

IMPLEMENTATION OF GREEN COSTING TO DEVELOP A SUSTAINABLE MARKETING STRATEGY

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Abstract: This study aims to analyze the application of Green Costing as part of a sustainable marketing strategy in companies. This study uses a literature review method with the Watase Uake literature search tool, which allows for the identification and selection of relevant articles from various sources. Based on an analysis of 15 selected articles, the results show that effective marketing strategies in supporting the implementation of Green Costing involve the use of environmentally friendly accounting policies, the use of digital technology to optimize energy and resource management, and effective communication through digital media to raise consumer awareness of the company's green initiatives. Internal factors, such as management commitment and company policy, as well as external factors, such as environmental regulations and market demands, influence companies' decisions to adopt Green Costing. Digital technologies, such as SVM and QPSO-based optimization models, support environmental cost efficiency and sustainability. However, the main challenges faced by companies are limited accurate data, high initial investment costs, and obstacles in implementing technology on a larger scale. Suggestions for further research are to focus on developing more affordable technological solutions and improving environmental data transparency to support better decision-making in sustainable marketing strategies.

Keywords: Green Costing, sustainable marketing strategy, digital technology, environmental cost efficiency

1. Introduction

The global industrial transformation that is increasingly moving towards sustainability is forcing companies to adjust their business strategies, one of which is by adopting an environmentally friendly approach (Brenner, 2018). In this context, Green Costing has emerged as a tool used to integrate environmental considerations into a company's cost planning and marketing strategies. Green Costing is a method for measuring and managing costs related to the environmental impact of a product or service (Rounaghi, 2019). This concept not only focuses on cost reduction but also aims to minimize the ecological footprint, which can ultimately enhance the company's image in the eyes of consumers who are increasingly concerned about sustainability issues (Papademetriou et al., 2023). In Indonesia, more and more companies are starting to implement Green Costing as part of their strategy, in line with increasing consumer awareness of the importance of sustainability in their consumption processes (Limaho et al., 2022). Therefore, implementing Green Costing in sustainable marketing strategies is becoming increasingly relevant and urgent (Ren et al., 2018).

Companies that adopt Green Costing not only consider direct costs related to production or distribution, but also take into account external costs, such as negative impacts on the environment and natural resources (Mpofu, 2022). The application of Green Costing provides further benefits, namely that companies can identify opportunities to reduce waste, improve efficiency, and minimize environmental impact (Rounaghi, 2019). Along with the development of digital technology that enables more transparent reporting and monitoring of environmental

management, more and more companies are beginning to design marketing strategies that prioritize sustainability. Today's consumers are increasingly demanding that the products they consume are not only of high quality but also produced with environmental considerations in mind (Glavič, 2021). Therefore, the use of Green Costing in sustainable marketing strategies can create added value for companies while strengthening their position in an increasingly competitive market (Caiado et al., 2018).

However, although the application of Green Costing promises various benefits, its implementation is not easy (Zhang et al., 2018). Many companies face challenges in formulating and implementing sustainable marketing strategies, especially those related to the measurement and evaluation of environmental costs, which are quite complex (Barua, 2020). In addition, another challenge is the lack of understanding among various stakeholders regarding the importance of integrating sustainability aspects into their businesses, which can be an obstacle to the widespread adoption of Green Costing (Jagarajan et al., 2017). Therefore, an integrated approach is needed in developing marketing strategies that combine green cost analysis with effective communication to educate consumers and encourage sustainable consumption behavior. Therefore, this study aims to explore further how the implementation of Green Costing can be used to develop effective sustainable marketing strategies.

Against this backdrop, this study aims to understand how the implementation of Green Costing can be optimized in sustainable marketing strategies, particularly in the context of companies operating in Indonesia. This study will explore various approaches applied by companies in integrating Green Costing into their strategies, as well as the factors that support and hinder the implementation of this strategy. Based on these objectives, the research questions asked are as follows:

RQ1: What is the form and approach of an effective marketing strategy in encouraging the implementation of Green Costing to create sustainable marketing in the company?

RQ2: What factors, both internal and external, influence the company's decision to implement Green Costing as part of a sustainable marketing strategy?

RQ3: How can the use of digital technology support the effectiveness of Green Costing implementation in improving company sustainability?

RQ4: What are the main obstacles faced by the company in implementing Green Costing for sustainable marketing strategy?

