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Green Procurement Strategies for Balancing Cost Efficiency with Long-Term Environmental Responsibility

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Abstract

Green procurement, defined as the systematic incorporation of environmental and sustainability considerations into purchasing decisions, has emerged as a strategic imperative for organizations seeking to balance cost efficiency with long-term environmental responsibility. While conventional procurement models traditionally emphasize price reduction, quality assurance, and timely delivery, the evolving socio-economic context has necessitated a paradigm shift toward approaches that integrate ecological and social dimensions. This transition has been accelerated by global sustainability agendas, regulatory frameworks, and the rising expectations of stakeholders. However, achieving a balance between the short-term financial goals of organizations and the long-term imperatives of environmental protection remains complex. This paper undertakes a comprehensive literature-based analysis of green procurement strategies developed up to 2022, with a focus on how organizations reconcile cost efficiency with sustainability objectives. By synthesizing theoretical frameworks, empirical studies, and applied methodologies, the review highlights the evolution of procurement practices from compliance-driven initiatives to strategic sustainability-oriented systems. The discussion emphasizes multi-criteria decision-making, life cycle costing, and supplier collaboration as key mechanisms for integrating economic and environmental goals. The findings demonstrate that while green procurement can enhance organizational reputation, reduce risks, and generate long-term economic gains, it also entails challenges such as higher initial costs, data limitations, and implementation complexities. This paper contributes to ongoing scholarly and managerial debates by consolidating insights from diverse disciplines and offering a structured foundation for the advancement of procurement strategies that align short-term economic imperatives with long-term environmental stewardship.

Keywords: Procurement, Sustainability Strategies, Cost Efficiency, Environmental Responsibility, Supply Chain Management, Life Cycle Costing

1. Introduction

The growing urgency of global environmental challenges has compelled organizations, governments, and societies to rethink traditional economic models and embrace sustainability-oriented practices. Among these, green procurement has emerged as a critical strategy, directly linking supply chain management, organizational performance, and environmental responsibility [1, 2]. Broadly defined, green procurement refers to the integration of environmental considerations into purchasing decisions, with the aim of reducing negative ecological impacts while maintaining or improving economic outcomes [3, 4, 5, 6]. This approach goes beyond conventional procurement objectives, which typically prioritize cost reduction, quality control, and efficiency, to incorporate factors such as resource conservation, waste minimization, and life cycle sustainability [7, 8]. As organizations increasingly face regulatory pressures, investor scrutiny, and stakeholder expectations, the pursuit of green procurement has evolved from a voluntary practice into a strategic necessity [9, 10].

The tension between cost efficiency and environmental responsibility lies at the heart of green procurement debates. Traditional procurement models emphasize short-term financial gains, often neglecting the hidden environmental and social costs associated with production, transportation, and disposal [11, 12]. Green procurement, by contrast, adopts a long-term perspective, recognizing that sustainable practices can yield benefits such as resource efficiency, risk reduction, and reputational gains [13, 14]. However, this transition is far from straightforward. Organizations frequently confront dilemmas wherein environmentally preferable products or services entail higher upfront costs, uncertain returns on investment, and significant implementation challenges. Reconciling these competing imperatives requires sophisticated strategies that balance immediate economic efficiency with broader sustainability objectives [15, 16]. The central question underpinning this research is thus: how can procurement systems be designed to optimize both cost efficiency and long-term environmental responsibility?

The historical evolution of procurement provides a foundation for understanding the emergence of green strategies. In the mid-20th century, procurement was primarily a transactional function focused on negotiating prices and ensuring timely deliveries [17, 18]. During the 1980s and 1990s, procurement began to evolve into a strategic function, with concepts such as total cost of ownership (TCO) and supplier relationship management gaining prominence. Concurrently, the global sustainability movement, epitomized by the 1987 Brundtland Report and subsequent international agreements, catalyzed organizational awareness of environmental issues [19]. By the early 2000s, terms such as green supply chain management (GSCM), sustainable procurement, and corporate social responsibility (CSR) entered mainstream discourse, signaling a paradigmatic shift [20, 21]. Green procurement emerged as a nexus between these developments, representing both a strategic tool and a moral imperative for organizations seeking to align operations with sustainability goals [22].

