

UNIVERSITY OF HELSINKI

**Strategic ESG Materiality Under Evolving Regulations and Expectations:
Evidence from the Automotive and Defense Sectors**

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Master's thesis

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Abstract

With the world facing evolving sustainability challenges, corporate sustainability reporting has shifted from being loosely regulated to increasingly mandatory and standardized. This study examines how evolving regulations and expectations influence environmental, social, and governance (ESG) materiality, priorities, and reporting practices in companies operating in the automotive and defense sectors. In the European Union, regulatory developments, such as the Corporate Sustainability Reporting Directive (CSRD) and related European Sustainability Reporting Standards (ESRS), have changed the scope and standardization of sustainability reporting, bringing new challenges and opportunities for companies operating across multiple sectors. With a focus on the implications for a company like Valmet Automotive operating in multiple sectors, the study adopts a qualitative and comparative research design following an abductive approach based on literature review and analysis, comparative case studies, namely three companies from both the automotive and the defense sectors, and thematic coding via ATLAS.ti.

The findings indicate that while regulatory developments do contribute to further standardization and comparability in ESG reporting and disclosure, sector-specific differences and norms in materiality continue to exist. Materiality is ultimately influenced by a combination of institutional and regulatory pressures, stakeholder expectations, and industry-specific realities. Environmental topics, especially those related to climate change, supply chain decarbonization, and circular economy, dominate the automotive sector, while in the defense sector, social and governance-related topics, such as affected communities, export compliance, and ethics, are more prominent. The results also showcase that companies operating in both these sectors face increased complexity in aligning ESG reporting norms and disclosure strategies. Based on the findings, the study suggests the following four recommendations for Valmet Automotive on materiality and broader sustainability reporting: acknowledge new sectoral ESG realities, strengthen alignment with CSRD-compliant disclosure, optimize governance, compliance, and disclosure strategies, and integrate the double materiality assessment as a strategic management tool. This study contributes to the conversation around materiality and ESG reporting in both the automotive and defense sectors, as well as the challenges and opportunities of companies operating across multiple sectors.

Keywords: Double Materiality, Sustainability Reporting, CSRD, Automotive Sector, Defense Sector

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List of Abbreviations

ASD – Aerospace, Security, and Defense Industries Association of Europe

BEV – Battery Electric Vehicle

CSDDD – Corporate Sustainability Due Diligence Directive

CSRD – Corporate Sustainability Reporting Directive

DMA – Double Materiality Assessment

EDA – European Defense Agency

EDIP – European Defense Industrial Program

EDIS – European Defense Industrial Strategy

EDTIB – European Defense Technological and Industrial Base

EFRAG – European Financial Reporting Advisory Group

ESG – Environment, Social, and Governance

ESRS – European Sustainability Reporting Standards

EU – European Union

GHG – Greenhouse Gas

GRI – Global Reporting Initiative

ICE – Internal Combustion Engine

IRO – Impacts, Risks, and Opportunities

NATO – North Atlantic Treaty Organization

NIAG – NATO Industrial Advisory Group

NFRD – Non-Financial Reporting Directive

OEM – Original Equipment Manufacturer

PHEV – Plug-in Hybrid Electric Vehicle

PM – Particulate Matter

SASB – Sustainability Accounting Standards Board

SBTi – Science Based Targets Initiative

SME – Small and Medium Enterprises

SoC – Substance of Concern

SVHC – Substance of Very High Concern

VA – Valmet Automotive

VOC – Volatile Organic Compound

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1. Introduction

1.1 Background of the Study

The world is currently navigating a period of unprecedented sustainability challenges. According to the Stockholm Resilience Centre's planetary boundaries framework, a quantitative assessment of the various safe limits for human pressure on nine critical areas needed in maintaining a stable and healthy Earth, seven out of the nine planetary boundaries have already been crossed; these include key boundaries like climate change, ocean acidification, and biogeochemical flows (Stockholm Resilience Centre, 2025; Gourdel et al., 2024; Steinhauer et al., 2025). When a boundary is crossed, the risk of abrupt, large-scale, and irreversible environmental change and impact to society and nature alike greatly increases.

Large enterprises, such as those in the private sector, are major contributors to the environmental degradation in these planetary boundaries, as well as total global carbon emissions; in turn, these corporations exacerbate climate change and global climate issues (Liu et al., 2025). Consequently, corporate sustainability reporting has evolved from a voluntary and loosely regulated practice into a mandatory pillar of corporate governance to foster transparency, accountability, and action on these negative impacts (Martinčević et al, 2025; Dunfjäll, 2025). Especially in resource-intensive and industrial sectors, increasing scrutiny related to regulatory, societal, and environmental factors is impacting company operations and disclosure. As pressures continue to grow, this global problem has forced a shift in the role of the private sector from merely being a primary driver of environmental degradation to also a critical player in achieving a more sustainable society (Steinhauer et al., 2025).

In recent years, the rapidly evolving sustainability regulatory environment and stakeholder scrutiny have influenced how companies define, prioritize, and report upon various environmental, social, and governance (ESG) topics. With the introduction of the Corporate Sustainability Reporting Directive (CSRD) and related European Union (EU) initiatives, such as the European Green Deal, more standardized and mandatory ESG disclosure is on the rise (Martinčević et al, 2025; European Commission, 2025d). The CSRD initially aimed to expand the reporting scope to approximately 50,000 companies, ensuring that sustainability information gains a similar status as

traditional financial reporting (Martinčević et al, 2025; Dunfjäll, 2025). However, while different ESG frameworks and directives aim to create uniformity, several issues, such as material topics, remain highly sector-dependent; these are shaped by risks, regulatory pressures, and societal expectations (Korsberg, 2025). This challenge is particularly complex for companies operating in different sectors with diverse ESG landscapes (Ioannou & Barkouki, 2025). For instance, the automotive industry faces pressures to transition to electric mobility, decarbonize fleet-wide emissions, and address circular economic challenges (Vijaya et al, 2025). On the other hand, the defense sector is impacted by issues on business ethics, human rights, and affected communities (Pedersen, 2024). As a result, companies spanning these sectors must fully understand and navigate distinct institutional environments and sustainability requirements, as well as ensure compliance for continued operation. Thus, further research is needed to clarify the ESG landscapes across these industries, as well as dual and multiple sector compliance.

1.2 Objectives and Purpose

The primary goal of this study is to understand how evolving sustainability regulations and expectations in the EU influence ESG priorities, materiality, and reporting practices in companies that operate across multiple sectors. More specifically, this research focuses on Valmet Automotive (VA), which is expanding from automotive contract manufacturing to also defense manufacturing; therefore, VA is facing a diverse set of regulatory requirements and pressures. Please note that in this thesis, Valmet Automotive and VA both refer to the Valmet Automotive Group as a whole. This thesis is commissioned by VA, influencing the objectives and purposes.

This study is beneficial and adds to academic literature because most existing ESG research examines sustainability strategy, disclosure, and materiality within a single sector. While there is research comparing different sectors within the realm of ESG, such as with reporting or investing, there is very limited current research comparing the automotive and defense industries within the EU in particular. As companies, such as Valmet Automotive, increasingly operate across sectors where ESG regulations, expectations, and norms differ significantly and evolve rapidly, additional research is needed to understand how an organization can navigate and reconcile comparable and also contrasting ESG landscapes.

The outcomes of this research will further clarify how companies operating cross-sectorally can align their sustainability strategies and reporting with EU-level obligations like the CSRD while also simultaneously maintaining consistency and sector relevance. To continue, these findings will have practical implications in materiality assessment, transparency practices, and sustainability governance. On a company-level, the research can support companies, such as VA, to strengthen their ESG performance and compliance readiness across multiple sectors. For policymakers and auditors, the study can also offer insights into how regulatory frameworks could shape a company's ESG adaptation and strategic challenges regarding materiality. Ultimately, this research aims to inform decision-making at VA, as well as contribute to a broader academic understanding on how regulatory pressures can influence ESG strategy in cross-sectoral environments.

1.3 Research Questions

The central research question of this study is how do evolving regulatory environments and expectations influence ESG materiality, priorities, and reporting in companies operating across both the automotive and defense sectors? Additionally, the central research question is expanded upon, guided, and supported by the following research subquestions:

1. How do the material topics differ between the automotive and defense sectors?
2. What are the key drivers behind the changes in ESG materiality in these sectors? Why?
3. What are the differences in ESG reporting norms between the automotive and defense sectors under e.g., the CSRD?

With these questions, the study aims to develop an understanding of what shapes ESG strategy in cross-sectoral industrial contexts, as well as offer actionable insights and recommendations for VA's sustainability strategy and practice.

2. Conceptual Framework

This chapter begins with a conceptual grounding of relevant topics; this study is guided by the idea that sustainability reporting practices, ESG priorities, and materiality assessments are shaped by various regulatory pressures, expectations, and sector-specific norms. Companies that operate in the automotive and defense sectors navigate institutional environments with unique and distinct expectations in transparency, legitimacy, and performance. The following sections provide an overview of the theoretical frameworks and contexts that define this complex landscape.

The first section, Institutional Theory, provides the foundation to answering the research questions and discusses the framework through which this thesis views the relationship between corporate sustainability reporting, institutions, and the pursuit of legitimacy and continuity. The second section, The Concept of ESG, focuses on the definitions and development of ESG, as well as its relationship and accompanying expectations with companies. The third section, the Regulatory Environment, discusses the various sustainability regulations within the European Union. Within this section, the automotive and defense sectors are further introduced to provide an overview of these industries in the European Union; particular attention is paid to sustainability and sustainability-related topics, including its regulatory environment, technological innovations, societal pressures and challenges, priorities, and key players. The fourth section, ESG Reporting Standards, details the various sustainability reporting standards within the European Union. Finally, the operationalization of my conceptual framework is highlighted at the end of this section.

2.1 Institutional Theory

Increasing institutional pressures and expectations now shape corporate disclosures and actions. Institutional theory provides a framework for understanding how organizations adapt and adjust to expectations (Björklin & Wallin, 2025). At the theory's core, it emphasizes that organizations are not only driven by economic profits and efficiency but also by the pursuit of legitimacy; legitimacy here is the generalized perception that an organization's actions are appropriate, proper, or desirable within a certain set of socially constructed norms and values (Azizi et al., 2025; Korsberg, 2025). As organizations are dependent on their external environments, they are pressured to align their internal structures and operations with institutionalized norms. Additionally, organizations face pressures to comply with institutional

demands and expectations or suffer penalization, whether in legitimacy or financially, for non-compliance (Ding & Wang, 2025). The authors continue that, “institutional frameworks and norms shape corporate behavior and influence the availability and demand for key resources, affecting corporate sustainability and social responsibility performance” (Ding & Wang, 2025). Essentially, alignment with these demands and expectations is needed to ensure survival and continued acceptance. Looking to general practices, such as sustainability reporting, that become standard across a sector or industry, a homogenization effect, namely isomorphism, is created via three primary mechanisms, specifically coercive, normative, and mimetic (Azizi et al., 2025, Korsberg, 2025).

These three isomorphic mechanisms within institutional theory drive ESG responsibility fulfillment. First, coercive isomorphism is attributed to the formal regulatory pressures and political influences involved (Björklin & Wallin, 2025). This is seen with the implementation of the Corporate Sustainability Reporting Directive (CSRD); companies are forced to align their practices with legal requirements to avoid the penalties, as well as maintain social legitimacy. Compliance with EU regulations falls within coercive isomorphism and is a major force at play within institutional theory regarding the contents of this study. Second, normative isomorphism is driven by the diffusion of professional standards and industry values. To add, normative isomorphism includes the social consensus of doing the “right thing” (Azizi et al., 2025). The application of different certifications, such as the ISO 14001 certification in Environmental Management, falls within this category of institutional theory. Third, mimetic isomorphism occurs during periods of uncertainty or change, essentially leading organizations to mimic the behaviors or reporting patterns of competitors perceived as successful or legitimate; this is aimed to ultimately minimize risks and improve marketing positioning, as well as utilize best techniques and practices (Ding & Wang, 2025; Korsberg, 2025). Institutional theory addresses the various complexities faced by multinational corporations via a combination of these three isomorphic mechanisms, and therefore, the theory helps to inform the research questions. Ultimately, for a corporation navigating the intricacies of ESG reporting in a single or multiple sectors, institutional theory serves as a critical lens to examine and analyze reporting norms and practices on and within materiality assessments.

