

An Integrated Framework for Sustainable Supply Chain Management: Environmental Drivers, Implementation Practices, and Performance Outcomes

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Abstract

The sustainability of supply chains is building the industry and has been a focal concern for policymakers, stakeholders, and researchers alike. However, literature that comprehensively connects the drivers, practices, and performance outcomes of environmentally sustainable supply chain management (ESSCM) remains limited. This study introduces a holistic ESSCM framework, suggesting that organizations within the construction sector may be influenced by a range of factors—whether driven, pressured, or motivated—to adopt sustainable practices across various phases, including planning and design, procurement, production, distribution and marketing, and reverse logistics. Collaboration is Central to practical implementation, as shared responsibility and teamwork are essential for the construction industry to integrate eco-friendly supply chain practices fully. Such integration, in turn, can yield positive environmental, social, and economic outcomes. This research contributes to the limited knowledge of sustainable supply chain management within construction. It holds practical value for policymakers, industry professionals, and stakeholders, underlining the necessity of joint efforts for a sustainable future.

INTRODUCTION

The global economy heavily relies on the construction industry to meet its energy demands, as seen in the growing consumption of resources to fuel these needs (Chen et al., 2017; Wan Ahmad et al., 2017; Yong et al., 2015). Research by Lima, Relives, and Barbosa-Póvoa (2016) similarly highlights the global increase in production and consumption within this sector. An unprecedented expansion in the commerce of construction materials has resulted from the rising consumption of primary energy—about 80% of which is sourced from construction resources, driven by population growth and technological advancement (Deng & Liu, 2011; Hajjari et al., 2017).

The building industry may be considered as one of the leading contributors to economic growth worldwide, categorized by a complex supply chain comprising a network of upstream, midstream, and downstream sectors. Upstream covers the extraction of the raw materials, midstream refers to the processing or manufacturing sector, and the downstream is what concerns the distribution

and sales of the final products. Supply in this commodity involves a complicated chain that encompasses the wide network of construction firms, suppliers, distributors, and consumers. This requires better management for performance. The economic and social impacts of this multi-layered supply chain are huge. Construction is also important for many developing nations because it also creates jobs, offers raw materials, and energy resources, while for nations like Saudi Arabia, Iran, Qatar, the UAE, Kuwait, and Nigeria, it boosts their GDP and economic development.

However, the industry has serious environmental risks and negatively affects human health and welfare, too.

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For instance, Shvarts et al. (2016) reported that the construction sector of Russia is much more environmentally hazardous than many other sectors.

Added to these are frequent cases of injury and accident related to construction, the negative impacts certainly raise alarm as to the overall sustainability of the supply chain within the said industry. This has drawn the attention of the public at large as well as other significant stakeholders (Ahmad et al., 2016; Cordes et al., 2016; Janus & Murphy, 2013; Matos & Hall, 2007; Shvarts et al., 2016; Wan Ahmad et al., 2017).

Due to the very nature of the sector and the strategic importance of it, sustainability in terms of supply chains has become one of the most prioritized concerns in front of the stakeholders of the construction industry. The term sustainability in this respect means fulfilling present needs without compromising the ability of future generations to satisfy their very own needs. The increased operating costs, hence growing awareness of climate change and the call for greater transparency about environmental and social practices, had as an effect the shooting interest in sustainability within the context of the construction industry. As a result, a growing number of stakeholders has been imposing pressure on businesses to disclose their impacts on the environment, society, and economy accordingly. Sustainability is best described by the discipline of keeping natural systems in balance while meeting social, economic, and environmental responsibilities. It is best defined by Dresner as "development that meets the needs of the present without compromising the ability of future generations to meet their needs"-in other words, Elkington's TBL concept. TBL also very strongly emphasizes the need to seek equilibrium among social, environmental, and economic objectives, while regarding the construction industry with its characteristic complexity due to the wide range of stakeholders and activities, sustainability down the supply chain will be very instrumental to ensuring appropriate environmental, social, and economic performances. Such an approach is what has been called SSCM, which embodies incorporating social and environmental considerations into the traditional supply chain management approach. It focuses on attaining sustainability in supply chain design and optimization. It is a relatively recent trend, but it has grown in popularity more and more all over the world during the last decade. Overall, the research on SSCM has grown in fields and sectors such as Agi & Nishant, 2017; Ganvese et al., 2017; Hisham & Montasser, 2017; Mani et

