

Master's Programme in Industrial Engineering and Management

# Integrating Sustainability into Procurement While Addressing Strategic Differences Across Categories

A Case Study on Industrial Manufacturing Company

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### **Abstract**

This thesis explored how sustainability can be effectively integrated into procurement while addressing strategic differences across procurement categories. A theoretical framework for sustainable procurement was developed, combining common sustainable procurement principles with category-specific strategies to account for each category's strategic importance and supply risks.

A case study approach was employed, combining qualitative and quantitative methods, to analyse the procurement practices of a sourcing organisation within a global industrial manufacturing company. Comparing these practices with the theoretical framework revealed key implementation challenges and led to actionable recommendations for improving sustainable procurement.

The results showed that effective sustainable procurement requires integrating sustainability into every stage of the procurement process, from strategy formulation and requirements definition to supplier selection and management, with supply chain transparency embedded throughout the process. Additionally, incorporating sustainability into category strategies through a category-specific approach ensures efforts are focused where they have the greatest impact. Key challenges identified in implementing sustainable procurement were limited supply chain visibility, inadequate sustainability data integration, resource constraints, the absence of a category-specific approach, and cost-related barriers.

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**Keywords** sustainable procurement, sustainable supply chain management, procurement strategy, category management, category strategy, industry

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### **Tiivistelmä**

Tässä diplomityössä tarkasteltiin, miten kestävyys voidaan tehokkaasti integroida osaksi hankintaa huomioiden hankintakategorioiden strategiset erot. Kestävälle hankinnalle kehitettiin teoreettinen viitekehys, joka yhdistää yleiset, kaikki kategoriat kattavat toimet kategoriakohtaisiin strategioihin varmistaen, että kunkin kategorian strateginen merkitys ja saatavuusriskit otetaan huomioon.

Tutkimus toteutettiin tapaustutkimuksena, jossa yhdistettiin kvalitatiivisia ja kvantitatiivisia menetelmiä. Tutkimuskohteena toimi globaalien teollisuusalan yrityksen hankintaorganisaatio. Organisaation hankintakäytäntöjä vertailtiin teoreettiseen viitekehukseen, minkä pohjalta esitettiin konkreettisia suosituksia kestävyysintegroimiseksi osaksi hankintaprosessia ja tunnistettiin haasteita, joita organisaatiot voivat kohdata kestävä hankinnan toteuttamisessa.

Tulokset osoittivat, että tehokas kestävä hankinta edellyttää kestävyys huomioimista hankintaprosessin kaikissa vaiheissa strategian ja vaatimusten määrittelystä toimittajien valintaan ja hallintaan, sekä toimitusketjun läpinäkyvyyden varmistamista koko hankintaprosessin ajan. Lisäksi kategoriakohtaisen lähestymistavan käyttöönotto ja kestävyys sisällyttäminen kategoriastrategioihin varmistaa, että toimet kohdennetaan sinne, missä niillä on suurin vaikutus. Keskeisiksi haasteiksi kestävä hankinnan toteutuksessa tunnistettiin toimitusketjun rajallinen näkyvyys, puutteellinen kestävyysdatan integraatio, resurssirajoitteet, kategoriakohtaisen lähestymistavan puuttuminen, sekä kustannuksiin liittyvät esteet.

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**Avainsanat** kestävä hankinta, kestävä toimitusketjun hallinta, hankintastrategia, kategoriainhallinta, kategoriastrategia, teollisuusala

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Pinja Hytönen

# 1 Introduction

This chapter serves as an introduction to the study. It first outlines the background of the study and discusses the research problem and objectives. Later in this chapter, the thesis structure and scope of the study are also presented.

## 1.1 Background

In recent years, the pressure to move towards more sustainable business models has been on the rise, with companies held increasingly accountable for the environmental, social, and economic impacts of both their own operations and those of their suppliers (Koberg & Longoni, 2019). The World Business Council for Sustainable Development has defined corporate social responsibility as "the continuing commitment by business to behave ethically and contribute to economic development while improving the quality of life of the workforce and their families as well as the local community and society at large" (World Business Council for Sustainable Development, 2000).

In *Cannibals with Forks: The Triple Bottom Line of 21st Century Business*, John Elkington introduced the Triple Bottom Line, today a widely used framework that encourages businesses to measure their performance in three key areas: people, planet, and profit. The Triple Bottom Line expands the traditional understanding of business success from a singular focus on financial returns to one that includes social equity, environmental stewardship, and economic sustainability. It's about achieving a balance where businesses can thrive financially while contributing positively to society and the environment. Elkington stresses that all three dimensions must be measured and managed together, meaning a company that excels financially but exploits people or harms the environment cannot be considered truly successful. Instead, success in the 21st century must involve creating value across all three areas simultaneously. (Elkington, 2000). Figure 1 illustrates the interconnected nature of the Triple Bottom Line.

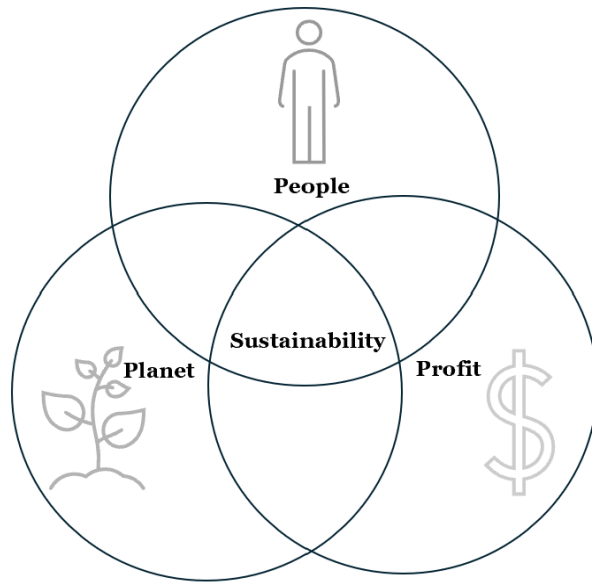


Figure 1. Triple Bottom Line (based on Elkington, 2000).

While many companies have made notable progress in enhancing their internal sustainability efforts during the last 20 years (Eccles, Ioannou & Serafeim, 2014), their environmental and social impact extends far beyond their immediate operations. For most companies, over 70% of the company's emissions fall under scope 3 emissions produced across the company's supply chain (World Economic Forum, 2023a). Of these, the upstream supply chain typically accounts for two-thirds (Kauppi, 2024a). Furthermore, managing and monitoring tier-n suppliers presents challenges, increasing the likelihood that poor environmental or labour practices may go unnoticed (Cherel-Bonnemaison, et al., 2021). At the forefront of upstream supply chain management, procurement plays a strategic role in shaping the organisation's sustainability footprint. (Chen, van Dalen & Wynstra, 2024).

Integrating sustainability into procurement strategies can be challenging as each procurement category has distinct characteristics. The categories may differ in product complexity, strategic importance, market dynamics, and supply risk (Saarikorpi, 2024), which makes a one-size-fits-all approach ineffective. Each category also faces unique environmental and social risks, which require specific sustainability actions (United Nations Global Marketplace, n.d.). These factors necessitate customised strategies for effective sustainability integration.

## 1.2 Research Problem and Objectives

Previous research highlights the importance of sustainable procurement, (Burian, Fröhlich, and Sievers, 2013) and emphasises the value of procurement approaches that consider the strategic significance of purchases (Kraljic 1983). However, there is a need for tailored sustainability approaches that align sustainability goals with procurement practices while considering the strategic position of each category.

This study aims to fill this gap by developing a framework for sustainable procurement that addresses both common approaches across procurement categories and category-specific strategies, ensuring that each category's strategic importance and associated supply risks are considered when integrating sustainability into procurement processes. Additionally, the study aims to compare the case organisation's current procurement practices with this framework, identify potential challenges organisations may face during implementation, and provide actionable recommendations for improvement.

This study addresses the following research question: How can sustainability be effectively integrated into procurement while addressing the strategic differences across procurement categories?

The study is conducted as a case study within the sourcing organisation of a local division of a global industrial manufacturing company. The research will begin by establishing a Sustainable Procurement Model, based on academic literature, that applies across the sourcing organisation and all categories. Next, a Sustainability Strategy Matrix will be created to address category-specific needs. This matrix will classify procurement categories based on supply risk and profit impact, offering tailored sustainability strategies for each quadrant, drawing from relevant academic insights. By combining an overarching model with category-specific strategies, the study will create a structured framework for sustainable procurement.

To apply this framework, the sourcing organisation's direct procurement categories will be placed on the Sustainability Strategy Matrix, based on supply risk and profit impact. Four representative categories, one from each strategic quadrant, will be selected for further investigation. In-depth interviews with sourcing managers responsible for these categories will provide insights into category characteristics, sustainability challenges, and the extent of sustainability integration within procurement strategies and processes. The findings from these interviews, alongside company data, will be analysed against the theoretical framework to assess alignment, identify challenges, and provide actionable recommendations.

### **1.3 Structure of the Thesis**

The thesis is structured into seven chapters. The first chapter serves as an introduction, outlining the background of the study, research problem and objectives, thesis structure, and scope of the study. The second chapter of the thesis delves into sustainable procurement, exploring key concepts and various drivers that motivate its adoption.

The third chapter introduces sustainable procurement practices, emphasising the importance of ensuring transparency and incorporating sustainability into every step of the procurement process. Building on these insights, it develops a Sustainable Procurement Model.

The fourth chapter explores category management in procurement, presenting the Kraljic Matrix and its derivative, a Sustainability Strategy Matrix. The fifth chapter introduces the case methodology, detailing the research method and data collection and analysis processes. It also discusses the validity and limitations of the study.

The sixth chapter focuses on the findings of the case study, exploring the integration of sustainability into the sourcing organisation's procurement practices. This analysis is conducted in relation to the theoretical framework. The seventh chapter introduces the theoretical and managerial implications of the study and provides suggestions for future research.

### **1.4 Scope of the Study**

The study has certain limitations related to its scope, methodology, and contextual boundaries, which shape its findings. These limitations are outlined to ensure transparency and assist in interpreting the results.

In discussions about supply chains, the term value chain is often encountered. While the supply chain encompasses all activities required to produce and deliver a product or service, the value chain adopts a broader perspective, incorporating activities such as research and marketing that contribute to overall value creation (Feller et al., 2006). This study focuses on the supply chain rather than the value chain, as procurement primarily influences supply-related processes such as sourcing and supplier relationships. Although value-adding activities are important, they fall outside procurement's primary scope of operations.

Furthermore, within this study, procurement is defined as a function of supply chain management (SCM) that involves acquiring goods and services necessary for business operations. The scope includes sourcing strategy and

category strategy development, requirements definition, supplier selection, and supplier management but excludes operational purchasing activities. This limitation ensures a strategic focus but may overlook insights from day-to-day purchasing practices. While procurement is treated as a critical component of SCM, the study does not address broader SCM functions such as logistics, inventory management, or demand planning. This focused approach ensures depth in procurement but excludes potential interactions between procurement and other SCM functions.

The research is restricted to the industrial manufacturing industry. This industry-specific focus allows for a detailed exploration of sustainability challenges and opportunities unique to industrial manufacturing but limits the generalisability of findings to other sectors. The study is also based on a single case within a local division of a global industrial manufacturing company, and findings may not be generalisable to other organisations. Furthermore, the qualitative data collection through interviews with sourcing managers provides valuable insights but may be influenced by subjective perspectives. The study mitigates this by comparing interview data with company documents and academic literature, though some biases may remain.

In this study, the decision to adopt the Triple Bottom Line approach over the Environmental, Social, and Governance (ESG) approach is intentional and aligns with the research objectives. Triple Bottom Line emphasises a holistic approach, integrating environmental, social, and economic considerations into business operations and decision-making processes. In contrast, ESG criteria are primarily utilised as metrics for external evaluation by investors and stakeholders, assessing a company's performance in environmental, social, and governance aspects. While ESG provides valuable insights for investment decisions, its application is more suited to external assessments rather than internal strategic development. (Miller, 2020). Furthermore, this study places greater focus on the environmental and social dimensions of the Triple Bottom Line, because these aspects are often less developed compared to economic considerations, which are traditionally well-established in organisational decision-making (Miller, 2020). The case study company also operates in an industry where cost efficiency and economic value are already strongly embedded in procurement processes. Procurement strategies of companies are primarily based on cost minimisation, without paying attention to sustainability (Aktin & Gergin, 2016). By focusing on the environmental and social dimensions, this study addresses the gaps in existing practices, complementing the organisation's established economic priorities.

## **2 Sustainable Procurement in the Industrial Manufacturing Industry**

This chapter provides an overview of sustainable procurement within the industrial manufacturing sector. It begins by outlining the principles of sustainable supply chain management, emphasising the strategic role of procurement as a key enabler of corporate sustainability. The chapter then explores the factors influencing the adoption of sustainable procurement practices, including environmental and social drivers, evolving regulatory requirements, and business value drivers.

### **2.1 Sustainable Supply Chain Management**

A supply chain is a network connecting a company with its suppliers to produce and distribute a product to the final customer. Organisations closer to the source of raw materials relative to the focal company are considered upstream, while those closer to the customer are referred to as downstream. Supply chain management oversees the flow of materials, goods, services, and information throughout this network. It encompasses all processes that transform raw materials into final products. (Chopra & Meindl, 2021).

Several factors influence the structure of a company's supply chain, including customers, supply chain objectives, supplier capabilities, regional considerations, operational processes, and the nature of the product. In traditional supply chain management, decisions on how to manage the supply chain are influenced by the uncertainties it faces. The two primary types of uncertainty are supply uncertainty (upstream) and demand uncertainty (downstream). Supply uncertainty arises from factors such as vulnerability to disruptions, potential quality issues, unreliable suppliers, limited sources or capacity, fluctuating lead times, and inconsistent yields. Demand uncertainty, on the other hand, is driven by unpredictable demand, forecasting challenges, short selling seasons, high inventory costs, and a wide variety of products. (Lee, 2002).

Supply chain managers are now confronted with another type of uncertainty, sustainability-related uncertainty. This involves concerns about the ethical and sustainable practices within the upstream supply chain, extending beyond just the first-tier suppliers. Busse et al. (2017) have identified three forms of sustainability-related uncertainty that companies are facing in their supply chains. The first is task uncertainty, which results from the amount, variety, and novelty of the products that are bought, as well as from the product-related characteristics such as the materials used. Source uncertainty, on the other hand, arises from distinct locations, length

of business relations, and production process-related characteristics. This form of uncertainty involves the difficulty in verifying the sustainability practices of individual suppliers, especially those in regions with differing cultural, regulatory, or economic environments. Such variations make it harder to assess whether suppliers are consistently adhering to sustainable practices. (Busse et al., 2017).

The third sustainability-related uncertainty originates from the supply chain's structural characteristics (Busse et al., 2017). Industrial supply chains are often long and complex (Baumgartner, Malik, & Padhi, 2020). The more complex the supply chain is horizontally and vertically (the more suppliers there are in each tier and the more tiers there are), the more uncertainty. Also, the more there is spatial complexity (the longer the physical distance to suppliers), the greater the supply chain uncertainty. As supply chains grow more layered and geographically dispersed, ensuring sustainability compliance across all levels becomes increasingly difficult. (Busse et al., 2017).

Carter & Rogers (2008) have defined Sustainable Supply Chain Management (SSCM) as the "strategic, transparent integration and achievement of an organisation's social, environmental, and economic goals in the systemic coordination of key inter-organisational business processes for improving the long-term economic performance of the individual company and its supply chains" (Carter & Rogers, 2008, p. 368). According to Carter & Rogers, the intersection of environmental and social performance is labelled as "Good?" suggesting that companies managing both environmental and social performance can reach a satisfactory level of sustainability. However, without the economic component, this is not fully sustainable in the long term. The intersections of economic and environmental performance as well as economic and social performance are labelled as "Better", which implies that companies focusing either on economic success and environmental stewardship or economic success with social responsibility are performing at a higher level of sustainability. The centre of the diagram, where environmental, economic, and social performance intersects, is labelled as "Best." This reflects Carter and Rogers' core argument: true sustainability in supply chain management is achieved when all three performance areas are integrated and balanced. Companies that excel in all three dimensions are considered to have the highest level of sustainability. (Carter & Rogers, 2008). Figure 2 illustrates this application of the Triple Bottom Line in sustainable supply chain management.

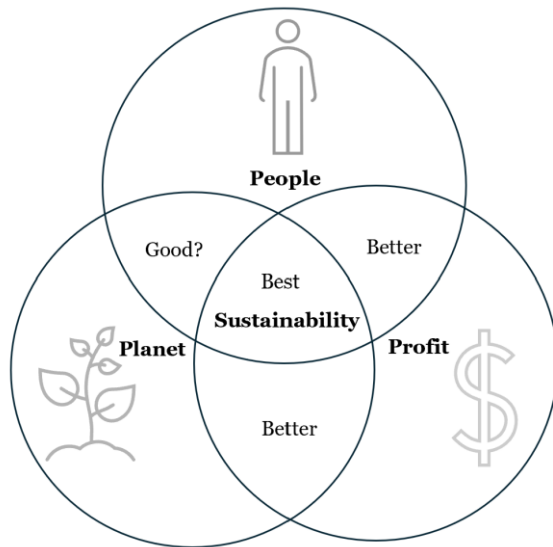


Figure 2. Triple Bottom Line in Sustainable Supply Chain Management (based on Carter & Rogers, 2008).

## 2.2 Sustainable Procurement

An organisation's emissions are broadly categorised into three main scopes. Scope 1 refers to the emissions an organisation directly generates through its facilities and vehicles and scope 2 to the emissions an organisation indirectly generates through the purchase of electricity, steam, heat, and cooling for its own use. Scope 3, on the other hand, refers to emissions that arise up and down the supply chain, from suppliers upstream to distributors and customers downstream. Scope 3 emissions usually account for more than 70% of a company's carbon footprint. (World Economic Forum, 2023a). Of these, the upstream supply chain typically accounts for two-thirds (Kauppi, 2024a ).

Social issues have also become significant in supply chains due to the involvement of numerous suppliers who can directly impact the reputation of the purchasing company. Scrutiny from enlightened stakeholders, both internal and external, holds firms accountable for managing social issues in their supply chains. (Yawar & Seuring, 2017).

Procurement plays a pivotal role in shaping organisational success. In large enterprises, 60-80% of costs, CO<sub>2</sub> emissions, risk management, innovation, and diversity are directly influenced by procurement activities. As the primary interface with the upstream supply chain, the procurement function has a decisive role in shaping an organisation's environmental and social sustainability footprint. (Sammalkorpi, 2024). Over the past decades, the procurement function has taken on a more strategic role within

organisations. This shift has led to a growing reliance on suppliers, not only for cost efficiency and product availability but also for ensuring sustainability. (Chen, van Dalen & Wynstra, 2024).

Sustainable procurement involves incorporating environmental, social, and economic factors into procurement, according to the triple bottom line. These considerations are integrated from the outset of a business relationship and continue throughout the entire procurement process. (Toikka, 2024).

## **2.3 Drivers for Sustainable Procurement**

Sustainable procurement initiatives are essential for reducing carbon emissions, preserving biodiversity, conserving natural resources, and addressing water scarcity. They also play a critical role in mitigating social challenges within supply chains, including human welfare, workplace safety, and community development. While compliance with evolving regulations remains a primary driver, sustainable procurement extends beyond regulatory obligations. It serves as a strategic tool for risk management, operational efficiency, stakeholder engagement, and innovation.

### **2.3.1 Environmental and Social Drivers**

The manufacturing industry is characterised by significant environmental and social issues. (Stark, Seliger, Bonvoisin, 2017). These include greenhouse gas emissions, environmental degradation, and resource depletion (Stark, Seliger, Bonvoisin, 2017), as well as challenges related to human welfare, safety, and community development (Yawar and Seuring, 2017). In response to escalating environmental pressures and social violations, sustainable procurement is no longer a choice but a necessity. Companies must actively engage in sustainable procurement practices to address these challenges.

The World Economic Forum's Global Risks Perception captures expert opinions on the world's most pressing risks, offering both a short-term (2-year) and a long-term (10-year) outlook. A striking observation from this survey is the prominence of environmental risks in the 10-year outlook, where four of the top five risks identified are environmental. These include extreme weather events, critical changes to Earth systems, biodiversity loss and ecosystem collapse, and natural resource shortages. (World Economic Forum, 2024).

According to IPCC (2023), global greenhouse gas emissions have continued to rise, driven by unsustainable energy use, land use, and changes in land-

use patterns. These emissions are further enhanced by varying consumption and production behaviours. As a result, rapid and widespread changes have impacted the atmosphere, oceans, cryosphere, and biosphere. Human-induced climate change is intensifying weather and climate extremes globally, leading to severe consequences and widespread damage to nature and people. The greenhouse gas emission levels projected for 2030, based on nationally determined contributions as of October 2021, suggest that global warming is likely to surpass the Paris Agreement's 1.5°C during this century, making it increasingly difficult to limit warming to below 2°C. (IPCC, 2023). Supply chains of multinational enterprises account for approximately 20% of all CO<sub>2</sub> emissions (Zhang et al., 2020), highlighting the need for sustainable supply chain practices.

Environmental sustainability efforts in supply chains have largely concentrated on mitigating climate change by reducing emissions. In contrast, strategies to prevent biodiversity loss resulting from supply chain activities have received comparatively little attention in management research. (Salmi et al., 2023). However, biodiversity loss and ecosystem collapse are ranked as the third most severe global risk expected over the next ten years (World Economic Forum, 2024a). In addition, the economic implications of biodiversity loss are substantial as over half of the global GDP, around \$44 trillion, depends on high-functioning biodiversity (Savage, 2024). Supply chains contribute significantly to biodiversity loss, with over 90% of the pressure on biodiversity coming from four major supply chains: food, energy, infrastructure, and fashion. (Kurth et al., 2021). The most significant impacts on biodiversity usually occur at the sub-tier supplier level, where resources and raw materials are produced or extracted. This indicates that purchasing executives and managers are uniquely positioned to influence biodiversity management practices and mitigate biodiversity impacts within their supply chains. (Salmi et al., 2023). Climate change and biodiversity loss are mutually reinforcing: climate change accelerates ecosystem degradation, which in turn increases the release of carbon into the atmosphere. Thus all actions to reduce climate change impacts in supply chains will help reduce biodiversity loss (IPBES-IPCC, 2021).

Direct overexploitation is a procurement issue where the supply chain's demand for raw materials contributes to the depletion of natural resources. Land-use and sea-use changes are also tied to procurement, as supply chains often drive habitat loss to make way for agricultural, industrial, or urban expansion. Often these impacts are created far from the location of the end customer and the company whose name the product is sold under. (Kauppi, 2024b). Global consumption of natural resources is projected to increase by 60% by 2060 compared to 2020 levels. These resources include fossil fuels, metals such as iron, aluminium, and copper, as well as land and

water (World Economic Forum, 2024b). Furthermore, By 2040, water demand will exceed supply by 40% (World Economic Forum, 2023b).

The rising demand for resources is driven by urbanisation, industrialisation, and population growth, resulting in serious impacts like biodiversity loss, water scarcity, climate change, and air pollution. (World Economic Forum, 2024b). According to the Circularity Gap Report 2023, material extraction and usage contribute to more than 90% of global biodiversity loss and water stress. In addition, 70% of global greenhouse gas (GHG) emissions are linked to the handling and use of materials. Furthermore, over 90% of raw materials globally do not circle back to use. (Circle Economy, 2023).

Social issues in supply chains have received less attention compared to environmental concerns. They refer to the challenges related to human welfare, safety, and community development (Yawar and Seuring, 2017). Yawar and Seuring (2017), identify seven major social sustainability issues in supply chains: labour conditions, child labour, human rights, health and safety, gender equality, minority development, and inclusion of disabled and marginalised people.

The most frequently discussed issue in the literature is labour conditions, which include concerns such as low wages, long working hours, workers' right to form unions, contract labour, and exploitation of workers. Child labour follows closely as a widely covered topic, addressing the employment of children under 15 and hazardous working conditions for those under 18. Human rights are also a significant focus, encompassing equal rights without discrimination based on nationality, ethnicity, religion, gender, or disability, (Yawar & Seuring, 2017).

Health and safety issues discussed slightly less frequently, pertain to ensuring the physical and mental well-being of workers by providing safe and hygienic work environments. Gender equality, which involves fair treatment and equal employment opportunities for women and transgender individuals, receives moderate attention in comparison to other issues. Furthermore, minority development, which aims to create opportunities for underrepresented groups based on race, religion, or ethnicity, and the inclusion of disabled and marginalised people, addressing the exclusion of these populations, are discussed the least often in literature. (Yawar & Seuring, 2017).

The Global Reporting Initiative also outlines societal aspects of social issues. These include local community impacts, anti-corruption measures, public policy engagement, anti-competitive behaviour, compliance with social laws, supplier assessments for societal impacts, and grievance mechanisms. These areas emphasise the need for organisations to actively

address their broader social and community responsibilities. (International Finance Corporation, 2024).

In the manufacturing industry, another important social sustainability topic is conflict minerals. The minerals trade of tin, tungsten, tantalum and gold, also referred to as 3TG, can be used to finance armed groups, fuel forced labour and other human rights abuses, and support corruption and money laundering in politically unstable areas (European Commission, 2021). A study by Kim and Davis (2016) found that an analysis of conflict minerals reports submitted to the Securities and Exchange Commission by over 1300 corporations revealed significant transparency challenges. Nearly 80% of these companies admitted they were unable to determine the country of origin for such materials, and only 1% could confidently certify their products as conflict-free. The study further noted that internationally diversified companies and those with extensive, dispersed supply chains faced even greater difficulty in declaring their products as conflict-free, as increased complexity reduces visibility within the supply chain. (Kim & Davis, 2016).

### **2.3.2 Evolving Regulations**

Organisations must increasingly align their supply chain operations with evolving legal requirements. The 2023 NCSU & GEP Global Supply Chain Sustainability Study reveals that seven out of the top 11 drivers behind the organisation's supply chain and sustainability program initiatives were regulatory in nature, illustrating that compliance with laws and standards has become a major influence on sustainability efforts. (NCSU & GEP, 2023).