2.2 The Concept of ESG

With the foundation of institutional theory in place, the conceptual framework is driven by the introduction of ESG to corporations, as well as how institutions and expectations can influence company disclosure and practices. To start with, the term ESG means environmental, social, and governance and falls within the realm of sustainability. While the terms are frequently used interchangeably, there is a distinct relationship between the broad principle of sustainability and ESG (Cunha, 2025). Sustainability is traditionally defined as “meeting the needs of the present without compromising the ability of future generations to meet their own needs” (World Commission on Environment and Development, 1987). In this context, sustainability serves as the overarching goal, whereas ESG adds the specific criteria and metrics used by companies and investors to track progress and contributions towards that goal (Cunha, 2025). The evolution of ESG is rooted in over 50 years of discussion, tracing back to the early 1970s with a focus mostly on global environmental governance (Vijaya et al., 2025). However, the concept of ESG was officially coined by the UN Global Compact in 2004, which now lays the framework for current business impact evaluation and reporting; the impacts of the ESG concept can now be seen in corporate sustainability practices and norms, such as via adopting key performance indicators (KPIs) based on and validated by the Science-Based Targets Initiative and modelling strategies and disclosure considering the UN’s 17 Sustainable Development Goals (SDGs) (UN Global Compact, 2025).

To continue, the concept of ESG represents a way to measure and evaluate a company on sustainability performance, as well as providing stakeholders a framework to assess the risks and opportunities difficult to capture via traditional financial reports (Wacławik et al., 2025b). Within the EU, approximately 80% of firms currently publish non-financial disclosures related to sustainability (Ioannou & Barkouki, 2025); this high percentage reflects a broad transition in the business landscape, where integrated reporting, both financial and non-financial, is increasingly viewed as standard practice. The impact of ESG on companies is and has been transformative, requiring the integration of sustainability into core corporate strategies rather than keeping it as a marginal philanthropic concern (UN Global Compact, 2025). As global industrial development worsened environmental challenges, such as climate change and resource scarcity, international bodies like the European Union have implemented strict laws to shift the focus of sustainability

and its disclosure from voluntary to mandatory and data driven (Vijaya et al., 2025). Therefore, the concept of ESG and its relation to corporate sustainability reporting is foundational in understanding its development and current practice.

2.3 The Regulatory Environment

The geographical scope of this research, namely the operating environment of Valmet Automotive, is within the European Union. The regulatory environment for sustainability reporting in the EU is currently shaped by the European Green Deal, a roadmap that is designed to transform the EU into a climate-neutral economy by 2050 (European Commission, 2025d). For instance, within this roadmap, sustainability reporting-related regulation like the Corporate Sustainability Reporting Directive (CSRD) has been a key focus. The goal of these regulations under the European Green Deal related to sustainability reporting is to mandate disclosure and improve the quality of data on sustainability topics, such as risks and impacts, directing financial capital toward activities that support the European Union's climate targets (Ecobio Manager, 2025). This focus and transition showcase a key shift from voluntary and somewhat fragmented reporting like the 2014 Non-Financial Reporting Directive (NFRD) (Directive 2014/95/EU) to an increasingly mandatory and standardized system (Dunfjäll, 2025).

The CSRD, which entered into force in early 2023, now serves as the primary legislative driver for this reporting transformation (Barangă & Ifrim, 2023); the CSRD replaced the NFRD and aims to standardize sustainability reporting, as well as equalize it with traditional financial reporting in rigor and auditability (Martinčević et al, 2025). By mandating detailed and standardized disclosures, the directive seeks to enhance corporate accountability across the EU market. The CSRD built upon the NFRD and its shortcomings, such as its unclear definition of materiality. As a result, the CSRD now employs a double materiality principle to clearly consider and combine impact and financial perspectives (Lehtinen, 2025). The EU has been implementing the CSRD for companies within member states based on criteria such as net revenues and corporate employee count (The European Parliament & The Council, 2025). Under the CSRD, companies that fall within set requirements will need to uniformly report on their ESG risks and impacts in different reporting waves, exemplifying how institutional demands from the EU shape corporate sustainability reporting.

However, since adoption, there have been obstacles in implementation. In February of 2025, the Omnibus I simplification package, also called the “Stop-the-Clock” Directive, delayed reporting timelines for companies and small and medium enterprises (SMEs) in the second and third reporting waves by two years to ease administrative burdens; Omnibus II was also introduced later in 2025 to reduce the companies in scope of the CSRD by up to 80% (Lehtinen, 2025). As of December 2025, the Council of the European Union and the European Parliament reached a provisional agreement to simplify the sustainability reporting requirements of the CSRD, more specifically by increasing the employee threshold to 1,000 employees, removing listed SMEs from the scope of the CSRD, and adding a net turnover threshold of over €450 million (Council of the European Union, 2025). While the CSRD has been delayed and modified, the materiality assessment requirements still continue as planned.

The regulatory environment of the automotive and defense sectors both have distinct regulatory environments, as well as ESG realities to operate under. In order to understand these, the following subsections will introduce and further detail the automotive and defense sectors.

2.3.1 Understanding the Automotive Sector

The automotive sector is one of the most economically significant industries within the European Union, driving industrial outputs, innovation, substantial employment, and exports (Vijaya et al., 2025). Within the EU, the automotive industry includes vehicle manufacturers, component suppliers, battery producers, and various related service providers; these account for 7% of the EU’s total GDP, provide approximately 13.8 million direct and indirect jobs, and form highly complex and integrated value chains across member states and abroad (Deubener et al., 2025). The industry also contributed around €1.7 trillion in gross value added to the EU economy, more specifically, with €570 billion in technology and car exports. However, the automotive sector has a large impact on ESG and is a significant contributor to global greenhouse gas (GHG) emissions (Vijaya et al., 2025). According to Csutora & Vetőné Mózner (2025), “with the exception of indirect emissions from the manufacture of fuel and automobiles, the transportation sector is accountable for one-third of all CO₂ emissions and one-fourth of all greenhouse gas emissions in the EU.” They continued that “passenger cars are responsible for more than half of

the EU's greenhouse gas emissions from the transport sector" (Csutora & Vetóné Móznér, 2025). Therefore, the sector is currently undergoing transformation from pressures driven by regulatory changes, technological innovations, and shifting societal expectations.

The regulatory environment under which the automotive sector operates is quite stringent, particularly regarding environmental performance. Central to the automotive sector is the EU's climate policy agenda, such as the European Green Deal and the "Fit for 55" legislative package. The European Green Deal aims to make Europe the first climate-neutral continent by 2050 and details several specific regulations to act as a rulebook for the industry (European Commission, 2025d). Under the European Green Deal, transition to clean mobility for the automotive industry is a regulatory imperative and strategic opportunity for innovation and independence (European Commission, 2025b). Regulatory mandates, such as the fleet-wide CO₂ targets (95g/km) of 2019, have established strict limits on emissions, with failure to comply resulting in hefty financial penalties of €95 per gram per kilometer (Csutora & Vetóné Móznér, 2025). To continue, the "Fit for 55" legislative package codifies a 100% carbon dioxide (CO₂) emission reduction target for all new cars and vans by 2035. This package serves as an attempt to ban the sale of new internal combustion vehicles (ICE). As of December 2025 with the introduction of the Automotive Package, the European Commission added nuanced flexibilities to the package. First, while the 2035 target remains, automotive manufacturers can now utilize a 10% "flexibility margin" compensation via the use of carbon-neutral e-fuels and biofuels made in the EU; this will result in a 90% tailpipe emissions reduction, as well as allow for plug-in hybrids (PHEV), hybrids, and select ICE vehicles to continue to play a role in the EU (European Commission, 2025b). In addition, the Euro 7 Standards, which are set for full implementation in 2026 and 2027, extend regulation past traditional tailpipe emissions to non-exhaust emissions, such as particulate matter (PM) from brakes and microplastics from tire wear (The International Council on Clean Transportation, 2024). This is relevant for Battery Electric Vehicles (BEVs) due to their increased overall weight; extra weight from batteries can produce additional and potentially significant non-exhaust PM. For the automotive sector, these regulations translate to increasingly strict CO₂ emission standards for vehicles, fleet electrification mandates, and phase-outs of new combustion engine vehicle sales by 2035.

In addition to regulation targeting environmental performance, companies within the automotive sector must also comply with a growing number of EU-wide sustainability-related directives covering, for example, supply chain due diligence, product safety, and human rights (Vijaya et al., 2025). While applicable to many sectors, these directives, such as the Corporate Sustainability Due Diligence Directive (CSDDD), add to the growing amount of regulation the sector must comply with (Ecobio Manager, 2025). Looking more broadly, the introduction of the CSRD sets disclosure requirements for all companies that fall in scope to report on various topics, such as environmental impacts, social issues, and governance structures (Ioannou & Barkouki, 2025). As a result, regulatory compliance has increasingly become a central tenant of not only ESG integration and reporting but also in a company's license to operate.

Complementing the regulatory environment, there have been technological innovations present within the sector, especially with the growing demand for hybrid and electric vehicles. Technological developments are increasingly centered on vehicle electrification and digitalization; these are linked to broader societal expectations concerning climate change mitigation, environmental protection, and responsibility. However, the competitiveness of the European automotive industry has declined in recent years. Since 2017, European automakers have lost around 13 percentage points in total market share; average profitability of automotive suppliers have also dropped from 7.4% in 2017 to 5.1% in 2023 (Deubener et al., 2025). The industry is under pressure from various disruptions, such as rising costs, geopolitical uncertainty, and intensified global competition. Research shows that “although sustainability offers a competitive advantage, not all companies are simultaneously making progress. Some companies have been able to implement sustainable strategies, such as investing in electric vehicle production, but not all have been able to follow suit quickly” (Vijaya et al., 2025). Additionally, intense competition from countries like China present a significant growth challenge. As a response, the industry has been prioritizing operational resilience, investing in sustainable and flexible production systems, and aligning corporate strategies with regulatory frameworks (Deubener et al., 2025). Together, these dynamics showcase the complex environment of the European automotive industry.

2.3.2 Understanding the Defense Sector

The defense industry is another major industry in the European Union, including products and services such as arms, ammunition, satellites, armored vehicles, aircraft, radar, and cyber defenses. The EU's defense industry has also been undergoing significant transformation in recent years. As of 2025, the sector is no longer just seen as a side manufacturing branch within the Union but rather as a central pillar of the EU's Economic Security Strategy (European Commission, 2025a). The industry spans the member states, encompassing over 2,500 small and medium-sized enterprises (SMEs) and several large-scale original equipment manufacturers (OEMs) (European Commission, 2025c). Key actors include the North Atlantic Treaty Organization (NATO), the NATO Industrial Advisory Group (NIAG), the European Defence Agency (EDA), and in the Nordic context, the Nordic Cooperation (Korsberg, 2025). These actors actively influence the geopolitical environment under which the defense sector operates, as well as strategies and directives relating to industry.

Beginning in the early 21st century and heightened by the Russian invasion of Ukraine beginning in 2022, the EU has been transitioning from a more fragmented collection of national defense markets and companies toward an increasingly integrated European Defence Technological and Industrial Base (EDTIB). Here, the goal is to achieve “strategic autonomy” to allow Europe to act independently militarily and industrially without dependence on other third-parties is a key aim (European Commission, 2025a). Geopolitical shifts have challenged the long-held assumptions that defense budgets could be continually reduced (Demirci, 2024). To continue, according to Korsberg (2025), “factors like geopolitical shifts and general instability, technological advancements and military modernization efforts drive the growth and importance of defense industry on a global scale. Climate change, though a result of greenhouse gases from human activities like industry, is a significant cause of environmental security issues, which can then cause humanitarian disasters, regional tensions and violence.” Therefore, the current geopolitical and environmental instabilities have forced a strategic pivot toward enhancing defense readiness and industrial autonomy. These instabilities and the resulting industrial transformation influence reporting expectations and disclosure contents by creating the reality the company operates within.

The EU has defined the European Defense Industrial Strategy (EDIS) as the Union's strategy to progress towards industrial readiness. Unveiled in 2024 and implemented by 2025, EDIS sets targets for defense industry in the Union. First, procurement spend in the EU must be at least 50% internal by 2030 and 60% by 2035. Second, collaborative investment targets into equipment have been encouraged to be at around 40% to attempt to reduce the possibility for non-interoperable systems (Demirci, 2024). The European Defence Industry Program (EDIP) acts as the legislative backbone to scale up production and joint acquisition within the EU under the EDIS; for example, the EDIP provides approximately €1.5 billion for the EU's defense industry in 2025-2027 (European Parliament, 2025). These key strategies actively shape the priorities and direction of the entire sector.

However, a major challenge in the sector is access to private financing; Pedersen (2024) stated, "while public investment has been increasing, a European Commission report from March 2024 highlighted the defense sector's challenge related to accessing private financing from an investment industry increasingly conscious of ESG issues. As of March 2024, only 29.8% of EU and UK-domiciled ESG funds had exposure to the aerospace and defense sector." As a result, the European Commission has been "emphasizing its [the defense industry's] central role in relation to national security, protection of civil liberties and establishing peace" (Pedersen, 2024). This can cause difficulties in technological innovation compared to other industries where private financing is abundant, as well as sector positioning.