One of the key intellectual contributions to green procurement is the recognition of life cycle thinking. Unlike traditional procurement approaches that emphasize purchase price and immediate performance, life cycle thinking accounts for the environmental and economic impacts of products across their entire lifespanfrom raw material extraction and manufacturing to usage and end-of-life disposal [23, 24]. This perspective highlights that initial cost savings may be offset by long-term environmental liabilities, while higher upfront investments in green alternatives can generate downstream savings through energy efficiency, reduced waste, and regulatory compliance [25, 26]. Life cycle costing (LCC) has thus become an essential tool for balancing cost and sustainability in procurement decisions [27].

Theoretical frameworks also shed light on the complexities of green procurement. Institutional theory, for example, explains how organizations adopt environmentally responsible procurement practices in response to coercive pressures (e.g., regulations), normative pressures (e.g., industry standards), and mimetic pressures (e.g., benchmarking competitors) [28]. Resource-based and dynamic capability theories, in turn, emphasize that the ability to integrate sustainability into procurement processes can create competitive advantage by fostering innovation, enhancing reputational capital, and building adaptive capabilities. Stakeholder theory underscores that green procurement is not only a managerial choice but also a response to the demands of diverse stakeholders, including customers, investors, regulators, and civil society [29, 30]. Together, these perspectives underscore the multidimensional drivers and outcomes of green procurement.

Empirical studies up to 2022 demonstrate that organizations adopting green procurement strategies report multiple benefits, ranging from improved brand reputation and customer loyalty to operational efficiency and cost savings [31, 32]. For instance, firms integrating green criteria into supplier evaluation often identify partners with higher levels of innovation and resilience [33]. Similarly, green procurement can reduce risks associated with regulatory non-compliance, supply chain disruptions, and reputational damage. Yet, these benefits are neither automatic nor evenly distributed across industries. Sectors such as manufacturing, construction, and transportation face particularly acute challenges due to the energy- and resource-intensive nature of their operations. In contrast, service-based industries often encounter fewer technical barriers but must grapple with ensuring transparency and accountability in complex supply networks [34].

Despite growing momentum, several barriers impede the widespread adoption of green procurement. The most frequently cited challenge is the perceived cost premium associated with environmentally preferable products and services [35]. While long-term savings may accrue through efficiency and risk reduction, organizations often face difficulties in justifying higher initial expenditures to shareholders or budget-constrained managers [36]. Additionally, the lack of standardized sustainability metrics complicates the evaluation and comparison of green alternative. Data scarcity, supply chain opacity, and inconsistent reporting further hinder the ability of procurement professionals to make informed choices [37]. Cultural and organizational resistance, stemming from entrenched procurement practices and short-term performance pressures, also pose significant obstacles [38]. These challenges underscore the need for comprehensive frameworks that align economic and environmental objectives in a coherent, data-driven manner [39].

The global policy landscape has also played a decisive role in shaping green procurement practices. International agreements such as the Kyoto Protocol, the Paris Agreement, and the United Nations Sustainable Development Goals (SDGs) have provided normative frameworks that encourage organizations to embed sustainability into procurement processes [40, 41]. National and regional policies, such as the European Union's Green Public Procurement (GPP) program, have further institutionalized the practice by mandating or incentivizing green purchasing in public and private sectors [42, 43]. By 2022, governments in Asia, Europe, and North America had established policies encouraging organizations to consider environmental criteria alongside traditional procurement priorities. These policies not only create compliance obligations but also stimulate innovation by creating markets for green products and services [44, 45].

Technological advancements have reinforced the potential of green procurement by enhancing data availability, analytical capabilities, and process transparency. Big data analytics, blockchain, and the Internet of Things (IoT) enable organizations to track supplier practices, monitor environmental impacts, and ensure accountability across global supply chains [46, 47]. Digital platforms also facilitate supplier collaboration, enabling joint initiatives to reduce waste, optimize logistics, and improve resource efficiency. Artificial intelligence and predictive analytics are increasingly employed to evaluate trade-offs between cost and sustainability, providing procurement professionals with actionable insights. These technological enablers expand the toolkit available for reconciling short-term economic imperatives with long-term environmental goals [48, 49].