al., 2018; Dadhich et al., 2014; Dehghanian et al., 2011; Deng & Liu, 2011; Dubey et al., 2014; Gawankar et al., 2017; Genovese et al., 2017; Hisham & Montasser, 2017; Mani et al., 2018). The building industry is still concerned with very limited research in respect of sustainability in the supply chains, while the concerns of environmental impacts in pollution, greenhouse gas emissions, and environmental degradation resulting from the entire industry augment. Previous studies often focus on fragmented aspects, not bringing motivations, practices, and performance of SSCM into one single integrated framework for environmental sustainability. Considering the above, this paper reviews relevant literature to identify the drivers of SSCM in the construction industry, its practices, and the outcomes of SSCM implementation in terms of performance. Since it was found that the environmental factors positively influenced the social and economic dimensions of the TBL model, the focus now is on sustainability related to the environmental issues as stated by Agi & Nishant (2017), Bhardwaj (2016), Deng & Liu (2011), Kumar et al. (2017), Seles et al. (2016), and Wang & Dai (2018).

SSCM has drawn much attention in several industries and streams of late (Agi & Nishant, 2017; Ahmad et al., 2016; Ansari & Kant, 2017; Bastas & Liyanage, 2018; Dadhich et al., 2014; Dehghanian et al., 2011; Deng & Liu, 2011; Dubey et al., 2014; Gawankar et al., 2017; Genovese et al., 2017; Hisham & Montasser, 2017; Mani et al., 2018). However, considering that growth in concern for environmental impacts that include degradation of the environment, green gases, and pollution-issues all emanating from the construction industry-Agi & Nishant, 2017; Chen et al., 2017; Janus & Murphy, 2013; Lima et al., 2016-the research on implementation of the sustainable supply chain management specifically for the construction sector is still scant as reported by Ahmad et al., 2016; Wan Ahmad et al., 2016.

In particular, most the available studies focus on specific aspects without integrating drivers, practices, and outcomes of SSCM into an overall framework for environmental sustainability. The article tries to fill this gap by reviewing relevant literature on identifying drivers for SSCM in construction, practices within SSCM, and the performance outcomes of SSCM implementation. It is about environmental sustainability, considering that environmental factors have been able to assist the social and economic features of the TBL framework in many situations, as indicated by Agi & Nishant, 2017; Bhardwaj, 2016; Deng & Liu, 2011; Kumar et al., 2017; Seles et al., 2016; Wang & Dai, 2018.

This study aims to answer the following questions:

- 1 What are the drivers for implementing ESSCM in the construction industry?
- 2 What are the environmental SSCM practices in the construction industry?
- 3 What are the performance outcomes of implementing environmental SSCM practices in the construction industry?

Based on these questions, an ESSCM framework is proposed. The remainder of this article is structured as follows: Section 2 discusses Sustainable Supply Chain Management (SSCM); Section 3 examines the drivers for environmentally sustainable SSCM implementation; Section 4 focuses on ESSCM practices in construction; Section 5 covers the outcomes of SSCM implementation; Section 6 presents an Environmentally Sustainable Supply Chain Management (ESSCM) framework; and Section 7 concludes with recommendations for future research directions.

SUSTAINABLE SUPPLY CHAIN MANAGEMENT (SSCM)

A Construction Perspective. A supply chain encompasses a series of business activities related to sourcing materials, and the complexity of a supply chain can vary greatly depending on the industry and the stakeholders involved. In the construction sector, the supply chain is notably intricate, involving a network of specialized companies operating in some of the world's most challenging and delicate environments (Ahmad et al., 2016). Sustainable Supply Chain Management (SSCM) refers to the management of materials, information, capital flow, and inter-company collaboration in a manner that balances economic, environmental, and social dimensions - often referred to as the triple bottom line (Seuring & Müller, 2008a). SSCM enables companies to deliver more excellent economic, environmental, and social value to stakeholders and customers. By adopting SSCM practices, organizations can enhance long-term performance and provide managers with a foundation for more informed decision-making (Mata et al., 2011). SSCM involves managerial decisions and structured actions to ensure supply chain operations align with the triple bottom line, creating a sustainable supply chain (Pagell & Wu, 2009).