2. Literature Review

Literature was searched through the Scopus database, using appropriate Boolean keyword combinations:

" *Environmental+Cost+Accounting* ", the literature search process was conducted through the Scopus database using the Watase Uake tool, with publication year filters from 2015 to 2025.

1. Inclusion and Exclusion Criteria

In order to make the article selection process objective, the following inclusion criteria were applied:

- a. Academic articles (peer-reviewed journal articles)
- b. Focus on the implementation of Green Costing in the context of sustainable marketing strategy
- c. Targeting companies or organizations committed to environmental sustainability
- d. Available in full text and has a clear abstract
- e. Published between the years 2015–2025
- f. Written in Indonesian or English

Meanwhile, the exclusion criteria include:

- a. Opinion articles, editorials, or commentaries without methodological basis
- b. Studies that only discuss technical aspects without linking to Green Costing in sustainable marketing
- c. Articles that do not address sustainability-focused companies or are not contextually relevant to this topic

2. Article selection process (PRISMA 2020)

The literature selection process follows four main stages according to the PRISMA 2020 diagram, namely:

Identification:

A total of 170 articles were found through the initial search in Scopus with the keyword "Environmental Cost Accounting" in the period 2015-2025. Of these, 39 articles were excluded because they did not meet the year criteria, 20 articles were removed for other reasons, and 2 articles did not have sufficient abstracts for further screening.

Filtering:

A total of 109 articles remained after the identification stage. Of these, 78 articles were eliminated because they did not meet the inclusion criteria, such as not being relevant to the study topic.

Feasibility assessment (Eligibility):

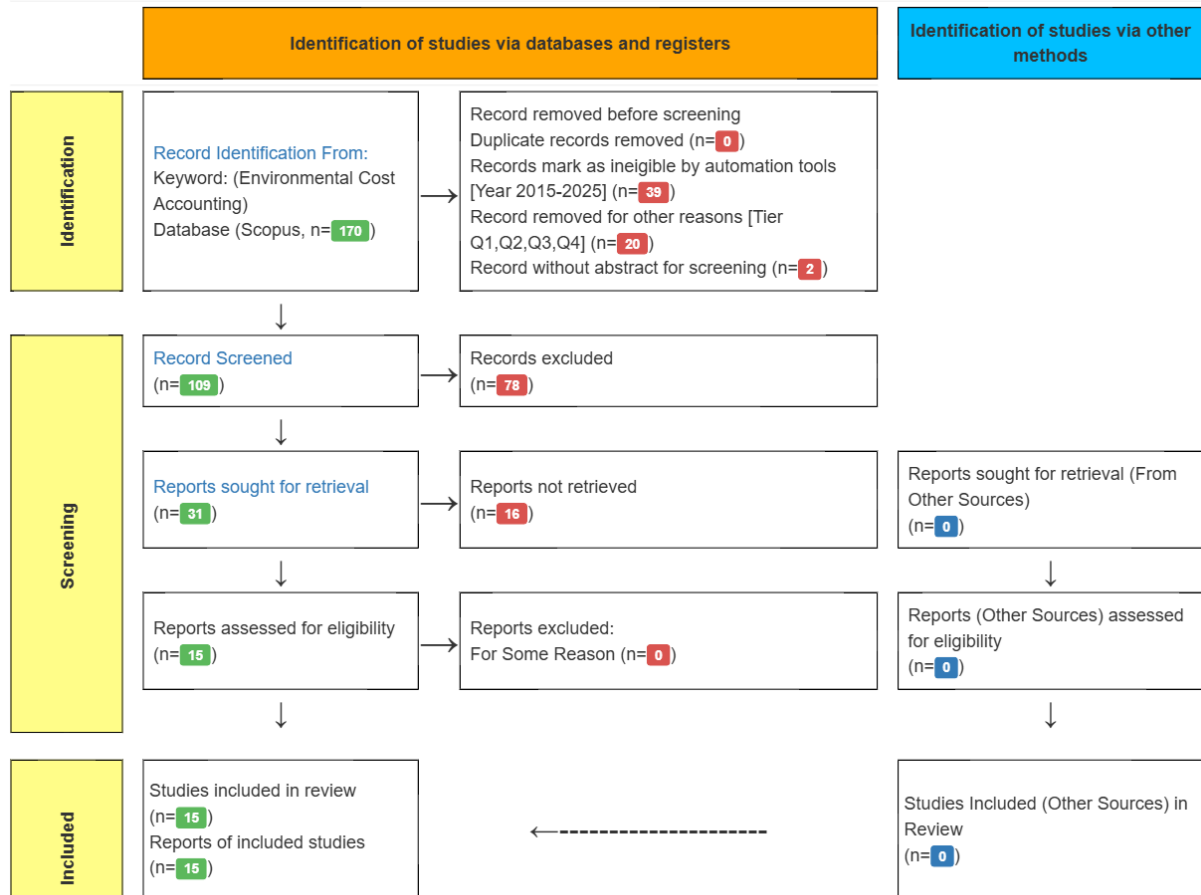
Sebanyak 31 artikel diajukan untuk penilaian full-text. Namun, 16 laporan tidak berhasil diperoleh, sehingga hanya 15 artikel yang dapat dianalisis lebih lanjut. Dari artikel-artikel yang dinilai kelayakannya, 0 artikel dikeluarkan karena alasan lain.