European Union has adopted several legislative acts under the umbrella Green Deal to transform the EU economy towards a sustainable future. These include, for example, the EU Corporate Sustainability Reporting Directive, EU Taxonomy Regulation, EU Sustainable Finance Disclosure Regulation, EU Batteries Regulation, EU Deforestation Regulation, EU Conflict Minerals Regulation, EU Forced Labour Regulation, and EU Packaging and Packaging Waste Regulation. The Corporate Sustainability Due Diligence Directive (CSDDD) represents a crucial and timely addition to this legislative framework, reinforcing and complementing the existing EU Directives and Regulations under the Green Deal. (ERM, 2024).

The CSDDD entered into force on 25 July 2024, and it aims to promote sustainable and responsible corporate practices both within companies and throughout their global value chains. It requires companies within its scope to identify and address negative human rights and environmental impacts resulting from their actions inside and outside Europe. This directive introduces a corporate due diligence duty, requiring companies to identify

and address both potential and actual human rights and environmental risks within their operations, subsidiaries, and value chains. Additionally, large companies are mandated to implement a climate change transition plan. This plan must aim for climate neutrality by 2050, in line with the Paris Agreement, and include intermediate targets specified by the European Climate Law. (European Commission, 2024a).

The Directive will be implemented in phases, beginning with a two-year period from the date of enforcement for member states to transpose the CSDDD into national law and set up supervisory authorities. Enforcement will follow a staggered timeline based on company size and turnover, starting three years after the directive's entry into force. The phases are as follows: a 3-year compliance period for companies with more than 5,000 employees and a turnover of EUR 1,500 million (from 2027), a 4-year period for those with over 3,000 employees and a turnover of EUR 900 million (from 2028), and a 5-year period for companies with more than 1,000 employees and a turnover of EUR 450 million, as well as for companies engaged in franchising or licensing agreements with turnovers exceeding EUR 80 million in the EU and EUR 22.5 million in royalties (from 2029) (European Commission, 2024b).

Figure 3 outlines the groups covered under the CSDDD, detailing the employee and financial thresholds for EU companies, non-EU companies, and franchised entities operating within the EU. Figure 4 illustrates the implementation timeline for these groups, highlighting the varying compliance requirements based on group classification and company size.



		
<b>Group 1:</b> EU Companies	<b>Group 2:</b> Non-EU Companies	<b>Group 3:</b> Franchised Companies (EU and Non-EU)
>1000 employees <i>employee threshold</i>	N/A <i>employee threshold</i>	N/A <i>employee threshold</i>
EUR 450 million turnover globally <i>financial threshold</i>	EUR 450 million turnover in the EU <i>financial threshold</i>	EUR 80 million turnover EUR 22.5 million in royalties <i>financial threshold</i>

Figure 3. Scope of the CSDDD (based on European Commission, 2024b).

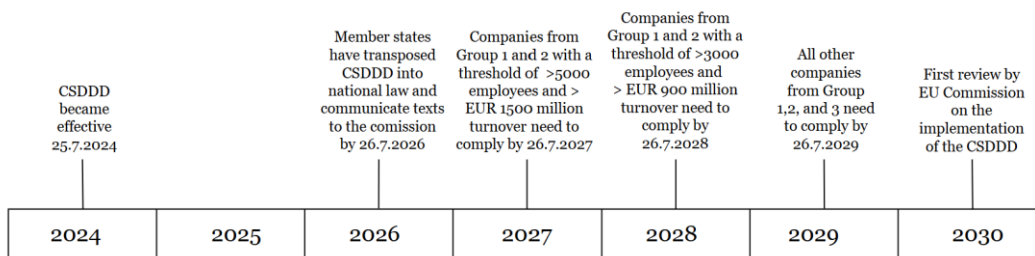


Figure 4. CSDDD Implementation Timeline (based on European Commission, 2024b).

The enforcement of the CSDDD rules will be managed in two primary ways; administrative supervision and civil liability. Member States will appoint an authority responsible for supervising and enforcing the rules. The European Commission will establish a European Network of Supervisory Authorities, which will include representatives from national bodies to ensure a coordinated approach across member states. (European Commission, 2024).

National supervisory authorities are tasked with ensuring that companies comply with the Directive. Substantiated concerns about a company's failure to meet the directive's standards can be submitted through accessible channels set up by supervisory authorities. The authorities are obligated to investigate these concerns and respond within a reasonable timeframe. When there is sufficient indication that a company has violated the directive, supervisory authorities have the power to initiate investigations. They may also conduct inspections to ensure that companies are meeting their obligations. The directive mandates administrative sanctions to be applied to non-compliant companies, with penalties set at a minimum of 5% of the company's net worldwide turnover in the previous financial year. To ensure the consistent and effective implementation of the CSDDD across the European Union, the European Commission will conduct regular reviews of how the directive is being enforced, and, for example, monitor how companies are designing, adopting, and implementing climate transition plans. (ERM, 2024).

The Directive establishes provisions for civil liability, allowing affected individuals, trade unions, and civil society organisations to seek compensation. They will be able to submit civil liability claims for at least five years, and those adversely impacted by a company's failure to comply with the CSDDD will have the right to full compensation. (ERM, 2024).

Businesses subject to the directive will be responsible for bearing the costs of establishing and operating the due diligence process. In addition, they need to bear the transition costs, which may include investments to modify

their operations and value chains to meet the due diligence obligations, as necessary. (European Commission, 2024).

The obligations companies must meet can be categorised into four major areas. The first obligation of the directive requires companies to incorporate due diligence into their policies and risk management systems. This involves implementing a policy to ensure risk-based human rights and environmental due diligence by the company. In addition, they need to embed due diligence policy and processes across the company and risk management systems. The second obligation requires the companies to map their own operations and value chains. Companies must regularly conduct comprehensive assessments of their own operations, as well as those of their upstream and downstream partners, to identify areas where adverse impacts might occur. They should use both relevant internal and external information sources. Companies are also expected to prioritise adverse impacts based on severity and likelihood, allowing them to focus on the most critical risks. (ERM, 2024).

The third obligation requires the companies to take appropriate action to prevent potential adverse impacts or to reduce their severity and extent. If adverse impacts occur, they must implement corrective action plans to address and remedy the damage. Companies are encouraged to engage in collaborative efforts with other stakeholders to address risks collectively and seek contractual assurances from their business partners. In cases involving small or medium-sized enterprises, the companies should provide proportionate support to help these companies comply. The fourth obligation mandates companies to establish a company-level notification mechanism, which is accessible to potentially affected stakeholders or their legitimate representatives and which does not prevent complainants from making use of other juridical or non-juridical mechanisms. They also need to establish a procedure to respond to and address complaints raised through the notification mechanism. This procedure needs to be fair, accessible, transparent, and publicly available and it needs to include reasonable steps to prevent all forms of retaliation. Lastly, the companies need to provide adequate information on how complaints are handled and complainants should be kept informed of the progress and outcome of their complaints. (ERM, 2024).

An important question regarding the CSDDD is determining what constitutes sufficient action from companies in preventing social sustainability issues within their supply chains, especially given that many companies face challenges in fully tracing the origins of their goods. One possible response to mitigate these risks could be relocating production from high-risk to lower-risk regions, as non-compliance could result in substantial fines. (Kauppi 2024c).

The CSDDD can also increase the legal and financial risks for companies failing to meet stringent sustainability standards. Volkswagen, BMW, and Mercedes recently faced a forced labour complaint related to Xinjiang, brought under Germany's Supply Chain Due Diligence Act (Yang & Nilsson, 2023). This case provides a glimpse of what may lie ahead under the CSDDD, where companies will need to demonstrate rigorous due diligence or face legal action within the EU for unethical practices in their global operations. (Kauppi, 2024a).

### **2.3.3 Business Value Drivers**

The business benefits of sustainable procurement extend far beyond regulatory compliance. Other advantages include managing risks, improving efficiency, meeting stakeholder requirements, and fostering innovation. Business value drivers feed into and support the development of value creation levers, such as cost savings and pricing power, which further contribute to revenue growth and profitability for companies (BSR, 2010).

#### ***Managing Risks***

Effective risk management is crucial for building resilient supply chains that can handle disruptions. (Carter & Rogers, 2008). By addressing and mitigating sustainability risks in the supply chain, companies can effectively manage costs, safeguard their market share, and lower risk premiums. Ensuring that suppliers have strong management systems and comply with regulations helps companies avoid potential supply chain disruptions or delays caused by sustainability issues. (BSR, 2010).

Additionally, companies are adopting sustainable procurement practices to help their suppliers adjust to new environmental regulations and extended product responsibility legislation, thus reducing future liability. With the rise of global sustainability regulations, knowing the full scope of their supply chains is critical for companies to stay compliant. Effective management of social and environmental risks can also help companies mitigate reputational risks that could otherwise harm their market position. Firms that demonstrate a strong capability in managing these risks may benefit from easier access to capital at lower costs, as well as better financing and insurance options. (BSR, 2010). Sustainability excellence also reduces transition risk by helping companies stay ahead of changes in regulation and stakeholder sentiment. (Cherel-Bonnemaison et al., 2021).

Effective supply chain risk management is essential for companies whose customers prioritise sustainability in purchasing decisions or whose market positioning and pricing power depend on a strong brand reputation. It is equally critical for businesses operating with short lead times, relying on

specialised inputs from a limited supplier base, or businesses undergoing efforts to consolidate or streamline their supply chains. (BSR, 2010).

### ***Improving Efficiency***

The 2023 NCSU & GEP *Global Supply Chain Sustainability Study* reveals that the biggest drivers for organisations' supply chain and sustainability program initiatives were operational improvement and cost reduction. (NCSU & GEP, 2023). Notably, many actions that enhance sustainability align with, rather than contradict, economic efficiency.

Strong sustainability credentials can reduce costs by 5-10%, as companies with strong sustainability practices emphasise operational efficiency and minimising waste (Cherel-Bonnemaison et al., 2021). Many supply chain sustainability initiatives allow companies to achieve greater efficiencies and reduce procurement costs. Responsible management of inputs like energy, water, and materials can cut procurement costs while also minimising the supply chain's environmental impact and improving worker health. (BSR, 2010).

Lean management is one of the most widely used methods for managing operations and supply chains. It focuses on reducing waste, eliminating non-value-adding activities, and streamlining operations. In lean management, waste is defined as anything that goes beyond the minimum equipment, time, materials, or energy necessary to produce goods valued by the customer. Lean targets several types of waste: overproduction, waiting, transportation, overprocessing, defects, motion, and excess inventory. (Jayswal, Chauhan, and Sen, 2017).

From a sustainability perspective, lean management's focus on waste reduction aligns closely with environmental sustainability. Minimising waste inherently reduces resource consumption, energy use, and landfill waste. Additionally, process-centred approaches in lean encourage addressing issues at their root, mirroring environmental strategies that focus on preventing pollution rather than mitigating its effects. However, conflicts can arise, particularly in lean systems' reliance on just-in-time logistics, which often necessitate frequent, smaller shipments, which can increase emissions due to higher transport frequency. Thus, to fully achieve both lean and sustainable objectives, organisations need to supplement lean practices with environmental management tools that address these ecological impacts. By adopting a strategic approach that balances these objectives, organisations can create systems that are both sustainable and efficient. (Martínez-Jurado & Moyano-Fuentes, 2014).

Strong labour, health, and safety practices, combined with effective management of social issues, also significantly contribute to cost efficiency, improved financial performance, and long-term business sustainability.

Companies that prioritise reducing workplace accidents and promoting employee health can boost productivity while lowering absences and turnover rates, ultimately reducing operational costs (BSR, 2010; Yawar & Seuring, 2017). In regions facing labour shortages, such as China, these practices position suppliers as employers of choice, stabilising labour costs and improving retention. Even if these savings are not directly passed on to buyers, companies benefit from more reliable and higher-quality supplies over time. (BSR, 2010). Furthermore, Swift et al (2019) found that companies with high visibility into their conflict minerals supply chains achieve higher profitability and realise improved sales performance and stock market valuations than comparable companies with less visibility. (Swift et al., 2019). Thus, managing social issues effectively can create a win-win situation, where both the company and its suppliers experience positive outcomes. (Yawar & Seuring, 2017).

Implementing sustainability practices to enhance efficiency is particularly critical for companies heavily reliant on natural resource inputs, as they are exposed to price volatility and resource scarcity. Additionally, companies that see downstream value in fostering resource-efficient upstream supply chains—such as those delivering carbon-efficient products—stand to gain significantly from such practices. (BSR, 2010).

### ***Meeting Stakeholder Requirements***

Companies' sustainability initiatives significantly enhance employee engagement. These efforts inspire employees by aligning with their desire for meaningful and impactful work (Simon & Zhou, 2018; Tschelisnig & Westerlaken, 2022). Additionally, sustainability initiatives have been shown to reduce employee turnover (Liu et al., 2022).

Companies that invest in managing sustainability issues often experience enhanced reputations, brand loyalty, access to new markets, and the ability to attract socially responsible investors. Supply chain sustainability also helps businesses build trust and credibility with external stakeholders. (Yawar & Seuring, 2017). These relationships provide valuable insights into emerging regulations, market trends, and external factors that could influence business. Furthermore, they enhance companies' ability to secure favourable outcomes in stakeholder decisions. (BSR, 2010).

Building a culture of responsibility is particularly important for companies that rely on skilled labour with flexible employment options. It is also crucial for those operating in industries or regions where the financial community perceives high risks related to governance or corruption. (BSR, 2010).

### ***Fostering Innovation***

As stakeholders become more aware of the environmental impacts of manufacturing and as transparency increases through the Internet, there is a growing demand for products made from more sustainable materials, processes, and working conditions. In response, companies are working closely with suppliers to enhance the sustainability features of existing products and even develop entirely new offerings. (BSR, 2010).

Saunila, Ukko, and Rantala (2017) found that the more a company values economic, institutional, and social sustainability, the more likely it is to invest in green innovation. Sustainability-focused capabilities drive green product innovation, which subsequently boosts market performance (Dangelico, Pujari, and Pontrandolfo, 2017).

For decades, supply chains followed a linear model in which raw materials were extracted, transformed into products, and eventually discarded after use. This approach, while highly efficient, is no longer viable in today's marketplace. The circular supply chain model aims to reduce waste by reusing, recycling, and remanufacturing materials. This shift is not only about environmental stewardship but also about ensuring the long-term competitiveness and resilience of businesses. The move to circular supply chains requires companies to consider the entire life cycle of the product. (Saenz & Hinkel, 2022). Globally, implementing circular economy strategies can reduce resource extraction and usage by 28% while cutting greenhouse gas emissions by up to 39% beyond current climate commitments (Circle Economy, 2022). Companies that invest in circularity can also reduce costs by reusing materials, extend the lifespan of products through remanufacturing, and create new revenue streams by recycling waste products. Additionally, by adopting circular supply chain practices, businesses can differentiate themselves from competitors by offering sustainable and innovative products. (Saenz & Hinkel, 2022).

Creating sustainable products is particularly vital for companies operating in mature or highly saturated markets where differentiation is essential. It is also critical for businesses supplying to companies that increasingly prioritise sustainability criteria in contracts and proposals. (BSR, 2010).

Figure 5 illustrates the key drivers for sustainable procurement. By embedding sustainability into procurement practices, organisations can strengthen their competitive advantage, enhance operational resilience, and generate long-term value throughout their supply chains.

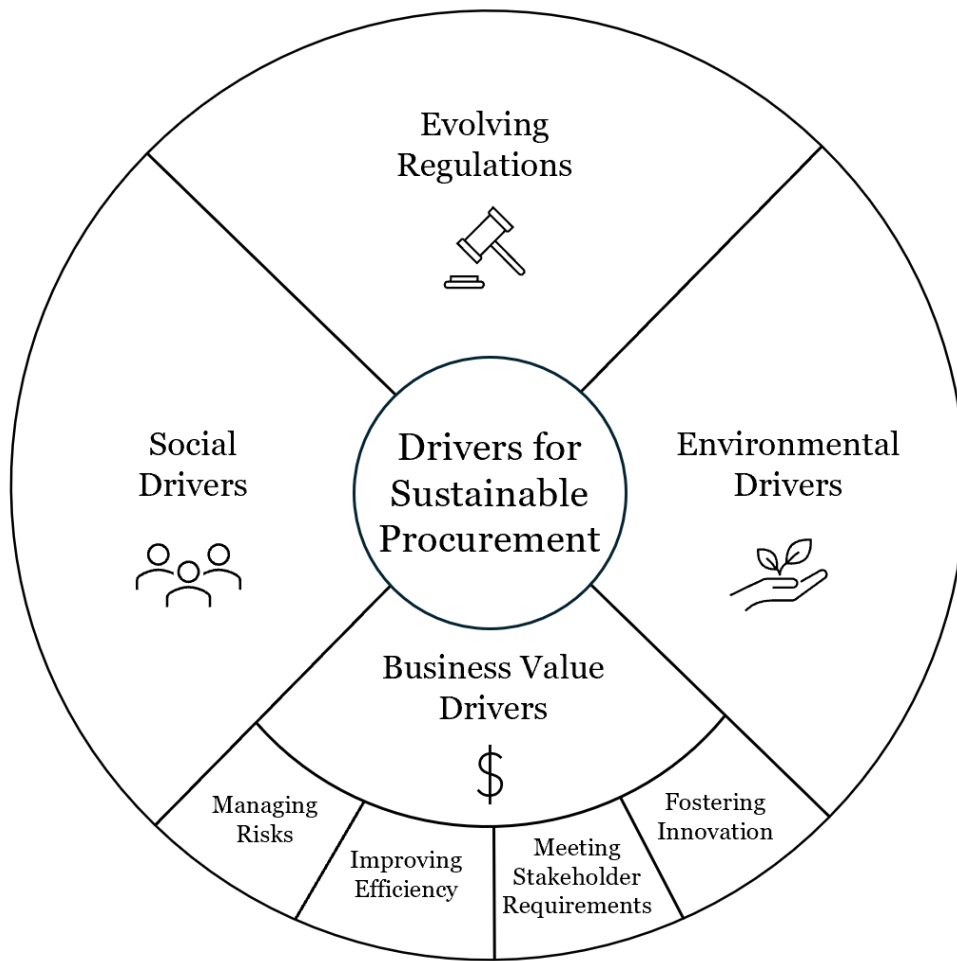


Figure 5. Drivers for Sustainable Procurement

### 3 Integrating Sustainability into Procurement

Achieving sustainable procurement requires companies to incorporate sustainability considerations into every step of the procurement process, from strategy formulation and requirements definition to supplier selection and management. By establishing sustainability as a core strategic goal, businesses ensure that sustainability is not an afterthought, but an essential part of their operational decision-making process. Figure 6 illustrates the procurement process steps, including transparency as an essential factor, fostering trust and accountability throughout the process. By engaging in open communication with stakeholders and ensuring ethical supplier operations, companies build credibility in their sustainability efforts (Carter & Rogers, 2008).

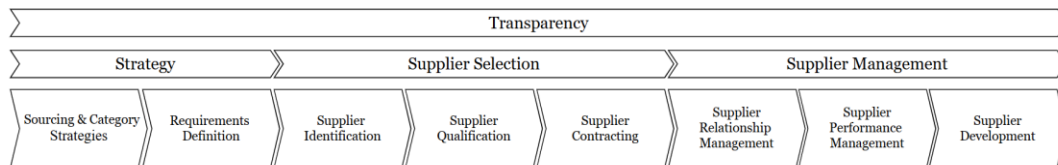


Figure 6. Procurement Process

This chapter discusses ways to integrate sustainability into procurement in different parts of the procurement process. First, tools to increase supply chain transparency are discussed, followed by approaches to integrate sustainability into sourcing and category strategies. Later, sustainability considerations in supplier selection and supplier management are discussed. Building on these insights, a model for sustainable procurement is developed.

#### 3.1 Increasing Supply Chain Transparency

Only 10-30% of companies have visibility beyond tier 1 suppliers (Kauppi, 2024d). The increasing complexity and globalisation of supply chains have placed transparency at the forefront of sustainable business practices. In a world where companies rely on vast networks of suppliers across different countries and industries, ensuring the social and environmental sustainability of these extended supply chains has become both a necessity and a challenge. Transparency, the open sharing and disclosure of relevant social and environmental information, has emerged as a critical factor in improving sustainability and ensuring that corporate values extend beyond a company's direct operations. (McGrath et al., 2021).

Effective supply chain mapping is a critical prerequisite for supply chain transparency. It is a process of diagrammatically representing a supply system to provide insights into its structure, flow, and key components of the supply chain. It helps in understanding, managing, and improving supply chain performance by visualising connections between participants, material flows, and value-adding activities. (MacCarthy, Ahmed, and Demirel, 2022). Risk mapping, on the other hand, is used to understand vulnerabilities in the supply chain and assess potential sustainability risks. It evaluates the likelihood of uncovering unsustainable practices and the potential consequences if these risks materialise. High-risk areas may include the likelihood of poor social practices, environmental damage, and excessive pollution. (Kauppi, 2024d). Risk prioritisation allows resources to be allocated effectively, focusing on the most significant issues within the supply chain. (ERM, 2024). This way companies can prioritise action in areas where the financial, regulatory, or reputational impacts would be most significant. (Kauppi, 2024d). Mapping the value chain is also required under the CSDDD to enable companies to identify high-risk areas where human rights or environmental impacts are most likely (ERM, 2024).

Another approach to improve visibility is supply chain modification. Companies can, for example, reduce the number of suppliers per product. Fewer suppliers means less information to manage, allowing companies to focus on ensuring that a smaller pool of suppliers meets sustainability criteria. They can also reduce the number of supply chain tiers and that way simplify the flow of information and reduce the complexity of sustainability evaluations. Yet, companies can source from closer locations and this way monitor sustainability practices more easily. (Foerstl, Meinlschmidt & Busse, 2018).

One big enabler of transparency is digital traceability, which is emerging as a key tool of sustainable procurement. Digital traceability provides transparency into the procurement practices, environmental impacts, and social standards of suppliers and allows companies to track the movement of goods and materials throughout the supply chain. With traceability, businesses can, for example, better ensure that raw materials are sourced responsibly, waste is minimised, and products are disposed of or recycled appropriately. It also enables companies to reduce resource consumption, optimise supply chain operations, and respond quickly to changing demands. Furthermore, traceability facilitates the identification of strategic opportunities within the value chain. By analysing the data gathered, companies can uncover inefficiencies, explore new business models, and drive innovation in product design and distribution. (Saenz & Hinkel, 2022).

However, implementing traceability requires companies to navigate differences in cultural expectations, technological capabilities, and

regulatory frameworks. It also involves significant upfront costs, including investments in hardware, software, and training for both the focal company and its suppliers. (McGrath et al., 2021). No single company can achieve full transparency alone; businesses must work with suppliers, regulators, and even competitors to create effective traceability solutions. (Saenz & Hinkel, 2022). Moreover, gathering and managing vast amounts of sustainability data is costly and complex (McGrath et al., 2021). This is where technology steps in as a critical enabler.

### **3.1.1 Common Solutions for Traceability**

One key tool for enhancing traceability is labels, such as third-party sustainability certifications. They can build trust and loyalty by assuring customers that the products they purchase are sourced ethically. They not only help companies manage their reputation but also encourage other members of the supply chain to adopt more responsible practices. (Yawar & Seuring, 2017).

Audit tools remain a foundational technology for collecting data on supplier compliance with sustainability standards. Different types of audit tools can be used to gather information on suppliers' social and environmental practices. Internal audits can range from simple self-assessment questionnaires to more complex cloud-based platforms enabling electronic data submission by suppliers. Alongside internal audits, many companies depend on third-party organisations for independent assessments, which provide unbiased verification of supplier practices and compliance with sustainability standards. (McGrath et al., 2021). Companies can also collaborate to share audits or establish standardised audit protocols, reducing the audit burden on suppliers who might otherwise need to comply with multiple audits from different customers (Foerstl, Meinschmidt & Busse, 2018). Additionally, companies are using both semi-announced and unannounced audits to scrutinise high-risk suppliers more closely. (Stevenson & Cole, 2018). Companies can also have dedicated experts stationed at key supplier locations, sending regular updates to the company on operations and sustainability efforts. (Foerstl, Meinschmidt & Busse, 2018).

However, audits also come with challenges. Frequent audits can create a burden for suppliers, especially those in developing countries with limited resources, leading to audit fatigue. As such, many companies are seeking ways to make audits more efficient and less disruptive. (McGrath et al., 2021). There can also be mock compliance practices in place among suppliers to pass the audits. These practices include hiding violations, such as maintaining multiple timesheets to obscure violations of working hours, and short-term, superficial adherence, like only complying with requirements on audit days. In some cases, more blatant deception occurs,

with suppliers directing auditors to fully compliant factories while directing orders to non-compliant ones. Some suppliers face challenges in fully meeting codes of conduct, often pointing to cultural and economic differences from developed countries as obstacles. Corruption is also prevalent in some regions, sometimes involving government officials. (Huq & Stevenson, 2020).

Surveys for suppliers can be conducted to gauge their level of awareness. Worker surveys and interviews with workers and managers also help reveal issues that might not come out in a traditional audit. (Stevenson & Cole, 2018). Companies are also using detailed document analysis for suppliers, which might better ensure compliance with legal standards. Additionally, risk-based audits and assessments before sourcing from new suppliers usually include a review of prior audit reports, certifications, and press reports on any prior violations. (Stevenson & Cole, 2018).

Anonymous reporting systems and notification mechanisms are also key tools in ensuring ethical practices. Anonymous reporting systems are used for gathering honest feedback on social conditions within supply chains. These platforms allow workers to report on issues such as wages, working hours, health and safety, and abuse anonymously. The data collected provides companies with real-time insights into labour conditions at supplier facilities, allowing them to identify and address issues more quickly. However, the success of anonymous reporting systems depends on the willingness of workers to engage with them, which can be influenced by factors such as cultural norms and technological access. (McGrath et al., 2021). As mentioned in Chapter 2, the CSDDD mandates that companies implement broader notification mechanisms to allow stakeholders, including employees, suppliers, and affected communities, to report human rights and environmental violations within their operations and supply chains. (ERM, 2024).

Supplier engagement systems help to actively engage with suppliers, helping them set sustainability goals, build capabilities, and improve performance. These platforms are used to create long-term partnerships where companies support their suppliers' development through training, capacity building, and shared learning. (McGrath et al., 2021).