The defense sector operates within a unique sustainability paradigm. On one hand, its activities, such as military action, are ecologically and socially destructive. For example, the defense industry is attributed to approximately 5% of global carbon dioxide emissions and has a track record of causing irremediable negative impacts on human rights through the lifecycle of its products (Pedersen, 2024). On the other hand, the industry provides essential aspects relating to social and governance sustainability, such as national security and international peace, as well as opportunities for environmental protection and clean innovation (Korsberg, 2025). Similar to the automotive sector, companies in the defense sector also have disclosure requirements set by the CSRD; these requirements define the specific topics for disclosure and compliance for companies in the EU (Ioannou & Barkouki, 2025). In the context of sustainability reporting, the sector places

a high priority on governance and ethical dimensions as it is susceptible to reputational and legal risks, such as corruption and bribery. As a result, companies often are a part of trade associations like the Aerospace, Security and Defence Industries Association of Europe (ASD) to achieve competitive legitimacy and compliance. For instance, “ASD’s publication ‘Common Industry Standards for European Aerospace and Defence’ focuses on compliance, and raises specific topics of corruption, gifts and hospitality, political donations and contributions, due diligence, integrity programs and sanctions” (Korsberg, 2025). By adhering to these standards, both industry-specific and wide sweeping disclosure, the defense sector is able to not only operate but transition toward a coordinated, sustainable, and self-sufficient industrial base.

2.4 ESG Reporting Standards

In addition to the regulatory environments of the automotive and defense sectors, there are ESG reporting standards that both sectors adhere to. To provide a common language for the disclosures in the CSRD, the European Commission adopted the European Sustainability Reporting Standards (ESRS) (Cunha, 2025). These standards, developed by European Financial Reporting Advisory Group (EFRAG), define the minimum level of mandatory information disclosure a company must provide regarding its strategy, impacts, risks, and opportunities (Panfilo et al., 2025). The ESRS is comprised of 12 standards, divided into two cross-cutting standards (ESRS 1 and 2) and 10 topical standards covering the full spectrum of environmental, social, and governance issues (Waclawik et al., 2025a). Each standard covers specific disclosure requirements; for instance, ESRS E-1 covers climate change and details topics such as greenhouse gas (GHG) emissions, and ESRS G-1 covers business conduct and includes areas like anti-corruption and information security. The figure below shows the 12 ESRS standards present under the CSRD.

Figure 1. European Sustainability Reporting Standards (ESRS)



Note. Figure by Schubert, S. (2022).

The mandatory cornerstone of the CSRD and ESRS is the principle of double materiality. According to Steinhauer et al. (2025), double materiality is, “a concept formally introduced by the European Commission in 2019 that requires companies to assess and disclose sustainability issues from two complementary perspectives: financial materiality (how sustainability issues affect the company) and impact materiality (how the company affects society and the environment).” Companies are required to report on sustainability matters using this dual assessment approach, disclosing their impacts, risks, and opportunities over the short-, medium-, and long-term (Barker & Mayer, 2025). To add, according to Calabrese et al. (2019), “materiality analysis requires the company to engage with different groups of stakeholders, gathering their insights on specific economic, environmental, and social issues. These insights assist in identifying not only what the company should report on, but also how the strategies for sustainability should respond to continually changing economic, social and environmental circumstances.” Through double materiality, a systematic approach to corporate sustainability informs identification, engagement, management, and disclosure of material topics.

Impact materiality represents the “inside-out” perspective, focusing on the company’s actual or potential impacts on people and the environment, whether positive or negative (Björklin & Wallin, 2025; Baumüller & Sopp, 2022). Here, companies are required to evaluate their impacts throughout the entire value chain, namely upstream, downstream, and in their own operations. Impact materiality must be assessed separately from financial materiality; this ensures that issues, such as human rights violations or biodiversity loss, are properly captured, even if they do not pose immediate financial risk or threat to the company (Dunfjäll, 2025). Conversely, financial materiality represents the “outside-in” perspective; it identifies matters that generate risks or opportunities relating to the entity’s development, financial position, cash flows, and access to capital over the short-, medium, and long-term (Panfilo et al., 2025). The primary audience for financial materiality often is investors and those who take a financial interest in the company (Dunfjäll, 2025). This alignment between both financial and non-financial data assists investors to identify long-term value creation in increasingly volatile climates, as well as improve transparency and increase valuation (Huang et al., 2025). Examples of material topics in companies differ vastly as Baumüller & Sopp (2022) report the Hicks (1961) quote that “materiality, like beauty, is in the eye of the beholder.” One company might report the topics of water and business conduct as material, while another might omit these completely and focus on energy and diversity.

In practice, Double Materiality Assessment (DMA) is the operational process that companies use to identify their impacts, risks, and opportunities (IROs) (Steinhauer et al., 2025). While there is not a rigid sequence for DMA completion, guidelines recommend understanding the business context, mapping the value chain, and involving a variety of stakeholders when evaluating material topics based on severity and likelihood (Cunha, 2025; Dunfjäll, 2025). For example, severity is assessed considering the scale, scope, and irremediability and uses a combination of both quantitative and qualitative data. While reporting on the DMA, the following must be disclosed, “a) the process to identify and assess the material impacts, risks and opportunities (ESRS 2 IRO-1); b) the interaction between material IROs and the company’s strategy and business model (ESRS 2 SBM-3); and c) the Disclosure Requirements under the ESRS covered by the sustainability statement (ESRS 2 IRO-2)” (Cunha, 2025). The double materiality concept and DMA are integral parts of sustainability reporting in the EU under the CSRD. Understanding the regulatory environment under which EU corporations operate is

essential to investigating and analyzing materiality similarities and differences across the automotive and defense sectors, as well as their reporting norms. The following table details key sustainability reporting-related concepts in the EU for quick reference.

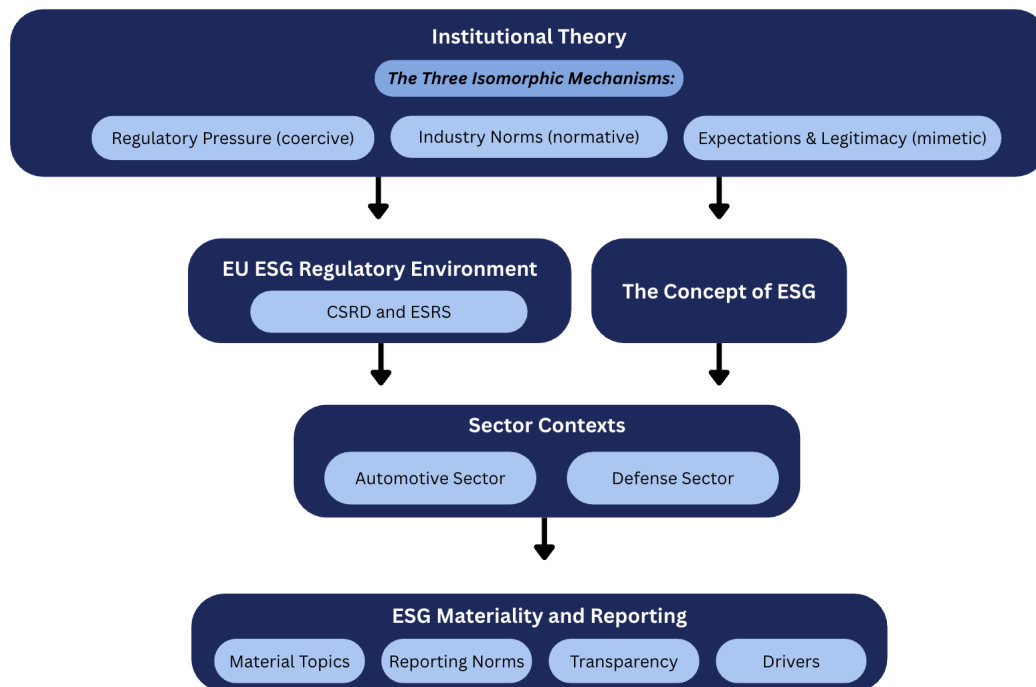
Table 1. Key Sustainability-related Terminology in the European Union

Term	Definition
Corporate Sustainability Reporting Directive (CSRD)	A mandatory EU legislative framework (Directive 2022/2464) that requires large and listed companies to publish regular, audited reports on their environmental and social impacts. The CSRD introduces double materiality and compliance with the ESRS (Martinčević et al., 2025)
European Sustainability Reporting Standards (ESRS)	A set of mandatory standards developed by EFRAG to operationalize the CSRD by defining the specific information that companies must disclose. The ESRS consists of 12 standards, namely two cross-cutting standards (ESRS 1 and 2) and ten topical standards covering the environment (E1-E5), social (S1-S4), and governance (G1) (Steinhauer et al., 2025).
EU Taxonomy	A standardized classification system used to determine whether specific economic activities are “environmentally sustainable.” The taxonomy identifies six environmental objectives, such as climate change mitigation and circular economy transition, to help direct capital toward sustainable investments (Azizi et al., 2025).
Double Materiality	A central principle of the CSRD which requires companies to report on sustainability from two perspectives, namely impact and financial materiality. Impact (“inside-out”) materiality assesses how a company’s activities and value chain impact society and the environment. Financial (“outside-in”) materiality assesses matters that pose financial risks and/or opportunities to the company (Björklin & Wallin, 2025).

2.5 Operationalization of the Conceptual Framework

The conceptual framework positions the transition from more voluntary ESG reporting to the mandatory CSRD reporting regime as a fundamental shift in corporate sustainability. Institutional theory provides the foundational framework in understanding the study's research questions. By understanding the background of ESG, the sustainability reporting-related regulatory environment in the EU, the automotive and defense industries, and their relationship with institutional theory, the conceptual framework provides a lens to analyze how companies in the automotive and defense sectors navigate material topics and overall sustainability reporting; the operationalization of the conceptual framework is illustrated below (See Figure 2). This conceptual grounding directly informs the research questions, as well as their analyzed results and discussion.

Figure 2. Operationalization of the Conceptual Framework



3. Methods

This section outlines the methodological approach used to understand, investigate, and analyze materiality in sustainability reporting within the context of the automotive and defense industries in the EU. Given the quickly evolving and unique nature of sustainability-related regulations and expectations, a focus on flexibility and sector comparability were considered to be essential when selecting methods.

3.1 Research Design

This study used a qualitative and comparative research design that situates Valmet Automotive at the focus point, consisting of literature review and analysis, comparative case studies, and thematic coding via ATLAS.ti to examine how regulatory environments and expectations influence ESG priorities, materiality, and reporting practices in both the automotive and defense industries. Case study companies were used to enable benchmarking and comparison within and across the sectors. When selecting the research design and approach, the study was initially presented in a master's thesis seminar at the University of Helsinki. Here, a peer reviewed and edited the approach and thesis work, and the seminar posed questions to improve the research design. Based on these factors, the research approach was modified slightly.

Given the exploratory and interpretive nature of the research questions, a qualitative research approach was appropriate because it enabled analysis of how companies identify and disclose material topics within their sustainability reports. This qualitative research design followed an overall abductive approach, combining theoretical and conceptual frameworks from existing literature with observations and results from corporate sustainability reports and related materials. Essentially, this research design allowed for the analysis of the findings via theoretical and conceptual ideas, such as institutional pressures and regulatory frameworks; in relation, the findings also may contextualize or add to these theoretical and conceptual ideas.

To add, a comparative research design was also chosen to understand and analyze the similarities and differences between the materiality and sustainability disclosure in the automotive and defense sectors. By examining companies in both sectors, the study was able to identify sector-

specific patterns, as well as relate these to the context of Valmet Automotive. Through this design, cross-sector analysis and practical application were facilitated.

3.2 Research Context

The research is situated within the context of the European ESG regulatory environment and focuses on companies in the automotive and defense sectors. The key company in focus is Valmet Automotive (VA), and it is compared to both the automotive and defense sector to help to understand the ESG materiality realities for companies operating across multiple sectors.

VA is a Finnish contract manufacturing and industrial technology company founded in 1968 and headquartered in Uusikaupunki, Finland. A global leader in vehicle contract manufacturing, VA has produced more than 1.9 million vehicles for several original equipment manufacturers (OEMs), such as Mercedes-Benz and Porsche, and has developed significant capabilities in electric mobility and advanced component systems across Europe. VA's operations span Finland, Germany, and Poland with business lines in roof and kinematic systems, as well as contract manufacturing in the automotive, defense, and other high-tech sectors. Following the divestment of the IONCOR business line in 2025, VA has shifted away from its own battery technologies. With a strategic focus on flexibility, quality, and speed in industrial serial production, VA has continued to position itself as a key partner for industrializing future technologies. As of 2025, the company's ownership changed, now including a majority stake held by the Finnish state (79%) and Pontos Group (21%) (Valmet Automotive, 2025).