Previous research on supply chain management (SCM) issues generally falls into two categories. The first category focuses on procurement within the supply chain, with studies examining supply management practices (Green

et al., 1996; Bowen et al., 2001). For instance, Bowen et al. (2001) explored supplier selection criteria and efforts to green the supply process, while other studies investigated factors influencing product greening (Lamming & Hampson, 1996; Seuring, 2004). The second category caters to logistics within SCM. Abukhader and Jönson (2004), for example, reviewed literature on environmental issues in logistics, exploring how the field of logistics and SCM addresses environmental challenges. Additionally, some research has examined the economic aspects of SCM: Hervani, Helms, and Sarkis (2005) assessed economic impacts in decision-making, Seuring (2001) studied cost management, and Hervani et al. (2005) evaluated performance management within supply chains.

Other studies have emphasized sustainability, primarily environmental aspects, in SCM. For example, Lamming and Hampson (1996) focused on environmental sustainability, while Baumann, Boons, and Bragd (2002) examined green product design. Further, some work has explored integrating environmental concerns into SCM Green Sustainable Supply Chain Management (Agi & Nishant, 2017; Dadhich et al., 2014; Deng & Liu, 2011). SSCM in the construction industry is particularly crucial because of finite construction resources and the continuously rising demand for energy. Implementing SSCM practices within this industry could help reduce or eliminate uncertainties and adverse impacts while ensuring economic viability and energy security. To address sustainability challenges, the construction industry must actively collaborate with stakeholders, including governments, local communities, suppliers, customers, and employees (Ahmad & Rezaei, 2013).

DRIVE OF SUSTAINABILITY SUPPLY CHAIN MANAGEMENT IN THE CONSTRUCTION INDUSTRY

The drivers of sustainable supply chain management (SSCM) in the construction industry stem from internal and external pressures, issues, and concerns from various stakeholders that either encourage or hinder the industry's commitment to sustainable practices. These drivers are considered external and internal (Agi & Nishant, 2017; Ahmad et al., 2016; WanAhmad et al., 2017).

External Drivers

Operating on a global scale, the construction industry crosses numerous political, economic, technological, Regulations, Energy transaction and social boundaries, making it a significant player in the international geopolitical and economic landscape (Lapide & Manzano,

2005). Understanding micro and macro environments is essential in today's complex business climate. Studies on the macro environment within supply chains focus on external influences beyond direct supply chain control, such as economic, governmental, and societal changes that can profoundly affect a company's performance (Halldórsson et al., 2009).

When assessing the macro-environment, factors such as industry trends, company characteristics, and the operating environment are considered, often using models like PESTEL or Porter's model to analyse these external forces (Gillespie, 2007). For this study, the PESTEL and Porter models provide a foundation, incorporating political, economic, and legal factors and additional forces specific to the construction industry, such as stakeholder influence, competition, and energy transition. Environmental and Social aspects are integrated within the Stakeholders and Technology components and considered under Energy Transition. This study also includes competition and energy transition as crucial elements, with energy transition playing a critical role in influencing construction company activities.

Economic Drivers

The construction industry and the economy are closely interlinked, with global economic health depending on consistent construction activity, and construction growth is heavily influenced by economic progress (Kennedy, 1974). Economic instability can negatively impact profitability and increase financial risks for companies. To maintain sustainability and enable business expansion, construction firms must keep profitability levels high, allowing them to replace unsustainable practices (Edwards et al., 2010). According to Heffron and McCauley (2014), energy supply and security contribute significantly to national economic growth, with energy demand expected to rise by 30% to 50% over the next two decades, potentially driving energy prices higher (DoE, 2014).