Larger companies often use ERP systems to integrate sustainability data into their broader business functions, such as procurement and risk management. These systems help centralise data, streamline operations, and provide a more holistic view of supply chain performance. (McGrath et al., 2021). For example, one of the most popular ERP systems globally, SAP, allows the tracking of material emission data by integrating sustainability metrics into material master data. (SAP, 2024).

Automating emissions data reporting within the supply chain improves transparency and accountability, enabling better emissions management. Utilising data-sharing platforms and digital tools allows companies to track emissions across the supply chain, enhancing transparency and enabling data-driven decisions. For example, Dow, a materials science company, has implemented a data visualisation dashboard for scope 3 emissions. This tool provides a detailed breakdown of emissions across its value chain and helps identify reduction opportunities. Scope 3 emissions are calculated primarily using internal data, like purchase and sales records and waste metrics, following established methodologies such as the Greenhouse Gas Protocol. Supplier data is collected via platforms like EcoVadis and CDP, covering aspects such as supplier and product carbon footprints, renewable energy use, and progress toward achieving climate goals. Moreover, the Schaeffler Group, a global German motion technology company, utilises raw material analysis to assist engineering and purchasing teams in identifying the most carbon-intensive raw materials. This analysis enables them to simulate the effects of replacing these materials with alternatives, considering both carbon emissions and associated costs. (World Economic Forum, 2023a).

Figure 7 illustrates the recently discussed solutions for procurement to enhance supply chain transparency. These include supply chain mapping and modification, and commonly used digital traceability tools, such as sustainability certifications, audits, document analysis, surveys, anonymous reporting channels and notification mechanisms. In addition, sustainability data should be included in supplier engagement systems, ERP systems, and data visualisation.

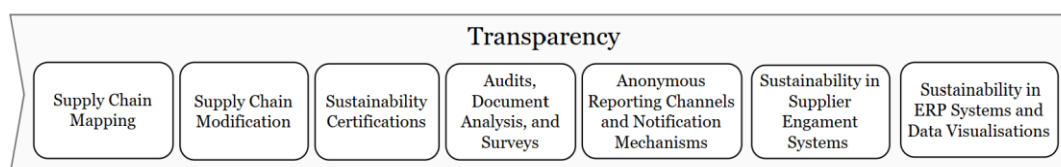


Figure 7. Procurement Solutions to Increase Supply Chain Transparency

Furthermore, emerging technologies are transforming digital traceability, offering new ways to enhance transparency and compliance. Notable advancements include blockchain technology, providing tamper-proof records, IoT devices, enabling real-time data collection, digital twins, creating virtual replicas for precise monitoring, and advanced surveillance tools, ensuring regulatory compliance. As these technologies continue to evolve, companies should actively monitor their development and consider integrating them into their operations to stay ahead in an increasingly data-driven world. These technologies and their implications are explored in greater detail in the next section.

### 3.1.2 Emerging Technologies for Traceability

One of the most recent developments in supply chain transparency is the use of blockchain technology. Blockchain is a decentralised and immutable digital ledger that records transactions across a network of computers. In the context of supply chains, blockchain allows companies to trace the origin and movement of goods, ensuring that information about the product is accurate and tamper-proof. Blockchain is particularly useful for improving traceability in complex networks of suppliers. The key advantage of blockchain lies in its ability to securely store and share data across multiple parties, without the risk of manipulation. Once data is entered into the blockchain, it cannot be altered, which enhances trust between the focal company and its stakeholders. (McGrath et al., 2021). In the Democratic Republic of Congo, there is a blockchain-based pilot project attempting to bring transparency to cobalt mining, a sector long plagued by child labour and human rights abuses. Each sealed bag of cobalt is tagged with a digital code, and key details, such as weight and date, are logged on the blockchain using mobile devices. Every step in the supply chain is recorded to ensure a tamper-proof record of the cobalt's journey. (Lewis, 2018). Ultimately, while blockchain technology offers a step forward in increasing supply chain transparency, a lot of work remains as the technology adaptation is still in its early stages. (McGrath et al., 2021).

Another emerging tool for supply chain transparency is the Internet of Things (IoT). IoT refers to the network of interconnected physical devices that collect and exchange data in real time. In supply chains, IoT devices such as sensors, GPS trackers, and RFID tags are used to monitor the movement of goods from suppliers to manufacturers and eventually to customers. It allows the monitoring of the exact location and condition of products at any point in the supply chain. This reduces the risk of delays, theft, or damage and ensures that the products meet sustainability requirements at each stage of the supply chain. (McGrath et al., 2021).

A digital twin is a virtual replica of the physical supply chain, continuously updated with real-time data from sensors and systems across the network. Implementing a digital twin has many sustainable performance advantages. For example, a process simulation-based digital twin can be used to measure resource efficiency, energy savings, and secondary resource recovery. IoT-enabled digital twins can enhance safety and warehouse management by identifying abnormal conditions in real time. In addition, vehicular digital twins can reduce workplace accidents and improve security. Digital twins are also used to support environmental risk and pollution assessments, such as simulating pipeline leaks for safety and cost savings. Furthermore, digital twins can enhance life cycle sustainability by

improving design quality, facilitating technical communication, accelerating implementation, and lowering carbon footprint. (Kamble, et al., 2022).

Furthermore, some companies are using advanced surveillance technologies like satellite imagery to monitor sustainability conditions in their supply chains. Satellite monitoring provides near real-time data on, for example, land use changes. (McGrath et al., 2021). Drones have also been used to, for example, detect child labour trafficking (Perry, 2024) and illegal deforestation and logging (Garcia et al., 2018). While these tools are valuable for monitoring compliance, they also raise questions about privacy and trust. Suppliers may feel that constant surveillance undermines their autonomy and creates a sense of mistrust. Therefore, companies must strike a balance between using these tools for transparency and maintaining positive relationships with their suppliers. (McGrath et al., 2021).

## **3.2 Sustainability in Strategy**

To effectively integrate sustainability into procurement, it must be positioned as a core strategic initiative, driving long-term value, rather than just fulfilling reporting obligations (BSR, 2019). It requires addressing organisational influences, drivers, and challenges, ensuring sustainability aligns with broader strategic goals (Engert, Rauter, & Baumgartner, 2016). Successful integration also involves organisational change and a commitment to continuous improvement, supported by tailored mechanisms that meet company-specific needs (Witjes, Vermeulen, & Cramer, 2017).

### **3.2.1 Setting Goals and Defining Metrics to Measure Progress**

Strategic goal setting plays a crucial role in an organisation's strategic planning process. To effectively monitor progress, strategic goals should be specific, measurable, achievable, realistic, and time-bound. Establishing challenging yet attainable goals inspires stakeholders, fosters commitment, and ensures alignment of efforts toward a unified objective. (Fayomi and Akanazu, 2024).

To effectively integrate sustainability into procurement strategy, it should be part of the key performance indicators (KPIs) (Neri et al. 2021). Sustainability is best embedded into strategy when integrated across business units with metrics that measure environmental, social, and economic performance. This approach fosters alignment and transparency across the organisation. (Sroufe, 2017, Meehan & Bryde, 2011). In addition, sustainability criteria should be integrated into the central database and supplier management systems. This ensures that sustainability is part of

every decision, reducing the need for separate evaluations. (Foerstl, Meinlschmidt & Busse, 2018).

Measuring sustainability in industrial supply chains is gaining importance, as both industry professionals and academics emphasise the need for practical and comprehensive metrics. Although previous research has identified over 2,000 performance metrics, the true challenge lies in defining the most effective and relevant ones. Key challenges in existing metrics include an excessive focus on economic aspects, a lack of a long-term perspective, and limited consideration of the entire supply chain. Additionally, there are issues with applicability and comparability across contexts and a lack of real-time metrics. (Neri et al., 2021).

One of the most important and widely standardised sustainability metrics regarding the upstream supply chain is emissions. While carbon neutrality and zero emissions are often used interchangeably, they embody distinct principles. Carbon neutrality refers to balancing the amount of CO<sub>2</sub> emitted into the atmosphere by offsetting an equivalent amount of carbon through activities like planting trees, investing in renewable energy projects, or purchasing carbon credits. Essentially, carbon neutrality allows businesses to continue emitting CO<sub>2</sub> as long as they offset their emissions through external offset measures. While this approach has gained popularity due to its relative ease of implementation, it is often criticised for over-reliance on offsets. These offset mechanisms do not always guarantee actual emission reductions. Carbon neutrality can also allow companies to avoid addressing the root cause of emissions by focusing too much on external offsets rather than reducing emissions at the source. (Chen, G., et.al, 2024).

In contrast, net zero takes a broader, more holistic approach to GHG management. While carbon neutrality focuses solely on CO<sub>2</sub>, net zero encompasses all major GHGs, including methane, nitrous oxide, and hydrofluorocarbons. The goal of net zero is to reduce emissions to as close to zero as possible, with any residual emissions being balanced by natural processes such as carbon absorption by oceans and forests. Net zero does not rely heavily on offsetting. (Chen, G., et.al, 2024).

Several different methods are available for calculating upstream Scope 3 emissions, including the supplier-specific method, hybrid method (combining supplier-specific data with additional inputs), average data method (based on mass, e.g., kilograms), and spend-based method (linked to economic value). Among these, supplier-specific and hybrid methods are the most accurate, despite being the least utilised. They offer the detailed insights needed to pinpoint emission hotspots, enabling more effective and targeted mitigation strategies. (GDP, 2022)

In conclusion, sustainability should be integrated into KPIs, with measurable goals that are actively monitored to ensure progress. The future

of metrics may involve industry-wide standardisation to improve comparability and reduce supplier effort. When it comes to upstream scope 3 emissions, while carbon neutrality is a positive step, adopting a net zero approach would be more impactful, as it takes into account all CHG emissions and prioritises reducing emissions at the source rather than relying on offsets. Supplier-specific and hybrid emission calculating methods provide the most accurate data for calculating emissions, enabling companies to identify hotspots and implement targeted reduction strategies.

### **3.2.2 Shifting from Risk Mitigation to Advancing Opportunities through a Category-Specific Approach**

Sustainability is often approached from a risk management perspective, with a focus on complying with regulations and minimising reputational and operational risks. These compliance strategies tend to be reactive, aimed at meeting minimum standards rather than driving proactive improvements. While compliance is essential, it alone may fall short in fostering sustainability in the supply chain. Consequently, compliance efforts are frequently enhanced with proactive approaches that focus on building long-term capacity and sustainability. Shifting from merely mitigating risks to actively pursuing opportunities involves moving from reactive to proactive management by strategically identifying key areas for impact within the supply chain. (Yawar & Seuring, 2017).

Opportunity mapping allows companies to identify areas in the supply chain where sustainability actions can positively impact both environmental goals and profitability. When pursuing sustainability, starting with opportunity mapping can be a strategic step, especially for gaining internal support and resources. Demonstrating initial successes in less complex areas can attract more resources and buy-in from management, making the way to tackle more challenging sustainability issues over time. Opportunity mapping focuses on identifying potential improvements across the supply chain, such as using recycled components, adopting alternative materials, reducing packaging, and implementing better employment practices. The goal is to locate high-opportunity and win-win areas where changes are feasible, likely to be adopted, and can drive both sustainable outcomes and cost benefits. (Kauppi, 2024d).

Furthermore, by strategically focusing efforts on areas with the greatest sustainability impact, companies can allocate resources more efficiently, enhancing their ability to manage complex sustainability information (Foerstl, Meinschmidt & Busse, 2018). A category strategy is a tailored approach developed for a specific category, addressing its unique needs, objectives, and targets, along with a structured plan to achieve them

(Huuhka, 2022). Integrating sustainability into category strategies enables organisations to align their sustainability initiatives with the distinct characteristics of each category, ensuring more effective and targeted implementation. The category-specific sustainability strategy approach is further discussed in Chapter 4.

As stated in Chapter 2, sustainability offers many positive impacts for a company beyond compliance and risk management. By transitioning to a proactive approach, embracing sustainability as an opportunity rather than merely a risk, and integrating sustainability into both sourcing and category strategies, organisations can unlock long-term value for all stakeholders.

### **3.2.3 Organisational Support and Internal Knowledge**

Sustainable procurement efforts are often hindered by organisational inertia (Meehan & Bryde, 2011). Effective internal management is essential for aligning organisational practices with sustainability goals. In order to meet the requirements of the CSDDD, companies must evaluate their internal capabilities and governance frameworks (ERM, 2024).

Commitment from top and middle management is vital for successfully adopting sustainable practices (Walker & Brammer, 2009; Luthra, Garg, & Haleem, 2016). Leadership engagement, supported by active employee involvement, fosters the integration of sustainability into core operations (Luthra, Garg, & Haleem, 2016).

Leading organisations are not only raising awareness of their sustainability efforts but also actively involving employees across various functions in developing and implementing supply chain sustainability strategies (BSR, 2010). Developing cross-functional teams can decentralise decision-making, connect departments and regions, and distribute the workload of managing sustainability information (Foerstl, Meinschmidt & Busse, 2018). Dedicated sustainability teams within organisations significantly improve performance (Dangelico, 2014), and assembling such teams for due diligence processes is key to complying with the CSDDD (ERM, 2024). Hiring regional sustainability experts allows companies to address local sustainability challenges more effectively, as they can process region-specific information and reduce the burden on central offices. Additionally, employing sustainability specialists enhances the organisation's ability to manage complex issues and uncertainty (Foerstl, Meinschmidt & Busse, 2018).

Furthermore, employee training in environmental responsibilities increases eco-friendly practices (Zaid, Jaaron, & Bon, 2018). Investing also in information systems should include training employees to manage sustainability data and practices and increasing the firm's internal capacity

to process complex sustainability information. (Foerstl, Meinlschmidt & Busse, 2018).

### **3.2.4 Sustainability in Requirements Definition**

During requirements definition, it is essential to set clear environmental and social criteria for purchased products. However, flexibility should be built into the requirements to allow suppliers to suggest better alternatives. (Kauppi, 2024e). In terms of emissions, procurement should prioritise selecting alternative materials and components with a lower carbon footprint. (World Economic Forum, 2023a). To tackle the challenge of material usage, procurement should source raw materials with a clear focus on social and environmental impacts. (BSR, 2010).

According to Green Public Procurement environmental criteria for purchased goods and inputs, the purchased materials should be sustainably sourced or recycled materials, that avoid the use of rare minerals and toxic waste. In their production, efficient use of resources, such as materials, energy, and water should be prioritised while minimising chemical use and toxic waste through an applied chemicals management system. For these purchased goods and inputs, delivery practices should focus on local sourcing, bulk shipments, reduced plastic, recyclable packaging, and low-emission vehicles to reduce environmental impact. For their usage phase, the criteria promote product longevity, reduced greenhouse gas emissions, minimised pollution, and transparency about newly identified substances of concern. (World Bank Group, 2023). In terms of social sustainability, the products should be sourced from ethical inputs, like metals mined from conflict-free areas. Additionally, the material production processes should be modified to reduce harm to workers. (BSR, 2010).

Circularity should span the entire product life cycle, from product design to end-of-life processing. In the design phase, actions focus on preventing and decreasing the use of raw materials as well as rethinking ownership, use and maintenance of the product. In the usage phase, circularity is achieved by encouraging businesses to make the most of products and materials already in circulation. This phase emphasises reusing items, repairing products when they break, restoring them to prolong usability, or transforming them into something new. Finally, in the end-of-life or return phase, circularity is reinforced by extracting value from products that can no longer be used in their original form. Waste materials are processed through recycling, reintroducing valuable components back into the economy to produce new items. Where recycling is no longer viable, recovery processes are used to extract energy from waste, making use of remaining resources to the fullest extent possible. (Potting et al., 2017).

Procurement can promote a circular economy by integrating circular criteria into procurement specifications, which may include requirements for recyclability, the use of recycled materials, repairability, and considerations for product lifespan. Procurement can also leverage market dialogue to engage suppliers early in the process, allowing for collaborative innovation and a clearer understanding of circular options available in the market. Another approach involves the adoption of innovative business models that support circularity, such as leasing or sharing, instead of traditional ownership models (Kristensen, Mosgaard, and Remmen, 2021).

Modular product design is yet another critical strategy for circularity, allowing components to be easily upgraded or replaced rather than discarding entire products. (Kauppi, 2024f). Konecranes', a Finnish company specialising in lifting solutions and material handling systems, retrofits exemplify this approach by extending the life of cranes through upgrades to components such as motors, controls, and safety features using the latest technology. This reduces waste, saves costs, and enhances efficiency without replacing entire systems, showcasing the benefits of modular, sustainable design in industrial applications. (Konecranes, 2024).

Furthermore, procurement strategies can promote industrial symbiosis and circular ecosystems by fostering partnerships and collaborations among different stakeholders, like suppliers and customers. This involves developing systems for material recovery and reuse at scale, thus creating closed-loop systems where waste from one process serves as an input for another. To implement these strategies effectively, procurement departments often rely on external resources, such as certifications, which provide a basis for including circular criteria in tenders. (Kristensen, Mosgaard, and Remmen, 2021).

Kristensen, Mosgaard, and Remmen (2021) also propose several contract types that procurement can use to support circular economy goals. One such approach is product-service systems contracts, where the organisation does not purchase the product outright but instead accesses it through models like pay-per-use or performance-based contracts. Another contract type is a purchase and buy-back agreement, which involves buying products with a predetermined agreement that suppliers will buy back the products at the end of life. Lastly, purchase and resale agreements allow the organisation to purchase products with the understanding that a third party will handle their end-of-life, potentially reselling them in secondary markets. (Kristensen, Mosgaard, and Remmen, 2021).

Collaborating with logistics providers and waste recycling companies further supports material efficiency by establishing pathways for recovering and reusing materials. Such partnerships allow supply chains to recapture value from used products, turning waste into a resource and reducing the

demand for virgin materials. Beyond these initiatives, broader actions like forming public-private partnerships, investing in technology, and implementing standardisation across industries can help drive a more sustainable approach to material use. Furthermore, benchmarking and learning across industries allow companies to adopt best practices and innovations from various sectors. (Kauppi, 2024f).

In conclusion, integrating sustainability into strategy entails incorporating it into sourcing and category strategies, as well as into requirements definition. Figure 8 provides a summary of what this integration means in these contexts.

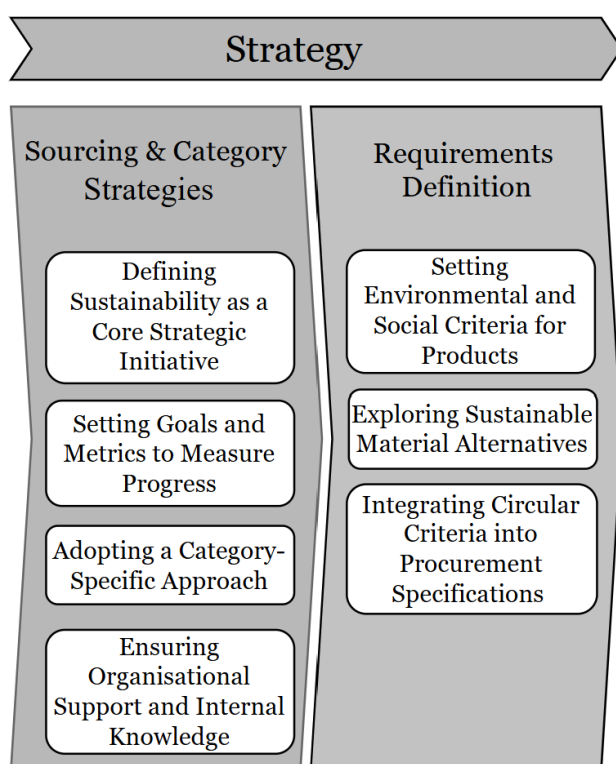


Figure 8. Integrating Sustainability into Strategy

### 3.3 Sustainability Considerations in Supplier Selection

Integrating sustainability into supplier selection can be challenging, especially due to trade-offs between cost and sustainability benefits, as cost reduction remains the primary focus in procurement (Walker & Brammer, 2009, Aktin & Gergin, 2016). Procurement should adopt a more strategic, long-term perspective. This approach would enhance the appeal of sustainable alternatives, which are often more lucrative in the long run (Burian, Fröhlich, and Sievers 2013).

Researching the market helps identify suppliers that prioritise sustainable practices and innovative solutions that align better with the organisation's sustainability goals. It is important for companies to start exploring the secondary source market now, adopting a forward-looking approach to secure the best, emerging solutions early. As new technologies and suppliers begin to appear, waiting until they're urgently needed means settling for costly, lower-quality options. (Kauppi, 2024f). Furthermore, integrating sustainability criteria into supplier selection ensures alignment with sustainability goals and fosters long-term partnerships. Standardising supplier evaluation criteria is also crucial, making it easier to manage sustainability data across different suppliers. (Foerstl, Meinlschmidt & Busse, 2018).

In the supplier evaluation phase, companies should assess products and suppliers based on total cost over the product's lifetime and its life cycle impact (Kauppi, 2024e). CO<sub>2</sub> emissions should be integrated alongside cost and quality criteria in sourcing decisions and supplier selection. (World Economic Forum, 2023a).

The purchase price is often the most visible part of procurement costs, which frequently leads to the misconception that the purchase price represents the total cost of procurement. However, this can be misleading, as procurement incurs numerous other costs over its life cycle that should be considered when evaluating and comparing different procurement options. The total Cost of Ownership (TCO) approach captures the life cycle costs of procurement; in its simplest form, it involves considering the costs associated with a product before the procurement decision, at the time of purchase, during the use of the acquired product, and at the end of the product life cycle (Ellram, 1995). The TCO approach can be applied to all types of purchases but is particularly critical for financially significant and long-term purchases. (Logistiikan Maaailma, 2024).

The procurement process costs refer to costs incurred in searching for a suitable product or service, potential site visits to suppliers, conducting audits, supplier evaluation, and selection processes. The purchase price refers to the agreed sum between the buyer and seller, forming the basis for the delivery of goods or performance of services. Operational costs may include expenses for training, installation, maintenance, storage, logistics, and handling of goods. Additionally, operational costs such as energy and water consumption throughout the product's life cycle should be considered. Complaints, returns, and development costs also fall under operational cost factors. Furthermore, costs at the end of the product's life cycle should also be considered, such as recycling costs or, conversely, whether revenue can be generated from the product or its components at

the end of its life cycle through circular business models. (Logistiikan Maailma, 2024).

By incorporating a comprehensive TCO approach, organisations can better assess the economic and strategic implications of procurement decisions, ensuring that both cost efficiency and value creation are maximised over the entire life cycle of a product or service. (National Institute of Governmental Purchasing, 2016). TCO is also beneficial for integrating sustainability into procurement decisions. It bridges procurement and sustainability by capturing all costs associated with a product over its life cycle. TCO evaluates direct and indirect costs, providing a long-term perspective on value and impact. It also provides a framework and language for describing and measuring sustainability impacts in a way that procurement managers can readily understand. When paired with life cycle assessment (LCA), TCO uncovers opportunities for cost and resource efficiencies. (Pluess, 2012).

LCA, on the other hand, evaluates the environmental impacts of a function, system, or product throughout its entire life cycle, from raw material extraction to manufacturing, transportation, use, and disposal. This cradle-to-grave analysis is essential for identifying where the most significant emissions occur and which stages offer the greatest opportunities for mitigation. (Chen, G., et.al, 2024).

The first step in an LCA is to clearly define the goal and scope of the assessment. This involves determining the function, system, or product being analysed and mapping its entire life cycle, from raw material extraction to disposal or recycling. Defining boundaries is crucial for establishing what stages of the life cycle will be included in the assessment. Once the scope is decided, the next phase is life cycle inventory, where data is collected on energy and material inputs and outputs across all stages within the defined boundaries. After data collection, a life cycle impact assessment is conducted. This involves multiplying activity data by relevant emissions factors to calculate the environmental impact of each stage of the life cycle. The final step in an LCA is interpreting the results to identify areas where emissions are concentrated, known as hotspots, and to highlight potential reduction opportunities. Interpretation helps guide strategic decisions on how to minimise environmental impacts, such as selecting alternative materials or suppliers, improving energy efficiency, or enhancing product design. (Curran, 2013).

Furthermore, organisations should use contracts to enforce sustainability standards. This includes setting clear performance clauses for environmental and social criteria, which hold suppliers accountable for maintaining sustainable practices throughout the contract period. (Kauppi, 2024e). Many companies develop and implement codes of conduct that set minimum standards for labour conditions, human rights, health and safety,

and environmental impact. These codes are applied across the supply chain, often requiring suppliers to align their operations with the company's policies. (Yawar & Seuring, 2017). Existing supplier policies can also be strengthened to incorporate sustainability standards, ensuring they are widely communicated and accessible in local languages. Supply contracts can be reinforced with penalties, ensuring that suppliers uphold worker rights and adhere to recruitment standards. (Stevenson & Cole, 2018). Suppliers that perform well in sustainability can be rewarded, encouraging them to maintain high standards without requiring frequent audits or interventions. (Foerstl, Meinschmidt & Busse, 2018). New suppliers can be required to meet strict compliance requirements, with no orders placed until compliance is fully assured. Companies can also restrict the use of third-party labour agencies by suppliers to control and monitor hiring practices more effectively. (Stevenson & Cole, 2018).

In conclusion, integrating sustainability considerations into supplier selection requires actions across supplier identification, qualification, and contracting. These actions are illustrated in Figure 9.

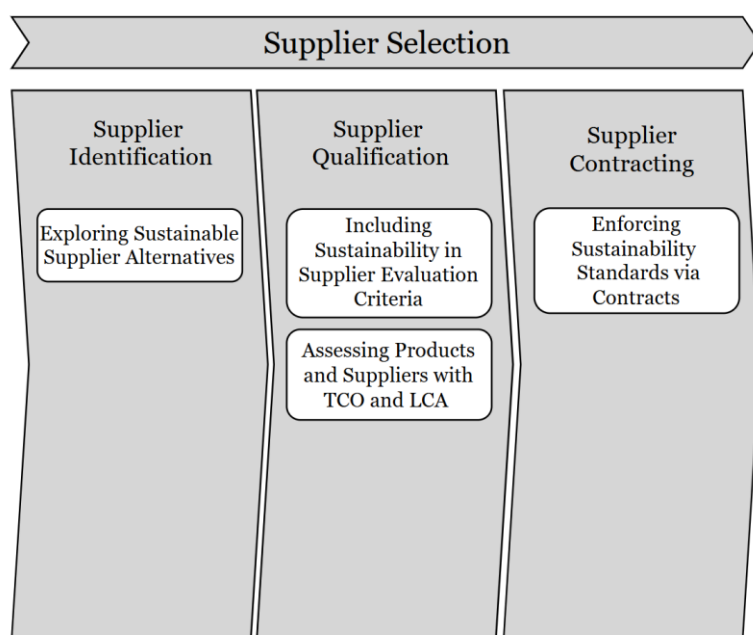


Figure 9. Sustainability Considerations in Supplier Selection

### 3.4 Sustainability Considerations in Supplier Management

Engaging suppliers is essential to achieving sustainability goals. Supplier development strategies can take the form of indirect or direct supplier development strategies. Indirect supplier development focuses on creating the right environment for suppliers to improve their performance. This can

involve establishing clear expectations, setting long-term goals for sustainable performance, and encouraging suppliers to participate in collaborative initiatives. (Yawar & Seuring, 2017).