In response to changes and challenges in the European automotive sector, VA has recently expanded its strategy to include not only the automotive manufacturing sector but the defense industry and other high-tech sectors. Leveraging decades of expertise in large-scale serial production, VA has signed strategic collaborations with several Finnish defense firms on the technology transfer related to the manufacturing of armored vehicles and related components in 2026. This transition reflects an EU, national, and industrial policy priority to strengthen domestic security supply and VA's own diversification strategy (Valmet Automotive, 2025).

Regarding ESG matters, sustainability has become an integral dimension of VA’s corporate strategy. For instance, the company has adopted science-based targets to reduce greenhouse gas emissions and publicly discloses its sustainability performance in accordance with recognized frameworks, transitioning towards the ESRS in anticipation of the CSRD. In the sixth edition of their annual sustainability report, VA completed a double materiality assessment; table 2 details the topics determined as material (Valmet Automotive, 2025). It is important to note that VA’s material topics reflect their operation within the automotive sector only as the company was not operating in the defense sector during 2024. Through this understanding of VA, the comparison of materiality and broader ESG reporting was facilitated.

Table 2. Valmet Automotive’s Material Topics (2024)

ESRS E-1 Climate Change	Climate Change
	Energy
ESRS E-2 Pollution	Volatile Organic Compounds (VOCs)
ESRS E-5 Circular Economy	Circular Economy
ESRS S-1 Own Workforce	Health and Safety
	Gender Equality and Equal Pay
	Data Privacy
	Secure Employment
	Development and Training
ESRS S-2 Workers in the Value Chain	Value Chain Workers

ESRS G-1 Business Conduct	Business Conduct
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3.3 Materials

The study used various materials to inform its understanding and results. First, the research included a desktop literature review and research of relevant primary and secondary source documents on ESG reporting, regulations, and industry expectations. For instance, examples included corporate sustainability reports, industry analyses, policy documents, media publications, and scientific and legal literature. These sources provided the foundation for understanding and comparing how companies utilize and interpret materiality, as well as respond to varying pressures and expectations within the realm of sustainability. These source documents were found and selected from search engines like Google Scholar using relevant key words and then saved for later reference. The use of publicly available data adds transparency and facilitates replicability of the study; however, it should be noted that the data reflects only externally communicated information from companies, and therefore, it might not fully capture the internal processes and understandings of materiality and sustainability reporting in these companies and sectors.

Next, the study selected six companies to facilitate meaningful cross-sector comparison generally and against VA. The comparison companies, namely three automotive and three defense companies, followed purposeful sampling based on VA’s customers and competitors, market share, and reputation in the sector in the European Union. Based on this purposeful sampling, the three selected companies in the automotive sector were the BMW Group (Germany), Mercedes-Benz Group (Germany), and the Volvo Group (Sweden); the three selected companies in the defense sector were Patria (Finland), Saab (Sweden), and Rheinmetall (Germany). For these companies, their most recent sustainability report publication, namely 2024, was used as the basis for understanding their current report and overall reporting, as well as a broader materiality and material topic comparison. Some of the companies published standalone sustainability reports, while others integrated their sustainability reports into their larger annual reports. In these cases, only the sustainability report sections were taken into account for the sake of comparability.

To ensure a manageable scope for this study, company publications on the year of 2024 are used in the analysis of materiality and sustainability reporting. As 2024 annual and sustainability reports are the most recent and up-to-date publications, this provides the most relevant and impactful results and insights into EU-based sustainability reporting. To avoid confusion, it is important to note that many of these publications on 2024 were published later, such as in 2025. To stay up to date on the evolving regulatory environment, however, some more recent sources were also used; these were used in building parts of the conceptual framework, as well as in the discussion of results and the creation of recommendations for VA. In addition, while other sustainability and reporting frameworks exist globally, such as the Sustainability Accounting Standards Board (SASB) and the Global Reporting Initiative (GRI), this study focuses on the CSRD and related ESRS; the key company, Valmet Automotive, is located within the EU, and the CSRD and European Sustainability Reporting Standards (ESRS) are the most relevant to their operation. Therefore, the scope is set to focus on the EU and companies based within the EU.

3.4 Methods of the Study

This study applies a qualitative content analysis which is supported by the use of ATLAS.ti software; this approach is used to examine materiality and ESG reporting across the selected companies. First, with the saved documents from desktop literature review and the selected companies, ATLAS.ti was used to code the dataset of documents; these documents were imported into ATLAS.ti. The coding strategy followed a hybrid approach. First, deductive coding was implemented based on different themes, such as within the CSRD framework. These codes were concrete and directly correlated to the theme or standard. Next, inductive coding was used to capture emerging patterns, such as in company responses and unique sectoral challenges. These codes allow for comparison, as well as insights into materiality articulation, gaps, and strategic alignment across the industry in an organized manner. This hybrid coding strategy is consistent with the abductive and comparative research design as this study's analysis involves continuous interaction between both the theory and concepts with the observations and results.

After coding all documents, the findings were analyzed via comparative analysis techniques. For example, a code for company reporting on the CSRD's ESRS E1 about climate change allowed for simple and accurate comparison across the selected companies and industries.

This comparative analysis included the number of material topics and reported material topics, as well as the focuses of different ESG areas in the companies and sectors. The results from the coding, such as specific information or the number of code instances, were noted and used when writing the results and discussion sections of the thesis. In total, this study used 7 different main codes with 23 subcodes under the materiality code; the codes were used in 192 instances across the documents and sources. For a complete list of codes, see the Appendix (Table A1).

The analysis also used elements of the conceptual framework, such as in interpreting the influences of the regulatory environment, standards, and institutional pressures on materiality and ESG reporting. This further reflects the overall abductive nature of this study as theoretical and conceptual ideas are used to understand and explain observed patterns and results. This combination of qualitative research methods created an integrated analytical strategy consisting of desktop research and literature review, ATLAS.ti coding, and comparative case analyses. Finally, after data collection and coding, the manuscript was written and later edited.

4. Results

4.1 Automotive Sector

The three selected companies in the automotive sector, namely the BMW Group, the Mercedes-Benz Group, and the Volvo Group, each identified and reported several material topics in their 2024 annual reports. The following section will detail the material topics of each of the three companies, as well as analyze trends across the industry and in relation to VA.

4.1.1 BMW Group

The BMW Group is a global leader in the automotive industry, headquartered in Munich, Germany. Operating with the core purpose “to move body, heart, and mind,” the Group offers a diverse portfolio of brands, such as BMW and Rolls-Royce. With more than 30 production sites worldwide, a 2024 revenue of 142.38 billion euros, and 158,441 employees (as of December 31, 2024), the Group is taking steps toward electrification, digitalization, and sustainable circular economy (BMW Group, 2025).

The material topics from BMW’s 2024 Annual Report are reported according to the ESRS, considering upstream and downstream of the total value chain, as well as their own operations; a total of 31 topics were reported as material in 2024. Within the environmental section, E-1 Climate Change (mitigation, adaptation, energy), E-2 Pollution (water, soil, microplastics), E-3 Water and Marine Resources (consumption, withdrawals), E-4 Biodiversity (direct exploitation), and E-5 Circular Economy (resource inflows/outflows, waste) were assessed as material (BMW Group, 2025).

Next, the social topics of S-1 Own Workforce (health and safety, gender equality, diversity, training, secure employment, social dialogue), S-2 Workers in the Value Chain (working time, freedom of association, child/forced labor), and S-4 Consumers and End-users (information access, privacy, safety, child protection) were determined to be material. Finally, within the governance section, G-1 Business Conduct (corruption/bribery prevention, political engagement, and lobbying) was reported as material.

4.1.2 Mercedes-Benz Group

The Mercedes-Benz Group is another global player in the automotive industry. Based in Stuttgart, Germany, the company is a leading provider of high-end luxury cars and vans. Employing 175,264 people (as of December 31, 2024) and generating 145.6 billion euros in revenue in 2024, Mercedes-Benz is governed by their “Ambition 2039,” which ultimately aims for a net carbon-neutral vehicle fleet across the entire value chain; the Group also aims to lead in electric vehicles, as well as driving and digital systems (Mercedes-Benz Group, 2025).

From their 2024 Annual Report, the Mercedes-Benz Group determined and consolidated their materiality into six areas, namely Decarbonization, Resource Use and Circularity, People, Human Rights, Digital Trust, and Traffic Safety. More broadly, the Group assessed 10 topics as material in total, with more granular inventories of material impacts risks, and opportunities categorized under these (Mercedes-Benz Group, 2025).

The materiality assessment considered both the upstream and downstream, as well as their own operations. The Group also reported that the following environmental topics were material, specifically E-1 Climate Change, E-2 Pollution (air, water, soil, microplastics), E-3 Water and Marine Resources, E-4 Biodiversity, E-5 Resource Use and Circular Economy.

Additionally, the social topics of S-1 Own Workforce (qualification, remuneration, working conditions), S-2 Workers in the Value Chain, S-3 Affected Communities (land/indigenous rights, water quality), and S-4 Consumers and End-users (cyberattacks, traffic safety), as well as the governance topic of G-1 Business Conduct (corporate culture, anti-corruption, political influence) were assessed as material for this year. (Mercedes-Benz Group, 2025).

4.1.3 Volvo Group

The Volvo Group is a leading global provider of transport and infrastructure solutions, ranging from cars and buses to construction equipment and power solutions. The Group, headquartered in Gothenburg, Sweden, employs around 102,000 individuals (as of December 31, 2024) and serves customers in around 180 markets. The Volvo Group’s net sales totaled 526.8 billion SEK (approximately 46 billion euros). Volvo is driven by the mission to “drive prosperity”

and is focusing on a strategy of long-term vision and solutions that are “100% safe, 100% fossil-free, and 100% more productive” (Volvo Group, 2025).

From the Volvo Group’s 2024 Annual Report, their materiality assessment based on upstream, downstream, and own operation considerations determined that 16 topics were material. The following environmental topics were material, specifically E-1 Climate (GHG emissions downstream/use phase, upstream goods/services, and own operations), E-2 Pollution to air in the use phase, E-5 Resource Use (waste from operations). The social topics were S-1 Own Workforce (health and safety, diversity, collective bargaining, non-discrimination), S-2 Value Chain Workers (rights, child/forced labor), S-3/S-4 Communities and End-users (impacts from sold products, product/traffic safety). Finally, the governance topics were G-1 Business Conduct (corporate culture, anti-corruption) and Political Engagement.

4.1.4 Automotive Sector Comparison

Based on the 2024 material topics of four companies in the European automotive sector, clear trends have emerged. The transition to electrified and digitalized mobility and transportation serves as a crucial driver in the sector, as reflected by their material topics. All of the four companies have increasingly aligned their sustainability disclosures with the CSRD and ESRS, as well as completed double materiality assessments. The following tables provide a comprehensive overview of the material topics, categorized by ESRS topic (Table 3), number of material topics (Table 4), and material subtopic areas (Table 5). The findings from these results will be discussed further in the discussion sector.

Table 3. Material Topics Under ESRS Comparison in the Automotive Sector (2024)

	BMW	Mercedes-Benz	Volvo	VA
ESRS E-1: Climate Change	✓	✓	✓	✓
ESRS E-2: Pollution	✓	✓	✓	✓
ESRS E-3: Water and Marine Resources	✓	✓	✗	✗
ESRS E-4: Biodiversity and Ecosystems	✓	✓	✗	✗
ESRS E-5: Resource Use and Circular Economy	✓	✓	✓	✓
ESRS S-1: Own Workforce	✓	✓	✓	✓
ESRS S-2: Workers in the Value Chain	✓	✓	✓	✓
ESRS S-3: Affected Communities	✗	✓	✓	✗
ESRS S-4: Consumers and End-users	✓	✓	✓	✗
ESRS G-1: Business Conduct	✓	✓	✓	✓

Table 4. Number of Material Topics Comparison in the Automotive Sector (2024)

	BMW	Mercedes-Benz	Volvo	VA
Number of Material Topics	31	10	16	11

Table 5. Material Subtopic Area Comparison in the Automotive Sector (2024)

	BMW	Mercedes-Benz	Volvo	VA
Climate Change	✓	✓	✓	✓
Energy Management	✓	✓	✓	✓
Air Pollution (VOCs/Exhaust)	✗	✓	✓	✓
Pollution: Soil and Chemicals	✓	✓	✗	✗
Microplastics	✓	✓	✗	✗
Water Management	✓	✓	✗	✓*
Biodiversity	✓	✓	✗	✗
Circular Economy and Waste	✓	✓	✓	✓
Health & Safety	✓	✓	✓	✓
Diversity	✓	✓	✓	✓
Secure Employment	✓	✓	✓	✓
Human Rights	✓	✓	✓	✓
Affected Communities	✗	✓	✓	✗
Consumers and Product Safety	✓	✓	✓	✗
Data Trust and Privacy	✓	✓	✓	✓
Anti-Corruption & Ethics	✓	✓	✓	✓
Lobbying & Political Topics	✓	✓	✓	✗
Export Compliance	✗	✗	✗	✗
Industrial Cooperation	✗	✗	✗	✗

*Note: *The light green marking under water management indicates that the topic of water was not assessed to be material. Rather, the topic was included under resource use and circular economy.*

4.2 Defense Sector

The three selected companies in the defense sector, Patria, Saab, and Rheinmetall, also identified and reported upon their materiality assessments and material topics for the 2024 reporting year. The following section will detail the material topics of these companies, as well as compare them across the industry and in reference to VA.