Notably, the COVID-19 pandemic underscored the fragility of global supply chains and amplified calls for sustainability-oriented procurement [50]. Disruptions in supply continuity, heightened demand volatility, and environmental concerns converged to highlight the risks of over-reliance on cost-based procurement models. In response, many organizations accelerated efforts to integrate sustainability into procurement strategies, recognizing that resilience and responsibility are mutually reinforcing [51, 52]. Green procurement has thus been recast not only as a sustainability initiative but also as a resilience strategy capable of buffering organizations against systemic shocks [53].

The introduction of green procurement also necessitates reconsideration of the role of suppliers. Vendors are no longer evaluated solely on cost and quality but also on their ability to meet environmental standards, innovate sustainable products, and align with organizational values [54, 55]. Supplier collaboration, capacity building, and shared investments in sustainability initiatives have emerged as critical practices [56, 57]. This relational orientation reflects the broader shift from transactional to strategic sourcing, wherein suppliers are viewed as long-term partners contributing to organizational sustainability goals [58]. However, this also places new demands on suppliers, particularly small and medium-sized enterprises, which may lack the resources or expertise to comply with green requirements [59]. Addressing this supplier capability gap remains an important challenge for organizations seeking to implement effective green procurement strategies [60].

In summary, the introduction underscores the strategic significance of green procurement as a mechanism for balancing cost efficiency with long-term environmental responsibility. The evolution of procurement from a transactional to a strategic function has been accompanied by the recognition that environmental stewardship is inseparable from organizational resilience and competitiveness. Yet, the integration of green practices into procurement systems is fraught with challenges, including cost premiums, data limitations, and organizational inertia. By 2022, the literature reflects both optimism and caution, highlighting that while green procurement offers pathways to sustainable growth, its successful implementation requires deliberate strategies, technological enablers, and supportive policy frameworks. The subsequent literature review examines in greater depth the theoretical foundations, methodological approaches, and empirical findings that have shaped the field, offering a comprehensive synthesis of how organizations navigate the dual imperatives of economic efficiency and environmental responsibility.

2. Literature Review

The evolution of green procurement as a scholarly and managerial concept reflects broader transformations in sustainability discourse, supply chain management, and corporate governance. While procurement traditionally emphasized cost minimization and transactional efficiency, the integration of environmental considerations into purchasing decisions has generated a rich body of literature that cuts across multiple disciplines, including operations management, environmental economics, organizational theory, and policy studies. This review synthesizes contributions up to 2022, focusing on the theoretical underpinnings, methodological approaches, empirical findings, and emerging debates surrounding green procurement strategies designed to balance cost efficiency with environmental responsibility.

2.1 Conceptual Foundations of Green Procurement

Green procurement is rooted in the recognition that supply chains are both economic and ecological systems, and that purchasing decisions exert significant influence over environmental outcomes [61, 62, 63]. Definitions vary, but a consistent theme is the incorporation of environmental criteriasuch as energy efficiency, recyclability, and emissions reductioninto procurement processes alongside traditional factors like cost, quality, and delivery. The conceptual foundations can be traced to early works on environmental management in the 1980s, which argued that organizations must account for the environmental externalities of production and consumption. The concept gained momentum in the 1990s as part of the broader green supply chain management (GSCM) literature, which emphasized the need to embed sustainability across all stages of the value chain [64].

The literature highlights that green procurement is not merely a technical adjustment but a strategic orientation reflecting shifts in organizational priorities. Early studies framed it primarily as a compliance mechanism, driven by regulatory requirements such as pollution control and waste management laws [65]. Over time, however, scholars have emphasized its potential to generate competitive advantage through innovation, reputation, and risk management [66]. This evolution mirrors the broader trajectory of sustainability discourse, which has moved from a focus on minimizing harm to creating positive value for multiple stakeholders [67].