Final inclusion:

A total of 15 articles from Scopus and no additional relevant articles from other sources were included in the final synthesis for thematic analysis.

Through the PRISMA selection process, 15 relevant articles were analyzed to identify the application of green costing in developing sustainable marketing strategies, particularly in the context of cost management and environmental impact in various industrial sectors. Most studies used quantitative approaches such as cost-benefit analysis (CBA), life cycle cost analysis (LCCA), and optimization models such as Support Vector Machine (SVM) and Quantum Particle Swarm Optimization (QPSO), while others were more conceptual or literature reviews. Common findings indicate that cost efficiency and environmental impact management significantly influence operational sustainability and marketing strategies. The strategies implemented include resource management optimization, emission reduction, and innovation in energy and waste management. Several articles highlight the importance of integrating sustainability into company operations, with environmentally friendly technology-based approaches, driven by collaboration between industry, government, and the community. Innovations in cost and environmental management are also identified as drivers of efficiency as well as opportunities to strengthen the image of sustainability-oriented companies.

Prisma Reporting: Green Costing



Generate From Wataase Uake Tools, based on Prisma 2020 Reporting

Figure 1. PRISMA diagram

Table 1. Findings

No.	Author and Article Title	Research Topic	Research Methods	Key Findings
1	Wang & Qiu, (2025), Relationship among environmental regulation costs, corporate accounting policies, and green innovation efficiency	The relationship between environmental regulatory costs, accounting policies, and green innovation efficiency	Empirical data analysis with fixed effects model	Environmental regulatory costs drive the efficiency of green innovation, but aggressive accounting policies hinder it. R&D investment acts as a mediator.
2	Iversen et al., (2024), Mountains of trouble: Accounting for environmental costs of land use	Impact of tourism development on the environment	Cost-Benefit Analysis (CBA) and Stated Preferences (SP)	Small tourism developments are more profitable at the regional level than large developments.

No.	Author and Article Title	Research Topic	Research Methods	Key Findings
	change from tourism development			
3	Han (2023), Optimisation Analysis of Enterprise Environmental Cost Accounting Based on Support Vector Machine Model	Optimasi akuntansi biaya lingkungan di perusahaan China	Model Support Vector Machine (SVM) dan Material Flow Cost Accounting (MFCA)	Model SVM dapat mengoptimalkan pengelolaan biaya lingkungan dengan fokus pada pengurangan pemborosan dan emisi.
4	Liu et al. (2025), Sustainability-Oriented Framework for Life Cycle Environmental Cost Accounting and Carbon Financial Optimization in Prefabricated Steel Structures	Environmental and carbon finance cost optimization of prefabricated steel structures	LCA, LCC, and carbon finance models	Moderate decarbonization investments can generate positive economic returns in a base carbon price scenario.
5	Ruela et al. (2024), Optimizing the Steel Ladle Thermal Management	Thermal management and cost optimization in steel ladle operations	Mixed linear programming and predictive models	Thermal management of ladles can reduce costs by up to 8% and CO2 emissions by a limited amount.
6	Kumar et al. (2024), Integrated Nutrient Management as a Low Cost and Eco-Friendly Strategy for Sustainable Fruit Production in Apricot	Integrated nutrient management for sustainable apricot production	Randomized block design for fertilizer evaluation	The use of a mixture of inorganic fertilizers, bio-fertilizers, and compost results in increased production yields and soil health.
7	Sing M & Beno, (2025), Enhancing Energy Efficiency in Educational Institutions	Energy management in educational institutions for efficiency	Energy audit, renewable energy system implementation, and economic analysis	The framework successfully reduced energy costs and CO2 emissions, and improved energy efficiency.