4.2.1 Patria

Patria is an international provider of defense, security, and aviation support services based in Helsinki, Finland, with offered products such as armored vehicles and defense and

weapon systems. Primarily owned by the Finnish state, Patria aims to provide national security and confidence in all conditions through operations on land, sea, air, and networks. The company employs around 3,000 individuals (as of December 31, 2024), had 825.7 million euros in net sales, and notably has partnered with the Finnish Defense Forces (Patria, 2025).

Patria determined that six topics were material in their annual sustainability report. More specifically, these topics are E-1 Climate Change, E-5 Circular Economy, S-1 Own Workforce, S-3 Affected Communities, S-4 Consumers and End-users, and G-1 Business Conduct.

4.2.2 Saab

Saab is a high-technology company focused on the defense and security market based in Stockholm, Sweden. The company has evolved to provide advanced solutions in air, land, sea, and cyber areas, with products ranging from fighter aircraft and submarines to radar systems. Saab employs around 24,500 people (as of December 31, 2024), serves customers in over 100 countries, and is committed to its mission of keeping people and society safe through innovation and strategic partnerships. In 2024, Saab's net sales were 62.75 billion SEK (approximately 5.6 billion euros) (Saab AB, 2025).

Saab categorized their material topics into four areas, resilient and safe societies, green and social transition, innovation and partnerships, and new for 2024. Within the Resilient and Safe Societies area, the material topics included Business and Human Rights (responsible sourcing/sales), Anti-corruption, Information Security, Export Compliance. These included portions of S-2, S-3, and G-1, as well as Saab's own targets.

Within the Green and Social Transition, material topics were Climate Impact (adaptation, mitigation, energy), Substances of Concern (SoC/SVHC), Circular Economy (resource use, waste), and Occupational Health and Safety. These topics relate to the disclosure requirements from E-1, E-2, E-5, and S-1. Next, Innovation and Partnerships included topics on Diversity and Inclusion, Sustainable Innovation, and Industrial Cooperation and Partnerships, which are associated with S-1 and Saab's own topics. Finally, the New for 2024 area disclosed the topics of

Political Engagement, Secure Employment, Gender Equality, and Training/Skills development as material, ultimately relating to ESRS S-1 and G-1.

4.2.3 Rheinmetall

Rheinmetall is an international company operating within dual sectors, namely the defense and mobility sectors. Based in Düsseldorf, Germany, the company specializes in defense and security technology and vehicle systems, such as armored vehicles, air defense, ammunition, and engine parts; Rheinmetall serves both military and civilian markets. Employing approximately 28,539 individuals (as of December 31, 2024), the company plays a critical role in strengthening EU defense capabilities, as well as electrification in vehicles. The company's net sales were 9.75 billion euros in 2024 (Rheinmetall, 2025).

Based on Rheinmetall's materiality assessment, six topics were also determined to be material. The topics include the following: E-1 Climate Change, E-2 Pollution (specifically soil), S-1 Own Workforce, S-2 Workers in the Value Chain, S-4 Consumers and End-users, and G-1 Business Conduct. These material topics follow the ESRS directly.

In addition, Rheinmetall detailed out the topics assessed as non-material, as well as the reasoning behind their assessment; these topics included E-3 Water and Marine Resources, E-4 Biodiversity, E-5 Circular Economy, and S-3 Affected Communities. For example, they reported under their E-4 justification that, "the Rheinmetall Group has sites in the vicinity of biodiversity sensitive areas. During an investigation, it was determined that no corrective measures need to be taken with regard to these areas" (Rheinmetall, 2025). Even though these topics were not determined to be material, data is at times disclosed voluntarily in the report.

4.2.4 Defense Sector Comparison

According to the 2024 double materiality assessments from three companies in the defense sector, namely Patria, Saab, Rheinmetall, as well as Valmet Automotive, trends have also emerged. For reference, VA's 2024 material topics are reflective of the automotive industry only; as they are expanding to the defense industry as well, they have been included in the comparison for the sake of perspective and insights. Geopolitical and ethical responsibilities are critical drivers in the

sector and are ultimately reflected in the material topics of the industry. All of the companies have increasingly aligned their disclosures with the CSRD and ESRS, and they all completed double materiality assessments. The following tables provide an overview of the material topics, categorized by ESRS topic (Table 6), number of material topics (Table 7), and material subtopic areas (Table 8). The findings from these results will also be discussed further in the discussion.

Table 6. Material Topic Comparison in the Defense Sector (2024)

	Patria	Saab	Rheinmetall	VA
ESRS E-1: Climate Change	✓	✓	✓	✓
ESRS E-2: Pollution	✗	✓	✓	✓
ESRS E-3: Water and Marine Resources	✗	✗	✗	✗
ESRS E-4: Biodiversity and Ecosystems	✗	✗	✗	✗
ESRS E-5: Resource Use and Circular Economy	✓	✓	✗	✓
ESRS S-1: Own Workforce	✓	✓	✓	✓
ESRS S-2: Workers in the Value Chain	✗	✓	✓	✓
ESRS S-3: Affected Communities	✓	✓	✗	✗
ESRS S-4: Consumers and End-users	✓	✗	✓	✗
ESRS G-1: Business Conduct	✓	✓	✓	✓

Table 7. Number of Material Topics Comparison in the Defense Sector (2024)

	Patria	Saab	Rheinmetall	VA
Number of Material Topics	6	13	6	11

Table 8. Material Subtopic Area Comparison in the Defense Sector (2024)

	Patria	Saab	Rheinmetall	VA
Climate Change	✓	✓	✓	✓
Energy Management	✓	✓	✓	✓
Air Pollution (VOCs/Exhaust)	✗	✓	✗	✓
Pollution: Soil and Chemicals	✗	✓	✓	✗
Microplastics	✗	✗	✗	✗
Water Management	✗	✓*	✗	✓*
Biodiversity	✗	✗	✗	✗
Circular Economy and Waste	✓	✓	✗	✓
Health & Safety	✓	✓	✓	✓
Diversity	✓	✓	✓	✓
Secure Employment	✗	✓	✓	✓
Human Rights	✓	✓	✓	✓
Affected Communities	✓	✓	✗	✗
Consumers and Product Safety	✓	✗	✓	✗
Data Trust and Privacy	✓	✓	✓	✓
Anti-Corruption & Ethics	✓	✓	✓	✓
Lobbying & Political Topics	✓	✓	✗	✗
Export Compliance	✓	✓	✓	✗
Industrial Cooperation	✓	✓	✓	✗

*Note: *The light green marking under water management indicates that the topic of water was not assessed to be material. Rather, the topic was included under resource use and circular economy.*

5. Discussion

5.1 How Do the Material Topics Differ Between the Automotive and Defense Sectors?

When comparatively analyzing the materiality disclosures between the automotive and defense sectors, a clear sectoral divergence in ESG priorities can be observed. These differences can be interpreted through institutional theory, as well as the rest of the conceptual framework. While both of these sectors adopt similar reporting structures under various evolving EU frameworks, the actual content and material topics differ. The automotive sector placed a strong emphasis on climate-related topics, such as Scope 1-3 emissions, electrification, and supply chain decarbonization, which could reflect forms of coercive, normative, and mimetic pressures. In contrast, companies in the defense sector focused on governance-related topics, including anti-corruption, compliance, export control, and privacy. This divergence suggests that sector-specific operational risks and risk management shape materiality topic outcomes despite increasing regulatory harmonization in the EU. This section will discuss how the material topics differ by each ESG category (See Tables 9 and 10).

Table 9. Material Topic Comparison of VA Against the Automotive and Defense Sectors (2024)

	Automotive Sector (BMW, Mercedes-Benz, and Volvo)	VA	Defense Sector (Patria, Saab, and Rheinmetall)	
ESRS E-1: Climate Change	Material for All	Material for All	Material for All	Material for All
ESRS E-2: Pollution	Material for 2/3	Material for 2/3	Material for 2/3	Material for 2/3
ESRS E-3: Water and Marine Resources	Material for 1/3	Not Material	Material for 1/3	Material for 1/3
ESRS E-4: Biodiversity and Ecosystems	Material for 1/3	Not Material	Material for 1/3	Material for 1/3
ESRS E-5: Resource Use and Circular Economy	Material for All	Material for All	Material for 2/3	Material for 2/3
ESRS S-1: Own Workforce	Material for All	Material for All	Material for All	Material for All
ESRS S-2: Workers in the Value Chain	Material for All	Material for All	Material for 2/3	Material for 2/3
ESRS S-3: Affected Communities	Material for 1/3	Not Material	Material for 1/3	Material for 1/3
ESRS S-4: Consumers and End-users	Material for All	Material for All	Material for 2/3	Material for 2/3
ESRS G-1: Business Conduct	Material for All	Material for All	Material for All	Material for All

Table 10. Material Subtopic Area Comparison of VA Against the Automotive and Defense Sectors (2024)

	Automotive Sector (BMW, Mercedes-Benz, and Volvo)	VA	Defense Sector (Patria, Saab, and Rheinmetall)	
Climate Change	Green	Green	Green	Material for All
Energy Management	Green	Green	Green	Material for 2/3
Air Pollution (VOCs/Exhaust)	Yellow	Green	Orange	Material for 1/3
Pollution: Soil and Chemicals	Yellow	Red	Yellow	Not Material
Microplastics	Yellow	Red	Red	
Water Management	Yellow	Light Green *	Orange *	
Biodiversity	Yellow	Red	Red	
Circular Economy and Waste	Green	Green	Yellow	
Health & Safety	Green	Green	Green	
Diversity	Green	Green	Green	
Secure Employment	Green	Green	Yellow	
Human Rights	Green	Green	Green	
Affected Communities	Yellow	Red	Yellow	
Consumers and Product Safety	Green	Red	Yellow	
Data Trust and Privacy	Blue	Green	Green	
Anti-Corruption & Ethics	Green	Green	Green	
Lobbying & Political Topics	Green	Red	Yellow	
Export Compliance	Blue	Red	Green	
Industrial Cooperation	Blue	Red	Green	

Note: *The light green and orange markings under water management indicates that the topic of water was not assessed to be material by the relevant company. Rather, the topic was included under resource use and circular economy.

5.1.1 Environmental Topics

Looking at the automotive sector, there is a large focus on environmental materiality; these sections within company sustainability statements and reports were very detailed and included several measured KPIs and targets. BMW and Mercedes-Benz both reported all five environmental topics of the ESRS as material, while Volvo and VA both reported three out of five as material (See Table 3). All companies reported Climate Change (E-1), Pollution (E-2), and Circular Economy (E-5) as material in 2024, demonstrating sectoral alignment in these ESRS topical areas.

On the other hand, companies within the defense sector reported fewer environmental topics as material. Patria and Rheinmetall only marked two out of five ESRS topics as material,

while Saab and VA market three out of five as material (See Table 6). The only ESRS topic with material consensus was climate change (E-1); on a sub-topic level, climate change and energy management were the only two topics with sector-wide materiality, both of which fall under E-1.

Climate-related topics, such as greenhouse gas emissions, were a priority in both the automotive and defense company reports. However, the focus differs significantly due to their products and product uses. In the automotive sector, there is a heavy emphasis on Scope 3 emissions, namely indirect emissions in the value chain, and especially downstream “use-phase” emissions of vehicles by BMW, Mercedes-Benz, and Volvo; scope 3 emissions were discussed by VA as well, but due to the nature of contract manufacturing for other companies, “use-phase” emissions were not emphasized (Valmet Automotive, 2025). Importantly, all companies analyzed had validated Science Based Targets (SBTi) for reducing their greenhouse gas emissions. This focus on emissions across the value chain and use phase reflects the large fleet-wide carbon footprint of passenger and commercial vehicles produced by these companies, as well as their shifting strategies towards electrification and decarbonization. Conversely, while defense firms, such as Patria and Saab, also have validated SBTi’s, they have a different approach regarding product and operational emissions; the primary focus often is found in decarbonizing their own operations and manufacturing processes (Scope 1 and 2), given their limited influence over the operational use of defense equipment and technology by governments.