However, direct supplier development is more efficient, as it involves active intervention by the buying company, such as working closely with suppliers to ensure that ethical practices are implemented, offering training programs for supplier employees, and providing support to improve operations. (Yawar & Seuring, 2017). Organisations should request detailed environmental data, such as CO<sub>2</sub> emissions, from their suppliers and set emissions reduction targets with them (World Economic Forum, 2023a). Efficiency in the supplier sites can be improved by establishing goals with suppliers to lower energy consumption (BSR, 2010). Suppliers should also be asked to demonstrate progress in problems such as water consumption, biodiversity, and solid waste while increasing recycling efforts and the use of recycled materials. In addition, they should report the percentage of recycled content in their products and energy usage across their facilities. Furthermore, suppliers should also be asked to share ideas that could help the buying company to improve its sustainability. (Kauppi, 2024e).

Several leading companies offer technical and financial assistance to their suppliers, helping them implement energy- and material-saving measures. Efficiency in the supplier sites can be improved by providing training on identifying energy-saving opportunities, implementing energy management systems, and adopting best practices. (BSR, 2010). Procurement should work closely with suppliers to reduce energy consumption by shifting to lower-emitting fuel sources and generating renewable energy onsite (World Economic Forum, 2023a).

Furthermore, suppliers can be asked to engage their own suppliers on environmental and social standards, ensuring that these values are upheld throughout the supply chain. To facilitate broader reach, sub-suppliers can be trained or train-the-trainer programs can be used to empower tier 1 suppliers to disseminate training to sub-suppliers. Many companies also demand their tier 1 suppliers to certify that they will source only from sub-suppliers who follow agreed-upon ethical policies and prohibit the use of high-risk sources. (Stevenson & Cole, 2018).

Individual companies may struggle to make significant changes when issues are deeply rooted in societal or infrastructural contexts, such as the presence of child labour in certain regions. When the challenges are part of the broader social or economic landscape, industry-wide solutions are more likely to yield lasting impact. Companies can work with trade unions, NGOs, competitors, research institutes, and government agencies to share information on risks and mitigation strategies (Stevenson & Cole, 2018).

This reduces the firm's burden of monitoring every potential sustainability issue internally. (Foerstl, Meinlschmidt & Busse, 2018).

In conclusion, integrating sustainability considerations into supplier management involves incorporating sustainability into supplier relationship management, supplier performance management, and supplier development. Figure 10 illustrates these considerations. In addition, the buying company can encourage suppliers to engage their own suppliers on sustainability matters and when the challenges are more systemic, companies can collaborate with various stakeholders to address these challenges effectively.

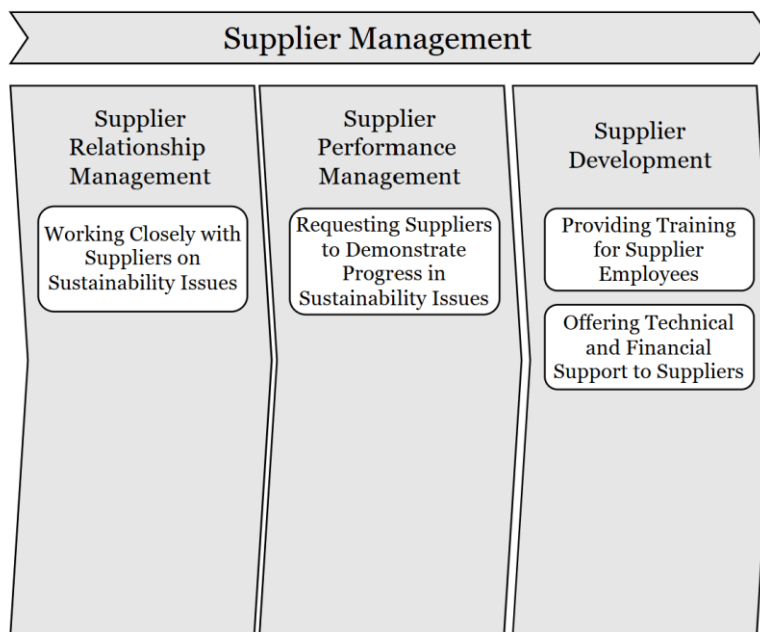


Figure 10. Sustainability Considerations in Supplier Management

As discussed in this chapter, achieving sustainable procurement requires companies to integrate sustainability considerations at every stage of the procurement process while maintaining transparency throughout. Figure 11 presents the Sustainable Procurement Model, which illustrates the key findings of this chapter. This model is later used to evaluate the case organisation's sustainable procurement practices, together with the Sustainability Strategy Matrix discussed in Chapter 4.

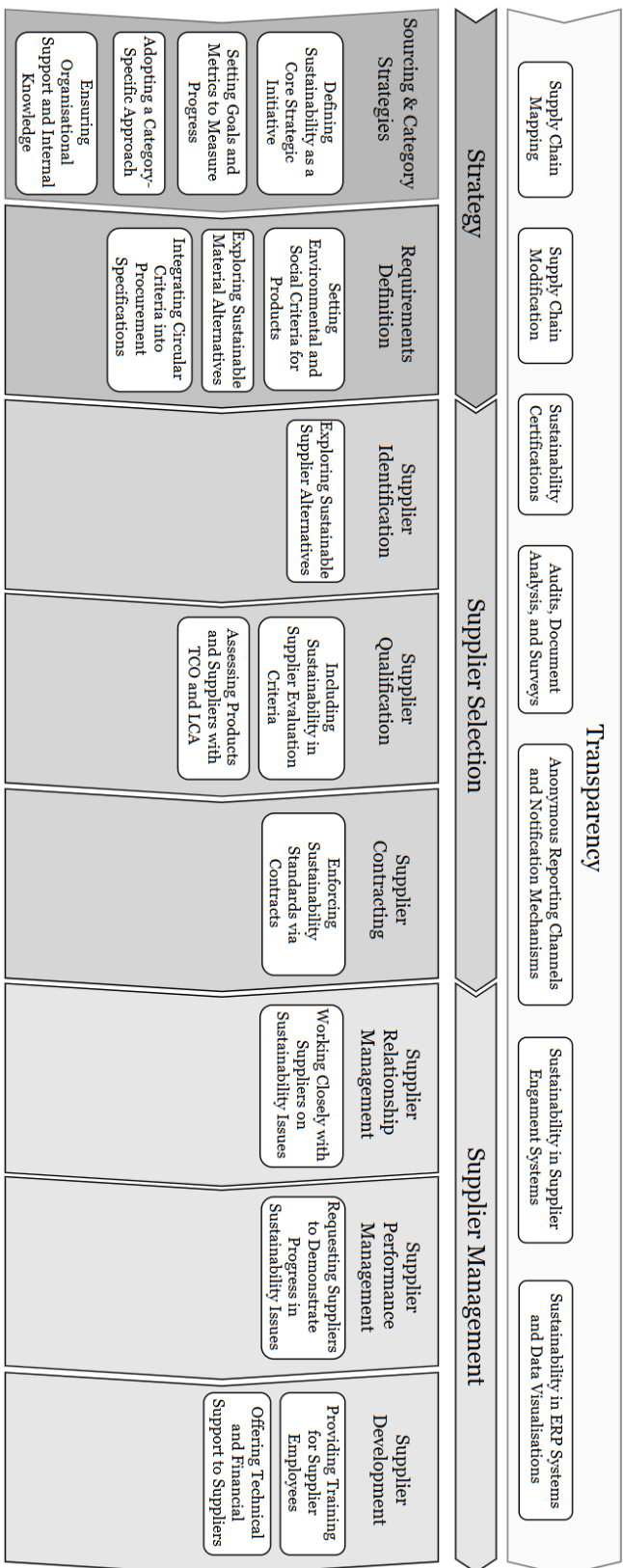


Figure 11. Sustainable Procurement Model

## 4 Category Approach to Sustainable Procurement

This chapter begins by discussing the role of category management in aligning procurement strategies with business goals. It then introduces portfolio and categorisation models, focusing on the Kraljic Matrix, to provide a structured approach to managing procurement categories. Finally, it presents the Sustainability Strategy Matrix, offering targeted approaches to integrate sustainability into procurement practices across different categories.

### 4.1 Category Management

A category is a group of products or services that form a manageable entity on the global business level and can be defined as "a set of products and services purchased from the same supply market having similar product or service and spend characteristics" (Tanskanen, 2024). The purpose of categorisation is to enable better control over total spending, tailor supply management strategies, allocate internal resources more efficiently, improve overall business performance, and reduce total costs. It also supports cross-functional collaboration and integration within the organisation. (Tanskanen, 2024)

A category strategy addresses the question of how a particular procurement category and its related category spend are managed. The starting point for a category strategy is aligning demand with supplier market opportunities. These perspectives should also be reflected against the company's core competencies. Typically, responsibility for the category strategy falls to the sourcing manager or procurement manager of that specific category. (Iloranta & Pajunen-Muhonen, 2015).

Category management ensures alignment between a specific procurement category and the company's business objectives. For instance, if the company has a certain target, it is necessary to consider how each category can contribute to this goal and create an action plan tailored to each category. Since categories vary, and total costs depend on diverse cost factors, the strategies and approaches to achieving cost savings also differ. It's essential to recognise that a 10% cost savings in some categories may be very challenging, while savings of 20-30% may be relatively achievable in others. Consideration should also be given to whether cost savings are best pursued through purchase price reductions or whether it would be more effective to focus on total cost management, exploring savings through other ways besides price or aiming to enhance performance in other ways. (Iloranta & Pajunen-Muhonen, 2015).

## 4.2 Portfolio and Categorisation Models

There is a need for a differentiated approach to handling different purchasing categories because the nature of the "buy" and the nature of the supply market in the categories are different (Saarikorpi, 2024). Each category's significance for the company's success also varies greatly (Kraljic, 1983). From this perspective, it becomes clear that a single, uniform procurement process and operating model is not suitable for all types of procurements. Organisations need to find the right approach for different situations. Different portfolio and categorisation models are utilised to guide this process.

The foundation of strategic procurement thinking was established in 1983 when Peter Kraljic introduced a categorisation model for purchased goods and services in his article *Purchasing Must Become Supply Management*. In the Kraljic model, also known as the purchasing portfolio, purchases are placed into a matrix with two dimensions: "(1) the strategic importance of purchasing in terms of the value added by product line, the percentage of raw materials in total costs and their impact on profitability, and so on; and (2) the complexity of the supply market gauged by supply scarcity, the pace of technology and/or materials substitution, entry barriers, logistics cost or complexity, and monopoly or oligopoly conditions" (Kraljic, 1983, p. 110).

Using these factors, the Kraljic Matrix helps to classify purchasing categories into four different quadrants, each needing a different procurement strategy. Non-critical categories are less important and have many suppliers. These can be managed with straightforward, efficient purchasing processes. Leverage categories are important and have many suppliers, resulting in companies being able to negotiate better terms and get good value. Strategic categories are critical to the company but have few suppliers. These require strong, long-term supplier relationships to ensure reliability. Lastly, bottleneck categories are less important with limited suppliers. These need careful management to avoid potential supply issues. Figure 12 illustrates the Kraljic Matrix, highlighting its key components.

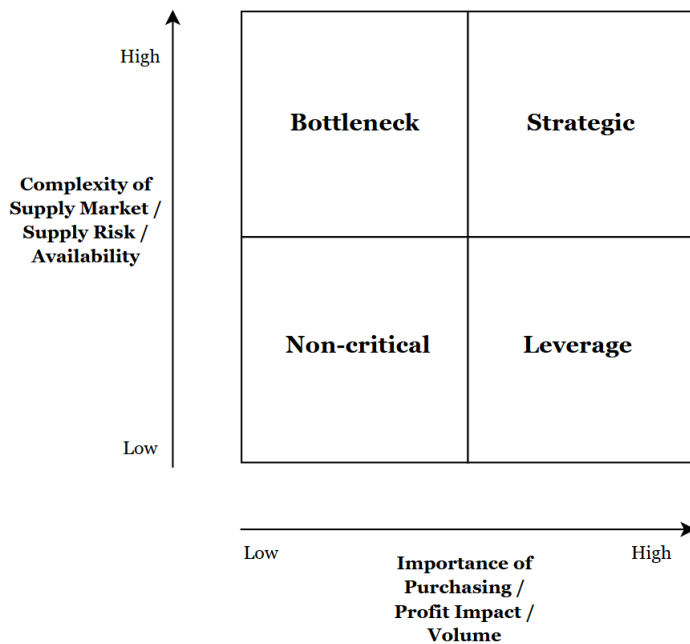


Figure 12. Kraljic Matrix (based on Kraljic, 1983).

### 4.3 Using the Kraljic Matrix to Identify Sustainability Strategies for Different Procurement Categories

As mentioned in Chapter 3, prioritising key aspects of sustainability management enables companies to allocate their resources more effectively, strengthening their ability to handle complex sustainability-related information. (Foerstl, Meinschmidt & Busse, 2018). Kauppi (2024e) expands the traditional Kraljic Matrix by demonstrating how power dynamics within buyer-supplier relationships affect sustainability strategies. Companies must consider the specific context of each quadrant to optimise their approach to sustainability, rather than applying the same effort across all areas. The focus shifts to "how, when, and where" sustainability can be effectively pursued, rather than spending unnecessary resources in less impactful areas. (Kauppi, 2024e).

In bottleneck categories, buyers have less power and must be cautious about pushing too hard for sustainability changes, as this could jeopardise the supply (Kauppi, 2024e, Benchekroun et al., 2019). The buying company should try to find alternative ways to gain influence, such as joining industry coalitions or lobbying for broader sustainability standards that apply across the market, thus reducing individual buyer pressure (Kauppi, 2024e, Krause et al., 2009). The buying company should also redesign products to lower carbon impact and identify areas for reducing emissions. (Carbon Disclosure Project, 2011).

In strategic categories, where both buyer and supplier are interdependent, collaboration becomes key. Sustainability and circularity should be embedded into product design. (Kauppi, 2024e, Benchekroun et al., 2019). Here, buyers and suppliers can share best practices and set sustainability as a key performance indicator (Kauppi, 2024e). Companies should jointly improve carbon performance with suppliers by integrating low-carbon operations planning and developing partnerships, where both the buying company and supplier benefit financially from reducing carbon emissions (Carbon Disclosure Project, 2011). Krause et.al. (2009) suggest stopping sourcing from strategic quadrant suppliers, who refuse to implement sustainability practices.

Kauppi (2024e) suggests that for non-critical categories, resource allocation is minimal, so detailed sustainability efforts are not prioritised. Instead, buyers can focus on basic requirements such as third-party certifications or enforce compliance with codes of conduct. (Kauppi, 2024e). If a supplier fails to meet these standards, it may be easier to switch suppliers without significant risk (Kauppi, 2024e, Krause et al., 2009). Companies should also focus on reducing demand for carbon-intensive products (Carbon Disclosure Project, 2011). Building on Dadhilkar et al. (2016) observation of a trade-off between cost and sustainable supplier compliance in this quadrant, easy-to-fix sustainability solutions offer a practical approach to mitigate this trade-off. These solutions are often less resource-intensive, more cost-effective, and simpler to implement, making them an attractive starting point for organisations aiming to balance cost and sustainability goals.

Kauppi (2024e) suggests that for leverage categories, where the buyer holds more power, companies can push suppliers to adopt higher sustainability standards. Buyers can set stricter criteria, knowing that their position gives them influence over suppliers' practices (Kauppi, 2024e). Sustainability should become a strategic goal, and companies should use sustainability criteria to select suppliers (Pagell et al., 2010). They should demand the use of more recycled materials and aim to reduce material usage and improve logistics. Companies should share best practices to help suppliers become more sustainable. (Kauppi, 2024e). In addition, companies should review supplier carbon management scorecards, set carbon reduction targets with suppliers, and require suppliers to regularly report their progress towards the targets (Carbon Disclosure Project, 2011). Figure 13 presents the Sustainability Strategy Matrix, which illustrates how the strategic position of a category influences the recommended sustainability approach.

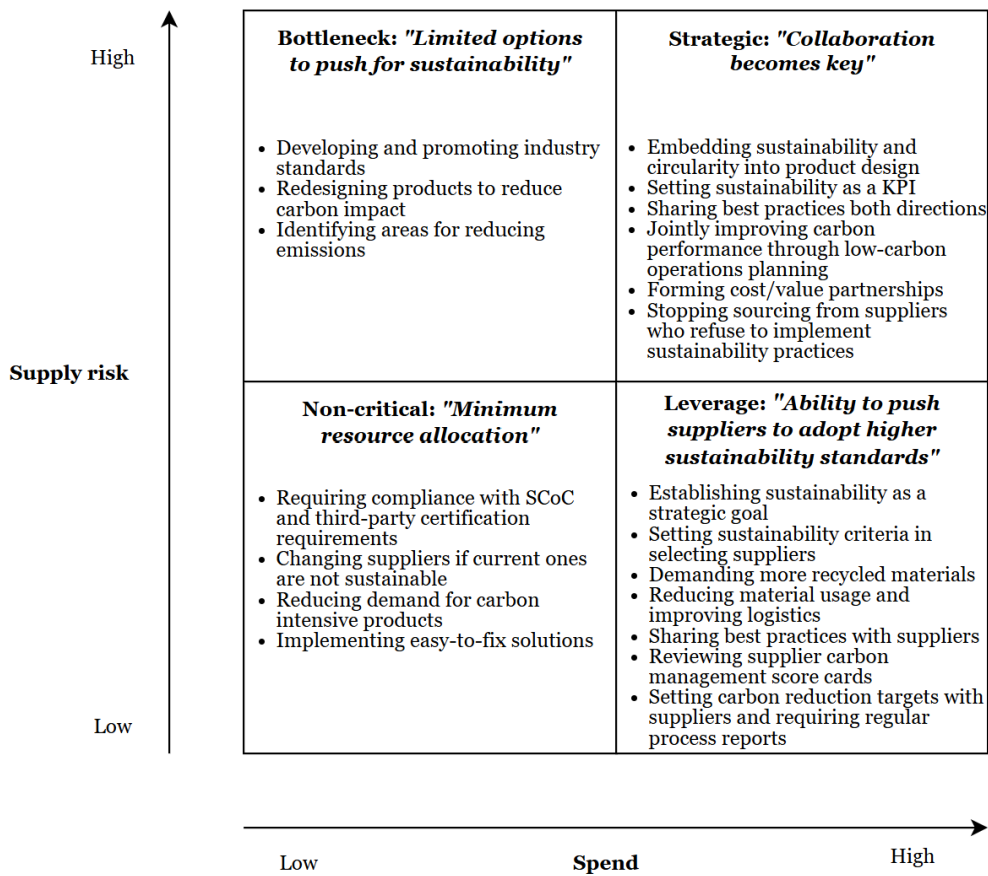


Figure 13. Sustainability Strategy Matrix (based on Kauppi, 2024e, Krause et al., 2009, Benchekroun et al., 2019, Dadhilkar et al., 2016, Pagell et al., 2010, and Carbon Disclosure Project 2011).

In conclusion, category management plays a crucial role in aligning procurement strategies with business objectives. A differentiated approach is essential, as purchasing categories vary in significance and supply market dynamics, requiring tailored strategies guided by portfolio and categorisation models. The same principle applies to integrating sustainability into procurement. The Sustainability Strategy Matrix was introduced as a tool to align sustainability efforts with different procurement categories, ensuring that the strategic position of each category is considered to optimise sustainability initiatives rather than applying a uniform approach across all areas.

Together with the Sustainable Procurement Model introduced in Chapter 3, the Sustainability Strategy Matrix forms the theoretical framework for the empirical part of this study. This framework serves as the foundation for analysing the case organisation's procurement practices and assessing the practical application of sustainability strategies in different procurement categories.

## 5 Methodology

This chapter outlines the research methodology used in this study. It begins by introducing the chosen research method, a case study, and justifies its suitability for addressing the research objectives. Subsequent sections detail the process of data collection and analysis, and discuss the measures taken to ensure the reliability and validity of the study.

### 5.1 Research Method

This study employs a case study approach following Yin's (2018) case study methodology, integrating both qualitative and quantitative methods. The case study method is ideal when the researcher has limited or no control over the case being studied and when the focus is on a current, real-world issue. A case study is particularly useful for addressing "how" and "why" questions, as it allows for an in-depth exploration of complex phenomena within their real-world context. (Yin, 2018)

Moreover, Yin (2018) divides case studies into three: explanatory, descriptive, and exploratory. This study adopts a descriptive-exploratory approach, as it provides a detailed account of how sustainability is currently integrated into procurement within the organisation while also exploring new insights, challenges, and opportunities for enhancing sustainability integration. This combined approach allows for a comprehensive understanding of existing practices and potential improvements.

Yin (2018) emphasises the importance of structuring a case study around propositions or a theoretical framework to guide the research and provide a clear focus for data collection and analysis. In line with this recommendation, this study is grounded in the theoretical framework presented in the previous chapters.

This study adopts an embedded single-case study design following Yin's (2018) categorisation of case study approaches. The single-case design, a detailed examination of a single organisation's procurement practices, was chosen because the case organisation represents a typical case within its industry, offering an opportunity to study phenomena that may be applicable to similar contexts. Additionally, this design leverages the critical nature of the case, as the case organisation is actively seeking to improve its sustainable procurement practices. An embedded case study design was chosen over a holistic design because the research seeks to explore multiple subunits within the case organisation, rather than focusing solely on the organisation as a single, undifferentiated entity. The embedded design

ensures that the study can investigate interrelationships and variations between subunits, providing richer insights into the integration of sustainability within the organisation's procurement practices.

According to Yin (2018), a well-defined unit of analysis is critical for ensuring the clarity and focus of a case study. The unit of analysis serves as the primary focus of the investigation and should align with the research question. In this study, the unit of analysis is the sourcing organisation within a local division of a global industrial manufacturing company. This focus allows for a detailed examination of sustainability integration within the procurement function while situating the findings within the broader organisational and industry context.

## 5.2 Data Collection and Analysis

The use of multiple data sources ensures triangulation and a richer understanding of the case (Yin, 2018). For this study, multiple sources of evidence were used. The internal documents and data used in the study are presented in more detail in Table 1.

Table 1. Case Study Data Sources

Document Type	Document Name	Usage
Internal documents	<ul style="list-style-type: none"> <li>● SCM Roles and Responsibilities (2023)</li> <li>● Supplier Relationship Management (2021)</li> <li>● Procurement Process Chart (n.d.)</li> <li>● SCM Organisation Chart (2024)</li> <li>● Category H Strategy (n.d.)</li> <li>● Category C Strategy (n.d.)</li> <li>● Category L Strategy (n.d.)</li> <li>● Category A Strategy (n.d.)</li> <li>● Sustainable Supply Chain Management (2024)</li> <li>● Sustainable Supply Management (n.d.)</li> </ul>	Used to provide an overview of the case company, the sourcing organisation, the case categories, and the practices employed in the organisation, and to compare the sourcing organisation's procurement practices with the theoretical framework

Case company publications	<ul style="list-style-type: none"> <li>• Sustainability Report (2023)</li> <li>• Multiple Reporting Channels (n.d.)</li> <li>• How do I report? (n.d.)</li> </ul>	Used to provide an overview of the practices employed in the organisation and to compare the sourcing organisation's procurement practices with the theoretical framework
Internal data	<ul style="list-style-type: none"> <li>• Category spend (2023)</li> <li>• Supply risk survey data (2024)</li> </ul>	Used to place categories into the Sustainability Strategy Matrix

The data collection began with a review of the case company's internal documents and data as well as external publications. This analysis provided a basis for understanding the organisation's procurement practices, sustainability initiatives, and the strategic importance and nature of each category.

Next, all sourcing managers responsible for the categories in scope in the division were asked on a supply risk survey to evaluate the supply risk associated with their respective categories. In this context, supply risk refers specifically to the availability of preferred suppliers in the category. The evaluations were conducted using a five-point scale: (1 = low, 2 = medium-low, 3 = medium, 4 = medium-high, and 5 = high).

Categories were placed on the previously introduced Sustainability Strategy Matrix based on 2023 category spend data and the sourcing managers' assessments of supply risk. One representative category from each of the four quadrants was selected for in-depth analysis. The categories chosen were Category H (Bottleneck), Category C (Strategic), Category L (Non-Critical), and Category A (Leverage). Figure 14 shows the placement of all categories and highlights the categories chosen for further analysis.

