

Research-Thesis: Barriers to the integration of non-financial dimensions in management control: the case of Walloon industrial companies.

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*Barriers to the integration of non-financial dimensions
in management control: the case of Walloon industrial
companies*

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0. Glossary

- CSRD: Corporate Sustainability Reporting Directive
- ESRS: European Sustainability Reporting Standards
- ESG: Environmental, Social and Governance
- KPI: Key Performance Indicator
- MCS: Management Control System
- EMA: Environmental Management Accounting
- SME: Small and Medium Enterprise

1. Introduction

Over the past decade, sustainability has moved from the margins of corporate communication to the centre of strategic and regulatory debate. Growing concern over climate change, resource scarcity and social inequality has reshaped what stakeholders expect of firms (Bansal & Song, 2017). Companies are no longer judged on financial returns alone, but also on their capacity to create lasting value while containing their environmental and social footprint. Within this shift, Environmental, Social and Governance (ESG) criteria have become a structuring reference for corporate strategy, reporting and investment decisions (Friede, Busch & Bassen, 2015; Gillan, Koch & Starks, 2021).

In Europe, this movement has been consolidated by regulation. The Corporate Sustainability Reporting Directive (CSRD) and the associated European Sustainability Reporting Standards (ESRS) considerably widen the population of firms required to disclose sustainability information, and they introduce the principle of double materiality, the obligation to assess both how sustainability issues affect the firm financially and how the firm's activities affect society and the environment ((Delgado-Ceballos, Ortiz-de-Mandojana, Antolín-López & Montiel, 2023; Nielsen, 2023). Sustainability is therefore shifting from a voluntary communication practice toward a structural reporting and managerial requirement (Arvidsson & Dumay, 2022; La Torre, Sabelfeld, Blomkvist & Dumay, 2020). Industrial firms stand at the heart of this transformation, since their carbon intensity, energy dependence and supply-chain exposure place them under especially close regulatory and stakeholder scrutiny (Bansal & Song, 2017).

Yet a clear gap persists between what firms report and how they are run. Sustainability reports, ESG dashboards and non-financial indicators have multiplied, but these tools rarely reach the systems that genuinely drive a company, its management control systems (MCS), and integration tends to remain partial and it varies considerably from one organisation to the other (Gond, Grubnic, Herzig & Moon, 2012; Crutzen, Zvezdov & Schaltegger, 2017). This gap isn't a minor technical delay. Management control systems form the backbone of how organisations decide, allocate resources and evaluate performance, and they were historically built around financial logic including profitability, cost efficiency and short-term results (Anthony, 1965; Otley, 1999). Sustainability, by contrast, introduces long-term horizons, qualitative and multidimensional objectives, and considerable measurement uncertainty (Gond et al., 2012; Schaltegger & Burritt, 2010). Embedding ESG criteria into an MCS therefore involves far more than adding indicators to an existing dashboard, it can unsettle the way performance itself is defined, discussed and rewarded (Eccles, Ioannou & Serafeim, 2014).

This tension raises a series of concrete questions.

- Why do many firms that report extensively on sustainability continue to make decisions through a predominantly financial lens?
- What slows the passage from external disclosure to internal piloting?
- Are the obstacles essentially technical (the difficulty of measuring carbon or social outcomes reliably, for example) or are they organisational, cultural and political, rooted in routines, incentives and managerial identities that have long privileged financial expertise (Burns & Scapens, 2000; Hopwood, 1987)?
- And do these obstacles operate uniformly, or do they vary with a firm's size, ownership, sector and history?

The persistence of financial dominance inside organisations that publicly promote sustainability is one of the central puzzles of contemporary management control, and it is the thread this thesis follows throughout.

These questions are especially relevant in the Walloon industrial context, which brings together multinational groups and small or medium-sized enterprises operating in energy-intensive and environmentally exposed sectors. Such firms face rising sustainability expectations while contending with economic uncertainty, competitive pressure and resource constraints (Johnstone, 2020). Studying how they attempt to embed ESG criteria into their control systems offers a grounded view of sustainability transformation in industry, one that broader international studies, focused on disclosure outcomes rather than internal mechanisms, tend to overlook (Crutzen & Herzig, 2013).