Next, pollution was another key topic from within the environmental section and reveals a divergence between manufacturing externalities and compliance. The automotive sector highlights air pollution, such as particulate matter from manufacturing and vehicle use and volatile organic compounds (VOCs) from paint shop operations, as significant material topics. Additionally, BMW and Mercedes-Benz add microplastic pollution from tire wear as a material topic. Air and microplastic pollution are negative impacts directly tied to the automotive sector’s operations and their product portfolio, and therefore, the materiality assessments reflect their sectoral reality. In contrast, companies in the defense sector like Saab and Rheinmetall highlight substances of concern, such as hazardous materials and chemicals, rather than air and microplastic pollution. The use of these hazardous chemicals and materials could be due to the fact that defense equipment must endure extreme conditions and environments, often requiring specialized chemicals or

materials that are subject to specific and strict regulatory exemptions and phase-out protocols (Saab, 2025). This is not material in all defense companies analyzed though. For example, Patria did not include pollution as a material topic. This exception could be attributed to differences in product offerings and operations. Still, the majority of analyzed defense companies listed pollution as material.

Circular economy is another material topic that showcases the differences between the automotive and defense sectors. For the automotive sector, the topic represents a core strategic pivot, while for the defense sector, it is currently more of a matter of operational efficiency. For example, Mercedes-Benz and BMW prioritize circularity in resource use to decouple resource consumption from production growth. Specific examples in these companies are found in battery recycling for electric vehicles, as well as the procurement of recovered secondary materials like steel and aluminum (Mercedes-Benz Group, 2025; BMW Group, 2025). With all automotive companies identifying circular economy as material, a clear message of strategic importance to the sector is illustrated. Companies in the defense sector like Patria and Saab have also identified circular economy as material in 2024 (Patria, 2025; Saab, 2025). However, part of the focus is on aligning circularity with lifecycle support, emphasizing maintenance and repair to extend the lifespan of defense assets. One important distinction in the defense sector is that Rheinmetall did not identify circular economy as material. This could illustrate the assumption that the defense sector does not view circularity in the same way as the automotive sector yet. For the automotive sector, circularity is a strategic risk and opportunity, while for the defense sector, consensus and prioritization on the topic are still developing.

Finally, nature-related topics, such as water and marine resources (E-3) and biodiversity (E-4), are more material for automotive companies, specifically in the upstream of the value chain. BMW and Mercedes-Benz identified raw material extraction, such as lithium and cobalt, as a material negative impact in relation to biodiversity and regional water stress (Mercedes-Benz Group, 2025; BMW Group, 2025). However, no defense firms marked these topics as material. Even so, some companies, such as Rheinmetall, determined that their production sites near sensitive areas related to biodiversity and water did not require corrective action (Rheinmetall, 2025). This suggests that defense firms typically just monitor environmental management, such as

through ISO 14001, while the mineral-intensive automotive sector sees these topics as essential to their strategies, supply chains, and continued operation.

Overall, the general trend present is the automotive sector's prioritization of environmental topics in double materiality assessments, especially climate change, pollution, and circular economy. This focus on environmental topics in materiality demonstrates the relevance and impactfulness of environmental topics on the sector as a whole, such as the sector's direct contribution to manufacturing and transport emissions, as well as exposure to and scrutiny under EU climate policy. Automotive firms operate within a sector full of regulatory pressures to decarbonize vehicle fleets, as well as their production; these are driven by institutional pressures, EU climate targets, and emission standards. As a result, the focus on environmental topic materiality is not a coincidence. These topics are not only crucial to reputation but also are financially and strategically material to the firm. On the other hand, the defense sector material topic disclosure trend showcases that while environmental themes are present in defense company ESG reporting, they are usually less prominent and standardized when compared to the automotive sector. This could be due to the sector having less scrutiny on environmental topics, as well as government backing with regulatory exemptions due to national security needs. Still, climate change and uniquely, hazardous chemical pollution, are key material topic takeaways for the defense sector.

5.1.2 Social Topics

Topics within the social section were also key priorities of the automotive and defense sectors. All analyzed companies marked S-1 Own Workforce as material with subtopics such as health and safety disclosed in detail. For instance, Valmet Automotive has implemented and disclosed a comprehensive health and safety policy, actions and targets which align with industry standards (Valmet Automotive, 2025). This material topic remains most consistent across companies in this study, mostly varying due to differences in company policy and approaches.

Human rights in the value chain relating to S-2 is a material topic for both sectors, but the focuses are different by industry. Three out of four defense companies marked this as material, while all automotive companies evaluated it as material. For example, the automotive industry focuses on raw material sourcing, such as with child and forced labor in mining. As material

sourcing and related concerns are prevalent in the automotive sector relating to EVs, auto parts, and batteries, this is shown clearly with their consensus on materiality here. In the defense industry, human rights materiality is often associated with product end-use. For instance, Saab was the first global defense company to implement a downstream due diligence process in accordance with the UN Guiding Principles for Business and Human Rights for responsible sales and business area surveillance (Saab, 2025). However, not all companies here marked this as material and could possibly reflect operational differences between companies.

Regarding S-3 Affected Communities, there is a different approach and focus between the automotive and defense sectors. The lenses through which this topic is viewed vary, ranging from local site impacts to national sovereignty and regional security. For instance, BMW engages with the local residents who live near production sites (BMW, 2025). Mercedes-Benz considers the rights of indigenous groups within the context of raw material extraction (Mercedes-Benz, 2025). The general trend within the automotive sector is the fact that affected communities are viewed through a localized lens, namely one that focuses on those close to operations and the value chain. On the other hand, defense firms generally view affected communities in a different way with material impacts on affected communities linked to national security and international peace. Saab and Patria include perspectives that argue their operations and industry support sustainable development by providing the necessary security required for a society to function; Patria states, “in an increasingly instable world, our industry has an important role to play, to support peace as pre-condition of sustainable development” (Patria, 2025; Saab, 2025). In addition, the defense sector displays robust human rights policies and due diligence procedures related to affected communities. Therefore, the defense industry introduces an extra dimension to the notion of affected communities. Rather than just looking at direct impacts on local communities, the sector sees itself as a catalyst for creating resilient and safe societies, as well as protectors of national sovereignty and values. There is overlap between these perspectives on the material topic of affected communities in an operational sense, but the major difference between the two sectors is exhibited in the extent to which the topic is applied.

Finally, S-4 Consumers and End-users is commonly reported in the automotive sector with three out of four companies reporting it as material. In defense, the number is two out of four. This difference could be due to the customer-oriented nature of automotive products, such as cars for

everyday life. Specifically for Valmet Automotive, S-4 is not a material topic due to being a contract manufacturer (Valmet Automotive, 2025).

Overall, the disclosure and subsequent focus of social topics is slightly different between the two sectors. While the automotive sector aims for a more localized and specific view of operational excellence in relation to their own workforce, value chain, affected communities, and products, the defense sector expands the extent to which social topics apply. While both sectors include management of their own workforces and consideration of the value chain based on this study, the trend of focus in the defense sector is one of broader scope and concentrated narratives.

5.1.3 Governance Topics

Business Conduct (G-1), such as with the prevention of corruption and bribery, is identified as material for all companies in both sectors. While the topic is universally material, the focus and reasoning behind materiality differs slightly between the two sectors. For automotive companies, robust and ethical business conduct is crucial for maintaining brand integrity and managing a global network of suppliers, customers, and users. In slight contrast, the defense sector faces higher scrutiny in business conduct due to primarily serving governments, as well as operation in highly regulated markets. Here, ethical breaches or shortcomings could be extremely detrimental to business and result in operation closures. As a result, many defense firms have extensive anti-corruption compliance programs to align with international humanitarian law and the UN Convention Against Corruption (Saab, 2025). Within the topic of Business Conduct, there are several subtopic areas to discuss.

The largest difference between the automotive and defense sector governance disclosure is found with export compliance. Saab, Patria, and Rheinmetall all list export control as highly material; the legal right to operate and sell products is dependent on the adherence to strict national and EU trade laws on defense-related products (Patria, 2025; Rheinmetall, 2025; Saab, 2025). Additionally, the risk of diversion or misuse of defense products, such as weapons or military vehicles, is a constant risk to manage. On the other hand, zero out of the four automotive companies raised this topic as material in 2024; this could reflect the different levels of risk and scrutiny present in the two sectors.

With the advancement of AI and the increasing digitalization of the world, digital trust and cybersecurity are two common material topics in both sectors. However, the automotive sector mostly identifies these topics as material due to customer privacy, while the defense sector focuses on the protection of classified data and national security interests (BMW, 2025; Mercedes-Benz, 2025; Patria, 2025; Saab, 2025, Volvo, 2025).

Finally, political engagement and lobbying materiality topic's focus differs between the two sectors. Regarding the automotive sector, companies like Volvo and BMW focus on political engagement in relation to, for example, shaping fleet emission standards in the EU (Volvo, 2025; BMW, 2025). The automotive sector's political engagement and lobbying surrounds infrastructure development, business opportunities, and economic policy to benefit continued operation and growth. On the other hand, defense companies like Patria and Saab concentrate on engagement with governments and national defense strategies, as well as with NATO integration and general legislation related to defense procurement (Patria, 2025; Saab, 2025). This dialogue is therefore centered on the strategies surrounding long-term success, as well as the importance of the domestic defense industrial base for national and wider NATO security.

Overall, the approach to and ultimate disclosure of governance topics in these two sectors follows a similar surface-level trend of the prioritization of responsible business conduct. However, major differences reveal themselves within the governance sections of company annual reports. The defense sector extensively discloses on anti-corruption, compliance, export control, privacy, and political lobbying due to their unique positioning in national and regional security industrial bases, as well as the sensitive nature of their products and portfolios. On the other hand, the automotive sector discloses mostly on ethical business conduct with fewer included subtopic areas; this could be due to operating in a sector with different levels of scrutiny, as well as business priorities in terms of customers and end-users.

5.2 What Are the Key Drivers Behind the Changes in ESG Materiality in these Sectors?

The primary drivers behind the evolving ESG materiality landscape in the automotive and defense sectors in the EU are coercive regulatory pressures, shifting market expectations, and current geopolitical contexts. With human activity, especially in high-impact industries like the automotive and defense sectors, continuing to push past planetary boundaries, ESG reporting has

moved from voluntary toward a standardized and mandatory reporting regime (Stockholm Resilience Centre, 2025; Steinhauer et al., 2025). In the EU, the largest catalyst for this change is the CSRD and the ESRS; the CSRD has transformed materiality from simply a voluntary concept and management tool to an institutionalized legal cornerstone of corporate transparency, accountability, and disclosure (Dunfjäll, 2025; Martinčević et al., 2025). The reporting framework and standards in the CSRD are foundational in forming double materiality and double materiality assessments and therefore, help to drive the shifts in ESG materiality. Under the double materiality approach, companies are compelled to not only evaluate how their operations impact the world but also how environmental and social factors pose financial risks to their operations and business models. As a result, topics that might have been in the periphery of corporate sustainability previously have now been evaluated and elevated as strategic disclosures both financially and in risk management. Looking at the material topics of the studied companies, almost all material topics reported aligned with the ESRS topics. Importantly, the findings on environmental, social, and governance material topics of this study suggest that regulatory shifts in the EU under the CSRD do not entirely eliminate sector-specific differences in materiality priorities. While reporting standards continue to standardize, the topics of materiality as shown by this study remain influenced by the industry itself. Thus, regulatory evolution and pressures shape the process and concept of materiality and materiality assessments but does not totally homogenize the actual outcomes.

Through the lens of institutional theory, the concept of coercive isomorphism helps to explain regulation as a driver of change (Björklin & Wallin, 2025). Here, organizations align their structures and reporting behavior with formal regulatory mandates, such as the CSRD in this case, to avoid penalties and gain legal legitimacy (Ding & Wang, 2025). As organizations are very dependent on their institutional environments, companies must comply with the CSRD to continue to operate. Therefore, using institutional theory, regulations like the CSRD act as a central and mandatory driver to standardize corporate disclosure across the EU and helps to shape ESG materiality.

To continue, other EU regulations also shape materiality to varying extents in each sector in addition to the CSRD and ESRS. For instance, overarching EU strategies and regulations like

the European Green Deal and the “Fit for 55” legislative package influence the material topics for companies in the automotive sector through their focuses and standards. As decarbonization is a major theme in these regulations, companies must also reflect these priorities in their operations. Therefore, decarbonization-related topics are also evaluated as material in DMAs due to implemented EU regulation that impacts the company. This is also the case in the defense sector with, for example, the EU Defense Industrial Strategy (EDIS) and the European Defence Industry Programme (EDIP) (Demirci, 2024). Through the EDIS and EDIP’s focus on national and regional security via the defense procurement and production of the EDTIB, these priorities are also reflected in the defense sector’s material topics, such as in governance-related topics. Therefore, the CSRD and the complementary EU regulatory environment is a driver of changes in materiality in both sectors.