Political Driver

The construction industry is deeply affected by governmental influence, as many construction firms are state-owned or closely connected to the government. This governmental involvement is one of the industry's most significant external forces (Edwards et al., 2010). National governments often control industry growth, with policies and decisions directly impacting construction companies (Wan et al., 2013). Hecht and Miller (2010)

suggest that government support is crucial for advancing sustainability, as alignment between business and governmental objectives is essential. State ownership or close government ties may lead to potential conflicts of interest as companies balance operational goals with national welfare considerations (Wolf, 2009). Political instability in construction-producing countries can also impact company management and operations, affecting factors like new energy policies, regulations, and geopolitical dynamics.

Competition

The growing demand for energy and fluctuating market dynamics have heightened competition within the construction sector. The industry includes two main groups: International Construction Companies (IOCs), which possess advanced technologies but limited access to construction resources, and National Construction Companies (NOCs), which have abundant resources but lack the technology for efficient extraction (Edwards et al., 2010). While NOCs currently face difficulties gaining the necessary expertise, their role is expected to grow in the energy market due to their resource advantage. Consequently, competition between IOCs and NOCs is intensifying, with NOCs projected to play a more prominent role. Collaboration among NOCs is expected to increase, and companies with resource control will likely gain influence through strategic alliances (Wolf, 2009). This competitive environment strongly influences these companies' SSCM strategies (Seuring & Müller, 2008).

Stakeholder Pressure

Managing stakeholder expectations is critical for promoting sustainable practices. Stakeholders are any group or individual who influences or is impacted by a company's goals, including suppliers, partners, environmental advocates, governments, community members, owners, consumer representatives, and competitors (Seles et al., 2016). Research suggests that stakeholder pressure is a significant driver for the adoption of green SSCM practices (Agi & Nishant, 2017; Esfahbodi et al., 2016; Mani et al., 2018; Mathivathanan et al., 2017; Silvestre, 2014). Access to affordable energy is also crucial for stakeholders as it supports economic growth, but disparities in energy access contribute to vulnerability (Heffron & McCauley, 2014). Building mutually beneficial relationships with stakeholders to understand and meet their expectations is a critical yet often challenging aspect of SSCM.

- **Investor Influence:** Increasingly, investors favor companies with substantial environmental, social, and governance (ESG) practices.
- **Community Engagement:** Community stakeholders expect responsible environmental stewardship and minimal disruption to local ecosystems, especially in regions where extraction occurs.
- **Consumer Demand:** While end consumers might not directly purchase oil and gas products, there is an increasing expectation that these companies adhere to sustainable practices, mainly as they supply energy to businesses and industries that serve the public.

Regulations

Regulations in the macro environment shape the construction industry significantly, with most firms working across countries with diverse regulatory landscapes. These regulations cover a broad spectrum, including technical, environmental, material use, and health and safety requirements as defined by international bodies (Edwards et al., 2010). Inconsistent regional regulations can lead to operational and environmental risks, particularly for international IOCs. Studies have found that regulatory pressures can influence SSCM adoption by requiring companies to modify their practices to comply with strict standards (Agi & Nishant, 2017; Mani et al., 2018; Seles et al., 2016).

- **Environmental Legislation:** Emissions, waste management, and resource conservation laws.
- **Carbon Emission Regulations:** Limits on greenhouse gas emissions are particularly stringent in developed countries, compelling companies to adopt sustainable practices.
- **Health and Safety Standards:** Regulatory bodies require companies to uphold strict employee health and safety standards, influencing supplier selection and operational practices.

Energy Transition

The high energy demand has forced companies to be more competitive, and countries, due to increased consciousness about global warming, have been engaging in more cooperation in finding cleaner energy resources. This is the reason there has been a shift, globally, in O&G production. This transition of O&G is mainly focused on the rapid development and deployment of environmentally friendly technologies that can replace first, the traditional products of O&G and then meet the growing energy requirements especially in transportation; Edwards et al., 2010.