2.2 Theoretical Perspectives

Several theoretical frameworks have informed scholarly understanding of green procurement. Institutional theory is widely applied to explain how regulatory, normative, and mimetic pressures shape organizational adoption of green procurement practices. Coercive pressures arise from government regulations and industry standards, normative pressures from professional networks and associations, and mimetic pressures from benchmarking competitors [68, 69]. Resource-based theory (RBT) provides another lens, positing that firms that integrate sustainability into procurement processes develop unique capabilities that enhance competitive advantage. Dynamic capabilities theory extends this view, emphasizing the ability of firms to reconfigure procurement practices in response to environmental change [70, 71].

Stakeholder theory has also been influential, highlighting how procurement practices are shaped by the expectations of customers, investors, regulators, and civil society. Green procurement is conceptualized as a mechanism for responding to these diverse stakeholder demands while aligning organizational objectives with societal values. Finally, transaction cost economics (TCE) has been employed to analyze trade-offs between cost efficiency and sustainability, examining how green procurement may alter transaction costs by requiring additional monitoring, certification, or supplier development. These theoretical perspectives collectively underscore that green procurement is a multidimensional construct shaped by economic, institutional, and social dynamics.

2.3 Methodological Approaches

The literature reveals a wide array of methodological approaches to studying green procurement. Survey-based studies dominate, often employing structural equation modeling (SEM) to test relationships between green procurement practices, organizational drivers, and performance outcomes [72, 73]. For example, researchers have used SEM to demonstrate that regulatory pressure, top management commitment, and supplier collaboration are significant predictors of green procurement adoption. Case study research has provided rich insights into implementation challenges and best practices, particularly in industries such as manufacturing, construction, and public procurement [74, 75].

Multi-criteria decision-making (MCDM) methods, including Analytic Hierarchy Process (AHP), Analytic Network Process (ANP), and Technique for Order of Preference by Similarity to Ideal Solution (TOPSIS), have been widely applied to evaluate trade-offs between cost and environmental criteria [76, 77]. These methods allow organizations to prioritize suppliers based on both economic and sustainability performance, integrating subjective judgments with quantitative data. Life cycle costing (LCC) and life cycle assessment (LCA) are also frequently employed to quantify the long-term economic and environmental impacts of procurement decisions. In recent years, data-driven approaches, including machine learning, big data analytics, and blockchain, have begun to complement traditional methodologies by enhancing transparency and predictive capabilities [78, 79].

2.4 Drivers of Green Procurement

A significant stream of literature examines the drivers of green procurement adoption. Regulatory frameworks are consistently identified as a primary driver, with studies showing that organizations subject to stringent environmental regulations are more likely to adopt green procurement practices. International agreements, such as the Paris Agreement, and regional policies, such as the European Union's Green Public Procurement program, have exerted strong coercive pressures on firms. Market-based drivers, including customer demand for green products and investor interest in sustainability, also play a crucial role [80, 81]. Organizational drivers, such as leadership commitment, corporate culture, and availability of resources, further influence adoption.

Empirical evidence indicates that competitive pressures can also stimulate green procurement. Firms adopt sustainable practices not only to comply with regulations but also to differentiate themselves in the marketplace. Reputation management is particularly salient, as stakeholders increasingly scrutinize supply chains for environmental and social performance [82]. At the same time, internal capabilities, such as expertise in environmental management and integration of sustainability metrics into procurement systems, mediate the extent to which external drivers translate into practice [83, 120]. The interplay of these drivers reflects the complex, multi-level influences shaping green procurement.

2.5 Barriers to Green Procurement

While the benefits of green procurement are widely recognized, the literature consistently identifies barriers that hinder adoption and implementation. The most prominent barrier is the perception of higher costs associated with green products and services [84]. Although life cycle analyses often reveal long-term cost savings, organizations frequently face challenges in justifying higher upfront expenditures, particularly in cost-sensitive industries. Data limitations present another significant barrier. The lack of standardized sustainability metrics, inconsistent reporting, and supply chain opacity make it difficult to evaluate and compare alternatives [85, 119].