The academic literature has indeed examined ESG disclosure, sustainability reporting quality and the relationship between ESG and financial performance in considerable depth (Friede, Busch & Bassen, 2015; Arvidsson & Dumay, 2022; Gillan et al., 2012). Far fewer studies, however, address the operational integration of ESG criteria into management control systems, and fewer still do so within industrial firms in a specific regional setting (Gond et al., 2012; Crutzen et al., 2017). The barriers that companies encounter as they move from reporting to driving remain insufficiently explored (Johnstone, 2020).

Against this background, the objective of this thesis is to analyse the main barriers to the integration of non-financial dimensions into the management control systems of Walloon industrial firms. The central research question is therefore: “what barriers limit the integration of ESG criteria into the management control systems of industrial companies in Wallonia, and how do these barriers shape managerial decision-making?”

Three sub-questions guide the inquiry:

- how do firms attempt to translate sustainability objectives into their performance management practices?
- Which obstacles and which facilitating factors recur across organisations
- How far does ESG integration extend beyond reporting into budgeting, investment appraisal and managerial incentives?

To address these questions, the thesis combines a review of the academic literature with a qualitative, multi-case study based on semi-structured interviews conducted in four Walloon industrial companies with professionals close to management control, operations and sustainability. Given the exploratory nature of the topic, the aim isn't statistical generalisation but analytical insight into how managers perceive and experience ESG integration in their own organisational settings (Eisenhardt, 1989).

The study contributes to the literature in two main ways. First, it shifts attention from disclosure outcomes toward the internal organisational mechanisms through which, or against which, ESG criteria become embedded in control systems, with a link in the industrial context (Gond et al., 2012; Eccles et al., 2014). Second, it documents the practical barriers and tensions firms face when reconciling financial and non-financial performance objectives, and it shows that integration trajectories differ markedly across organisations. Beyond its academic contribution, the study offers managerial insight into the operational realities of sustainability integration.

The remainder of the thesis is organised as follows. The first part sets out the regulatory and organisational context driving ESG pressures on industrial firms. The second examines the theoretical foundations of management control systems and their evolution toward sustainability. The third reviews the barriers and facilitators identified in the literature. The fourth presents the methodology, before the empirical findings are reported case by case and then compared across firms. A discussion relating the cases to the literature precedes the conclusion, which draws together the main observations, limitations and avenues for future research.

2. ESG pressures and the transformation of industrial performance

2.1 The rise of sustainability as a strategic concern

For most of the twentieth century, environmental and social initiatives were treated as voluntary gestures, attached more to a firm's reputation than to its core activity (Bansal & Song, 2017). This is no longer the case. Over the past two decades, the growing visibility of climate change, resource depletion, social inequality and governance scandals has reshaped what society expects of business. Firms are now asked not only to generate economic value, but also to account for their environmental and social effects (Freeman, 1984). This expectation has crystallised around the framework of Environmental, Social and Governance criteria, which gives investors, regulators and other stakeholders a common reference for judging how a company manages sustainability-related risks and opportunities (Gillan, Koch & Starks, 2021).

The three pillars cover distinct concerns. Environmental criteria address carbon emissions, energy use, waste and resource efficiency. Social criteria concerns working conditions, safety, diversity and relations with local communities. Governance criteria relate to ethics, transparency, board structure and risk management (Gillan et al., 2021). Taken together, they mark a clear departure from a purely financial reading of corporate success. Where performance was once measured almost entirely through profitability, return on investment or market value, organisations are now expected to fold non-financial dimensions into the way they assess and manage their activity (Arvidsson & Dumay, 2022).

This change rests on more than regulation. Public awareness of environmental and social challenges has risen sharply (Lidskog & Standring, 2023), and younger generations of employees and consumers increasingly weigh a firm's sustainability commitments when they choose where to work or what to buy. The interviews conducted for this study echo this point, since one respondent from Knauf Insulation observed that new generations no longer accept work without meaning and that companies failing to act responsibly now struggle to attract and retain talent. Firms therefore face mounting pressure to show that sustainability genuinely shapes their activities rather than decorating their communication.