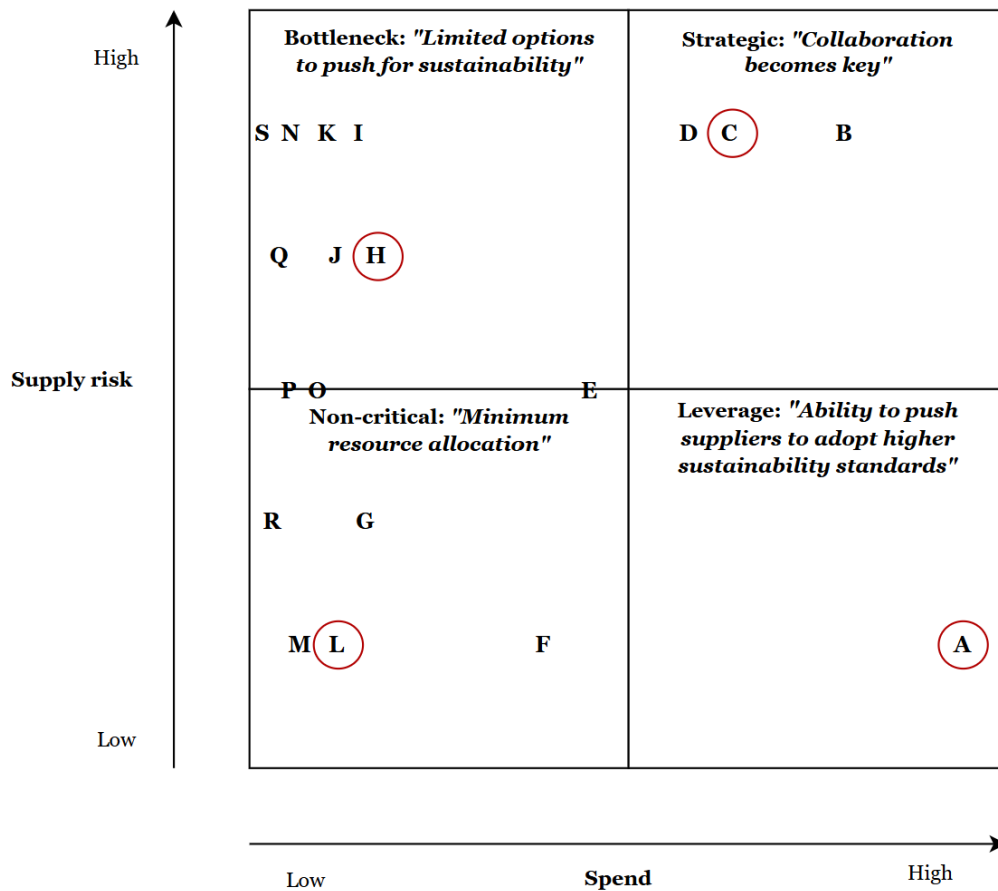


Figure 14. Sourcing Organisation’s Procurement Categories Placed on Sustainability Strategy Matrix

The selection of categories was guided by the principles of theoretical sampling, a concept introduced by Glaser and Strauss (1967), aiming to maximise the relevance and depth of insights into the research topic. The selected categories were chosen as typical examples within their respective quadrants, reflecting the key characteristics of each procurement type.

Interviews are one of the most important data sources for case studies (Yin, 2018). To gain deeper insights into the four selected categories from the Sustainability Strategy Matrix, semi-structured interviews were conducted with the sourcing managers overseeing these categories. Each of them is responsible for managing their respective category within the local division, either independently or in collaboration with a partner division manager. The interviews lasted between 56 minutes and 1 hour 30 minutes, with an average duration of 70 minutes. Further details about each interview are provided in Table 2.

Table 2. Interviews with Case Categories' Sourcing Managers

	H (Bottleneck)	C (Strategic)	L (Non-Critical)	A (Leverage)
Title of the sourcing manager	Senior Sourcing Manager	Sourcing Manager	Sourcing Manager	Sourcing Manager
Experience of the sourcing manager	10 months in current position, 10 years as a Sourcing Manager, and over 30 years in sourcing	6,5 years in current position	2 years in current position, over 10 years in sourcing	5 years in current position
Date of the Interview	13.12.2024	13.12.2024	11.12.2024	12.12.2024
Duration of the Interview	1h 30min	1h 9min	56m	1h 4min

Yin (2018) emphasises using semi-structured interviews with a clear protocol to guide the data collection process while allowing flexibility to explore emerging themes. Semi-structured interviews provide an effective way for researchers to explore participants' thoughts and experiences in-depth, offering rich and detailed insights. They are particularly useful because they allow the researcher to focus directly on the research topic while remaining flexible enough to uncover unexpected or unanticipated information. (Yin, 2018).

However, there are some risks that need careful consideration. Poorly formulated questions can lead to misunderstandings or irrelevant responses. In addition, participants may not answer truthfully to the questions. Furthermore, the interviewer might unintentionally influence the participant's responses. To mitigate these issues, the interview guide should be centred around broad, open-ended questions that allow participants to express their perspectives freely. Additionally, researchers must be skilled in conducting interviews and analysing the responses to ensure the reliability and validity of the data collected. Proper preparation and reflexivity on the part of the researcher are key to minimising bias and maximising the quality of the findings. (Yin, 2018).

The interviews were conducted using an interview guide, which ensured that all relevant topics were covered while allowing flexibility in the order of questions to facilitate smooth dialogue and natural transitions. Follow-up

questions were also asked when necessary. At the beginning of each interview, background information about the sourcing manager was collected to provide context for their responses. The interview guide focused on key themes, including category characteristics, prioritisation of procurement criteria, sustainability in category management, supply chain transparency, and organisational factors. Each theme included specific questions designed to explore the topic in depth. These themes and questions were developed based on the theoretical framework. The primary aim of the interview guide was to provide insights into the characteristics of the selected procurement categories, the current strategies and procurement practices employed, the alignment of sustainability objectives with broader procurement goals, and the challenges and opportunities related to integrating sustainability into procurement processes and category strategies. The interview guide used for data collection is available in Appendix A.

All interviews were conducted via video calls using Microsoft Teams. The platform facilitated recording, allowing for smooth and uninterrupted conversations without the need for extensive notetaking during the sessions. Additionally, the transcription feature available in Microsoft Word was utilised, significantly aiding the data analysis process by providing readily accessible transcriptions of the interviews. All interviews were conducted in Finnish, and the citations presented in this study were translated into English.

When starting the interview analysis, the transcriptions were reviewed, and any misspellings were corrected. The use of coding and thematic analysis for qualitative data aligns with Yin's (2018) emphasis on systematically organising and interpreting evidence. The six-phase model of thematic analysis introduced by Braun and Clarke (2006) was followed by the researcher in conducting the analysis. A key part of the data analysis process was comparing the findings against the theoretical framework to ensure consistency and deeper insights.

Furthermore, Yin (2018), presents four main strategies for analysis: examining theoretical propositions, creating a description, using a mixture of quantitative and qualitative data, and examining rival theories. The primary analysis strategies for this thesis were examining theoretical propositions and using a mixture of quantitative and qualitative data. Creating a description was used as a supplementary approach to provide context while examining rival theories was not applicable to this study.

### **5.3 Validity and Limitations**

Ensuring quality in case study research involves addressing validity and reliability. Yin (2018), suggests strategies for enhancing the quality of case study research, focusing on construct validity, internal validity, external validity, and reliability.

Construct validity was ensured by employing multiple sources of data and maintaining a clear chain of evidence throughout the research process. Data collection involved internal company documents and quantitative metrics related to category spending and supply risk perceptions. Semi-structured interviews with sourcing managers provided qualitative insights. Additionally, a clear chain of evidence was established by documenting each step of the research process.

Internal validity was addressed through the use of pattern-matching and explanation-building techniques. Pattern-matching involved comparing data from different sources to identify consistencies and variations. Explanation-building was employed to analyse the collected data, constructing a logical narrative that connects observed practices to the broader research question.

To ensure external validity, the study relied on analytical generalisation rather than statistical generalisation. The findings are designed to contribute to a broader theoretical understanding of sustainability integration into procurement rather than being representative of all organisations. While the research focuses on a single organisation, the lessons learned can be applicable to similar organisations facing comparable challenges, offering theoretical contributions that extend beyond the specific case.

Reliability was achieved through a well-documented and repeatable research process. All feasible data were documented while ensuring the anonymity of the case company. To protect the confidentiality of the case organisation and sourcing managers, identifying details have been omitted. These measures align with ethical research practices and ensure participant anonymity.

## 6 Findings

This chapter presents the key findings of the case study. The chapter begins with an overview of the case organisation, followed by an overview of the case categories. It then examines the case organisation's sustainable procurement practices, assessing the implementation of recommendations from the Sustainable Procurement Model. Additionally, the chapter evaluates the application of the Sustainability Strategy Matrix across the case categories. The chapter concludes with a critical assessment of the organisation's strengths and areas for improvement.

### 6.1 Overview of the Case Organisation

The case study focuses on the sourcing organisation within a local division of a global industrial manufacturing company. The supplier base of the company is diverse, comprising both local and global suppliers and spanning categories that range from bulk items to highly sophisticated, customised components. The category spend also varies widely between categories. Supplier performance is equally varied—some suppliers perform poorly, while others present minimal issues. (Supplier Relationship Management, 2021).

The case company is committed to enabling a low-carbon society, preserving resources, promoting social progress, and creating a culture of integrity and transparency along the extended value chain. The company has set a target to reduce their scope 1 and 2 GHG emissions by 80% by 2030 and 100% by 2050, compared to the 2019 baseline. (Sustainability Report, 2023).

Furthermore, the case company has set targets to achieve a 25% reduction in scope 3 emissions by 2030 and a 90% reduction by 2050, using 2022 as the baseline year. Additionally, the company has set a goal to cut scope 1 and 2 emissions from its main tier 1 suppliers by 50% by 2030, relative to the same baseline. (Sustainable Supply Chain Management, 2024).

The case company provides standardised policies, processes, and systems, but also grants its divisions full ownership and accountability for their respective strategies, performance, and resource management. This means that while divisions align with the company's strategic direction and explore opportunities for collaboration, they also have the flexibility to define their own course of action to achieve corporate financial and sustainability targets and allocate resources as needed. (Sustainability Report, 2023). In several aspects of sustainability, the local division has established more

ambitious targets compared to the broader company goals. (Sourcing Manager H).

The case division is actively collaborating with a partner division, as these two divisions use a lot of the same technologies and suppliers. The case division is distinct in that its products are customised to meet the specific needs of the customers.

The organisation responsible for procurement in this local division is called the SCM organisation. It consists of three teams with their own focus areas: Purchasing, Sourcing, and Planning and Development. Their team leaders are part of the SCM management team. The main purpose of the SCM organisation is to support business growth and profitability by actively managing and developing suppliers throughout the product life cycle. The main KPIs are on-time delivery, quality, cost, and inventory turnover. (SCM Roles and Responsibilities, 2023). Figure 15 illustrates the local division SCM organisation.

The purchasing team is responsible for ensuring material availability for customers' production units with proactive material flow management. They have full ownership of the purchasing process. The planning and development team, on the other hand, is responsible for developing processes and tools for sourcing, purchasing, demand planning and inventory management. (SCM Roles and Responsibilities, 2023).

The sourcing team supports the development of competitive products for customers by collaborating closely with R&D and involving suppliers early in the process. They develop existing suppliers, strengthen the portfolio with new ones as needed, and ensure business continuity with a multi-sourcing and region-for-region approach. The team focuses on achieving this while considering the TCO. (SCM Roles and Responsibilities, 2023).

In the Sourcing Team, there are 11 sourcing managers, each responsible for managing between one to five categories. This study focuses on categories whose products are directly used in the case company's offerings. The sourcing managers within the team are represented in Figure 15 with rounded boxes. The darker, rounded boxes indicate sourcing managers whose categories (A–S) fall within the scope of this analysis. The sourcing managers whose categories do not include products relevant to the scope of this study are shown as white rounded boxes and are excluded from the analysis.

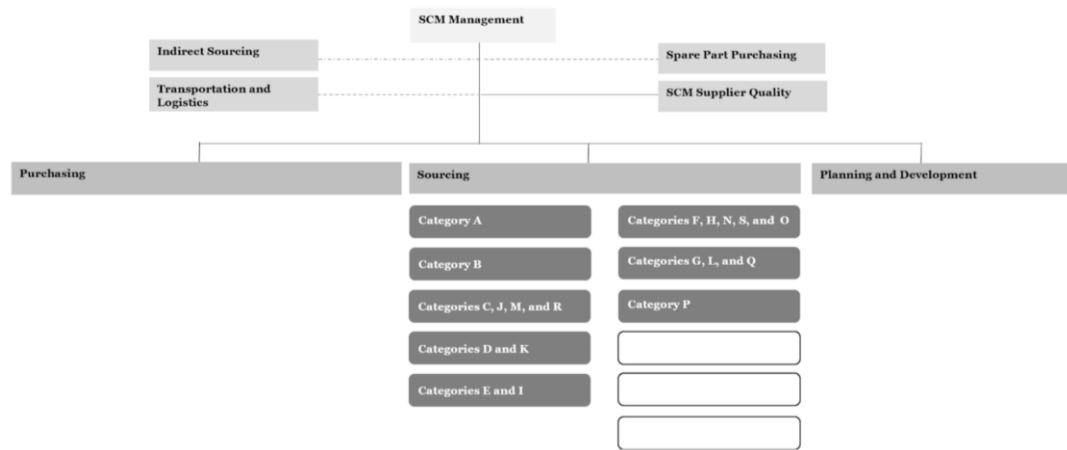


Figure 15. Case Company Local Division SCM Organisation (based on SCM Organisation Chart, 2024).

To provide clarity, from this point forward, the global industrial manufacturing company will be referred to as the case company, and the sourcing team within the local division’s SCM organisation, which is the focus of this study, will be referred to as the sourcing organisation.

Sourcing managers in the sourcing organisation are responsible for driving category development in alignment with the respective category strategies. They are accountable for the category's overall performance within the local division. This includes managing suppliers' availability, quality, cost, and technology, as well as health, safety, and environmental standards. Additionally, the sourcing managers are responsible for identifying opportunities for new product development projects. Their responsibilities also extend to supplier selection during R&D projects, negotiating component contracts in the R&D phase, and creating risk mitigation plans for single or sole-source components during new product development (NPD) and mass production phases. Sourcing Managers also act as SCM project leads for designated projects, driving cross-functional competence teams within their category to align future technology and supply chain needs. Furthermore, they participate in scanning for emerging technologies and identifying potential suppliers to meet future requirements. (SCM Roles and Responsibilities, 2023).

## 6.2 Overview of the Case Categories

This section presents an overview of the case categories analysed in the study, each representing a distinct segment of the Sustainability Strategy Matrix with its own strategic significance and supply risk. It examines the physical nature of the products within each category, how the categories are

managed within the organisation and their market dynamics. Additionally, category-specific sustainability challenges are explored, offering a comprehensive understanding of the procurement landscape.

### **6.2.1 Bottleneck Category H**

Bottleneck Category H consists of different aluminium profiles, which are extruded shapes made from aluminium alloys. The majority of the spending within this category is focused on devices essential to dissipate heat from electronic components and systems, ensuring safe operating temperatures. (Sourcing Manager H).

The category is currently managed locally but maintains a global scope, with the same suppliers and products used across Europe, America, and Asia. The category was previously managed globally, and efforts are still made to coordinate the category collaboratively across locations to ensure alignment and consistency. The division is also closely collaborating with the partner division, sharing suppliers and technology due to significant similarities. (Sourcing Manager H).

The category is highly dependent on aluminium and its price, which serves as a critical determining factor. The price of aluminium is entirely dictated by global market conditions. The aluminium raw material market is volatile, influenced by factors such as trade wars and fluctuations in the automotive industry. (Category H Strategy, n.d.). The case company monitors the development of aluminium prices and the availability of aluminium.

Despite the global availability of aluminium, supply risks have emerged due to production reductions in certain regions, making it less profitable for producers to operate. This has impacted both availability and pricing. Additionally, potential delivery challenges can quickly influence market conditions. Aluminium processing is also highly dependent on energy prices, as it is an energy-intensive process. This dependency has created challenges recently, particularly in Europe. (Sourcing Manager H).

Advancements in manufacturing technologies continue to drive innovation and adaptation in the industry. (Category H Strategy, n.d.).

In this category, the supply risk is medium to high due to a limited number of viable suppliers (Supply Risk Survey, 2024). Suppliers are located in the EU and Asia (Category H Strategy, n.d.). The case company is actively trying to locate new European suppliers and reduce reliance on suppliers in China (Sourcing Manager H).

The case company retains ownership of the design intellectual property. Most suppliers struggle to meet the complex and precise design requirements of the case company, as the products are challenging to make (Sourcing Manager H). In Europe, tool manufacturing also poses significant challenges, and the transfer of tools between toolmakers and manufacturers

is difficult (Category H Strategy, n.d.). These tools can also be sensitive to break (Sourcing Manager H). The high complexity of the product and risks associated with manufacturing are influencing the availability of European suppliers. European suppliers also tend to be significantly more expensive, posing additional challenges. (Sourcing Manager H).

EU suppliers predominantly rely on recycled aluminium for their products. The limited availability of recycled aluminium creates supply concerns, as it is not yet abundant enough to meet consistent demand. Additionally, the quality and properties of recycled aluminium must align with those of virgin aluminium to ensure proper functionality. Enhancing recycling and collection processes is essential to secure a steady and sufficient supply. (Sourcing Manager H).

There are some significant sustainability challenges in Category H. Aluminium production contributes approximately 2% of global CO<sub>2</sub> emissions, and global aluminium production has more than doubled between 2000 and 2020 (Hasanbeigi, Springer & Shi, 2021). In addition, global demand for aluminium is expected to rise by over 80% by 2050 (World Economic Forum, 2022). The issue is also recognised as a problem by the Sourcing Manager H: *"If you think about the whole device, the material is probably the biggest factor in terms of emissions."*

Aluminium can be recycled indefinitely with significantly lower energy requirements compared to producing new aluminium from raw materials. Despite this, approximately 7 million tons of aluminium are still not recycled each year (World Economic Forum, 2022). The Sourcing Manager H states: *"If more recycled aluminium could be obtained, I believe it would reduce emissions."*

Another sustainability concern in the category is the emissions generated by long transportation routes. *"Transportation is also one factor, and sustainability is one of the reasons why we would like to find suppliers closer to this region as well"* (Sourcing Manager H).

The category has also had issues related to conflict minerals in its supply chain (Sourcing Manager H). *"Looking at sustainability more broadly, it is also essential to pay close attention to the sourcing of raw materials for aluminium to avoid any sanction issues" [...]* *"We're a bit far from those smelters, so they're not really under our control just yet,"* Sourcing Manager H describes.

### **6.2.2 Strategic Category C**

Strategic Category C comprises devices that operate as switches or rectifiers in power electronics circuits, enabling the control, conversion, and distribution of electrical energy in various applications. (Sourcing Manager

C). The category is managed both locally and globally. There is a global sourcing manager who oversees and coordinates efforts across all regions, ensuring alignment and consistency. However, the practical groundwork and day-to-day activities are handled locally. The local site serves as a sort of parent site, where much of the development takes place. The solutions and practices established at this site are often replicated and implemented across other units in Europe, America, and Asia. (Sourcing Manager C).

The category's market is growing due to several key trends, such as the expansion of e-mobility, the decarbonisation of industrial processes, the generation of renewable energy, the storage of electrical energy, and the increasing demand for higher energy efficiency (Category C Strategy, n.d.). The category's supply risk is medium to high due to the limited number of key suppliers and the high cost and difficulty of switching suppliers. (Supply Risk Survey, 2024). The supplier base is heavily concentrated. The case company is actively seeking new suppliers in Europe to reduce dependence on Chinese suppliers; however, the alternative suppliers currently do not meet the company's quality standards. (Category C Strategy, n.d.).

The category faces several sustainability issues. The Sourcing Manager C describes: *"(Category C devices) are one of the most closely monitored items (in terms of sustainability). Whenever there is a topic of interest, it tends to involve (Category C devices) in one way or another."*

The manufacturing process of the device is very energy intensive: *"This is a category that consumes a significant amount of energy"* (Sourcing Manager C). Another challenge is that the manufacturing requires vast amounts of ultra-pure water. Poor water management can strain local water resources and lead to contamination if effluents are not treated properly. The Sourcing Manager C describes: *"These processes consume a significant amount of water. A closed water circulation system has long been a goal in this category to minimise water usage. Despite the closed-loop system, the processes still consume a significant amount of water or groundwater. This has been a concern, especially in populated areas, to ensure that water consumption is sustainable and that industrial use does not deplete the area's water and groundwater resources. Additionally, it is important that the water returned to the environment is of high quality."*

Furthermore, toxic chemicals are used in the category's production process. *"There are very harmful materials used in these processes, such as arsenic and others"* (Sourcing Manager C).

In addition, the global and fragmented nature of the category's supply chain poses challenges. *"There have been issues (with conflict minerals), and I've also had to investigate them. They are inherently challenging because as you dig deeper into the supply chain, these issues always tend to emerge."* (Sourcing Manager C).

### 6.2.3 Non-Critical Category L

The non-critical Category L primarily consists of packaging materials such as cardboard, plywood, and wood. In addition to these, there are also plastic-based packaging materials, such as corrosion protection films, bags, and desiccants to manage moisture. Foam materials are also used in some cases to provide additional protection during transportation or storage. Overall, the category includes a mix of simple and functional materials tailored to diverse packaging needs. Compared to other categories, the products in this category are relatively straightforward, with common examples including cardboard boxes, wooden pallets, and various other packaging materials. (Sourcing Manager L).

The category is managed locally. There is significant collaboration with the partner division, as they largely use the same suppliers and similar types of products. Additionally, the partner division leads the design of the category, essentially designing the packaging solutions for both divisions. The category is highly localised, with all suppliers located within the same country or neighbouring countries. (Sourcing Manager L).

The business environment for the category is shaped by unique market conditions for raw materials in each country. The supply risk is low due to the strong availability of materials and the presence of numerous potential suppliers for most items, fostering price competition. (Category L Strategy, n.d.). While certain materials, such as heavy-duty cardboard, may be harder to source and are not produced locally by all suppliers, the majority of materials are widely available (Sourcing Manager L).

The category encounters some sustainability challenges, such as the use of plastics. Globally, we produce around 400 million tonnes of plastic waste every year. Around 36% of all plastic produced is used for packaging, with 85% of this waste ending up in landfills (World Economic Forum, 2022). This problem is also recognised by the Sourcing Manager. (Sourcing Manager L).

The category is associated with numerous legislative requirements (Sourcing Manager L). On the 16th of December 2024, the European Commission adopted the Packaging and Packaging Waste Regulation. It entered into force 20 days after publication and will apply 18 months after entry into force, although longer transitional provisions apply to certain requirements. (Council of the EU, 2024). The PPWR emphasises extended producer responsibility, requiring companies to be accountable for the entire life cycle of their product packaging. It sets ambitious targets for recycling, reuse, and refilling across various packaging waste categories. The regulation encourages the use of lightweight materials and reducing packaging volume while mandating clear labelling requirements for

material composition, sorting instructions, and reuse guidance. (European Parliament, 2024).

The Sourcing Manager L refers to the directive's requirements for establishing 2030 and 2040 targets on the minimum recycled content percentage for packaging, stating: *"The EU PPWR is set to come into effect in 2030, but it's something that needs to be gradually taken into consideration. This regulation will mandate that 40% of wood and plastic packaging must be reusable by then, moving away from single-use packaging."*

A key characteristic of the category is its reliance on largely renewable materials, predominantly wood-based. This reliance introduces the necessity for certifications that verify the sustainable sourcing of wood, ensuring it originates from responsibly managed forests. *"The EU requirements, such as the EUDR (EU Deforestation Regulation), which was initially planned to come into force next year but has been delayed, have had an indirect impact. While it doesn't directly affect us much, as we don't purchase packaging materials from outside the EU, it does have an indirect effect through our suppliers. For example, if a supplier sources plywood from countries like Brazil, the regulation influences the supply chain through those channels."* (Sourcing Manager L).

Even though the category's supply chains are local and relatively short, simple, and easy to follow, problems might still arise: *"A good example is the (widely discussed case involving freshwater pearl mussels), which shows that risks can still exist, no matter how well things may look on paper. The actual practices can often differ from what is officially documented."* (Sourcing Manager L). In this case, a packaging company was responsible for a logging operation that caused severe environmental damage to the habitat of the critically endangered freshwater pearl mussels. The incident in 2024 involved multiple crossings of a protected river by heavy machinery, resulting in the destruction of thousands of mussels. (Yle, 2024). This highlights the potential risks that can arise in supply chains, even when the suppliers are geographically close.

#### **6.2.4 Leverage Category A**

The leverage Category A consists of different materials, such as steel, copper, aluminium, and polycarbonate, that are manufactured according to the company's drawings by suppliers. The category is currently managed locally, with no global role overseeing or guiding its operations. (Sourcing Manager A).

The business environment of the category is characterised by a strong dependency on raw material prices and a wide range of suppliers of

different sizes. The market is defined by tight margins and tough competition. Key fundamentals include case company-specific designs and ownership of intellectual property. Local supply is preferred, but there are also suppliers from elsewhere in Europe and Asia. (Category A Strategy, n.d.). The supply risk is considered low, due to the amount of suppliers and possible suppliers being high. (Supply Risk Survey, 2024).

The category faces some critical sustainability challenges. First, the steel industry is a significant emitter of CO<sub>2</sub>, contributing approximately 7% of all human-induced emissions globally (Holappa, 2020), and steel demand is expected to reach 2.3 billion metric tons by 2030, with an annual growth rate of 3% (World Economic Forum, 2023a). As previously mentioned, aluminium production is also a significant (Hasanbeigi, Springer & Shi, 2021) and growing (World Economic Forum, 2022) contributor to global CO<sub>2</sub> emissions.

The category's importance in advancing sustainability is well recognised by the Sourcing Manager A. *"I consider this category crucial (in advancing the local division's sustainability goals), especially in terms of product CO<sub>2</sub> emissions. For example, steel accounts for roughly half the weight of a (case company product), meaning that even small changes can result in significant percentage reductions in the product's CO<sub>2</sub> footprint. This makes the category highly important."*

The use of fossil-free steel, also known as green steel, is seen as a potential future solution by the sourcing manager A. *"When the availability of green steel improves, we should start exploring whether we can pay a higher price for it to have green steel in our equipment. Currently, there aren't many green steel suppliers"*. The sourcing manager highlights the limitations associated with green steel, particularly in terms of extended delivery times and higher costs: *"With a six-month lead time, it would be possible to order green steel at a premium price. Perhaps a single case or marketing project could be done, but in the long run, our demand is so high that we can't start using it. We also have so many different suppliers, so we'd need to begin quite a large-scale effort to organise a green steel flow to our suppliers."* (Sourcing Manager A).

Furthermore, transportation is a significant source of emissions in the category, as Sourcing Manager A stresses: *"Transportation is likely the main contributor to the carbon footprint. We cannot import large items from Asia or other distant regions. However, we have brought in some smaller items from those areas."*

The Sourcing Manager A also emphasises that there are negative sustainability impacts concerning raw material mining. *"The steel, copper, and aluminium mining processes also carry significant environmental and social implications, which extend far beyond our direct operations."* In

addition, they highlight the environmental considerations associated with surface treatments, stating: *"When these parts are painted and coated, there are environmental impacts to consider."* (Sourcing Manager A).

