The explanatory design is employed because the study aims not only to describe sustainability-driven budgeting practices, but also to explain the mechanisms through which such practices influence operational efficiency and corporate competitive advantage. Data analysis is conducted using Structural Equation Modeling with the Partial Least Squares approach (SEM–PLS). The SEM–PLS method is considered appropriate for research oriented toward theory development and testing, involving multidimensional latent constructs, and allowing for the simultaneous examination of direct and indirect effects within a single structural model.

Population and Sample

The research population comprises financial managers, operational managers, and strategy or sustainability managers who are directly involved in corporate budgeting processes and strategic decision-making. These respondents are selected due to their

relevant knowledge and practical experience related to the implementation of sustainability-driven budgeting and its implications for operational processes and firm performance. A purposive sampling technique is employed, with inclusion criteria requiring respondents to have active involvement in budget formulation and a clear understanding of the company's sustainability policies. The sample size is determined based on the adequacy principles of SEM–PLS, ensuring that the number of observations is sufficient to produce stable and reliable estimations of both the outer model and the inner model.

Research Instruments

The research instrument consists of a structured questionnaire developed based on theoretical foundations and prior empirical studies in the areas of business sustainability, managerial budgeting, operational efficiency, and competitive advantage. The sustainability-driven budgeting construct is measured using indicators that reflect the extent to which environmental, social, and governance considerations are integrated into budgeting processes and sustainability-oriented resource allocation. Operational efficiency is measured through indicators related to cost control, process optimization, and effective resource utilization, while competitive advantage is measured using indicators capturing differentiation, long-term competitiveness, and the firm's competitive positioning. All measurement items are assessed using a Likert scale. Instrument evaluation is conducted through validity and reliability testing within the SEM–PLS framework, including assessments of convergent validity, construct reliability, and discriminant validity, to ensure that each latent construct is measured accurately and consistently

RESULTS AND DISCUSSION

Result

Sample Characteristics

This study involved 210 respondents, all of whom were financial managers, operational managers, or strategy/sustainability managers directly engaged in corporate budgeting processes and strategic decision-making. An analysis of respondent characteristics was conducted to provide contextual understanding for the structural model results and to ensure that the data were obtained from informants with relevant expertise and decision-making authority.

Table 1. Respondent Characteristics

Characteristics	Frequency	Percentage
Financial managers	82	38.3%
Operational managers	71	33.2%
Strategy/Sustainability managers	61	28.5%
Working experience ≥ 5 years	147	68.7%
Manufacturing sector	96	44.9%
Service sector	74	34.6%
Other sectors	44	20.5%

The interpretation of Table 1 indicates that the majority of respondents possess adequate work experience and occupy strategic positions relevant to budgeting practices and sustainability management. The diverse sectoral composition suggests that the research findings represent a wide range of business contexts, thereby enhancing the cross-industry relevance of the analytical results.

Descriptive Statistics of Research Constructs

Descriptive statistics were employed to summarize the general response patterns of the respondents with respect to the constructs of sustainability-driven budgeting, operational efficiency, and competitive advantage.

Table 2. Descriptive Statistics of Constructs

Construct	Mean	Standard Deviation
Sustainability-Driven Budgeting	4.12	0.63
Operational Efficiency	4.05	0.59
Competitive Advantage	4.18	0.61

The results presented in Table 2 indicate that all three constructs exhibit mean values above the midpoint of the measurement scale, suggesting that respondents generally perceive sustainability-driven budgeting practices, operational efficiency, and competitive advantage to be at relatively high levels within their respective organizations. The moderate variation in responses reflects a reasonable degree of consistency in respondents' perceptions.

Outer Model Evaluation

The outer model evaluation was conducted to ensure the validity and reliability of the latent constructs prior to structural model analysis.

Table 3. Convergent Validity and Reliability

Construct	Outer Loadings Range	AVE	Cronbach's Alpha	Composite Reliability
Sustainability-Driven Budgeting	0.71 – 0.86	0.59	0.87	0.91
Operational Efficiency	0.73 – 0.88	0.62	0.88	0.92
Competitive Advantage	0.72 – 0.87	0.60	0.86	0.90

Table 3 shows that all indicators have outer loading values exceeding the minimum threshold of 0.70, while the Average Variance Extracted (AVE) values for all constructs are above 0.50. In addition, Cronbach's alpha and composite reliability values for all constructs exceed 0.70, confirming that the research instrument demonstrates adequate convergent validity and strong internal reliability.

Discriminant Validity

Discriminant validity was assessed to ensure that each latent construct possesses sufficient conceptual distinctiveness from the other constructs in the model.

Table 4. Fornell–Larcker Criterion

Construct	SDB	OE	CA
Sustainability-Driven Budgeting (SDB)	**0.768**		
Operational Efficiency (OE)	0.612	**0.787**	
Competitive Advantage (CA)	0.584	0.655	**0.775**

The square root of the AVE values on the diagonal is higher than the correlations among constructs, indicating that each construct demonstrates adequate discriminant validity. Accordingly, sustainability-driven budgeting, operational efficiency, and competitive advantage are empirically distinguishable.

Inner Model Evaluation

The inner model evaluation was conducted to assess the explanatory power of the structural model in explaining the endogenous variables.

Table 5. Coefficient of Determination (R^2)

Endogenous Variable	R^2
Operational Efficiency	0.38
Competitive Advantage	0.47

The R^2 values indicate that sustainability-driven budgeting explains 38 percent of the variance in operational efficiency, while the combined effect of sustainability-driven budgeting and operational efficiency explains 47 percent of the variance in competitive advantage. These values reflect a moderate to strong explanatory power of the model within the context of managerial research.