The expansion of ESG investing has reinforced this pressure from the financial side. Institutional investors increasingly include ESG indicators into their assessment of a firm's long-term resilience and risk exposure, and sustainable investment products have grown considerably (Amel-Zadeh & Serafeim, 2018). As a result, sustainability performance is no longer read as a purely ethical matter, it is also treated as a factor that can influence competitiveness, access to capital and investor confidence (Friede, Busch & Bassen, 2015).

2.2 Regulatory pressure and the European framework

Regulation has been the most powerful force institutionalising these practices, particularly in Europe (La Torre, Sabelfeld, Blomkvist & Dumay, 2020). Over recent years the European Union has built a body of rules designed to improve the transparency of corporate sustainability information and to push firms toward more sustainable models. The central instrument is the Corporate Sustainability Reporting Directive (CSRD), adopted in 2022, which substantially widens the range of companies

required to disclose sustainability information and strengthens the audit and reliability requirements attached to it (Frankel, Kothari & Raghunandan, 2025).

The CSRD operates through the European Sustainability Reporting Standards (ESRS), which aim to harmonise disclosures across European firms on issues such as climate risk, greenhouse gas emissions, biodiversity, workforce management, value chains and governance (Labro & Pierk, 2025). Its most distinctive feature is the principle of double materiality, which requires a firm to report both on how sustainability issues affect its own financial position and on how its activities affect society and the environment (Delgado-Ceballos et al., 2023; Nielsen, 2023). This dual perspective is significant because it challenges the long-standing primacy of financial materiality, since a matter that is immaterial to the bottom line may still be material to the outside world and must now be disclosed.

In practice, these obligations transform internal processes well beyond the reporting department. Companies must now collect, monitor, verify and communicate large volume of non-financial information that were previously measured loosely or not at all (Arvidsson & Dumay, 2022). This is far from costless. Many firms struggle with the complexity of the standards, the shortage of internal expertise, and the reliability of the data they must produce (Frankel et al., 2025). The point was made vividly at Spadel, where one manager noted that preparing for CSRD, audits, data collection, the calculation of CO₂ emissions, mobilises a great many people and represents a substantial cost. The very rules meant to embed sustainability thus also generate a heavy organisational burden, a tension that runs through this thesis.

Industrial firms feel this pressure most acutely. Their energy use, emissions, waste and dependence on complex supply chains expose them to stronger regulatory and stakeholder scrutiny than firms in lighter sectors, which places them at the centre of sustainability transition.

2.3 External crises and organisational resilience

Beyond regulation, a sequence of external shocks has sharpened attention to sustainability by linking it to resilience. The COVID-19 pandemic, geopolitical conflict, supply-chain disruption, inflation and the energy crisis have all exposed the fragility of established economic models and underlined the value of long-term risk management (Leoni et al., 2021). During the pandemic, firms confronted production stoppages, shortages and acute uncertainty, and these difficulties prompted many to reconsider their resilience strategies. In this context, sustainability came to be associated not only with environmental responsibility but also with the capacity to absorb shocks and remain stable over time (Lidskog & Standring, 2023).

The energy crisis illustrates how directly such shocks reach industrial firms. Rising energy prices and raw materials shortages pushed companies to improve efficiency and to rethink their dependence on volatile supplies. The Spadel case is revealing here. The respondents explained that the surge in energy costs encouraged the firm to invest more heavily in technologies reducing energy consumption. In other words, an external pressure that was economic in origin accelerated an objective that was environmental in substance, which is a recurring pattern in industrial settings,

where sustainability advances most quickly when it coincides with cost or risk reduction (Berrone, Fosfuri, Gelabert & Gomez-Mejia, 2013).

Climate change itself increasingly figures as a direct operational and financial risk. Extreme weather, tightening regulation, carbon pricing mechanisms and stakeholder activism all add to the uncertainty facing industrial firms, so that sustainability is progressively absorbed into broader discussions of competitiveness and strategic adaptation (Carreira, Silva & Cepêda, 2025). Yet folding these concerns into existing systems remains difficult, because many firms still operate with management tools designed for financial efficiency rather than sustainability, which is a limitation that will be examined in the next part.