Lastly, Sourcing Manager A emphasised the importance of maintaining proper social conditions, noting that compliance is supported by a predominantly European supplier base. *"Ensuring that social conditions are in order is also important. Fortunately, with a supplier base that is predominantly European, local and EU laws help ensure compliance with safety, recycling, and other sustainability requirements."*

### **6.3 Sustainable Procurement Practices in the Case Organisation**

This section explores the implementation of recommendations from the theoretical Sustainable Procurement Model within the sourcing organisation. The analysis begins with an examination of the extent to which supply chain transparency is realised, followed by an assessment of how sustainability is integrated into the strategy. Within the strategy section, the implementation of recommendations from the Sustainability Strategy Matrix is also evaluated across the case categories. Subsequent to the strategy discussion, the focus shifts to the incorporation of sustainability in the organisation's requirements definition phase, as well as in the supplier selection and supplier management processes. The section concludes with a critical assessment of the organisation's strengths and areas for improvement.

#### **6.3.1 Supply Chain Transparency**

According to the Sustainable Procurement Model, ensuring transparency involves implementing supply chain mapping, modifying the supply chain where necessary, and utilising tools such as sustainability certifications, audits, document analysis, and surveys. Furthermore, establishing anonymous reporting systems, notification mechanisms, and supplier engagement platforms as well as integrating sustainability into ERP systems and data visualisation are essential to promote transparency and accountability.

##### ***Supply Chain Mapping***

While there is visibility into certain tiers of the supply chain, particularly the first and sometimes the second tier, the sourcing organisation has not implemented a systematic approach to mapping the entire supply chain.

Instead, visibility depends on the suppliers and the complexity of the category.

The supply chain for Bottleneck Category H typically includes up to four or five tiers, with visibility primarily focused on direct suppliers and extending to the third tier in some cases. *"We are directly involved with the direct suppliers. In addition, we monitor raw material markets quite extensively. However, we may not necessarily be in regular direct contact with, for example, a smelter. The third tier is probably the one within our scope or the one we still monitor."* (Sourcing Manager H).

Strategic Category C is characterised by complex supply chains with four to six tiers, depending on the supplier's internal operations. Visibility typically reaches the second or third tier. *"I have visibility into the (product manufacturers). Then there are two ways they operate: they either have their own facilities for (the initial production stages), or they source (these components) externally. I know who supplies (certain key materials) to them and so on. However, I haven't visited those suppliers and don't necessarily have direct contacts there, but I have a certain level of understanding of the chain. If we go further down to the raw material level, I have no idea where they originate from."* (Sourcing Manager C).

The level of visibility in Non-Critical Category L varies depending on the supplier and product complexity. *"It depends on the supplier how much visibility we have into the chain." [...]"In some other categories, there can be dozens of different materials in one product, making it much more complex than in this category, where it's mostly wood, cardboard, or plastic. We don't necessarily always ask, but if we do, they do tell us the country of origin of the wood, for example. If it's just wood, it's relatively straightforward" [...]"We have a fairly good idea overall, but there are still some unclear areas as well."* (Sourcing Manager L).

The Leverage Category A typically has four to five tiers, depending on whether there is a distributor as a second tier: cutters, coaters, smelters, and mines. In addition, for material coating surface materials may be used, which have their own chain. (Sourcing Manager A). Visibility in the supply chain extends to the first and sometimes the second tier, with some challenges in tracing the materials further. *"We can receive reports from each smelter, but since we have a multiple-source risk management policy, we order the same component from multiple suppliers, and the supplier itself might order raw materials from several raw material suppliers. This can mix things up, making it difficult to track which supplier provided what and with what production methods."* (Sourcing Manager A).

In conclusion, while there is visibility into some tiers, particularly the first and sometimes the second, a systematic approach to mapping the entire

supply chain is lacking. The supply chains are often complex and difficult to track, further restricting mapping efforts and making it harder to identify and mitigate risks at all levels. The lack of a holistic mapping strategy limits transparency and could present challenges in managing deeper-tier risks.

### ***Supply Chain Modification***

The supply chains in case categories have been adjusted due to reasons such as competition, availability, group strategies and requirements, category strategies, and risk management (Sourcing Manager H). In the Bottleneck Category H, efforts have been made to increase the share of European suppliers. *"We are trying to find new European suppliers and make our existing European suppliers more competitive. This would help us better manage transportation and other risks. We've discussed our current suppliers' plans, such as whether they plan to expand or open factories elsewhere."* (Sourcing Manager H). The number of suppliers has also been reduced, and some suppliers have been replaced: *"For example, in China, there's one supplier we've stopped working with completely, and now we're stopping with another as well. We already have a replacement for one, and we're still looking for a replacement for the other."* (Sourcing Manager H).

In the Strategic Category C, the number of suppliers has been adjusted to be purposefully broad: *"We don't need fifty different suppliers. We can manage perfectly well with, for example, five good suppliers actively competing. That way we know their chains and so on."* (Sourcing Manager C). Additionally, regional adjustments are being considered: *"For example, now there's the China risk, so we have this region-to-region thinking. Here, it would be good to have at least one European supplier, if not more, and we could source from Asia, outside of China. Ideally, we'd also reduce dependence on Taiwan, but that's somewhat naive thinking because so many of the World's (category's) suppliers come from Taiwan at the moment. A significant amount also comes from South Korea and other places in China's vicinity."* (Sourcing Manager C).

In the Non-Critical Category L, where the suppliers are highly local, there has been stability in the supply chain. *"There hasn't been a need to make any major changes, so we're in a good position. Of course, there are always some new investigations ongoing about what new things could come up. But the main suppliers have stayed the same, and their shares have remained quite stable."* (Sourcing Manager L).

In the Leverage Category A, efforts are made to maintain an optimal number of suppliers: *"At least in the first tier, we aim to keep the number of suppliers lower. Small suppliers cannot be our suppliers, and we can't manage our supplier base if we order small amounts from multiple suppliers. So, we prefer to consolidate the suppliers. On the supplier side,*

*they fortunately have a limited number of raw material sources they use, so there are fewer suppliers there. However, we want them to have multiple sources for the same raw materials they need so they can remain competitive and ensure availability."* (Sourcing Manager A).

In conclusion, supply chain modifications in the case categories have generally aimed to maintain an optimal number of suppliers and improve regional balance while reducing risks. The focus has been on enhancing competitiveness and ensuring supply chain resilience. Although these changes have not been driven by sustainability requirements, they align with and support sustainability goals. There is a clear intent to shift from Asian to European suppliers, but higher costs, limited availability, and existing supply chain dependencies restrict this transition.

### ***Sustainability Certifications***

Case company direct material suppliers are required to adhere to recognised environmental and health and safety management standards, such as ISO 14001 or equivalent certifications (Supplier Relationship Management, 2021). ISO 14001 is an internationally recognised standard for environmental management systems, providing a framework for organisations to improve environmental performance, minimise their footprint, comply with legal requirements, and achieve environmental goals (International Organisation for Standardization, 2015).

The sourcing managers emphasise that the certifications must be in order. One of them stated: *"We simply require that they have, for example, ISO 9001 (quality management certification) or an equivalent, and an environmental certification like ISO 14001. If we see the certificate on the wall, that is sufficient proof for us."* (Sourcing Manager C). Another sourcing manager also highlighted the importance of certifications, saying: *"(When evaluating the performance of suppliers), we check whether they have acquired all the necessary certifications"* (Sourcing Manager A). Similarly, a third sourcing manager stressed: *"Generally, the certifications must be in order"* (Sourcing Manager L). However, one sourcing manager noted that having a clear plan for implementation can be sufficient: *"ISO 9001 (quality management certification) is mandatory, but for any additional certifications, suppliers are expected to provide a clear plan detailing when they will obtain those certifications"* (Sourcing Manager A).

Case company also sets sustainability requirements for its direct material suppliers on packaging. The packaging shall be environmentally friendly, according to ISO14001, and appropriate for the purpose. (Supplier Relationship Management, 2021).

Furthermore, certain materials have additional certification requirements. For instance, one sourcing manager explained: *"For wood-based materials, it brings with it certifications that aim to ensure the wood comes from sustainably managed forests"* (Sourcing Manager L).

In conclusion, the case company's requirement for sustainability certifications like ISO 14001 is a positive step toward ensuring supplier compliance with environmental and safety standards. However, while ISO 14001 is generally mandatory, some flexibility exists for suppliers with clear implementation plans. In addition, ISO 14001 focuses on environmental management and does not address social sustainability aspects, which may leave gaps in ensuring comprehensive sustainability compliance.

### ***Audits, Document Analysis, and Surveys***

The company has a specific Sustainable Supply Management programme that covers new supplier onboarding as well as existing supplier monitoring. The aim of the programme is to uphold human rights and decent working conditions, ensure safe and environmentally sound operations, and comply with relevant regulatory requirements. (Sustainable Supply Management, n.d.).

The first step of this programme is a sustainability self-assessment questionnaire. The assessment needs to be filled by all new suppliers and existing suppliers, regardless of their location. (Sustainable Supply Management, n.d.). The assessment also requires suppliers to provide documentation to validate their responses. *"The first indications (of suppliers' sustainability) come from these surveys, which give us some information, and then when we visit the supplier, we try to look at sustainability aspects from different perspectives and consider them"* (Sourcing Manager H).

On-site assessment is required if the sustainability self-assessment survey comes back with a high-risk score and the risk level of the country of the supplier is high. These on-site assessments follow a generic protocol covering 30 parameters and are conducted by trained assessors. In addition, for certain focus countries, a more extensive on-site assessment is conducted automatically. This more extensive assessment covers 42 parameters and is conducted by Sustainable Supply Management lead assessors. It also uses a country-specific protocol that reflects the local legislation of the supplier country. (Sustainable Supply Management, n.d.).

Formal audits are also made to almost every new direct supplier to ensure they meet technical, safety, and sustainability requirements. *"Before we can start sourcing from any production facility, we need to audit it, meaning we go there to inspect the place. Most of the audit criteria are on the*

*technical side, but we also ensure that safety issues are in order, employee well-being is addressed, and sustainability matters are in place."*

(Sourcing Manager H). *"There is a separate safety section (in audits), as safety is our number one priority. Then we address quality issues, as well as how the supplier handles scrap materials."* (Sourcing Manager A). *"In audits, things like how they consider energy savings, water savings, or something like that are usually taken into account, and that's where the sustainability aspect comes in"* (Sourcing Manager C).

The most critical categories are subject to audits every five years, while others are audited as needed (Sourcing Manager H). The company focuses on auditing suppliers based on identified needs or performance concerns. *"We don't necessarily audit our suppliers regularly. If the supplier's quality or availability has been poor, we will audit them. But there may be suppliers we haven't audited this decade because the situation is good, and no significant changes have occurred."* (Sourcing Manager A). *"If we see that there's a problem or we suspect that there's a problem, we can dig a bit deeper or ask, for example, our (global sustainability team) to go and take a look. But usually, if it gets to that level, we don't end up using that supplier."* (Sourcing Manager C).

To address any shortcomings identified during audits, the sourcing managers develop action plans with suppliers. *"If a supplier gets lower scores in an audit, we create an action plan based on the audit. If they address the issues based on the action plan, their audit score improves."* (Sourcing Manager A).

Although supplier visits are distinct from formal audits, they also serve as an opportunity to observe practices related to sustainability: *"When visiting a supplier, we focus on whether they recycle materials, turn off lights, or use automation, for example"* (Sourcing Manager C).

In conclusion, the implementation of sustainability self-assessment questionnaires, document analysis and audits enables the identification and mitigation of potential risks, while the creation of action plans fosters ongoing improvement. However, some suppliers may go without audit for extended periods, potentially leaving gaps in the monitoring of their sustainability and compliance practices.

### ***Anonymous Reporting Systems and Notification Mechanisms***

The case company provides multiple reporting channels for stakeholders to report suspected or observed violations of the law, the company's code of conduct or the supplier's code of conduct, with a business ethics helpline serving as a key platform. Reports can relate to, for example, human rights, environmental concerns, conflict minerals, and health and safety. (Multiple Reporting Channels, n.d.).

Reports can be made anonymously, but the company encourages providing contact details to facilitate follow-up and effective resolution. The company takes all reasonable steps to maintain confidentiality and ensures that individuals reporting in good faith are protected from retaliation. When a report is submitted, an independent service provider receives and processes reports, forwarding them to a dedicated investigations team to ensure impartiality and compliance with legal requirements. All reports are thoroughly investigated and tracked systematically to ensure due process. The reporter can follow up on the report using a unique report number. (How do I report?, n.d.).

In conclusion, the case company has established multiple reporting channels, including a notification mechanism, which aligns with the core requirements of the CSDDD. The notification mechanism allows all stakeholders to report violations related to human rights, environmental issues, and other compliance concerns. Reports are investigated by a dedicated team and the reporters can follow the progress of their reports, ensuring transparency throughout the investigation.

### ***Sustainability in Supplier Engagement Systems***

Supplier engagement systems are used in sustainability issues by the sourcing organisation. These include a cloud-based procurement and supply chain management platform, a collaboration and document management platform, and a third-party sustainability intelligence platform.

The cloud-based procurement and supply chain management platform is used by the company for supplier registration, qualification, classification, performance evaluation, sourcing activities, and contract management. (Supplier Relationship Management, 2021). The previously mentioned sustainability self-assessment questionnaire is located on this platform. In addition, the platform is used to manage contracts related to sustainability obligations, such as the Supplier Code of Conduct (SCoC).

The collaboration and document management platform is used by the sourcing organisation to serve as a centralised platform for sharing up-to-date requirements and guidelines and facilitating document sharing, contact updates, and meeting notes with suppliers. Suppliers' plans for CO<sub>2</sub> emissions reductions are saved in their respective sites on the platform. (Supplier Relationship Management, 2021).

Although these two systems are utilised to store and manage sustainability-related data, they primarily serve broader operational purposes. Their full potential in driving sustainability integration and proactive supplier engagement remains an area for further development.

The third-party sustainability intelligence platform is primarily used to collect data on supplier sustainability performance, with a particular focus on upstream scope 3 emissions. The key objective of the case division is to ensure that all key suppliers, identified based on local spending, are registered on the platform, acquire a scorecard, and provide their CO<sub>2</sub> emissions data through the platform. Once a supplier has submitted their CO<sub>2</sub> emissions data, reduction roadmaps and action plans are taken into supplier meetings to drive progress and support emission reduction efforts. The organisation also aims to integrate CO<sub>2</sub> emissions into Supplier Rating and track their upstream scope 3 CO<sub>2</sub> emissions based on the data provided by suppliers in the future. (Sourcing Manager H).

The integration of the third-party sustainability intelligence platform was a recurring theme in all interviews, highlighting its significance in the company's sustainability strategy. One sourcing manager described: *"On the sustainability side, we've tried to get suppliers involved on (the platform). It's a project-like effort, where we are trying to include a significant number of suppliers" [...]* *"We've successfully made many suppliers visible on (the platform), and for many, the (CO<sub>2</sub>) measurements are already visible. However, there's still a lot missing, and the work will continue (the year 2025)." (Sourcing Manager H).*

Efforts to encourage supplier participation involve sending invitations to join the platform and setting minimum requirements. *"We have sent invitations to suppliers to join (the platform), and we are expecting them to be there and meet the minimum requirements set. And it's essentially a process where the requirements continuously increase—we started at a certain level, and now we are just moving forward with it." (Sourcing Manager C).*

The monitoring of the suppliers' performance related to the third-party sustainability intelligence platform is not part of daily operations. *"It's one thing that must be in order, and we mainly follow up if there's a problem or something is missing. Once a month we have a meeting where we monitor how many suppliers have joined (the platform), how they have responded (to requests), and generate actions" (Sourcing Manager C).* While progress has been made, there is recognition that the practices for monitoring CO<sub>2</sub> emissions are still evolving. *"(The platform) has those metrics, but we are still quite at the beginning, and perhaps those practices on how to monitor (CO<sub>2</sub> emissions) in the future are still developing" (Sourcing Manager L).*

The third-party sustainability intelligence platform integration supports the company's broader sustainability targets. *"Through (the platform), the CO<sub>2</sub> emissions reduction target has now been set. By 2030, they need to be*

*halved, or something along those lines."* (Sourcing Manager A). However, there is a lack of specificity in current practices. *"Currently, there isn't, for example, any specific CO<sub>2</sub> measurement or direct numerical target per category"* (Sourcing Manager A). One sourcing manager also mentioned that a plan to join the platform is usually adequate for new suppliers, stating, *"It is essentially a requirement for new suppliers. However, if they are not yet part of (the platform), they need to provide a plan outlining how they intend to join in the future, which is typically sufficient for us."* (Sourcing Manager A).

In conclusion, the case company utilises a range of supplier engagement systems to manage sustainability-related data and performance. The cloud-based procurement platform and the collaboration and document management platform are valuable for managing supplier relationships and storing sustainability data. However, their full potential to drive proactive supplier engagement in sustainability issues is still under development. On the other hand, the third-party sustainability platform is already well-established and plays a central role in tracking and managing supplier CO<sub>2</sub> emissions. However, some actions are still needed to fully optimise its use, including further engaging suppliers and refining more specific CO<sub>2</sub> reduction targets.

### ***Sustainability in ERP Systems and Data Visualisation***

An ERP system is used by the case company to manage master data, such as price lists (Sourcing Manager A). In addition, a supply chain collaboration platform, developed by the case company, facilitates a collaborative commerce network with suppliers, providing real-time access to ERP and non-ERP content, including forecasts, orders, on-time delivery, order confirmations, and documents. Furthermore, the case company's daily management is supported by dashboards created using a data visualisation platform, monitoring KPIs like critical material shortages, late orders, safety stocks, and quality notifications (Supplier Relationship Management, 2021). However, sustainability data is not integrated into ERP master data or the supply chain collaboration platform, and sustainability-related data visualisation is currently lacking. One of the sourcing managers suggested: *"In the future, what I would personally like to see is CO<sub>2</sub> emission values for individual products included in the price lists. Through that, we could possibly integrate CO<sub>2</sub> emissions into (our ERP system). It would then provide an estimate, which would still be at a more detailed level compared to the way we currently calculate using some average figures."* (Sourcing Manager A).

In conclusion, while the case company's ERP system and supply chain collaboration platform effectively support supplier relationship management and daily operations, they currently do not incorporate

sustainability data. In addition, the absence of sustainability-related data visualisation restricts the ability to make more informed, data-driven decisions. However, there is significant potential for improvement through the integration of CO2 emissions data into the ERP system. Such integration would allow sustainability data to seamlessly flow into both the collaboration platform and data visualisations, enabling a more data-driven approach to sustainability across the organisation.

### **6.3.2 Sustainability Integrated into Strategy**

The case company's procurement process begins with sourcing and category strategies, where current and future business needs are assessed, and objectives and targets for the division and controls are set. Strategic development activities and category-specific goals are also defined. (Procurement Process Chart, n.d.). According to the Sustainable Procurement Model, integrating sustainability into strategy involves establishing sustainability as a core strategic priority and setting clear, measurable goals. It also requires transitioning from a focus on risk mitigation to seizing opportunities through a category-specific approach, while ensuring strong organisational support and building internal expertise. Furthermore, in the requirements definition phase, it is crucial to establish environmental and social criteria for products, explore alternatives for sustainable materials, and incorporate circular economy principles into procurement specifications.

#### ***Defining Sustainability as a Core Strategic Initiative and Setting Measurable Goals***

Integration of sustainability into strategic objectives in the sourcing organisation appears limited. One sourcing manager noted that sustainability is not part of the category strategy, and there are no concrete goals attached to it. *"The sustainability objectives are limited to meeting the minimum requirements"* (Sourcing Manager C). Another sourcing manager emphasised that *"Sustainability currently doesn't significantly guide our operations and remains more in the background"* (Sourcing Manager A).

The categories' success is measured using core KPIs, which are price, quality, and delivery capability. Sustainability is not part of the KPI's. One respondent said: *"Sustainability is not included as a criterion in any of the metrics. Currently, there are no measures in place for sustainability; instead, the focus is primarily on cost, quality, and availability."* (Sourcing Manager A).

Sustainability is also not explicitly tied to performance-driven accountability (PDA) targets. As one respondent explained, *"Not that I*

*recall, (sustainability) hasn't been explicitly linked to PDA targets. There might be a general goal, but there's not much concrete action tied to it. It's more about how you can influence sustainable development in a broad sense—like the idea is floating around, but there's no real practical substance." (Sourcing Manager A).*

In conclusion, sustainability is not integrated into strategic objectives, performance metrics, or accountability structures in the sourcing organisation. These observations highlight a gap between high-level sustainability intentions and actionable measures. While sustainability is acknowledged as important, it is not yet fully embedded within strategy.

### ***Shifting from Risk Mitigation to Advancing Opportunities Through a Category Specific Approach***

Sourcing managers have identified key sustainability challenges and potential obstacles within their respective categories. Additionally, several sustainability objectives, such as scope 3 upstream CO<sub>2</sub> emissions reductions and circularity goals, primarily target suppliers who account for a major portion of the overall spend. This approach loosely considers the strategic importance of categories. Furthermore, supply risk has not been taken into account, even though it plays a crucial role in determining how much can be required from suppliers.

Sustainability has not been integrated into category strategies, and the strategic position of each category does not influence the sustainability actions within them. Instead, the same level of sustainability requirements is either applied or not applied uniformly across all categories. Next, the focus will be on examining how the category-specific strategies outlined in the Sustainability Strategy Matrix are implemented within the case categories.

### ***Alignment with Sustainability Strategy Matrix***

According to the Sustainability Strategy Matrix, bottleneck categories offer limited opportunities to drive sustainability initiatives. In such cases, the buying company should focus on developing and advocating for industry standards. However, the Sourcing Manager of Bottleneck Category H stated that they are not currently taking an active role in this effort.

According to the Sustainability Strategy Matrix, collaboration with research and development or new product development functions is essential in bottleneck categories to minimise the carbon footprint of the focal company's products. The Sourcing Manager H indicated that they work closely with new product development and production engineering, primarily focusing on material selection and, occasionally, manufacturing

techniques. However, sustainability considerations have not yet been a primary focus of these efforts.

Furthermore, according to the Sustainability Strategy Matrix, identifying opportunities to reduce emissions is crucial in these categories. In Bottleneck Category H, areas for emission reduction have been identified, including the use of recycled aluminium and sourcing from suppliers closer to production sites. (Sourcing Manager H). Figure 16 summarises the implementation of the Sustainability Strategy Matrix recommendations within the category, highlighting areas for improvement.

**Bottleneck Category H**


Developing and promoting industry standards	
Redesigning products to reduce carbon impact	
Identifying areas for reducing emissions	

Figure 16. Alignment of Bottleneck Category H with the Sustainability Strategy Matrix

According to the Sustainability Strategy Matrix, collaboration is essential for achieving sustainability goals in strategic categories. Sustainability and circularity should be integrated into product design, with sustainability established as a KPI. However, in Strategic Category C, neither sustainability nor circularity considerations are currently incorporated into product design, and sustainability has not been set as a KPI (Sourcing Manager C).

According to the Sustainability Strategy Matrix, sharing best practices with suppliers in both directions is essential in strategic categories. It is recommended that companies collaborate with suppliers to enhance carbon performance through low-carbon operations planning. Additionally, forming partnerships where both parties benefit financially from reducing carbon emissions can further drive sustainability efforts. In Strategic Category C, these recommendations are being implemented. The Sourcing Manager C stated that they actively guide suppliers on sustainability issues, such as energy efficiency and CO<sub>2</sub> emissions reduction, while suppliers also share their own sustainability expertise. Furthermore, Sourcing Manager C has discussed global trends and areas for improvement with the sustainability representatives from supplier organisations. They have found these exchanges highly valuable in fostering a shared understanding of sustainability challenges and opportunities (Sourcing Manager C). The

Sourcing Manager C also emphasised that sustainability efforts in the category are often embedded in initiatives related to energy and water conservation, reinforcing the importance of resource efficiency. *"Avoiding waste, whether of natural resources or energy, is not only beneficial for sustainability but also makes operational and financial sense. By minimising consumption and optimising processes through continuous improvement, suppliers can reduce costs and enhance efficiency."*

Additionally, according to the Sustainability Strategy Matrix, strategic categories are encouraged to stop sourcing from suppliers that refuse to implement sustainability practices, ensuring alignment with their environmental and social objectives. According to Sourcing Manager C, suppliers that fail to meet sustainability requirements will be phased out, as in today's market, no supplier can afford to ignore sustainability. Figure 17 summarises how the recommendations of the Sustainability Strategy Matrix have been implemented within the category.

**Strategic Category C**

Embedding sustainability and circularity into product design	
Setting sustainability as a KPI	
Sharing best practices both directions	✓
Jointly improving carbon performance through low-carbon operations planning	✓
Forming cost/value partnerships where both benefit financially from reducing carbon emissions	✓
Stopping sourcing from suppliers who refuse to implement sustainability practices	✓

Figure 17. Alignment of Strategic Category C with the Sustainability Strategy Matrix

According to the Sustainability Strategy Matrix, companies should allocate minimal resources to non-critical categories. They must ensure compliance with the SCoC and relevant third-party certification requirements. Adherence to the SCoC is a non-negotiable standard for all suppliers within the company's supply chain, including those in the non-critical Category L (Sustainable Supply Chain Management, 2024). According to the Sourcing Manager for Category L, this category has numerous certification

requirements, and suppliers are expected to meet all relevant certifications and regulatory standards set.

According to the Sustainability Strategy Matrix, for non-critical categories, the buying company should switch suppliers if the current ones are not sustainable. According to the Sourcing Manager L, this policy is implemented: *"Surely, we will stop using them. It's quite straightforward, especially in a category like this where there are many competitive suppliers to choose from. We have no reason to stick with a supplier that doesn't operate responsibly."*

According to the Sustainability Strategy Matrix, in the non-critical categories, companies should reduce demand for carbon-intensive products and implement easy-to-fix solutions. According to the Sourcing Manager of Non-Critical Category L, efforts have been made to maximise material recycling and avoid excessive packaging. In addition, the products in the category are primarily made from renewable materials, while reducing the use of plastic. These initiatives are reducing the category's demand for carbon but can also be considered easy-to-fix solutions that can be implemented with minimal effort. Providing a practical example, the Sourcing Manager highlighted a recent initiative aimed at optimising packaging materials. *"For example, one concrete and significant action we have taken is reducing the thickness of plywood used in maritime packaging from 12 millimetres to 9 millimetres" [...]" This makes the packaging significantly lighter while still maintaining sufficient durability."* (Category Manager L). Figure 18 summarises the alignment of Non-Critical Category L with the Sustainability Strategy Matrix.