Sustainable Materials and Equipment: The companies apply usage of environmentally friendly material like biodegradable chemicals or any alternative material to reduce waste generation as well as reduction in emission during the production process. **Selection of Suppliers:** SCM sustainability puts more emphasis on the selection of suppliers who have better environmental behaviour in order to lessen the carbon footprint of the company.

Internal Drivers

Internal drivers for SSCM come from factors within a company's micro-environment that influence adopting sustainable practices. Given the construction industry's complexity, extended supply chains, and intricate internal structures, these internal drivers include management commitment, company size, technical capabilities, employee education and training, company strategy, and managerial preparedness (Agi & Nishant, 2017; Mathivathanan et al., 2017; Seles et al., 2016).

Management Commitment

Research indicates that management commitment is a critical factor in the success of SSCM. This commitment is reflected in the leadership of top management and organizational culture around sustainability and transparency (Varzandeh et al., 2014; WanAhmad et al., 2017). Strategic decisions made by senior management, covering supplier selection, materials, production processes, distribution, and end-of-life product management, are all shaped by their dedication to sustainability across the supply chain (Agi & Nishant, 2017; Luthra et al., 2016).

Technical Capability

The technical capacity of an organization is also critical to the successful implementation of SSCM, especially given the complexity of construction supply chains, which require sophisticated technical competencies (Agi & Nishant, 2017; Silvestre, 2014). Effectively managing the supply chain sustainably is crucial (Ahmad et al., 2016; Janus & Murphy, 2013; WanAhmad et al., 2017). Organizations with robust technical capabilities are more inclined to adopt Sustainable Supply Chain Management (SSCM), while those lacking these resources may face challenges. Increasing technical demands for sustainability can raise operational costs and impact a company's competitiveness, necessitating even greater capability for effective adoption (Ahmad et al., 2016). Agi and Nishant (2017) similarly assert that implementing sustainable supply chain practices across a

product's lifecycle requires specific technical proficiency. Such capabilities empower organizations to enhance cost-efficiency and environmental compatibility by leveraging innovation to address production challenges.

Organization Size

The size of a company significantly influences its decision-making and ability to adopt sustainable supply chain practices. Larger companies are typically better equipped to implement sustainable supply chain management due to their resource advantages, whereas smaller firms often face limitations (Agi & Nishant, 2017; Bhardwaj, 2016). Similarly, L\"{a}htinen et al. (2016) noted that larger organizations with abundant resources are more likely to incorporate sustainable practices than small and medium-sized companies. Stakeholder pressure for environmental sustainability also tends to be higher for larger organizations. Small and medium-sized enterprises lacking the expertise and resources may struggle to address emerging environmental challenges, influencing their motivation to adopt sustainable practices (Esfahbodi et al., 2016).

Employee Education and Training

Effective implementation of environmentally sustainable supply chain management (ESSCM) requires skilled employees with technical knowledge of environmental concerns and sustainable practices (Agi & Nishant, 2017; Ansari & Kant, 2017; Bhardwaj, 2016). Given the constantly evolving nature of environmental sustainability, organizations rely on their employees' abilities to adopt new practices, which is achievable through ongoing education and training in emerging "environment-friendly practices and processes" (Agi & Nishant, 2017; Luthra et al., 2016; Seles et al., 2016).

Collaboration

In fact, the supply chain of the construction industry holds intrinsic complexity and therefore achieving sustainability is difficult. The internal collaboration in various functions

and processes must be solid. Moreover, appropriate measures of sustainability can only be promoted or induced under effective partnership with suppliers, employees, and other internal stakeholders. In this respect, several previous studies have supported this viewpoint, such as Agi & Nishant 2017; Ansari & Kant 2017; Dadhich et al. 2014; Esfahbodi et al. 2016; Genovese et al. 2017; Liman et al. 2015; Luthra et al. 2016. According to Silvestre, 2014, successful sustainable supply chain management requires active collaboration of all supply chain members; the collaborators should have "aligned objectives, open communication, and the sharing of resources, risks, and rewards." Environmentally Sustainable Supply Chain Management, also termed as green supply chain management, is an integral part of sustainable supply chain management. In every stage of the supply chain process, environmental factors are considered in ESSCM. The researchers have also identified different practices in the ESSCM context, though each focuses on other aspects of sustainability. For example, Esfahbodi et al. (2016) identify such ESSCM practices as procurement, production, eco-design, distribution, and investment recovery. In this perspective, the sustainable procurement of materials that are eco-friendly, reusable, recyclable, and nontoxic has always come into the limelight. The practice of sustainability, according to Deng and Liu, 2011, encompasses the supply chain from green raw materials to storage, transportation, sales, consumption, return, recycling, and finally disposal.