2.4 From shareholder value to stakeholder expectations

Underlying all of this is a slower shift in the conception of the firm itself. For decades companies operated largely within a shareholder-oriented model in which the central aim of management was to maximise financial returns for owners, and in which control and evaluation systems were built to monitor profitability, cost and short-term results (Friedman, 1970). That model has been progressively contested by the recognition that corporate activity generates wider effects on employees, customers, communities, regulators and suppliers, the stakeholders whose interests, in Freeman's (1984) influential formulation, the firm can't legitimately ignore. This stakeholder conception has since been developed into a foundational framework for understanding the firm's obligation to its various stakeholders (Donaldson & Preston, 1995).

This move toward a stakeholder view changes how performance is understood. Corporate success can no longer be captured by financial indicators alone, since stakeholders now expect information on emissions, employee well-being, diversity and ethical conduct, which encourage organisations to adopt a more holistic notion of performance that combines financial and non-financial dimensions (Kaplan & Norton, 1992). For management control systems, this is a demanding shift. Traditional tools were budgeting cycles, whereas ESG concerns are often qualitative, long-term and multidimensional, and far harder to standardise (Gond et al., 2012).

The diversity of stakeholder expectations also generates competing pressures. Investors may prioritise profitability and risk reduction, regulators compliance and transparency, employee social well-being, and customers responsible products (Delmas & Toffel, 2004). These expectations rarely align and reconciling them is especially demanding for industrial firms operating under tight economic and competitive constraints. Sustainability integration is therefore not only a technical matter of adding indicators, but also a strategic and, at times, political process of balancing objectives that pull in different directions. How management control systems mediate that balance is the question to which this thesis now turns.

3. Management control systems and the sustainability challenge

3.1 What management control systems do

Management control systems sit at the centre of how organisations turn intentions into actions. In the classic definition, management control is the process by which managers ensure that resources are obtained and used effectively and efficiently to accomplish the organisation's objectives (Anthony, 1965). An MCS is therefore the set of formal and informal mechanisms such as budgets, performance indicators, planning cycles, reporting routines, incentives and shared norms, through which a firm directs behaviour, allocates resources and evaluates results (Chenhall, 2003). It is the machinery that connects strategy at the top to day-to-day decisions on the ground.

A useful way to see the full reach of these systems is Malmi and Brown's (2008) idea of an MCS "package". Rather than a single tool, control in practice is a combination of five interrelated elements: planning, cybernetic controls (such as budgets and financial measures), reward and compensation, administrative controls (governance structures and procedures), and cultural controls (values, symbols and norms). The value of this view, for the present study, is that it makes clear that sustainability can in principle enter a firm through several doors at once, not only through a new indicator on a dashboard, but also through how investments are planned, how managers are rewarded, and what the organisation treats as normal. As later chapters show, firms differ sharply in which of these doors they use.

A second influential framework is Simons's (1995) "Levers of controls", which distinguishes four ways control systems are used, namely belief systems that communicate core values, boundary systems that set limits, diagnostic systems that monitor performance against targets, and interactive systems that managers use to debate uncertainty and stimulate learning. Simons's contribution is to stress that control isn't only about constraint and measurement, but also about guiding attention and dialogue. This distinction matters for sustainability, because ESG issues are often surrounded by uncertainty and rarely fit neatly into routine diagnostic monitoring. Whether sustainability is handled diagnostically, as one more target to hit, or interactively, as a real object of strategic discussion, turns out to be a key marker of how deeply it is integrated.

What unites these frameworks is that management control was conceived around objectives that are mostly financial and above all, quantifiable. Otley (1999) similarly built his performance management framework on questions of objectives, strategies, targets and rewards that, in practice, have long been expressed in monetary terms. This financial orientation isn't a flaw, since it reflects what these systems were designed to do, and contingency research has long shown that control designs are shaped to fit the firm's environment, technology, size and strategy (Chenhall, 2003). But it is precisely this orientation that makes the integration of non-financial dimensions difficult, as the rest of this part explains.

3.2 Why sustainability strains traditional control

Embedding ESG criteria into an MCS is harder than it first appears, because sustainability objectives differ in nature from the financial objectives these systems were built to handle. Three differences stand out.