<b>Non-Critical Category L</b>	
Requiring compliance with Supplier Code of Conduct and third-party certification requirements	
Changing suppliers if current ones are not sustainable	
Reducing demand for carbon intensive products	
Implementing easy-to-fix solutions	

Figure 18. Alignment of Non-Critical Category L with the Sustainability Strategy Matrix

According to the Sustainability Strategy Matrix, for leverage categories, organisations have significant influence over suppliers and can push for

higher sustainability standards. They should set sustainability as a strategic goal and use sustainability criteria in selecting suppliers. According to the Leverage Category A Sourcing Manager, sustainability is not set as a strategic goal and sustainability criteria are not used in selecting suppliers.

According to the Sustainability Strategy Matrix, for leverage categories, the buying company should require suppliers to use more recycled materials in their products. According to Sourcing Manager A, assessments have been conducted to determine the proportion of recycled raw materials used. However, they acknowledge the company's limited influence in this area, stating: *"When it comes to circularity in raw materials, we don't have a significant impact. Steel mills and suppliers have their own targets, which they use to market their products and reduce their emissions trading costs"* (Sourcing Manager A). This response suggests that while suppliers have their own motives to use more recycled materials, the buying company's ability to enforce stricter requirements on recycled material usage remains limited.

According to the Sustainability Strategy Matrix, for leverage categories, key actions include reducing material usage and improving logistics. The Sourcing Manager A highlights their focus on weight reduction in product design, emphasising that a lighter design is both cost-effective and environmentally friendly. Additionally, the Sourcing Manager stresses the importance of having fast and flexible procurement channels, which means sourcing materials from nearby suppliers rather than distant ones to improve efficiency and sustainability. Furthermore, they point out that they have their own logistics system operating between suppliers, ensuring that pallets and pallet collars are returned for reuse, minimising packaging waste of their products and reducing the logistics emissions.

Furthermore, in leverage categories, the focus should be on sharing best practices with suppliers and reviewing supplier carbon management scorecards. According to Sourcing Manager A, they are actively guiding suppliers on sustainability issues and emphasising their preference for actual emissions reductions over compensation methods. *"Some steel suppliers offset their CO<sub>2</sub> emissions through carbon trading or by planting trees, while others are genuinely considering concrete ways to produce steel fossil-free, such as using electric arc furnaces. Our view is that we want to focus on real reductions, not just compensating for emissions with money."* (Sourcing Manager A). They are also reviewing supplier management scorecards, setting carbon reduction targets with suppliers, and requiring regular progress reports. (Sourcing Manager A). Some of the category's suppliers are already carbon-neutral. *"Some suppliers have already achieved carbon neutrality by implementing various measures, the most significant of which is switching to renewable electricity. This has*

*allowed them to minimise their factory's CO2 emissions effectively."* (Sourcing Manager A). Figure 19 provides a summary of how the Leverage Category A aligns with the recommendations of the Sustainability Strategy Matrix.

<b>Leverage Category A</b>	
Establishing sustainability as a strategic goal	
Using sustainability criteria to select suppliers	
Demanding more recycled materials	
Reducing material usage and improving logistics	✓
Sharing best practices with suppliers	✓
Reviewing supplier carbon management scorecards	✓
Setting carbon reduction targets with suppliers and requiring suppliers to regularly report their progress	✓

Figure 19. Alignment of Leverage Category A with the Sustainability Strategy Matrix

In conclusion, the alignment of the case categories with the Sustainability Strategy Matrix varies. While the Non-Critical category aligns well with the recommendations of the matrix, categories in other quadrants have the potential to drive greater impact. The alignment of the case categories with the Sustainability Strategy Matrix is presented in Figure 20.

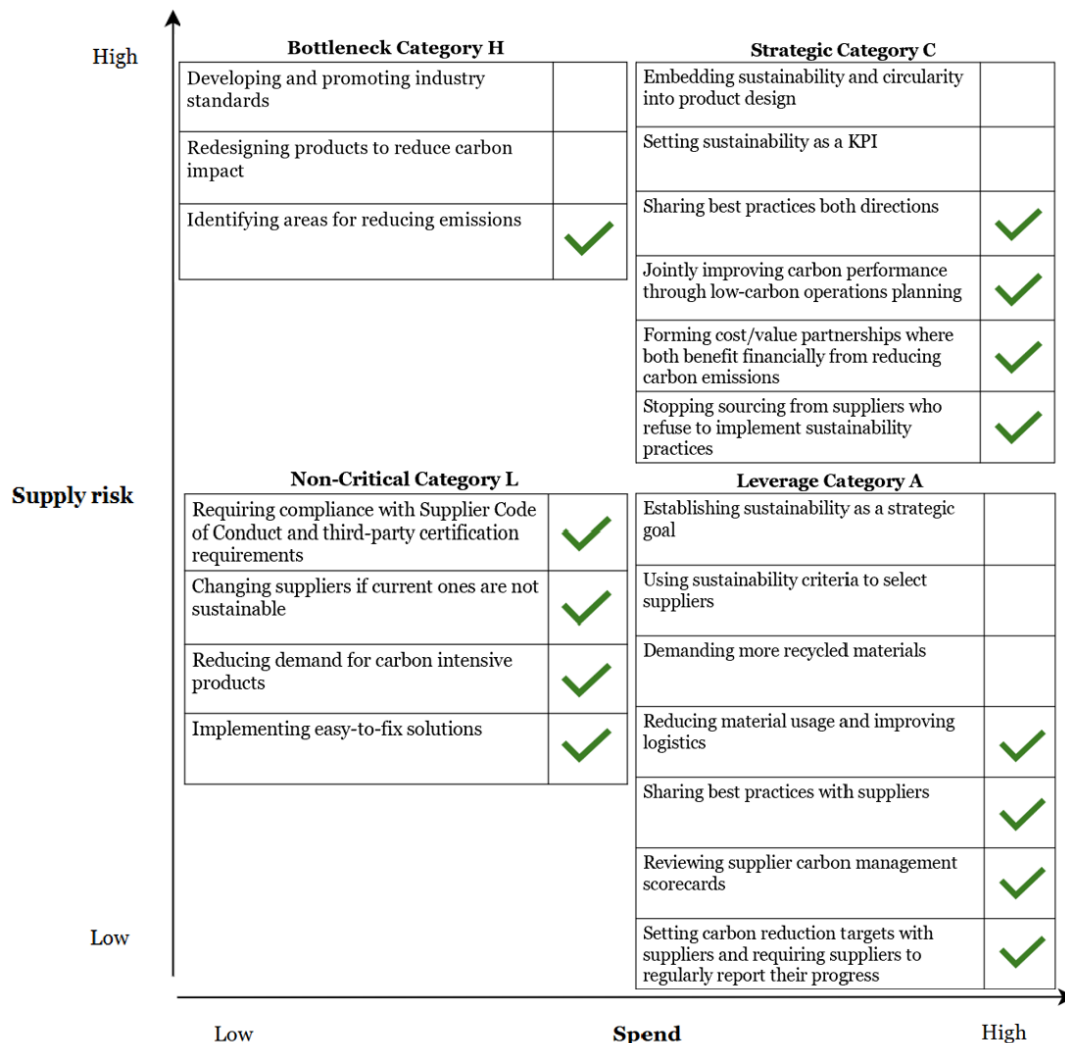


Figure 20. Alignment of Case Categories with the Sustainability Strategy Matrix

### ***Organisational Support and Internal Knowledge***

The organisational support in integrating sustainability into procurement practices is met with varying perspectives among sourcing managers, reflecting both strengths and areas for improvement. One sourcing manager highlighted the organisation's proactive efforts in advancing sustainability, particularly emphasising leadership's role: *"The boss has really taken this onto the agenda quite effectively. [...]"* Previously when I compared how different locations handle these matters, it became clear multiple times that (this local division) is actually a pioneer in these areas." (Sourcing Manager H). Similarly, another manager expressed a positive view, affirming that the organisation greatly supports sustainability integration in procurement (Sourcing Manager C).

However, not all feedback was as optimistic. Some managers pointed out gaps in support when it comes to practical implementation. *"Yeah, well I mean, of course, in a way, the requirements are pushing for what is coming, but how much support there is for implementing them is another matter—it could definitely be better. In this division, a lot of it falls on my shoulders in terms of how it's handled. The requirements do come from the top, but their implementation largely becomes the responsibility of procurement and also (certain individuals in the partner division)."* (Sourcing Manager L). Another manager stressed the financial challenges and the need for higher-level commitment to address the cost implications of sustainable procurement: *"At the moment, there isn't necessarily that kind of support from the organisation. In this category, it requires money and would mean higher costs, at least initially. If volumes grow, machine investments are made, and they start paying themselves back, then the cost level could potentially return to the previous level. But for now, it probably requires management approval and understanding—that if there is cost pressure, a choice has to be made, like deciding whether to buy the cheaper combustion engine car or the more expensive electric car."* (Sourcing Manager A).

When sourcing managers were asked whether they were part of any cross-functional teams specifically focused on sustainability, their responses varied, highlighting different levels of involvement. One sourcing manager mentioned being actively involved in an internal team aimed at developing sustainability within procurement. They had participated in initiatives related to conflict minerals, sustainable supply management, CO<sub>2</sub> reduction exercises, and circularity practices. Although their current involvement has decreased due to time constraints, they have previously contributed significantly to these efforts. Another sourcing manager stated that their involvement is more needs-based. They are part of monthly meetings discussing suppliers' progress on the third-party sustainability intelligence platform, which could be considered as participation in a sustainability-focused team. Beyond that, they join initiatives when a specific area requires development or improvement. One respondent noted that while their team regularly considers sustainability as part of its overall operations, they are not formally involved in a team solely dedicated to sustainability issues. Sustainability is addressed as part of broader discussions within their existing team. Yet, another sourcing manager mentioned not being part of any sustainability-focused team.

The integration of sustainability into procurement requires not only organisational support and cross-functional teams focused on sustainability, but also internal knowledge and expertise. Sourcing managers shared a range of insights regarding the organisation's capabilities in sustainability and the need for specialised resources. One

sourcing manager highlighted the existing expertise within the organisation, pointing to the presence of a dedicated sustainability specialist: *"I feel that (the organisation has expertise in sustainability matters). We have a dedicated team for this, like (global division HSE & Sustainability Manager), for example. I've even held a session with her and one supplier about these sustainability issues."* (Sourcing Manager C).

However, the evolving nature of sustainability requirements poses challenges. One sourcing manager noted that while knowledge is growing, there is still much to learn. *"While sustainability has been worked on for several years now, on a larger scale, it's still a somewhat new issue in certain ways and at certain levels. The requirements are constantly increasing and becoming more specific, and perhaps standards are forming as well. So this is also a learning process for us—what I know now, I certainly didn't know five years ago, nor was I as informed about the topic. It's a process that evolves and refines itself as we move forward."* (Sourcing Manger C).

Sourcing managers reported varying levels of participation in sustainability-related training programs. One sourcing manager shared that they had attended nearly every training session available, motivated by their strong personal interest in the topic. Another highlighted their active participation, noting the completion of both mandatory and recommended sessions. Conversely, one sourcing manager acknowledged only completing the mandatory training and not pursuing additional learning opportunities. Finally, one respondent mentioned engaging in online courses alongside participating in company-organised sustainability sessions.

One sourcing manager acknowledged significant knowledge in other parts of the organisation but noted a need for greater focus and resources in their own division. *"If we include (the partner division) in this, which essentially designs everything for us as well, then there's an incredible amount of expertise there. And perhaps even more resources too." [...]"From my perspective, since this is just one of the categories I handle and a relatively small part of all my categories, there are actually quite a lot of sustainability aspects related to it. So, we could definitely use more resources (in this division)."* (Sourcing Manger L).

Another sourcing manager emphasised the benefits of centralising sustainability expertise to improve coordination: *"Of course, there could always be more expertise and resources. In our (local) team, our knowledge and understanding have been increasing all the time—that's clear. But on the other hand, this is such a large and complex field, and quite a specialised one as well, that I think it would be good to have someone responsible for it. Whether that would be full-time or part-time, it*

*would still be important to have someone who has an overview of the whole. That would definitely be something that, whether now or in the near future, would surely bring additional benefits."* (Sourcing Manager H).

A recurring theme was the need for a dedicated role or function to lead sustainability efforts: As one sourcing manager noted: *"There should be someone knowledgeable at the starting point who could train people and also the supplier base towards more sustainable practices. Once it becomes part of the culture and the way of working, it might then progress more naturally and be integrated into daily or even strategic operations. We have had training, and we do have smart people working here. However, there isn't currently a role for a sustainability specialist who would handle this centrally and lead improvement projects."* (Sourcing Manager A)

In conclusion, while there is a general sense that the organisation is committed to integrating sustainability into procurement, some interviews suggest that support is not always consistent or sufficient for implementation. Some sourcing managers feel the burden of responsibility and cost constraints, highlighting the need for more actionable support and resources. While the organisation has made efforts to develop sustainability practices and expertise, there is a clear need for enhanced resources and coordination. Most of the interviewed sourcing managers see value in establishing a central role to lead sustainability initiatives.

### ***Setting Environmental and Social Criteria for Products***

The case company has set clear environmental and social criteria for products. The company has developed lists of prohibited and restricted substances to guide this process and updates them regularly, in line with international regulations. The case company also expects suppliers to actively support ongoing efforts to manage and demonstrate product compliance with legislation, such as the EU regulation on Persistent Organic Pollutants, Toxic Substances Control Act, the EU Waste Electrical and Electronic Equipment Directive, the EU Battery Directive, the EU Per- and Polyfluoroalkyl Substances (PFAS) directive, EU regulation on the Registration, Evaluation, Authorisation, and Restriction of Chemicals (REACH), and the EU directive on the Restriction of Hazardous Substances (RoHS). A third-party service provider is used in collecting data on PFAS, REACH, and RoHS. In addition, the suppliers need to provide a full material disclosure for certain products. (Supplier Relationship Management, 2021).

In addition, suppliers are expected to actively support the case company's initiatives for responsible minerals. (Supplier Relationship Management,

2021). The case company is working towards ensuring that its products do not contain conflict minerals sourced from mines that support or fund conflict within the Democratic Republic of Congo or neighbouring countries. The case company is committed to identifying which products are impacted and targeting efforts accordingly. They are not buying products and materials containing conflict minerals directly from conflict mines and they are asking suppliers to work towards ensuring that any conflict minerals contained in the products and materials supplied to the company originate from conflict-free sources. Furthermore, the case company is contributing to conflict-free trade by encouraging suppliers not to discriminate against legitimate sources of conflict minerals. (Sustainable Supply Chain Management, 2024).

Suppliers who use minerals in their supply to the case company are required to complete a standard survey annually, certifying that their products originate from conflict-free sources. If a supplier is unable to certify their products as conflict-free, it triggers a red flag, prompting an investigation into the issue. To monitor supplier performance, a dedicated supplier status file is used to track report scores and action plans are reviewed and discussed in monthly meetings. Additionally, the division of the sourcing organisation has a designated local single point of contact who provides escalation support in collaboration with a central team based in India. (Sustainable Supply Chain Management, 2024).

Compliance with conflict minerals regulations is a fundamental requirement and not an issue that is constantly reinforced. *"It's more of a case where these things have to be in order. My suppliers haven't been involved in any conflict minerals issues. It's clear to them as well—they're already aware of these matters."* (Sourcing Manager A).

While some sourcing managers report that their suppliers are well-informed and compliant, challenges persist. One sourcing manager acknowledged that issues can arise, particularly when tracing materials beyond the immediate supplier level (Sourcing Manager C). They noted that complications can arise when a supplier provides materials to multiple customers while also using materials that the sourcing organisation has sourced and specified. If compliance issues are triggered by another customer's requirements, it can create a challenging situation. *"In such scenarios, our options are limited. We can monitor the issue and encourage resolution, but we cannot make decisions for other customers. Ultimately, suppliers must consider their values and business priorities, deciding if they can meet certain demands or maintain compliance for their various clients."* (Sourcing Manager C).

Additionally, technical challenges sometimes hinder the process. For example, reporting tools for conflict minerals occasionally fail to function properly (Sourcing Manager C). Supplier performance also varies by region. *"Some suppliers are lagging behind; for example, Japanese suppliers tend to be slightly behind their European counterparts"* (Sourcing Manager C).

In conclusion, the case company has set clear environmental and social requirements for its products and actively monitors supplier compliance. However, challenges remain, particularly in ensuring conflict mineral compliance across complex supply chains.

### ***Exploring Sustainable Material Alternatives***

Procurement is working closely with product design functions (Sourcing Manager H). The design team often outlines their preferences, and together with procurement, they explore viable options (Sourcing Manager C). One sourcing manager described their role in the design process: *"We are involved in evaluating whether there is a need to use certain materials, considering if alternatives or thinner options could be used instead. Factors like vibration, temperature, and other requirements are assessed and challenged. Often, products coming from product development are over-specified, just to be on the safe side. As procurement representatives, we try to prevent over-specification right from the start."* (Sourcing Manager A). However, often the solutions that meet the sourcing organisation's quality requirements are also resource-intensive in terms of production. (Sourcing Manager A).

In product design, consideration is given to material properties. One sourcing manager explained: *"Efforts have been made to implement sustainability actions wherever possible. The goal is always to make packaging as optimal as possible, avoiding overpacking and eliminating unnecessary materials like plastic."* (Sourcing Manager L).

When considering sustainable alternatives for high emissions materials like steel and aluminium, cost remains a significant factor. One sourcing manager explained: *"If we start making these decisions based on raw material choices, we'll have to be prepared to accept the higher price"* (Sourcing Manager A). Another sourcing manager highlighted that decisions regarding sustainable materials are evaluated on a project-by-project basis, often influenced by customer demands and the price differential (Sourcing Manager H).

The sourcing organisation is also taking steps to require certified packaging materials: *"We will likely soon begin requiring that all the packaging we purchase is certified. Currently, many suppliers already buy and use certified materials almost entirely, but that doesn't automatically mean*

*the final packaging they produce and sell to us is certified.*" (Sourcing Manager L).

In conclusion, while the sourcing organisation has made efforts to explore sustainable material alternatives, significant challenges remain. The cost and availability of sustainable materials, such as green steel and recycled aluminium, limit broader adoption.

### ***Integrating Circular Criteria into Procurement Specifications***

Circularity is another key consideration in material selection. The case company has set a group-level target to maximise the use of sustainable materials in its products and packaging. Their aim is to cover at least 80% of the case company's products and systems with a case company circularity approach by 2030. (Sustainable Supply Chain Management, 2024). However, division-specific or category-specific circularity targets are currently lacking.

One sourcing manager describes that efforts to increase recycled material in products are limited by the constraints of material properties: *"Increasing the amount of recycled fibre in materials like cardboard boxes is currently limited, as it inevitably reduces the material's physical durability. This would mean more material would be required to achieve the same strength."* (Sourcing Manager L). Packaging design must balance sustainability with functionality to avoid waste caused by product damage during transit. *"It's not sustainable either if our equipment gets damaged because the packaging was made too cheaply or was too weak. The packaging must also be durable and functional enough to prevent waste caused by transportation damage."* (Sourcing Manager L).

The use of recycled metals is a key consideration in sustainable procurement. However, one sourcing manager noted that the limited market availability of recycled aluminium presents challenges (Sourcing Manager H). Furthermore, another sourcing manager noted that they have limited influence over circularity in steel (Sourcing Manager A).

The sourcing organisation integrates circular logistics practices: *"We have a circular logistics system between our suppliers, where pallets and pallet collars are returned to the suppliers. This means packaging material waste should not be generated. Additionally, we aim to minimise the use of plastic in packaging."* (Sourcing Manager A). In addition to this, the organisation operates its own collection vehicle, which gathers materials directly from nearby suppliers, reducing the need for separate transportation by suppliers. (Sourcing Manager A).

In conclusion, the case company is committed to integrating circularity into procurement. However, challenges such as material performance limitations, market availability, and limited influence over supplier's

circularity practices remain. There are also no division- or category-specific targets. Furthermore, in addition to focusing on recycled materials and logistics, the sourcing organisation could further enhance circularity by exploring other circular solutions.

### **6.3.3 Sustainability in Supplier Selection**

According to the Sustainable Procurement Model, the supplier selection phase consists of supplier identification, qualification, and contracting. In the sourcing organisation, supplier identification involves scouting, screening, pre-qualifying suppliers, and conducting requests for information and requests for proposals. During supplier qualification, suppliers are evaluated against the company's requirements. The supplier contracting phase includes issuing requests for quotation and finalising contracts with approved suppliers (Procurement Process Chart, n.d.).

#### ***Exploring Sustainable Supplier Alternatives***

The Sustainable Procurement Model highlights the importance of exploring sustainable supplier alternatives during the supplier identification phase. In the sourcing organisation, sustainability risks are mitigated through supplier selection, including considerations of the suppliers' locations (Sourcing Manager A).

In Leverage Category A, the close location of the suppliers plays a crucial role in reducing logistics costs and emissions while ensuring fast and flexible procurement channels. *"When considering the nature of our supplier base, sustainability has been a part of it for a long time. Our procurement channels need to be fast and flexible, which means sourcing locally rather than from distant locations."* (Sourcing Manager A).

For the Non-Critical Category L, whose suppliers are highly local, differences between suppliers are small, making it harder to differentiate which suppliers perform better in terms of sustainability. *"We only work with suppliers who are sustainable and meet all of our requirements, ensuring that we can source from any of them without concern. The suppliers are highly local and comparable in terms of sustainability, if not identical, then at least in key aspects. They all have the necessary certifications and, in our view, operate responsibly."* (Sourcing Manager L).

One of the sourcing managers assumes sustainability is already embedded in the supply base, stating: *"We want to believe that all our suppliers operate sustainably"* (Sourcing Manager L). Another respondent expressed a similar assumption: *"We assume that our entire supply chain operates sustainably, so we're not willing to pay anything extra for it. Our*

*expectation is that sustainability is already integrated into the product, its development, and its manufacturing throughout the entire chain."*  
(Sourcing Manager C).

In conclusion, some of the interviewed sourcing managers recognise the importance of exploring sustainable suppliers. However, others rely heavily on existing suppliers, assuming that sustainability is already inherent within the supplier base and the broader supply chain. This approach may overlook opportunities for more rigorous supplier evaluation.

### ***Including Sustainability in Supplier Evaluation Criteria***

The Sustainable Procurement Model recommends integrating sustainability into supplier evaluation criteria. Sustainability is not currently part of supplier evaluation criteria in the sourcing organisation. In the interviews, all the sourcing managers highlighted that the evaluation of the category's suppliers relies heavily on core KPIs, which are price, quality, and delivery capability. Additionally, daily, weekly, and monthly management tools are employed to ensure consistent performance monitoring.

The interviews consistently emphasised that supplier competence, quality, and delivery capability must be reliably in place as a foundation, with price being the decisive factor. One sourcing manager described: *"We have regular partners with whom quality and availability are well established, and we are familiar with their capabilities. Therefore, when we conduct tenders, the deciding factor is price."* (Sourcing Manager A). Another sourcing manager stated: *"When we start the process, we first assess the capabilities of the suppliers"* (Sourcing Manager H). Most of the interviewees additionally highlighted multi-sourcing as a significant factor in their decision-making process. One of them stated: *"We aim to have at least two suppliers to ensure a multi-source setup"* (Sourcing Manager C). Another respondent added: *"We don't want any single supplier to have too large a share of the total deliveries"* (Sourcing Manager H). Other factors mentioned influencing supplier selection were the batch sizes offered by suppliers and the location of the suppliers.

In some cases, flexibility on price is necessary to achieve faster delivery times. One sourcing manager described: *"I recently had a case where a cheaper option was available, but I chose one that wasn't as low in price because it offered faster delivery. Certain projects require quick delivery times, making it a priority over cost."* (Sourcing Manager A). Similarly, there are situations where price flexibility is required to secure higher-quality products or services. One sourcing manager explains: *"I've had to switch to a more expensive supplier because the cheaper one wasn't able to deliver with sufficient quality"* (Sourcing Manager A). Another sourcing manager discussed: *"There are certain special conditions, such as*

*environments with highly corrosive gases, where we are willing to invest more in a component to withstand these challenging conditions"* (Sourcing Manager C).

In conclusion, sustainability is not currently included in supplier evaluation criteria, with decisions primarily based on price, quality, and delivery capability. While flexibility on price is sometimes allowed for better quality or faster delivery, cost remains the key determinant. While compliance with standards for fair labour conditions, social responsibility, occupational health and safety, and environmental accountability is required from suppliers (Supplier Relationship Management, 2021), sustainability is not part of supplier evaluation.

### ***Using TCO and LCA to Assess Products and Suppliers***

The Sustainable Procurement Model recommends using TCO and LCA to assess both products and suppliers. Currently, none of the managers are using LCA as a standard approach. Although there is a growing interest in integrating LCA methodologies, the absence of a clearly established calculation method has limited its practical implementation. *"We're increasingly moving toward (LCA approaches), although there isn't a fully established calculation method yet. However, I believe it will become more and more integrated over time."* (Sourcing Manager H).

TCO is being applied to varying degrees, though not always in a formalised way. Some sourcing managers calculate TCO in specific cases, weighing factors such as transportation costs when determining whether sourcing locally or further afield would ultimately be more cost-effective. *"If transportation costs are high, we won't source from further away. Instead, we'll choose a closer option if it results in a lower final cost."* (Sourcing Manager A). *"I've calculated TCO in certain cases. Not for everything, but there are situations where it makes sense to do it."* (Sourcing Manager C). One sourcing manager described that their approach often relies on a rough estimation rather than a formalised calculation: *"Of course, everyone considers the overall picture in their heads, a rough TCO calculation of sorts, but not a proper, formal one."* (Sourcing Manager L).