Shifting market expectations is another driver of the changing ESG materiality environment. In recent years, ESG performance has increasingly been viewed as a critical indicator for long-term operational resilience, value creation, and financial health (Huang et al., 2025; Vijaya et al., 2025). Sustainability data is no longer just a topic of interest. Rather, investors use qualitative and quantitative ESG disclosures to evaluate a firm in a variety of ways, such as a firm’s vulnerability to climate-related physical and transition risks in relation to supply chain disruptions (Gourdel et al., 2024). Double materiality is key component of sustainability reporting in the EU and contributes to more comprehensive and standardized disclosure. High-quality and data-driven sustainability reporting can help to investors to make better-informed investment decisions (Barangă & Ifrim, 2023). Consequently, companies who fail to meet these sustainability disclosures and expectations face higher risks related to cost of capital and investment, as well as possibly in their overall market valuation (Huang et al., 2025).

Beyond investors, market expectations are also shaped by companies themselves and consumers. Using the institutional theory’s lens again, market expectations can be explained via normative and mimetic isomorphism (Björklin & Wallin, 2025). As sustainability and sustainability reporting continue to become institutionalized as a professional norm within companies in the automotive and defense sectors in the EU, under normative isomorphism, companies will adopt and integrate these practices to signal alignment with current market expectations. Additionally, as consumers continue to expect sustainability from corporations,

companies will need to shift to once again signal alignment with current societal expectations found in the market. At the same time, mimetic isomorphism happens under uncertainty, such as downturns in the European automotive market or geopolitical instability; therefore, under this mimetic isomorphism principle, companies are drawn to imitate the ESG strategies of industry leaders to minimize risks and secure legitimacy in the eyes of the public (Azizi et al., 2025; Korsberg, 2025). These shifts could possibly be seen as one of the reasons for relative standardization of material topics in each sector respectively. As industry leaders shift toward, for example, electrification in the automotive sector, others often follow in their approach and subsequent disclosure.

Finally, the complex geopolitical stage of the present is another emerging driver of materiality and its changes, characterized by different trends in each sector. Global security tensions have heightened attention toward compliance, ethical procurement, and supply chain security. For the automotive sector, disruptions to supply chains, shifts with ICE vehicles and EVs, and international tariffs place significant pressure on their operations. This pressure is further complicated by the intense competition from Chinese manufacturers in areas like electric vehicles (Deubener et al., 2025). As a response, the EU has presented the Automotive Package to support the transition to clean mobility, industrial leadership, and strategic independence in an evolving global competition (European Commission, 2025d). Therefore, automotive companies' material topics are shaped by these geopolitical considerations as these are the conditions they operate within; critical to survival and success are decarbonization and electrification, supply chain resilience, and circular economy. In the defense sector, the ongoing Russia-Ukraine war has challenged the idea that defense budgets can just be reduced and rapidly increased European spending (Pedersen, 2024). The EU's response, namely the EDIS, has been designed to increase domestic production and reduce reliance on outside producers (Demirci, 2025). As geopolitical risks continue to evolve, the defense industry must be ready to meet these challenges. Consequently, materiality in the defense sector reflects the reality of needing to secure supplies and industries, maintaining a license to operate, and balancing national and regional peace with minimizing environmental damage inherent in military activities. This creates an intricate reporting environment where various ESG disclosures might need to be carefully managed or omitted while aiming to meet stakeholder and regulatory expectations.

5.3 What Are the Differences in ESG Reporting Norms Between the Automotive and Defense Sectors Under the CSRD?

The automotive and defense sectors both currently operate in scope of the CSRD and ESRS, and while there are many similarities between the structures of their sustainability disclosures, there are several distinct sectoral norm differences in reporting regarding transparency expectations and the number of material topics.

First, transparency expectations differ significantly between the two sectors and their reporting norms. Automotive companies often aim for high transparency regarding their products to gain a competitive edge. For instance, BMW uses their “Vehicle Footprint” reports to compile and provide comprehensive insights into their products at a very detailed level, and Mercedes-Benz is transitioning toward tracking 24 specific critical raw materials across their supply chain (BMW, 2025; Mercedes-Benz, 2025). Conversely, the defense industry faces difficulty in balancing ESG transparency with confidentiality tied to national security. For example, Patria explicitly states that, “Patria is not providing exact information of its material inflows used in its operations due to security reasons” (Patria, 2025). Saab and Rheinmetall both prioritize information security as material, reflecting the defense sector’s norm where certain data points, such as environmental, material, or supply chain data must remain confidential to protect national security interests (Rheinmetall, 2025; Saab, 2025). Therefore, these two sectors differ in their disclosure transparency norms due to their positioning in national economies and security.

Next, the number of material topics and the ultimate granularity of material topics also differ between the sectors; this difference could reflect varying levels of reporting maturity in relation to the CSRD and ESRS, as well as a more significant norm present within the sector. Automotive companies usually have a high level of granularity in their disclosures and material topics. For example, BMW marked 31 topics as material in their 2024 report with over 500 individual data points (BMW Group, 2025). On average, the four automotive companies had 17 material topics (See Table 4). While companies in the automotive sector might have a higher number of material topics, they also are usually grouped into strategic focus areas, such as Mercedes-Benz and Volvo, to ensure high-level management oversight (Mercedes-Benz, 2025; Volvo, 2025). In the defense industry, the number of material topics is typically lower; on average,

the four defense companies had 9 material topics (See Table 7). This norm difference suggests that automotive companies are generally more transparent in their reporting, while defense companies are usually more selective and cautious in their disclosure scopes.

5.4 How Do Evolving Regulatory Environments and Expectations Influence ESG Materiality, Priorities, and Reporting in Companies Operating Across Both the Automotive and Defense Sectors?

The evolving regulatory environment and expectations in the European Union influence companies in the automotive and defense sectors by requiring a transition from voluntary sustainability reporting to standardized, auditable, and strategically integrated sustainability disclosures. This transition is driven by the CSRD and the accompanying ESRS and double materiality principle. Here, companies in both sectors are obligated to identify, evaluate, and report on their “inside-out” impacts on the environment and society and their “outside-in” financial risks (Dunfjäll, 2025; Steinhauer et al., 2025). For dual-sector firms, namely those that operate across two sectors, as well as multiple sector firms, these pressures create a unique and complex reporting environment where institutional pressures and regulation shape the structure of the company’s sustainability agenda and disclosure. Here, regulatory shifts create an opportunity for the harmonization of material topics. However, the specific sectors ultimately dictate the material topics and reporting content and reveal possible strategic tensions for dual-sector companies (Korsberg, 2025; Martinčević et al., 2025).

In the automotive sector, the EU regulatory environment, such as with the “Fit for 55” legislative package, has driven environmental materiality topics to the forefront. Stringent targets and heavy penalties for non-compliance have required manufacturers to prioritize relevant topics, such as decarbonization, circular economy, and electrification, in their double materiality assessments (Vijaya et al., 2025). Additionally, challenges from global automotive and EV manufacturers and global trade fragmentation continue to exert pressure on European automotive companies. Through the present trend of transparent and data-driven sustainability reporting, automotive manufacturers might be able to not only demonstrate technological innovation but also maintain their competitive advantage in volatile markets in the EU and abroad. Conversely, in the defense sector, materiality is often focused on governance and social areas. As military activities often involve somewhat of a “sustainability paradox,” where production and readiness are costly

to the environment but essential for national security, defense firms often prioritize business ethics, export compliance, affected communities, and anti-corruption (Korsberg, 2025; Pedersen, 2024). Rapidly shifting geopolitical tensions, such as the Russia-Ukraine War and the introduction of the EDIS, have further increased pressure on defense companies to improve disclosure transparency to secure access to private financing from ESG-conscious investors and ensure compliance with EU regulation. However, it is important to note that disclosures in the defense sector are generally less transparent compared to the automotive sector due to implications to national security. Therefore, the regulatory environment in the EU directly shapes the material topics and the number and granularity of material topics in both sectors.

Expectations from the market also further influence sustainability reporting in both the automotive and defense sectors by shifting toward quantitative data and standardization (Björklin & Wallin, 2025; Panfilo et al., 2025). Investors utilize these data-driven and standardized disclosures through ESRS and the EU Taxonomy to reduce information asymmetry and decide on investments (Huang et al., 2025; Barangă & Ifrim, 2023). Therefore, market expectations continue to drive the priority of transparent and standardized sustainability reporting to ensure compliance and continued operation, as well as secure access to capital. As a result of strict regulation such as the CSRD and market expectations, companies reporting in the automotive and defense sectors are trending toward standardized sustainability disclosures with differences due to sectoral materiality variations and transparency norms. This demonstrates the priority of sustainability disclosures to not only comply with regulation but also leverage ESG as a risk management tool, value generating opportunity, and a differentiator.

Ultimately, companies that operate across both sectors face tension when aligning their double materiality assessments (DMA), but they can use the DMA as a strategic gateway. Here, firms must reconcile the quantifiable environmental and supply chain-related disclosure demands of the automotive industry with the intricate and sometimes confidential social and governance requirements of the defense industry. Through the DMA process, companies are compelled to consider and embed sustainability into their core strategy and risk management, transforming ESG from a mere compliance exercise to a way to create a competitive edge and ensure long-term survival in an increasingly volatile global economy.

5.5 Strategic Adaptation and Recommendations

For a company currently expanding from the automotive to also the defense industry, Valmet Automotive is positioning itself as a multiple sector firm. As a result, there are many opportunities but also strategic tensions in relation to double materiality and ESG disclosure. The following section details these recommendations for Valmet Automotive to strategically adapt to its new sector positioning, as well as navigate regulatory complexity, improve ESG reporting practices, and strengthen strategic positioning. These recommendations are based on the analysis of ESG double materiality, reporting norms, and regulatory expectations across the automotive and defense sectors as looked at by this study.

5.5.1 Recommendation 1: Acknowledge VA's New Sectoral ESG Realities

VA's expansion into the defense sector ushers in a new set of ESG-related norms and realities to consider with sustainability reporting and double materiality. In the coming double materiality assessment, investing additional time and consideration on topics central to the defense industry is essential to transitioning to this sector. Based on the findings from this study, the areas to consider and assess in this new operating space regarding VA's material topics are found in the social and governance topic areas. Examples of these topics include affected communities, export compliance, and industrial cooperation. When compared against its defense counterparts, VA generally performs relatively strongly in the environmental topic area due to its history in the automotive sector; the automotive sector reports environmental topics somewhat uniformly and more comprehensively (See Tables 9 and 10). However, with a changing product portfolio due to the sectoral shifts, VA's environmental topics must also be reexamined. For instance, pollution and hazardous chemicals are one of the most material topics in the environmental area for the defense sector. Therefore, VA must carefully consider and reconcile these benchmarked areas (See Tables 9 and 10) of difference in its upcoming DMA. By bridging these gaps, VA will be able to ensure its relevant material topics are evaluated.

5.5.2 Recommendation 2: Strengthen Alignment with CSRD-Compliant Disclosure

With EU sustainability regulation's continuing evolution, it is increasingly important for companies to ensure the alignment and compliance of their sustainability reporting and disclosures with these emerging standards. For companies operating in both the automotive and defense

sectors, aligning internal reporting procedures and external disclosures are essential for maintaining transparency, investor confidence, and ultimately regulatory compliance across sectors.

The second recommendation for Valmet Automotive is to continue to advance and strengthen its shift toward CSRD-aligned sustainability reporting. While not in scope yet, Valmet Automotive should position itself to be ready when the company does fall within under the CSRD; the scale and complexity of the CSRD and ESRS require dedicated and prolonged effort to ensure smooth transition and minimized risk of noncompliance. This transition toward the CSRD is essential for both sectors in the EU. Additionally, 80% of companies in the EU already report non-financial disclosures related to sustainability (Ioannou & Barkouki, 2025). Globally, 99% of companies in the S&P 500 reported on sustainability (Governance and Accountability Institute, 2025). As VA looks to continue to be a trusted manufacturing partner for both its owners and customers, specific and data-driven sustainability reporting is key.

In order to strengthen alignment with CSRD-compliant disclosure, VA has a few areas of action it can start on and ultimately leverage to its advantage while still not in the CSRD's scope. First, relevant internal ESG data management and processes could be considered and assessed. Effective sustainability reporting requires the availability of reliable, verifiable, and comparable data in environmental, social, and governance performance across its operations and increasingly into the value chain. For instance, a centralized ESG data collection and management system could enable systematic data monitoring, as well as create decision-useful narratives and prepare for auditing across countries. Such a system could also support more efficient reporting processes, as well as transparency. Within the topic of data and process management, Scope 3 value chain data processes are one key area of focus for VA; these are central to the strict climate disclosures of the automotive sector, as well as related to affected communities and due diligence scrutiny of the defense sector. In this time of transition, VA could reevaluate its current Scope 3 processes to ensure they are efficient and support the new ESG realities of the defense sector.

In addition to data infrastructure, the introduction and development of clear ESG key performance indicators (KPIs) are another essential step toward meeting regulatory expectations.