Structural Model and Hypothesis Testing

Hypothesis testing was conducted through the analysis of path coefficients and bootstrapping procedures.

Table 6. Path Coefficients and Bootstrapping Results

Hypothesized Path	Path Coefficient	t-value	p-value
SDB → Operational Efficiency	0.62	10.41	< 0.001
Operational Efficiency → Competitive Advantage	0.54	8.27	< 0.001
SDB → Competitive Advantage	0.21	3.12	0.002

The results presented in Table 6 indicate that sustainability-driven budgeting has a positive and significant effect on operational efficiency. Operational efficiency also exerts a significant influence on competitive advantage. In addition, the direct effect of sustainability-driven budgeting on competitive advantage remains significant, although with a smaller coefficient.

Mediation Analysis

A mediation analysis was conducted to examine the role of operational efficiency in the relationship between sustainability-driven budgeting and competitive advantage.

Table 7. Mediation Effect Results

Indirect Path	Indirect Effect	t-value	p-value
SDB → OE → CA	0.34	6.89	< 0.001

The mediation test results indicate that the indirect effect of sustainability-driven budgeting on competitive advantage through operational efficiency is statistically significant. Because the direct effect also remains significant, operational efficiency functions as a partial mediator. This finding suggests that sustainability-driven budgeting enhances competitive advantage primarily through improvements in operational efficiency, while also exerting a direct contribution to firm competitiveness.

Overall, the results demonstrate that sustainability-driven budgeting is an important determinant of both operational efficiency and competitive advantage. Operational efficiency is empirically confirmed as a key mechanism that bridges the influence of sustainability-oriented budgeting practices on long-term competitiveness. The tested SEM–PLS model shows strong empirical consistency in both the outer model and inner model evaluations, indicating that the findings provide a credible analytical foundation for the development of sustainability management theory and practice.

Discussion

The findings of this study show that sustainability-driven budgeting plays a significant role in enhancing operational efficiency and competitive advantage, both directly and indirectly through the mediating mechanism of operational efficiency. These results confirm that sustainability-based budgeting does not merely function as a symbolic policy or normative compliance with ESG agendas, but rather operates as a strategic managerial instrument with tangible implications for operational performance and competitive positioning.

The positive effect of sustainability-driven budgeting on operational efficiency reflects that integrating sustainability principles into the budgeting process encourages firms to allocate resources in a more rational, measurable, and long-term oriented manner. Practices such as energy-efficient budgeting, investment in environmentally friendly processes, and sustainability-based cost control enable firms to reduce waste, improve process productivity, and optimize the use of operational inputs. In this sense, sustainability does not represent an additional cost burden, but instead serves as a framework of managerial discipline that strengthens internal efficiency.

Furthermore, operational efficiency is shown to have a significant effect on competitive advantage. This finding indicates that firms capable of managing costs, time, and resources efficiently are in a stronger position to create differentiation, enhance customer value, and sustain long-term competitiveness. Operational efficiency enables firms to respond more rapidly to market changes, reduce production costs without compromising quality, and reallocate resources toward strategic innovation. In this context, efficiency functions as an internal foundation for the creation of sustainable competitive advantage.

The mediation analysis reveals that operational efficiency plays a partial mediating role in the relationship between sustainability-driven budgeting and competitive advantage. This finding has important theoretical implications. On one hand, sustainability-based budgeting enhances firm competitiveness primarily through improvements in operational efficiency as the main internal mechanism. On the other hand, the persistence of a significant direct effect indicates that sustainability-driven budgeting also generates additional strategic value beyond efficiency, such as enhanced corporate reputation, stakeholder legitimacy, and market trust. In other words, sustainability-oriented budgeting operates not only through internal operational pathways, but also through external strategic channels.

Conceptually, these findings reinforce the view that sustainability practices embedded within core management systems, in this case budgeting, are more likely to generate competitive advantage than sustainability initiatives that are fragmented or ad hoc. Budgeting serves as a central coordination mechanism within organizations. When

sustainability principles are integrated into this process, their impact becomes systemic and extends across multiple operational functions. This helps explain why sustainability-driven budgeting exerts a relatively strong influence on operational efficiency in the research model.

Accordingly, this discussion confirms that the relationship among sustainability, efficiency, and competitive advantage is structural and interdependent. Sustainability-driven budgeting acts as an initial catalyst that shapes operational efficiency, which in turn strengthens firm competitiveness in a sustainable manner. These findings extend the business sustainability literature by demonstrating that budgeting is not merely a financial control tool, but also a strategic instrument for translating sustainability agendas into tangible competitive advantage

CONCLUSIONS

This study concludes that sustainability-driven budgeting has a positive and significant effect on both operational efficiency and corporate competitive advantage. Operational efficiency is empirically confirmed to act as a partial mediator that links sustainability-based budgeting practices to firm competitiveness. These findings demonstrate that integrating sustainability principles into the budgeting process is capable of enhancing internal performance while simultaneously strengthening a firm's strategic competitive position. From a theoretical perspective, this study contributes to the business sustainability literature by positioning budgeting as a key managerial mechanism in the creation of sustainable competitive advantage.

The practical implications of this study indicate that financial managers and strategic managers should view sustainability-driven budgeting as a strategic investment rather than merely a compliance obligation. Integrating ESG considerations into budgeting can serve as an effective tool for improving process efficiency and generating long-term value for the firm. Nevertheless, this study has limitations due to its reliance on a cross-sectional survey design, which constrains long-term causal inference, as well as its dependence on managerial perceptions as the primary data source. Future research is therefore encouraged to employ longitudinal designs or objective firm performance data in order to enhance the generalizability and analytical depth of the relationship between sustainability, efficiency, and competitive advantage

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