No.	Author and Article Title	Research Topic	Research Methods	Key Findings
8	Minde et al. (2024), Exploring Sustainable and Cost-effective Wastewater Management Solutions for Urban India	Low-cost wastewater treatment in urban areas	Life Cycle Cost Analysis (LCCA)	SIBF systems are more cost-effective than MBBR, with lower lifecycle costs.
9	Paul et al. (2025), Optimizing Sustainable Energy Management in Grid-Connected Microgrids Using Quantum Particle Swarm Optimization	Energy optimization in microgrid with emission reduction	Quantum Particle Swarm Optimization (QPSO)	QPSO reduced operating costs by 9.67% and CO2 emissions by 13.23%.
10	Kadrigama et al. (2023), Sustainable Green Energy Management	Renewable energy management in multi-energy systems	ARSFL Metaheuristic Algorithm	ARSFL algorithm reduces costs and CO2 emissions better than PSO and GA.
11	Signorini et al. (2025), Cost Efficiency in Buildings: An Ontological Perspective for Sustainable Life Cycle Management	Cost efficiency in building lifecycle management	Ontology and Lifecycle Management	Develop standardized data structures to improve transparency and cost efficiency in construction projects.
12	Yousefi et al. (2023), Sustainable Management of Alkaline Battery Waste in Developing Countries	Alkaline battery waste management with metal recovery	Life Cycle Cost Analysis (LCCA)	Recovery of metals such as zinc can reduce annual financial losses and environmental impacts.
13	Sievers et al. (2025), Federated Reinforcement Learning for Sustainable and Cost-efficient Energy Management	Federation-based learning energy management	Integrated Learning (FL) and Reinforcement Learning (RL)	Reduce costs and emissions with federated learning compared to other methods.
14	Zhen et al. (2023), Eco-compensation Quantification of Sustainable Food	Sustainable food waste management	Life Cycle Cost Analysis and Cost-Benefit Analysis	AFDC is the best economic and environmental alternative for food waste management.

No.	Author and Article Title	Research Topic	Research Methods	Key Findings
	Waste Management Alternatives			
15	Zhen et al. (2023), Analyzing the Influence of Green Finance on Sustainable Business Development in China	The influence of green financing on sustainable business development in China	Panel econometric model	Green finance significantly improves sustainable business performance by supporting environmentally friendly projects.

From the analysis of selected articles, several key themes related to environmental cost management and sustainable strategies were identified. Effective cost management involves the integration of accounting policies and green innovation, with environmental regulations promoting efficiency, although aggressive accounting policies can hinder it (Wang & Qiu, 2025). Small-scale tourism development is more economically and environmentally beneficial than large-scale development (Iversen et al., 2024). Technologies such as Support Vector Machine (SVM) help optimize environmental costs, although they are limited to internal company data (Chen et al., 2024). In prefabricated steel construction, Life Cycle Assessment (LCA) and Life Cycle Costing (LCC) have proven effective in assessing economic and environmental performance (Liu et al., 2025). The main challenge in applying optimization technologies, such as Quantum Particle Swarm Optimization (QPSO) in microgrids, is their limitation in large-scale applications (Paul et al., 2025).

3. Method

This study adopted a Systematic Literature Review (SLR) approach, following the Preferred Reporting Items for Systematic Reviews and Meta-Analyses (PRISMA) 2020 guidelines, to evaluate marketing strategies that can increase the adoption of mobile app-based financial services among college students. The SLR approach was chosen because it allows researchers to systematically, clearly, and structuredly synthesize scientific evidence from various relevant previous studies.

4. Result and Discussion

RQ1: What is the form and approach of an effective marketing strategy in encouraging the implementation of Green Costing to create sustainable marketing in the company?

Effective marketing strategies to support the implementation of Green Costing in sustainable marketing involve integrating sustainability principles into every aspect of a company's operations, including environmental cost accounting and green innovation. This approach requires policies that support energy efficiency, waste management, and carbon footprint reduction, which are reflected in lower environmental costs and increased operational efficiency (Wang & Qiu, 2025). In this case, technology and accounting policies that support environmentally friendly cost management are key to creating marketing strategies that appeal to consumers who are increasingly concerned about sustainability issues.