In conclusion, LCA is not yet used in the organisation due to the lack of an established calculation method, though interest in its adoption is growing. TCO is applied to some extent, mainly in assessing transportation costs, but often informally rather than through structured calculations.

### ***Using Contracts to Enforce Sustainability Standards***

According to the Sustainable Procurement Model, contracts should be used as a tool to enforce sustainability standards. The case company's supplier

requirements for direct purchases mandate that suppliers adhere to all applicable laws and regulations, the case company's SCoC, and their contractual obligations. The SCoC is a set of standards and guidelines for ethical and sustainable business practices in the case company's supply chain. It defines the case company's expectations for their suppliers and the supplier's business practices. It is used by the case company to communicate their requirements towards suppliers and to demonstrate compliance with their supply chain with international frameworks and legislation towards their stakeholders. It is part of the general terms and conditions as a non-negotiable clause, applicable to all tier 1 suppliers. (Sustainable Supply Chain Management, 2024).

The case company has recently renewed their SCoC due to changes in the regulatory landscape, stakeholder expectations, and global landscape. The major change is that company liability goes beyond tier-1 suppliers. The case company is providing training on SCoC topics to both internal employees and suppliers. (Sustainable Supply Chain Management, 2024).

In conclusion, contracts are used to enforce sustainability standards. This is done primarily through adherence to laws, the SCoC, and contractual obligations.

#### **6.3.4 Sustainability in Supplier Management**

The supplier management phase includes supplier relationship management, performance management, and development (Procurement Process Chart, n.d.). Supplier relationship management aims to enhance transparency, support business growth, and improve customer satisfaction. Supplier performance management ensures ongoing compliance through assessments, and the supplier development phase focuses on improving supplier capabilities. (Supplier Relationship Management, 2021).

##### ***Working Closely with Suppliers on Sustainability Issues***

According to the Sustainable Procurement Model, the supplier relationship management phase should involve active collaboration with suppliers on sustainability. In a thesis work by Paavolainen (2023), customer requirements were identified as the biggest driver for the sourcing organisation's suppliers to adopt sustainable practices and initiatives. This highlights the significant role of customer expectations in shaping supplier sustainability efforts.

The sourcing organisation requires its direct material suppliers to participate in strategic business review meetings, which are held annually, bi-annually, or quarterly. These meetings focus on long-term objectives and performance reviews. For shorter time horizons, monthly operational meetings are organised to evaluate short-term performance and resolve any

past issues. In addition, in cases where supplier performance poses significant risks to production, projects, or customer deliveries, management escalation meetings are conducted. Additionally, technical meetings and innovation workshops serve as platforms for leveraging supplier expertise in product design and solution development. (Supplier Relationship Management, 2021).

The focus on metrics and performance is consistent. *"Every couple of months, we review the basic metrics (with the supplier)" [...]"We look whether there have been any quality cases and how the OTD looks. We ensure that everything is working and investigate why it isn't if there have been any issues. Then, perhaps once or twice a year, we have a seasonal meeting where we delve deeper into the details."* (Sourcing Manager L).

Sustainability has become a recurring topic in supplier meetings. *"At least from my perspective, I can say that sustainability is almost always one of the topics in every meeting. We look at how things have progressed, what plans there are for improvement, and so on. After all those surveys have been completed, it becomes a bit more concrete."* (Sourcing Manager H). Another sourcing manager discussed: *"I've brought up the CO<sub>2</sub> issue with every single supplier I work with, specifically to make them understand why we are making these demands, why they're receiving these extensive question sets, and what the reasoning behind it is. It's also about ensuring that certain suppliers are at the forefront, so we can continue working with them in the future, and that they are on the same level with us when it comes to sustainability requirements."* (Sourcing Manager C). The meetings have also addressed specific topics concerning particular suppliers. *"We have had meetings with steel manufacturers where we have gone through their CO<sub>2</sub> emissions and fossil-free steel initiatives."* (Sourcing Manager A).

In conclusion, the sourcing organisation maintains active engagement with suppliers through strategic, operational, and technical meetings. Sustainability is currently a regular topic in these discussions.

### ***Requesting Suppliers to Demonstrate Progress in Sustainability Issues***

The Sustainable Procurement Model suggests that in the supplier performance management phase suppliers should be asked to demonstrate progress in sustainability issues. According to the interviews, suppliers are expected to do this. *"We require (from our suppliers), and our customers demand from us, that the energy used should be produced in a sustainable way" [...]"We also demand that suppliers aim to be CO<sub>2</sub> neutral. We*

*communicate this requirement, show how we have done it ourselves, and set that as the expectation.*" (Sourcing Manager C).

One sourcing manager explained that suppliers have been encouraged to reduce waste, as it not only affects pricing but also contributes to sustainability. By minimising the amount of scrap, the supplier can reduce unnecessary material use. (Sourcing Manager H). They also emphasised the impact of quality on sustainability: *"If the process yield is maximised, resulting in as few defective products as possible, it is also an environmental act. This is because it prevents the waste of energy and raw materials used."* (Sourcing Manager H).

Suppliers are also contributing ideas to help the buying company improve its sustainability efforts. One sourcing manager shared: *"(Suppliers) also provide suggestions if they notice anything being excessively overengineered, such as recommending a thinner cardboard or wood piece where appropriate"* (Sourcing Manager L). Similarly, another sourcing manager noted: *"We are exploring ideas from suppliers—such as achieving the same rigidity with thinner materials"* (Sourcing Manager A).

One key tool in supplier performance monitoring in the sourcing organisation is supplier rating. Supplier rating is done quarterly based on quality, OTD, buffer compliance, and cooperation. Poorly performing suppliers need to be developed and rating results is one trigger for a supplier development project. (Supplier Relationship Management, 2021). Supplier ratings are conducted quarterly, and the previous year's performance is reviewed the following year. Supplier rating doesn't currently include sustainability criteria. (Sourcing Manager A).

In conclusion, sourcing organisation's suppliers are expected to demonstrate progress in sustainability. However, while sustainability is increasingly emphasised, it is not yet integrated into the Supplier Rating system, leaving room for further alignment with sustainability goals.

### ***Providing Training for Supplier Employees***

Sustainable Procurement Model highlights the importance of offering training for suppliers on sustainability issues. When asked about the challenges of integrating sustainability into procurement, all sourcing managers identified the suppliers' lack of internal expertise as the primary issue. One manager described: *"For large (supplier) companies, this isn't a challenge because they already have a need to address these issues, but for medium-sized and small companies, it's largely a question of expertise. They can't always afford to hire consultants, and even if they do, there's always some uncertainty about the outcome."* (Sourcing Manager H).

Another sourcing manager had a similar view: *"Supplier staffing resources have perhaps been the challenge. For example, when suppliers have had to deal with the (third-party sustainability intelligence platform) process, they've found themselves in unfamiliar territory, needing to figure out how to calculate kilowatt-hours from machines and how to measure CO<sub>2</sub> emissions."* (Sourcing Manager A). Yet, another sourcing manager added: *"For example, with FSC and BFC certifications, it hasn't always been entirely clear to all suppliers what is required of them and what it means for their operations"* (Sourcing Manager L).

Given these challenges, a potential solution could involve offering targeted training programs for supplier employees. Some training has already been provided to key suppliers, as highlighted by one sourcing manager: *"We offered a (case company sustainability session) training for our key suppliers. It would also be good for some other suppliers to attend it, as it helps spread the sustainability message more effectively to the supplier base. This way, there's no need to be a broken telephone; instead, it's better to involve knowledgeable individuals who understand the topic in depth."* (Sourcing Manager A). Such training could focus on practical skills, such as calculating CO<sub>2</sub> emissions according to the case company's requirements or understanding the demands of certifications.

In conclusion, the lack of internal expertise among suppliers, especially smaller ones, is identified as a challenge in integrating sustainability into procurement processes. Offering targeted training programs for supplier employees has already been initiated for key suppliers and could further support broader sustainability efforts across the supplier base.

### ***Offering Technical and Financial Support to Suppliers***

The Sustainable Procurement Model highlights the importance of offering technical support and financial assistance to suppliers to strengthen their performance. According to the interviews, technical support for suppliers is well established in the sourcing organisation. One of the sourcing managers explained that they regularly engage with suppliers to explore ways to reduce energy consumption, improve energy efficiency, and lower CO<sub>2</sub> emissions. The most impactful change on supplier sites has been transitioning to renewable energy. Additional measures include using biodiesel in trucks, offering electric car leasing options to employees, upgrading lighting systems to energy-efficient LEDs, investing in newer, more efficient machinery, and addressing heating. (Sourcing Manager A).

One part of supplier development in the sourcing organisation is supplier development projects. They are collaboration projects with suppliers that use lean methods to enhance quality, OTD, and cost performance. Supplier

development projects are conducted with selected and trusted suppliers to improve performance and/or sustainability. Furthermore, supplier development plans, reviewed quarterly, outline long-term or strategic actions requiring supplier attention and support, such as footprint changes or technology investments. (Supplier Relationship Management, 2021).

One sourcing manager explained that the category's pricing model reflects a more sustainable approach. Instead of relying on the traditional minimum order quantity -method, they use a year-volume and production batch size perspective for their products. This approach shifts greater responsibility to the supplier for production planning, enabling more efficient manufacturing processes. The sourcing manager noted that this reduces setup times, minimises energy consumption, and avoids unnecessary waste, which ultimately lowers emissions. (Sourcing Manager H). Another sourcing manager also explained: "*Efforts are being made to optimise order sizes to make full use of (metal) sheets and avoid overly frequent orders*" [...] "*I personally believe it's important to keep suppliers profitable enough so that they can invest in new equipment, improve production, and so on*" (Sourcing Manager A).

According to Paavolainen (2023), the main barriers for the sourcing organisation's suppliers for implementing sustainable practices and initiatives are financial constraints. While sustainability offers potential benefits, it requires investments with long payback periods, which can exceed typical project allowances, which is why suppliers often prioritise other investments, such as technology or production efficiency. Furthermore, the suppliers mentioned that although customers may show support for sustainability, this preference does not always translate into actions, particularly concerning pricing. (Paavolainen, 2023).

When considering what influences supplier selection most during tendering, sourcing managers consistently cite price as the primary determining factor. Many of the sustainable procurement actions in the sourcing organisation are also driven by cost-saving considerations. As one sourcing manager noted: "*In this category, when costs are saved, CO<sub>2</sub> emissions are also reduced*" (Sourcing Manager A). This connection between cost savings and sustainability was emphasised in all interviews. When asked about sustainability actions, the responses often began with a focus on cost savings, followed by the acknowledgement that the actions also promote sustainability.

As highlighted by Paavolainen (2023), companies must assess the costs and benefits of sustainability initiatives and explore ways to embed sustainability into both their strategic development and operational processes. This may include identifying cost savings through sustainable

practices but also partnering with suppliers to co-invest in sustainability efforts (Paavolainen, 2023).

In conclusion, the sourcing organisation provides well-established technical support to suppliers, focusing on areas such as energy efficiency, CO<sub>2</sub> emissions reduction, and renewable energy adoption. However, financial constraints remain a significant barrier for suppliers in implementing sustainable practices. Organisation's efforts to align sustainability with cost-saving measures, such as optimising order sizes and avoiding overly frequent orders, highlight the potential for sustainable practices to create win-win solutions. To further support sustainability, the organisation could consider co-investing with suppliers on sustainability efforts and incorporating sustainability more deeply into decision-making processes beyond immediate cost considerations.

### **6.3.5 Key Strengths and Gaps in Sustainable Procurement Practices**

As discussed in this chapter, the sourcing organisation has successfully implemented some of the sustainable procurement practices suggested by the theoretical framework. Anonymous reporting systems and notification mechanisms are in place, fostering transparency and accountability. Sustainability standards are also effectively enforced through supplier contracts. In addition, collaboration with suppliers is strong, with technical support provided to enhance sustainability efforts.

In some areas, while the sourcing organisation has practices strongly in place, refinements could further strengthen their approach. Supply chain modification is pursued when needed, but costs and availability create challenges. When it comes to sustainability certifications, while ISO 14001 is generally mandatory, some flexibility exists for suppliers with clear implementation plans, and the certificate does not address social sustainability aspects. Surveys, document analysis, and audits are well in place, but audits can be infrequent, leading to unmonitored risks. Supplier engagement systems are established but their full potential in driving proactive supplier engagement in sustainability issues is still under development. Environmental and social criteria for products are well defined, yet enforcing conflict mineral compliance remains difficult. Sustainable material alternatives like green steel and recycled aluminium are explored, but high costs and availability limit adoption. Circularity principles are integrated but lack division- and category-specific targets, and material performance limitations, market availability, and limited influence over supplier's circularity practices remain. Although sustainable supplier alternatives are explored, the approach highlights a strong reliance on existing suppliers, which may overlook opportunities for more rigorous supplier evaluation. Furthermore, while TCO and LCA methodologies are

being introduced, a lack of standardised calculation methods hinders systematic implementation.

In some areas, the sourcing organisation should further enhance its sustainable procurement efforts. When it comes to organisational support and internal knowledge, although internal knowledge is developed through training and sustainability-focused teams, sourcing managers face cost constraints, limited resources, and a need for stronger coordination. Suppliers are requested to demonstrate progress in sustainability issues, but sustainability is not yet integrated into the supplier rating system. A lack of expertise among suppliers, particularly smaller ones, is a challenge. Training programs for key suppliers have begun but expanding them would further strengthen sustainability across the supply chain.

The sourcing organisation also lacks actions in certain areas of the theoretical framework. Supply chain mapping efforts are limited, making risk identification challenging, especially in the deeper tiers of the supply chain. Sustainability is not defined as a core strategic initiative and the lack of sustainability data integration in the ERP system and data visualisation restricts informed decision-making. Sustainability is not yet embedded in performance metrics or accountability structures within the sourcing organisation. Additionally, sustainability has not been integrated into category strategies, leading to a uniform approach across all categories rather than a targeted, category-specific strategy. While the Non-Critical Category L aligns well with the recommendations in the Sustainability Strategy Matrix, categories in other quadrants have the potential to drive greater impact. Furthermore, sustainability is not yet included in supplier evaluation criteria, where decisions are primarily based on price, quality, and delivery capability.

## **7 Conclusions and Recommendations**

This chapter introduces the theoretical and managerial implications of the study. It discusses the key factors in effectively integrating sustainability into procurement and the challenges associated with their implementation. It also offers recommendations for organisations to enhance sustainable procurement and overcome challenges. Furthermore, the chapter provides suggestions for future research.

### **7.1 Theoretical Implications**

As discussed in Chapter 1, previous research has highlighted the importance of sustainable procurement (Burian, Fröhlich, and Sievers, 2013) and emphasised the value of procurement approaches that consider the strategic position of purchases (Kraljic, 1983). However, there was a need for tailored sustainability approaches that align sustainability goals with procurement practices while accounting for the strategic position of each category.

This study aimed to answer the research question: How can sustainability be effectively integrated into procurement while addressing the strategic differences across procurement categories?

To answer this question, a framework for sustainable procurement was created. It combines common sustainable procurement approaches across all procurement categories with a category-specific approach that ensures each category's strategic importance and associated supply risks are considered. Additionally, the study compared the sourcing organisation's current procurement practices with the theoretical framework, identified challenges organisations may face during implementation, and provided actionable recommendations for improvement.

A central finding was that effective sustainable procurement requires companies to incorporate sustainability considerations into every step of the procurement process, from strategy formulation and requirements definition to supplier selection and management. Embedding supply chain transparency throughout the procurement process is also essential. Furthermore, incorporating sustainability into category strategies and considering each category's strategic importance, supply risks, and specific sustainability challenges ensures that sustainability actions are focused where they have the greatest impact.

Despite the advantages of sustainable procurement, the case study highlighted several challenges in implementing sustainable procurement. These challenges can be grouped under five key obstacles: limited supply chain visibility, inadequate sustainability data integration, internal and external resource constraints, the absence of a category-specific approach, and cost-related barriers.

One of the most significant obstacles was the lack of visibility within complex global supply chains, particularly beyond first-tier suppliers. This limited transparency makes it difficult to identify risks and ensure supplier adherence to sustainability standards. The Corporate Sustainability Due Diligence Directive further underscores the need for companies to take full accountability for their extended supply chains and invest in comprehensive mapping efforts. Supply chain mapping would enhance transparency and better ensure that sustainability standards are upheld across all tiers. Furthermore, emerging technologies such as blockchain, IoT devices, digital twins, and advanced surveillance tools should be actively monitored for their potential future integration into operations to improve supply chain visibility.

Another identified obstacle was the absence of sustainability-data integration. Without systematically collecting supplier data and incorporating it into ERP systems and data visualisation tools, decision-making becomes more difficult, sustainability monitoring remains inadequate, and the development of sustainability goals and performance metrics is hindered. Furthermore, without comprehensive data integration, supplier engagement systems do not effectively support proactive sustainability initiatives. The lack of sustainability data integration also makes it more challenging to implement the LCA approach and to incorporate sustainability into the organisation's supplier rating process. Effective integration of sustainability data would enable more informed decision-making, improved supplier oversight, and stronger alignment with sustainability goals.

Another identified barrier to sustainable procurement was resource constraints, both internally and at the supplier level. Internally, the lack of a dedicated sustainability role inside the focal organisation results in fragmented initiatives. Establishing a specialised role responsible for coordinating sustainability initiatives across the organisation would drive alignment and enhance internal expertise, ensuring that sustainability becomes an integrated and continuously evolving aspect of procurement practices. Externally, some suppliers often lack the expertise required to meet the sustainability standards set by the sourcing organisation. This capability gap limits progress toward shared sustainability objectives and increases the risk of non-compliance with procurement requirements.

Targeted training could be provided to help suppliers build the necessary capabilities.

Yet, another problem identified was the lack of a category-specific approach to sustainable procurement. While sustainability efforts in the non-critical procurement category align well with the Sustainability Strategy Matrix, other procurement categories with greater strategic significance offer untapped potential for impact. Without integrating sustainability considerations into category strategies, sustainability efforts remain generic and fail to account for differences in supply risk and strategic importance across procurement categories. This one-size-fits-all approach results in missed opportunities, as some categories offer significant potential for sustainability improvements. Additionally, sourcing managers may struggle to justify sustainability-driven decisions if category-specific strategies do not clearly define sustainability priorities. Integrating sustainability into category strategies and implementing a category-specific approach would allow to focus efforts where they can have the greatest impact.

Finally, many of the sustainable procurement actions within the organisation are driven by cost-saving considerations and cost constraints frequently limit the implementation of sustainability initiatives. Many sustainability-driven procurement actions are restricted by budgetary considerations, affecting key decisions such as sustainable supplier selection, and the usage of environmentally friendly materials, such as green steel. Furthermore, sourcing managers often encounter financial constraints that hinder their ability to prioritise sustainability objectives. While identifying cost-saving opportunities that align with sustainability goals is beneficial, it is also important to integrate sustainability considerations into procurement decision-making processes, even when direct financial benefits are not immediately apparent. Social sustainability initiatives, for example, may not always yield immediate cost savings, yet they are critical for long-term value creation and compliance. To fully integrate sustainability, environmental and social considerations should be part of procurement decisions, even when financial benefits are not immediately evident.

## **7.2 Managerial Implications**

Organisations should incorporate sustainability considerations into every stage of the procurement process, from strategy formulation and requirements definition to supplier selection and management. Supply chain transparency should be embedded throughout the procurement process. Furthermore, sustainability should be incorporated into category

strategies to help prioritise actions where they have the most impact. Based on the identified obstacles in implementing sustainable procurement, organisations can take the following actions to improve their practices. Recommendations are categorised into short-term initiatives and long-term strategic developments.

In the short term, organisations should focus on enhancing supply chain mapping to improve visibility and identify potential sustainability risks. In addition, integrating sustainability data into the ERP system will enable better decision-making and facilitate measurable goal setting. Establishing a dedicated sustainability role will also help drive alignment and provide support in sustainability efforts, and supplier training should be prioritised to support suppliers in meeting sustainability requirements. Additionally, adopting a category-specific approach to sustainable procurement will ensure that sustainability strategies are tailored to the unique characteristics and impact potential of each category.

For long-term strategic development, organisations should consider how sustainability aligns with financial planning. This could involve evaluating priorities, assessing where long-term value can be created through sustainable choices, and balancing immediate costs with future benefits. In addition, exploring emerging technologies such as blockchain, IoT devices, digital twins, and advanced surveillance tools, can further enhance supply chain visibility.

### **7.3 Future Research**

A key focus of this research has been the role of a category-specific approach in enhancing sustainable procurement. This study has emphasised the importance of incorporating sustainability into category strategies and tailoring sustainability approaches to different procurement categories to maximise impact.

Future research should further examine the practical implementation of a category-specific approach and assess its impact over time. Further studies should also investigate the trade-offs between sustainability, cost, and operational efficiency when applying category-specific procurement strategies to ensure a balanced and effective approach.

Furthermore, this study has investigated how emerging technologies, such as blockchain, IoT devices, digital twins, and advanced surveillance tools, can facilitate sustainability integration in procurement. While these

technologies offer promising solutions, their practical implementation and scalability across industries remain areas for further exploration.

Future research should analyse how organisations can integrate these tools into existing procurement systems while addressing challenges such as data security, interoperability, and supplier collaboration. Additionally, empirical studies on the real-world impact of these technologies on sustainability performance and procurement decision-making would provide valuable insights for organisations looking to adopt these emerging solutions.

# Appendices

## Appendix A: Interview Guide in Finnish

### **Haastattelun taustatiedot ja tarkoitus**

Haastattelut ovat osa diplomityötä, jonka tavoitteena on kehittää käytännöllinen malli kestävyiden integroimiseksi osaksi hankintaa, sekä arvioida, miten hyvin mallin suositukset toteutuvat organisaatiossa ja mitä mahdollisia haasteita suositusten implementointiin liittyy. Haastattelun tarkoituksena on saada syvällisempää tietoa hankintakategorian luonteesta, strategisista linjauksista, hankintaprosessista sekä kestävyiden huomioimisesta kategorian hallinnassa. Lisäksi tavoitteena on selvittää, miten kestävyystavoitteet sopivat yhteen muiden kategorian tavoitteiden kanssa, sekä tunnistaa hankintaorganisaation kestävyiden integrointiin liittyviä haasteita ja mahdollisuuksia.

Haastatteluvastaukset käsitellään luottamuksellisesti ja haastatteluista saatu tieto esitetään työssä anonymisti. Haastattelutallenteet ja litteroinnit tuhoetaan diplomityön valmistuttua.

### **Haastattelukysymykset**

#### **Haastateltavan tausta**

1. Mikä on tehtävänimikkeesi ja kauanko olet toiminut nykyisessä tehtävässäsi?
2. Mitkä ovat päävastuusi ja keskeiset tehtäväsi?

#### **Kategorian luonne**

3. Miten kuvailisit kategorian luonnetta?

Millaisia materiaaleja tai tuotteita siihen kuuluu?

Kuinka kompleksisia nämä ovat teknisiltä ominaisuuksiltaan?

4. Miten kuvailisit kategorian toimittajamarkkinaa?

Kuinka suuri on saatavuuden riski? Miksi?

5. Johdetaanko kategoriaa pääasiassa lokaalisti vai globaalisti?

Mitä osia hallitaan keskitetysti, ja mitkä ovat paikallisia vastuita?

6. Ketkä vastaavat kategorian hallinnasta paikallisessa divisioonassa?

## **Hankintakriteeristön priorisointi**

7. Mitkä tekijät vaikuttivat eniten, kun viimeksi kilpailutitte toimittajia?
8. Millaisia mittareita käytätte arvioidessanne toimittajien suoriutumiskykyä?
9. Kuinka teette päätöksiä tilanteissa, joissa:

Edullisempi hinta tarkoittaisi pidempiä toimitusaikoja?  
Korkeampi laatu vaatisi suurempia kustannuksia?  
Kestävämpi (more sustainable) vaihtoehto olisi kalliimpi?

10. Missä asioissa olette valmiita joustamaan?

Onko jotain, mistä ette missään tapauksessa joustaa?

11. Miten hankintakriteeristö on kehittynyt ajan myötä?

Onko jokin kriteeri, joka on korostunut viime aikoina enemmän kuin muut?

12. Mitä työkaluja tai malleja käytätte kategorian hankintakriteeristön priorisointiin?

13. Miten kategorian menestystä mitataan?

## **Kestävyys kategorian hallinnassa**

14. Kuvaile kategorian hankintaprosessia alusta loppuun.

Onko kestävyys integroitu osaksi hankintaprosessia?

15. Miten kestävyys on integroitu kategorian strategiaan?

Onko kategorialle asetettu kestävyystavoitteita?  
Miten näet kategorian tärkeyden paikallisen divisioonan kestävyystavoitteiden edistämässä?

16. Onko kategorialla joitakin erityispiirteitä, jotka vaikuttavat sen kestävyden hallintaan?

Onko kategorialla tunnistettu merkittäviä kestävyysriskejä (ympäristöön tai sosiaalisiin kysymyksiin liittyen)?

17. Millaisia kestävyysvaatimuksia asetatte kategorian toimittajille?

Miten varmistatte, että nämä vaatimukset täyttyvät?  
Miten teette yhteistyötä toimittajien kanssa edistääksenne kestävyttä?

Mitä tapahtuu toimittajalle, joka ei noudata  
kestävyysvaatimuksia?

18. Tehdäänkö tuotteille Life Cycle Assessment tai Total Cost of Ownership -arvioita?
19. Millä mittareilla kategorian kestävyyskehitystä mitataan?
20. Onko sinulla antaa jotakin esimerkkiä onnistuneista kestävyysprojekteista?
21. Mitä haasteita olette kohdanneet kestävyysprojekteissa?

### **Toimitusketjun läpinäkyvyys**

22. Kuinka pitkälle toimitusketjuun sinulla on näkyvyyttä?
23. Onko toimitusketjua pyritty muokkaamaan (esim. vähemmän toimittajia, vähemmän tasoja, toimittajia lähempää)? Mistä syystä?

### **Organisaatio**

24. Koetko, että organisaatiossa on osaamista ja resursseja hankinnan kestävyyskehittämiseksi?
25. Koetko, että organisaatio tukee kestävyysintegroimista osaksi hankintaa?
26. Oletko käynyt koulutuksia kestävyteen liittyen?
27. Oletko mukana jossakin sisäisessä tiimissä, jossa pyritään kehittämään hankinnan kestävyttä?

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