Other sustainable practices are optimization of wastes, reduction in carbon footprints, green purchasing, green product design, recycling mechanisms, ecodesign, green packaging, management of environmental protection, collaboration with customers, management of suppliers, logistics, and product stewardship. These practices can be summarized under four headings, namely: environmentally sustainable planning and design, procurement, distribution and production, and reverse logistics. A summary of such categories can be seen in Table 1.

Table 1. *Categories of Sustainable Practices in Supply Chain Management*

Practices	Meaning	Sources
Environmentally sustainable planning and design	Also referred to as eco-design, this approach focuses on strategic planning and product design to minimize waste and reduce environmental harm. It includes evaluating product disassembly, recyclability, and potential environmental hazards through life cycle analysis to assess and mitigate any harmful impacts.	(Agi & Nishant, 2017; Ahmad et al., 2016; Bhardwaj, 2016; Esfahbodi et al., 2016; Kumar et al., 2017; Luthra et al., 2016; Seles et al., 2016; WanAhmad et al., 2017)

Environmentally sustainable Procurement (purchasing)	This practice involves managing suppliers within the supply chain to ensure they meet the organization's environmental sustainability standards. Materials sourced should fulfill requirements for recyclability, reusability, and minimized environmental impact.	(Janus & Murphy, 2013)(Lähtinen et al., 2016)(Subramanian & Gunasekaran, 2014)(Gawankar et al., 2017)(Ahmad et al., 2016)(Singh, 2016)(Wang & Dai, 2018)
Environmentally Sustainable production	This practice promotes production methods that have minimal environmental impact. Such methods should prioritize flexibility, reduced energy consumption, using renewable, eco-friendly materials, and minimizing harmful pollutants released into the air, water, and environment.	(Genovese et al., 2017)(Bhardwaj, 2016)(Kumar et al., 2017)(Luthra et al., 2016)(Gawankar et al., 2017)(WanAhmad et al., 2017)(Hong et al., 2017)(Seles et al., 2016)
Environmentally sustainable Distribution/ Marketing	his practice ensures that products are delivered to consumers in an environmentally sustainable manner. It involves using sustainable transportation methods, storing products in an eco-friendly way, and marketing them with sustainability in mind.	(Bhardwaj, 2016; Dadhich et al., 2014; Deng & Liu, 2011; Esfahbodi et al., 2016; Genovese et al., 2017; Luthra et al., 2016; Seles et al., 2016; Silvestre, 2014; Wang & Dai, 2018)
Reverse logistics	This practice focuses on recovering used products that would otherwise become waste for recycling purposes. It helps protect the environment by reducing waste. Additionally, it involves retrieving surplus goods and assets through investment recovery and divestment strategies.	(Esfahbodi et al., 2016) (Seles et al., 2016)(Subramanian & Gunasekaran, 2014)(Dadhich et al., 2014)(Ansari & Kant, 2017)(Singh, 2016)(Deng & Liu, 2011)

ESSCM PERFORMANCE OUTCOMES

Numerous studies have shown that implementing environmentally sustainable supply chain management (ESSCM) enhances an organization's performance across environmental, social, and economic dimensions (Agi & Nishant, 2017; Dubey et al., 2014; Esfahbodi et al., 2016; Kumar et al., 2017; Seles et al., 2016; Subramanian & Gunasekaran, 2014; Wan et al., et al., 2016). Therefore, the primary performance outcomes of ESSCM are environmental, social, and economic.