Organizational resistance also poses challenges. Entrenched procurement practices, short-term performance pressures, and a lack of awareness among managers can impede adoption. Supplier-related barriers are particularly pronounced, as small and medium-sized enterprises (SMEs) often lack the resources or expertise to meet green requirements [86, 118]. Cultural differences and varying levels of environmental awareness across global supply chains further complicate implementation. Finally, technological and infrastructural barriers, including the absence of advanced data systems and monitoring tools, limit the ability of organizations to fully operationalize green procurement.

2.6 Empirical Evidence on Outcomes

Empirical research has documented a range of outcomes associated with green procurement. On the economic front, studies show mixed results. While some organizations report cost savings through energy efficiency, waste reduction, and resource optimization, others highlight increased costs due to green premiums and implementation expenses. This divergence reflects differences in industry contexts, time horizons, and measurement approaches. However, evidence consistently indicates that green procurement enhances reputational value, customer loyalty, and stakeholder trust [87, 88]. These intangible benefits often translate into long-term financial gains, even if short-term costs are higher.

Environmental outcomes are more consistently positive. Green procurement reduces resource consumption, emissions, and waste generation, contributing to broader sustainability goals [89]. For example, public sector procurement programs have demonstrated significant reductions in greenhouse gas emissions by prioritizing green suppliers. Social outcomes are less frequently studied but include improved labor practices, community engagement, and alignment with corporate social responsibility objectives. These findings underscore that green procurement generates multi-dimensional value, though trade-offs and contextual variations persist [90, 117].

2.7 Sectoral and Regional Variations

The literature highlights significant sectoral and regional variations in green procurement practices. In manufacturing, green procurement often focuses on material selection, energy efficiency, and waste reduction. In construction, attention is directed toward sustainable building materials, energy-efficient designs, and waste management. Service industries, such as hospitality and information technology, emphasize transparency, carbon footprint reduction, and supply chain accountability. Public sector procurement is distinctive in its scale and regulatory influence, with governments using procurement policies to drive market transformation [91, 92].

Regional variations reflect differences in regulatory frameworks, cultural values, and economic conditions. European countries have been leaders in green procurement due to strong regulatory frameworks and policy support. In contrast, developing countries face greater challenges, including limited resources, weaker enforcement mechanisms, and competing development priorities [93]. However, emerging economies are increasingly adopting green procurement as part of broader sustainable development agendas, often supported by international aid and policy guidance. These variations underscore the need for context-specific strategies that account for industry and regional characteristics.

2.8 Technological Enablers

Technological innovation has emerged as a significant enabler of green procurement. Big data analytics allows organizations to process large volumes of supplier data to identify sustainability risks and opportunities. Blockchain technology enhances transparency by providing immutable records of supplier practices, reducing the risk of greenwashing [94, 95]. The Internet of Things (IoT) enables real-time monitoring of resource usage and emissions, facilitating more accurate assessments of supplier performance. Artificial intelligence (AI) and machine learning are increasingly applied to evaluate trade-offs between cost and sustainability, offering predictive capabilities that support strategic decision-making [96, 97].

These technologies not only improve the accuracy and reliability of green procurement systems but also reduce transaction costs associated with monitoring and verification. However, technological adoption is uneven, with resource-rich firms in developed economies more likely to leverage advanced tools than SMEs or organizations in developing countries. This digital divide poses challenges for the global diffusion of green procurement practices, highlighting the need for capacity building and technological transfer [98, 99].

2.9 Integration with Broader Sustainability Agendas

Green procurement is increasingly integrated with broader sustainability frameworks, such as the United Nations Sustainable Development Goals (SDGs) and corporate environmental, social, and governance (ESG) agendas. By aligning procurement practices with these frameworks, organizations can demonstrate accountability to stakeholders and contribute to global sustainability objectives. Scholars note that green procurement plays a pivotal role in advancing SDG 12 (responsible consumption and production) and SDG 13 (climate action) [100, 101]. Moreover, ESG reporting standards increasingly require firms to disclose procurement-related sustainability metrics, reinforcing the institutionalization of green procurement.