First, sustainability operates over long and uncertain horizons. Financial control cycles are typically annual or quarterly, geared to budgets and reporting periods, whereas the benefits of an environmental investment may take years to materialise and are difficult to forecast (Slawinski & Bansal, 2015). A control system organized around short-term financial results tends, almost mechanically, to underweight commitments whose payoff lies far in the future. This isn't a matter of emphasis, since the pressure to meet short-term financial targets has been shown to encourage a real short-term focus among managers (Merchant, 1990).

Second sustainability is multidimensional and frequently qualitative. Financial performance can be condensed into a small number of comparable monetary figures, while ESG performance spans emissions, safety, diversity, ethics, community relations, many of which resist conversion into a single common unit. Translating such diverse challenge of sustainability accounting (Gond et al., 2012).

Third, the relationship between sustainability and financial performance is itself ambiguous. The large body of evidence reviewed by Friede, Busch and Bassen (2015) points to a broadly positive or at least non-negative association, but the link is neither immediate nor mechanical, and managers can't always demonstrate a clear business case for a given ESG initiative. In a system that justifies decisions through expected financial return, this ambiguity weakens the standing of sustainability arguments.

The consequence is a recurring tension between an established financial logic and an emerging sustainability logic. Because control systems carry assumptions of the context in which they were built and tend to reproduce established routines (Burns & Scapens, 2000; Hopwood, 1987), they don't absorb new objectives easily. Sustainability doesn't simply slot into the existing machinery, it competes with financial priorities for attention, resources and legitimacy. This tension is the analytical core of the thesis, and it reappears in every case studied.

3.3 The rise of sustainability control systems and “eco-control”

Faced with these strains, research and practice have developed dedicated tools to bring environmental and social concerns inside the control function. A first strand concerns environmental management accounting (EMA), which extends conventional accounting to capture the environmental costs and effects of corporate activity (energy, emissions, waste and water) that ordinary cost systems leave invisible (Burritt & Schaltegger, 2010). By making these flows visible in managerial terms, EMA gives decision-makers information they would otherwise lack, and recent evidence links its adoption to improved firm performance, particularly when it is combined with environmental innovation and stakeholder integration (Gerged, Zahoor & Cowton, 2024).

A second, closely related strand is the concept of eco-control, defined by Henri and Journeault (2010) as the application of management control methods to environmental management (environmental budgets, indicators, targets and incentives). Their study of Canadian manufacturers showed that eco-control can support environmental performance and, indirectly economic performance, which gave empirical weight to the idea that control systems aren't passive recorders but active levers of sustainability. This is a particularly relevant reference for an industrial setting such as Wallonia.

More broadly, scholars now speak of sustainability control systems (SCS) as the counterpart to conventional MCS, dedicated to piloting social and environmental objectives. Gond et al. (2012) examined how SCS and MCS can be combined, using Simons's levers to describe configurations ranging from situations where the two systems remain separate, sustainability managed in a silo, disconnected from core strategy to situations where they are technically and organisationally integrated. Their framework usefully frames integration as a matter of degree rather than a yes-or-no question, and it supplies a vocabulary for describing the different trajectories observed in the empirical cases.

3.4 Integration in practice, still partial and uneven

Despite these tools, the evidence on actual practice is sobering, and it is here that Crutzen's work is central. In their review of empirical research Crutzen and Herzig (2013) found that knowledge of how firms genuinely use management control to support sustainability strategies remained limited and fragmented, with most studies concentrated on large firms and on the design of systems rather than their everyday use. The field had described many possible configurations but documented relatively few real ones.

The picture sharpened in the comparative study by Crutzen, Zvezdov and Schaltegger (2017) of large European firms, which is especially pertinent to this thesis. They observed that sustainability control relied heavily on informal mechanisms, such as values, culture and leadership commitment, rather than on formal systems such as budgets, targets and incentives, and that firms displayed significantly different control patterns. In many organisations sustainability remained loosely coupled to the core control system, visible in discourse and reporting, but only weakly embedded in the financial routines that drive decisions. One reason for this absence of coupling lies in the professional identity of the actors who run these systems, since accountants, shaped by long-standing routines and training, have often remained on the margins of corporate sustainability rather than taking ownership of it (Wenzig, Nuzum & Schaltegger, 2023). This finding directly anticipates the central question of the present study, why integration so often stops at the reporting boundary, and it proves the comparative lens through which the four Walloon cases are later read.