In addition, digital marketing approaches through social media and online platforms increase consumer awareness of corporate green initiatives. Optimization models such as SVM for environmental cost management can be used to demonstrate waste reduction and resource efficiency, supporting the transparency and effectiveness of Green Costing marketing strategies (Kadirgama et al., 2023). This approach is also reflected in energy management in educational institutions and urban waste processing, where cost efficiency and sustainability are the main focus (Sing M & Beno, 2025).

RQ2: What factors, both internal and external, influence the company's decision to implement Green Costing as part of a sustainable marketing strategy?

Internal factors that influence a company's decision to implement Green Costing include accounting policies that support environmental cost efficiency and management's commitment to green innovation. Companies with environmentally friendly accounting policies tend to be quicker to adopt technologies that reduce operational costs and environmental impact. For example, cost management using Life Cycle Costing (LCC) and Life Cycle Assessment (LCA) can provide insights into the long-term benefits of investing in green technologies, as seen in a study in the prefabricated steel construction sector (Zhang et al., 2018).

Important external factors include increasingly stringent environmental regulations, consumer demand for environmentally friendly products, and industry competition that encourages the adoption of higher sustainability standards. Companies operating in markets that prioritize sustainability, such as in the renewable energy sector, will be more inclined to integrate Green Costing into their strategies to meet market expectations and government regulations (Kadirgama et al., 2023). In addition, pressure from the public and environmental groups that are increasingly critical of companies' environmental impact is accelerating the decision to implement Green Costing.

RQ3: How can the use of digital technology support the effectiveness of Green Costing implementation in improving company sustainability?

The use of digital technology in the implementation of Green Costing is very important in improving the transparency and efficiency of environmental cost management. Technologies such as algorithm-based optimization models, such as Quantum Particle Swarm Optimization (QPSO), can be used to manage energy and resources in microgrid systems connected to the electricity grid, reducing operational costs and CO₂ emissions (Yousefi et al., 2023). In addition, digital technology enables companies to monitor and measure carbon footprint reductions in real time, thereby assisting in making more accurate data-driven decisions for their sustainability strategies.

In addition, the use of technology also enables companies to more effectively communicate their Green Costing initiatives to consumers through digital platforms. By using social media and web-based applications, companies can raise public awareness of their efforts to reduce environmental impact and improve sustainability. This technology also facilitates more transparent reporting on companies' environmental performance, which can increase consumer confidence and attract customers who care about environmental issues (Signorini et al., 2025).

RQ4: What are the main obstacles faced by the company in implementing Green Costing for sustainable marketing strategy?

The main obstacles faced by companies in implementing Green Costing include limited access to accurate data and the availability of resources to implement the necessary technology. Models such as SVM for environmental cost optimization require comprehensive internal data, which may not always be available in companies with limited resources (Minde et al., 2024). In addition, companies operating in smaller markets or with thin profit margins may find it difficult to allocate funds for the necessary investments in environmentally friendly technologies, as seen in the obstacles faced in the microgrid sector that uses QPSO to reduce emissions (Sing M & Beno, 2025).

External barriers, such as strict regulations and pressure from consumers or stakeholders, also pose significant challenges. Although there is a push to adopt Green Costing as part of a sustainable marketing strategy, many companies feel burdened by high initial costs and challenges in aligning operations with global sustainability standards. This often leads to delays or avoidance of Green Costing implementation, even though the long-term benefits can be greater (Sievers et al., 2025).

5. Conclusions

Based on the results and discussion of this study, it can be concluded that the implementation of Green Costing in the company's sustainable marketing strategy involves the integration of accounting policies that support environmental cost efficiency, the use of digital technology to optimize energy and resource management, and effective communication through digital media to increase consumer awareness of green initiatives. Internal factors, such as management policies and commitment to sustainability, and external factors, including increasingly stringent regulations and market demands, strongly influence companies' decisions to adopt green costing. Digital technologies, such as SVM and QPSO-based optimization models, are proven to support environmental cost efficiency and sustainable marketing strategies. However, the main challenges faced by companies are limited accurate data, high initial investment costs, and barriers to large-scale technology implementation. Suggestions for future research are to focus on developing more affordable technological solutions and improving the transparency of environmental data to support better decision-making in sustainable marketing strategies.

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