Environmental Performance Outcome

The main benefit of ESSCM adoption is considered to be the amelioration of environmental conditions along the chain. Environmental performance means the capability of the firm to decrease negative environmental impact by emissivity, waste, and hazardous materials. The main results of increased environmental performance are savings of energy, preservation of water, waste reduction, and raw materials. Further, it leads to an increased energy efficiency, reduced consumption of greenhouse gases, reduced utilization of poisonous materials, and greater dependency on renewable resources. Other benefits include enhancement in pollution control, efficient resource optimization, as well as company-based environmental management (Dubey et al., 2014; Eskandarpour et al., 2015; Gawankar et al., 2017; Hong

et al., 2017; Mathivathanan et al., 2017; Subramanian & Gunasekaran, 2014). This view is supported by empirical evidence from the studies of Esfahbodi et al. (2016) and Wang & Dai, 2018.

Social Performance Outcome

Several studies have indicated that adopting ESSCM improves an organization's social responsibility and enhances its corporate image (Kumar et al., 2017; Seles et al., 2016; Singh, 2016). Social performance focuses on improving people's living standards without causing harm to the environment or depleting natural resources (Luthra et al., 2016). Mathivathanan et al. (2017) argue that adopting sustainable supply chain management practices ensures that ethical standards promoting social justice are maintained. The social performance outcomes of implementing ESSCM include reduced compliance costs related to environmental health and safety, fewer customer complaints or returns, employee training in green practices, and enhanced employee well-being and job satisfaction (Subramanian & Gunasekaran, 2014). Wang & Dai (2018) note that environmentally sustainable production lines can reduce pollution and improve both the working conditions of employees and the community environment while also boosting the company's social reputation. Thus, ESSCM implementation leads to better social performance for organizations.

Economic Performance Outcome

Economic performance outcomes refer to organizations' financial success and profitability through adopting Environmentally Sustainable Supply Chain Management (ESSCM). According to Wang and Dai (2018), aligning sustainable supply chain management (SSCM) with economic strategies enhances resource optimization and strengthens stakeholder relationships, both of which can ultimately lead to increased revenue. Implementing sustainable practices in procurement and production can also lower material costs, reduce production expenses, and improve production efficiency. Luthra et al. (2016) point out that green supply chain practices—such as using recycled or reused materials—can decrease raw material and packaging costs, directly boosting profitability and economic performance. Many other studies also highlight

that implementing green sustainable supply chain practices has a significant positive impact on economic performance (Agi & Nishant, 2017; Bhardwaj, 2016; Deng & Liu, 2011; Genovese et al., 2017; Kumar et al., 2017; Luthra et al., 2016; Seles et al., 2016; Singh, 2016).

Proposed ESSCM Framework

Based on the literature review, various internal and external drivers influence the implementation of ESSCM practices. Depending on the organization's characteristics, these drivers pressure organizations to adopt or refrain from implementing ESSCM. Implementing ESSCM practices produces positive environmental, social, and economic performance outcomes. These relationships are captured in an integrated Environmentally Sustainable Supply Chain Management (ESSCM) framework, as illustrated in Figure 1