The CSRD requires companies to report on standardized metrics on topics such as climate, resource use, social topics, and governance. By having internal KPIs that directly correspond with ESRS disclosure requirements, VA can ensure that ESG performance is measurable, comparable, compliant, and integrated into overall corporate performance. In VA's current case, this could look like a KPI on energy intensity related to E1-7 or diversity metrics related to S1-8.

Through the alignment of its reporting structures with recognized sustainability reporting frameworks, VA can simultaneously support stakeholder transparency and regulatory compliance. Ultimately, proactive action regarding the EU's sustainability regulatory environment could boost VA's competitive edge and showcase VA's continuing role as a trusted manufacturing partner to customers, investors, and owners alike.

5.5.3 Recommendation 3: Optimize Governance, Compliance and Disclosure Strategies

As VA is now operating across two sectors, one of which is extremely influenced by geopolitical sensitivity, regulatory oversight, and overall scrutiny, the areas of governance, compliance, and disclosure are increasingly central to ESG performance and continued operation. Based on the findings from this study, governance-related topics such as export control, political lobbying, and industrial cooperation are highly material and have a prominent role in the defense sector (See Table 10). As VA expands its operations and product offerings within defense- and high-technology-related manufacturing, current governance and compliance frameworks should be reassessed, possibly updated and properly disclosed to reflect the new risks and opportunities of the sector. For instance, VA could assess its due diligence and oversight mechanisms and their subsequent disclosure as defense-related manufacturing is often subject to scrutiny and strict export regulations. Developing clear processes and policies for control, documentation, and the subsequent ESG disclosure of governance topics are crucial for minimizing operational and reputational risks in the defense sector; these could then be reported in VA's annual sustainability report to align with what companies in the automotive and defense sector are currently doing and trending toward doing with regard to relevance to VA. In an additional layer of complexity, VA needs to consider the reconciliation of the disclosure transparency expectations of the defense sector with the automotive sector and the ESRS. As a firm operating in multiple sectors, VA must transition to reporting according to the ESRS for the more transparent and granular automotive

industry, as well as for the added material topics of the defense industry before VA falls within scope of the CSRD. VA would benefit from fusing of these expectations and norms into their sustainability disclosure, as well as their core sustainability strategy to minimize the risks of transition and secure its competitive advantage as a uniquely positioned company operating in multiple sectors.

5.5.4 Recommendation 4: Integrate the DMA as a Strategic Management Tool

The introduction of double materiality and the DMA as a central tenant of EU sustainability regulation showcases a shift in how companies should evaluate and prioritize ESG topics. While many companies might initially approach the DMA as just a regulatory reporting requirement, it also has the potential to serve as a strategic management tool (Steinhauer et al., 2025).

For Valmet Automotive, deeply integrating DMA into strategic decision-making and related processes could improve the company's ability to find emerging risks and opportunities in its own operations and across the value chain, as well as support planning and resource allocation. Through the DMA's systematic approach to evaluating both financial and impact perspectives on ESG topics, VA could improve operations and prioritize investments that address the largest amount of material risks and opportunities to foster VA's competitive edge as a sustainable manufacturing and engineering partner. Specific potential applications include incorporating DMA insights into capital allocation decisions, as well as risk management processes (Dunfjäll, 2025). In capital allocation decisions, sustainability-related investments like supply chain sustainability initiatives, energy efficiency improvements, and governance risk mitigations programs can be viewed through the lens of the DMA to understand their impacts on overall performance and stakeholder expectations. Essentially, the DMA can help to inform investment prioritization and ensure alignment with VA's broader strategy and objectives. In risk management, DMA analysis can help to adapt to changes in both the regulatory and stakeholder expectation environments. By monitoring both the financial risks and environmental and societal impacts, this could strengthen the mitigation of risks and secure competitive advantage in both the short and long-term. Therefore, the DMA is a dynamic tool VA could consider to leverage to ensure regulatory preparedness and overall long-term resilience.

5.6 Reliability, Validity and Ethical Concerns

There are a few types of threats to validity that could impact this study's credibility and conclusions. To start with, one threat is researcher bias, where prior assumptions and ideas about sustainability, reporting, and practices in the automotive and defense sectors could impact how documents are interpreted or coded. Therefore, the researcher's positionality must be considered. In this case, the researcher has a strong interest in how organizations implement ESG frameworks in practice. The researcher has study and work experience in the United States, Finland, and China relating to sustainability, venture capital investment, and risk management, and these experiences have shaped their understanding of reporting and compliance. Their bachelor's studies in law shape how they read and interpret legal and policy documents and publications, and their master's studies in forest sciences add in background on environmental sciences. Additionally, Valmet Automotive is a company that the researcher has been working for on their sustainability team, and this research was commissioned by VA. With this, the researcher is aware that their access to and familiarity with the company may create an "insider perspective." At the same time, this proximity may lead to deeper insights into challenges and insights. To mitigate this possible bias, the coding process will be structured and transparent based on a combination of deductive and inductive codes and documentation, so documents and codes can be traced to their origins.

A second threat to validity is selection bias in the chosen comparison companies. These companies represent a limited portion of the sector and its ESG practices, or their sustainability reports may overreflect certain maturities and sizes. To address this bias, the sampling criteria are defined explicitly. Additionally, the aim of the study is not to claim statistical representativeness. Rather, it focuses on comparison and analysis to identify patterns and differences within ESG reporting in the automotive and defense sectors.

Next, while this study relies exclusively on publicly available documents and does not involve human participants, there are several ethical considerations that are relevant to its research design. To start, by using corporate sustainability reports, policy documents, and media sources, accurate representation of the material and fair interpretation are needed. As company reports, such as sustainability reports, are often strategically constructed around selective disclosure, there is also an ethical responsibility to avoid misinterpreting the conclusions. In response, the research's

analysis will use multiple primary and secondary sources to contextualize corporate claims and reports.

Additionally, as the research design includes companies from the defense sector, topics of confidentiality, national security, and political sensitivity could be relevant. While the research only uses publicly available information, there remains a risk of drawing conclusions that could potentially misrepresent details or motives. However, to mitigate this, the study explicitly limits its analysis to non-classified, publicly disclosed, sustainability-related materials and focuses on reporting behaviors, materiality interpretations, and ESG frameworks.

Finally, there could be ethical considerations related to data handling and transparency. All documents imported into ATLAS.ti are publicly accessible and do not contain personal information or data. In addition, analysis procedures will be documented transparently to ensure that conclusions can be traced back to specific data sources and documents. This enhances overall accountability and ethical rigor. Overall, the ethical implications of this research are addressed and mitigated through structured sourcing, transparent analysis, and a reliance on publicly available, non-sensitive information.

5.7 Broader Implications

The findings of this study have broader implications for both academic research and practice in industry and policy regarding corporate sustainability and reporting. The results of this study highlight the key underlying idea that while regulation such as the CSRD do help to standardize sustainability disclosure, the sector-specific realities strongly influence the content and disclosure. This contributes to the growing amount of literature on institutional and industry-related factors in corporate sustainability governance and sustainability reporting in the EU but also globally. For companies and policymakers alike, this study could help to inform decision-making when approaching the topic of corporate sustainability reporting. Next, this study showcases the increasing complexity faced by dual-sector and multiple sector companies in relation to ESG strategy and disclosure. For these companies, standardized reporting requirements may not only introduce opportunities for compliance and alignment but also tensions in transparency, materiality assessments, and overall sustainability disclosure. From this study, dual

and multiple sector companies, even if not in the defense or automotive sectors, can utilize the findings to further understand the intricacy and nuance of operating in multiple sectors with overarching ESG requirements, strategies, risks, and opportunities. Finally, the recommendations add to the idea that ESG reporting and DMAs can be more than just a compliance exercise; rather, they can be a strategic tool for risk management and value creation. With the regulatory environment and stakeholder expectations constantly evolving, this study can help to analyze the impacts of regulation on ESG disclosure in two large sectors in the EU, as well as assist companies operating in dual and multiple sector environments through its insights on DMA within corporate sustainability reporting.

5.8 Limitations and Future Research

This study is subject to a few limitations. First, the results and discussion are based on a limited sample of companies within the automotive and defense sectors; therefore, this limited sample could impact the generalizability of the results. While the selected companies do provide relevant insights into sustainability reporting practices and DMAs, a broader sample could yield more comprehensive results. The current sample was chosen via purposeful sampling based on VA's customers and competitors, market share, and sector reputation in the EU to find the most relevant companies for comparison.

Next, the study uses publicly available sustainability disclosures; therefore, these disclosures might not fully represent the complete scope of sustainability practices or decision-making in these companies or industries. As this research focuses on these public disclosures, this limitation is mostly mitigated. Finally, as the EU regulatory environment evolves such as with the CSRD, the corporate responses and actions could change rapidly as well. Therefore, the long-term applicability of these results could be impacted and may require adjustments.

To address these limitations and further the understanding of these topics, future research could focus on expanding the overall scope of the research and analysis, as well as include additional sectors for comparison. This could help to create more generalizable findings across the sectors. To continue, longer studies that analyze the evolution of corporate sustainability reporting in these sectors over a few years could provide insights into the impacts of regulation like the

CSRD in the long term. The current study is limited to the 2024 reporting year, so the long-term impacts and changes have limited visibility for comparison. Finally, future studies could expand upon and explore the impacts, risks, challenges, and opportunities of sustainability reporting and DMA via quantitative interviews with professionals, academics, and policymakers. This added layer of interviews and first-hand experience could provide additional insight into the topics of ESG reporting and DMA in dual and multiple sector firms from various perspectives.

6. Conclusion

This study examined how evolving regulatory environments and expectations in the European Union influence sustainability reporting and double materiality in companies operating in the automotive and defense sectors, with a focus on the implications for a multiple sector firm like Valmet Automotive through a qualitative research design consisting of literature review and analysis, comparative case studies, and thematic coding via ATLAS.ti. The results highlight that while regulatory developments, such as the CSRD and accompanying double materiality principle, have increased the overall standardization, formalization, and comparability of sustainability reporting and disclosure, they have not completely eliminated sector-specific differences and norms.

Through the study's conceptual framework and foundation of institutional theory, the findings demonstrate that materiality is influenced by a combination of institutional and regulatory pressures, stakeholder expectations, and industry-specific operational realities. In the automotive sector, detailed and targeted environmental material topics, such as climate change mitigation, circular economy, and value chain decarbonization, are valuable and reported across the industry sample; this reflects the strict regulatory requirements and pressures for transparency and granularity present in the sector. In contrast, the defense sector places greater emphasis on material topics related to social and governance due to the sector's geopolitical context and high level of scrutiny. ESG disclosure in the automotive sector typically includes a higher average number of total material topics, while in the defense sector, disclosure is often focused on selected strategic areas due to national and regional security concerns. These findings suggest that while regulation does influence the structure of sustainability reporting and the topics disclosed, the substance of material priorities remains tied to sectoral pressures, realities, and dynamics.

Furthermore, the research highlights that companies operating across different sectors face complexity in ensuring the alignment and integration of ESG reporting norms, practices, and strategies. Dual and multiple sector companies must navigate various transparency expectations, reconcile competing double materiality realities and priorities, and balance international, regional, and national regulatory compliance; while these areas sometimes align, they can also differ greatly and cause tension not only for a company's ESG strategy but also continued strategic and forward-

thinking operation. Especially in this dual-sector context, ESG reporting is more than a compliance exercise. Rather, it is a critical component of stakeholder communication, risk management, value creation and investment, and strategic decision-making. Through the integration of, for example, DMA, dual-sector firms have the opportunity to not only evaluate material topic sustainability in the context of strategy and risk management, but also to secure competitive advantage.

In conclusion, the findings of this study suggest that evolving regulatory environments and expectations do influence ESG materiality, priorities, and reporting in companies operating across both the automotive and defense sectors and highlight the importance of considering both regulatory drivers and sectoral contexts when considering, adapting, and analyzing ESG practices. As sustainability requirements and expectations continue to rapidly evolve, companies and especially those operating across multiple sectors need to adapt to these changes to be able to strategically position themselves as industry leaders in progress toward a more sustainable future.

Appendix

Table A1. ATLAS.ti Codes and Usage

Code Name	Number of Uses
Automotive Industry	11
Climate Change	5
Defense Industry	15
ESG	17
EU Regulatory Environment	16
Institutional Theory	8
Materiality (MT)	16
MT: Affected Communities	4
MT: Air Pollution	5
MT: Biodiversity	3
MT: Business Conduct	8
MT: Circular Economy	7
MT: Climate Change Mitigation	7
MT: CO2 Emissions	1
MT: Data & Privacy	8
MT: Development and Training	1
MT: Energy	8
MT: Export Compliance	3
MT: Gender Equality	6
MT: Health and Safety	8
MT: Human Rights	8
MT: Industrial Cooperation	3
MT: Microplastics	2
MT: Political Engagement	5
MT: Privacy	1
MT: Product Safety	4
MT: Secure Employment	6
MT: Soil Pollution	4
MT: Value Chain Workers	1
MT: Water	5

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