This integration reflects the recognition that procurement is a critical leverage point for achieving systemic change. Because procurement decisions shape upstream production processes and downstream consumption patterns, they offer opportunities to influence sustainability across entire value chains. However, integrating procurement with broader sustainability agendas requires coherence, transparency, and alignment with organizational strategies. Studies suggest that firms that embed green procurement into core strategies are more likely to achieve both economic and environmental objectives [102, 103].

2.10 Synthesis of Trends up to 2022

The literature up to 2022 reveals several key trends in green procurement. First, there has been a clear progression from compliance-driven approaches to strategic, value-creating practices. Second, the scope of evaluation has expanded beyond cost and quality to include environmental, social, and resilience dimensions. Third, methodological diversity has enriched the field, with MCDM, life cycle costing, and data-driven approaches offering complementary tools. Fourth, technological innovations such as big data, AI, and blockchain are transforming the possibilities of green procurement [1, 5]. Finally, while significant progress has been made, challenges remain in balancing short-term cost concerns with long-term sustainability goals, particularly in resource-constrained contexts.

In conclusion, the literature provides a comprehensive understanding of how green procurement strategies have evolved to balance cost efficiency with long-term environmental responsibility. By synthesizing theoretical perspectives, methodological approaches, and empirical evidence, this review underscores both the promise and the complexity of green procurement. The insights generated form a foundation for advancing research and practice, highlighting the need for integrative frameworks that align organizational, technological, and policy dimensions in pursuit of sustainable procurement systems.

3. Discussion and Implications

The literature on green procurement demonstrates a fundamental transformation in how organizations perceive procurement, shifting from a transactional function concerned primarily with cost to a strategic activity that balances economic and environmental considerations. The discussion in this section highlights the implications of these findings for theory, managerial practice, and policy, with particular attention to the persistent challenges of integrating cost efficiency and environmental responsibility.

One of the central insights emerging from the literature is that green procurement should not be viewed as a trade-off between cost and sustainability but rather as a process of creating long-term value. Although environmentally preferable products or services may involve higher upfront costs, they often generate savings over the product life cycle through reduced energy consumption, lower waste management expenses, and avoidance of regulatory penalties [116]. This perspective shifts the procurement function from a short-term focus on purchase price to a long-term orientation that captures total cost of ownership (TCO) and life cycle costing (LCC). The implication for managers is that procurement decisions must incorporate long-term perspectives and recognize that sustainability can enhance rather than undermine financial performance [115].

At the same time, the literature reveals that organizations face significant challenges in operationalizing this long-term perspective. Short-term financial pressures, shareholder expectations, and budgetary constraints frequently push firms toward prioritizing cost over sustainability. The implication is that organizations must design incentive systems and governance structures that align procurement practices with strategic sustainability objectives [104, 105, 106]. This may involve adjusting performance metrics, introducing sustainability-linked procurement policies, and embedding environmental considerations into supplier contracts [107, 108]. Without such institutional alignment, green procurement risks remaining an aspirational ideal rather than a practical reality.

The findings also underscore the role of supplier collaboration as a key mechanism for balancing cost and environmental goals. Traditional procurement often relies on competitive bidding and cost minimization, which can discourage suppliers from investing in sustainability [77, 109]. In contrast, collaborative approaches that emphasize long-term partnerships, capacity building, and joint innovation create opportunities for both cost efficiency and environmental performance. For example, buyers may provide technical assistance or share financial risks with suppliers to facilitate the adoption of greener technologies. The implication is that procurement strategies must move beyond transactional contracting toward relational governance models that foster mutual benefits.