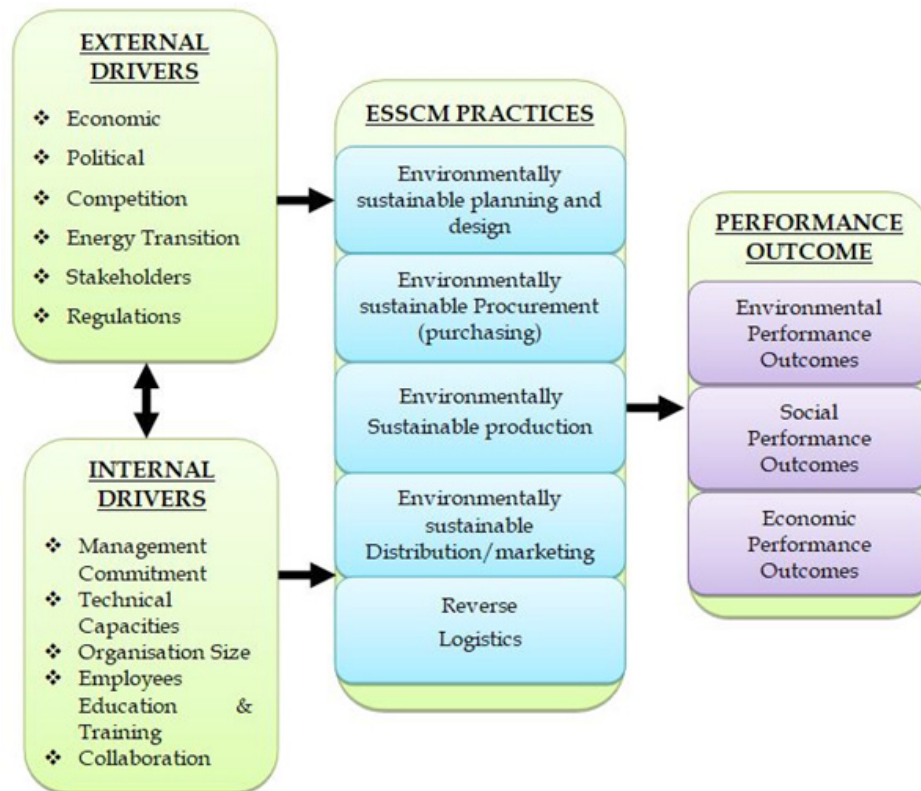


Figure 1. Environmentally Sustainable Supply Chain Management (ESSCM) Framework

The proposed ESSCM framework suggests a direct relationship between external business environment drivers and the internal business environment within construction industry organizations, influencing their adoption of sustainable supply chain management practices. The framework emphasizes that factors such as economic conditions, political climate, competition,

energy transition, stakeholder pressure, regulations, management commitment, technical capabilities, organization size, employee education, and training, and collaboration can drive or motivate construction industry organizations to implement environmentally sustainable practices in areas such as planning & design, procurement, production, distribution/marketing, and reverse logistics.

This proposition is supported by various studies (Agi & Nishant, 2017; Ahmad et al., 2016; Luthra et al., 2016; Wan et al., 2016; Wan Ahmad et al., 2017). Additionally, the framework links the adoption of ESSCM practices to performance outcomes across the environmental, social, and economic dimensions, which is also affirmed in existing literature (Agi & Nishant, 2017; Dubey et al., 2014; Esfahbodi et al., 2016; Kumar et al., 2017; Seles et al., 2016; Subramanian & Gunasekaran, 2014; Wan et al., et al., 2016).

CONCLUSION

While the construction industry plays a crucial role in economic and social development, it also has a substantial environmental impact across its supply chain. This environmental footprint has attracted growing attention from stakeholders, highlighting the urgent need for sustainable supply chain management practices to mitigate ecological damage. However, despite this rising concern, there is still limited research exploring the drivers of sustainable practices, the specific practices themselves, and their performance outcomes in a comprehensive way.

This study addresses this gap by proposing an integrative framework for Environmentally Sustainable Supply Chain Management (ESSCM) within the construction industry. It suggests that various factors drive companies to adopt sustainable practices, including economic considerations, regulatory environments, competition, energy transition, stakeholder pressures, management commitment, technical capabilities, organization size, employee training, and collaborative efforts. These drivers encourage the adoption of sustainable practices across key areas, including planning, procurement, production, distribution/marketing, and reverse logistics. Implementing these practices can yield positive environmental, social, and economic outcomes.

However, this study has certain limitations. The framework has not yet been empirically tested in the construction industry, nor does it draw on specific case studies, making it broadly applicable but lacking validation in real-world settings. Given the complexity of the construction industry's supply chain, it may require customized approaches to achieve effective sustainability. Future research should focus on validating this framework through empirical data from the construction sector, including specific case studies across various countries.

By identifying the key drivers of ESSCM practices and examining their performance outcomes, this study

contributes valuable insights into the limited body of knowledge on sustainable supply chains in the construction industry. Additionally, it offers actionable guidance for policymakers, industry practitioners, and stakeholders, making its findings practical and relevant for real-world application.

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