From a theoretical standpoint, the review reinforces the relevance of institutional, stakeholder, and resource-based perspectives. Institutional theory highlights that green procurement is often driven by regulatory and normative pressures, but these external pressures alone may not ensure effective implementation. Stakeholder theory suggests that firms adopt green procurement not only to satisfy regulators but also to meet the expectations of customers, investors, and civil society. Resource-based and dynamic capability theories further emphasize that integrating sustainability into procurement can generate unique organizational capabilities that provide long-term competitive advantage. The implication for research is the need to explore how these theoretical perspectives interact in different contexts, particularly in developing economies where regulatory pressures may be weaker but stakeholder expectations are rising.

Technological enablers such as big data, blockchain, and artificial intelligence provide new opportunities for overcoming some of the traditional barriers to green procurement. These tools can enhance transparency, reduce transaction costs, and provide predictive capabilities that support informed decision-making. However, they also introduce new challenges, such as data privacy concerns, digital divides between large firms and SMEs, and the need for specialized expertise [110, 111]. The implication is that technology should be viewed as a complement rather than a substitute for organizational commitment and institutional support.

At the policy level, the literature suggests that public procurement has a particularly important role to play in advancing green procurement. Governments, as large purchasers, can stimulate demand for sustainable products and services, thereby creating economies of scale that reduce costs for all market participants. Policy frameworks such as the European Union's Green Public Procurement guidelines and national sustainability mandates provide critical leverage for institutionalizing green procurement practices. The implication is that policymakers must balance regulatory requirements with supportive measures such as subsidies, training programs, and technical assistance to ensure that green procurement is accessible and viable for organizations of different sizes and sectors.

In summary, the discussion highlights that green procurement is not only a technical adjustment to procurement processes but also a strategic, organizational, and policy challenge. It requires rethinking cost structures, realigning incentives, fostering supplier collaboration, leveraging technology, and creating supportive institutional environments. The implications are profound: organizations that effectively integrate cost efficiency with environmental responsibility are likely to achieve not only compliance and reputational gains but also long-term resilience and competitiveness in increasingly sustainability-oriented markets.

4. Conclusion

This paper has reviewed the evolution and current state of green procurement strategies up to 2022, focusing on how organizations balance cost efficiency with long-term environmental responsibility. The analysis reveals a clear trajectory: from compliance-driven procurement models emphasizing regulatory adherence to strategic approaches that integrate sustainability as a source of innovation, reputation, and competitive advantage. The literature demonstrates that while cost concerns remain a significant barrier, life cycle perspectives and collaborative procurement models offer pathways for reconciling short-term financial pressures with long-term environmental benefits.

Several conclusions can be drawn. First, green procurement has become an indispensable element of modern supply chain management, reflecting the growing recognition that procurement decisions have far-reaching economic, environmental, and social consequences. Second, while higher upfront costs and organizational resistance continue to hinder adoption, empirical evidence suggests that long-term benefits often outweigh these challenges, particularly when life cycle costing and total cost of ownership are applied. Third, technological innovations and policy frameworks are reshaping the possibilities of green procurement, providing tools and incentives that make sustainability integration more feasible and effective. Fourth, the global literature underscores significant regional and sectoral variations, indicating that one-size-fits-all solutions are unlikely to succeed; instead, context-specific strategies are essential.

For managers, the findings imply that procurement strategies must evolve from transactional cost-saving practices to strategic functions that balance multiple objectives, including environmental stewardship and stakeholder expectations. This requires embedding sustainability metrics into procurement policies, fostering supplier collaboration, and leveraging technological enablers. For policymakers, the results suggest that supportive institutional environments are critical, combining regulatory requirements with capacity-building initiatives to ensure equitable adoption across industries and regions [112, 113]. For researchers, the review highlights the need for more cross-disciplinary, context-sensitive studies that integrate insights from economics, organizational theory, and technology management.

In conclusion, green procurement represents both a challenge and an opportunity for organizations navigating the complexities of global supply chains in the 21st century. By balancing cost efficiency with long-term environmental responsibility, organizations can not only mitigate risks and comply with regulations but also generate strategic value, enhance resilience, and contribute to global sustainability objectives [114, 115]. The advancement of comprehensive, data-supported, and context-sensitive green procurement frameworks is thus essential for aligning business success with environmental stewardship in an era where sustainability is no longer optional but imperative.

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