Taken together, this body of work establishes two points that frame the remainder of the thesis. The tools to integrate ESG criteria into management control exist and are reasonably well understood. Yet their adoption is uneven, frequently informal, and rarely extends into budgeting, investment appraisal and incentives. The decisive questions are therefore less about the availability of instruments than about the barriers that hold integration back which is the subject of the next part.

4. Barriers and facilitators of ESG integration: Literature review

The previous part showed that the tools for integrating ESG criteria into management control exist, yet that their adoption remains partial and uneven (Crutzen & Herzig, 2013). This raises the question at the heart of the thesis what holds integration back? This part reviews the obstacles identified in the literature and then turns to the factors that, conversely, facilitate integration. Rather than presenting a flat list, it groups the barriers into four “families”:

- Economic and financial
- Technical and methodological
- Organisational and cultural
- External and institutional

Before considering that conditions under which firms overcome them. This structure provides the analytical grid against which the four cases are later described.

4.1 Economic and financial barriers

The most fundamental obstacle is the enduring dominance of financial logic within management control. As established earlier, these systems were built around profitability, cost efficiency and short-term results (Anthony, 1965; Otley, 1999), and this orientation continues to shape how decisions are framed and justified. When a firm assesses an initiative, the implicit reference point is usually its effect on the bottom line. ESG initiatives whose financial return is uncertain or distant therefore start with a disadvantage (Hahn, Pinkse, Preuss & Figge, 2015).

This disadvantage is sharpened by short-termism (Merchant, 1990). Control cycles are organised around annual budgets and quarterly results, while benefits of sustainability investments, like energy efficiency, emissions reduction, social initiatives, often accrue only over the long run and are hard to quantify in advance. The temporal mismatch means that, in any given budgeting round, expenditures with immediate and measurable financial effects tend to crowd out commitments whose payoff is deferred. Sustainability isn't rejected on principle. It is simply outcompeted for resources by objectives that the system is better equipped to value.

A related difficulty is the absence of a clear, demonstrable business case for many ESG initiatives. Although the aggregate evidence points to a broadly positive relationship between sustainability and financial performance (Friede, Busch & Bassen, 2015), this relationship is neither immediate nor guaranteed at the level of an individual decision. Managers operating under cost pressure may be reluctant to commit resources to outcomes they can't translate into expected financial return. For small and medium-sized enterprises in particular, limited budgets, scarce staff and competing operational priorities make it especially hard to justify investments whose benefits can't be readily monetised (Johnstone, 2020).

These pressures combine into what the literature describes as a structural trade-off, or even a paradox, between financial and sustainability objectives. Hahn, Pinkse, Preuss and Figge (2015) argue that the tensions between economic, environmental and social goals aren't temporary frictions to be engineered away but persistent features of corporate sustainability that managers must learn to hold in balance. Seen through this lens, the financial barrier isn't a matter of tight budgets, it reflects a deeper contradiction between logics that control systems are poorly designed to reconcile.

4.2 Technical and methodological barriers

A second category of obstacles concerns measurement. Financial performance can be expressed through a small set of standardised, comparable monetary indicators, while ESG performance can't. Sustainability spans heterogeneous dimensions, such as carbon emissions, energy and water use, waste, safety, diversity, ethics, community relations, many of which are qualitative or resist conversion into a single common unit (Gond et al., 2012). Building indicators that are reliable, comparable and genuinely useful for driving is therefore a substantial technical challenge, and one that conventional accounting systems were never designed to meet.

This challenge is compounded by problems of data. Producing credible ESG information requires collecting, consolidating and verifying large volumes of non-financial data, often dispersed across sites, functions and supply chains, and frequently recorded in incompatible formats or not recorded at all. Many firms lack the information systems needed to capture this type of data with the rigour expected of financial reporting. The reliability of carbon data is a particular concern, since the quality of carbon accounting varies considerably and depends heavily on the assurance mechanisms firms put in place (Gipper, Sequeira & Shi, 2025). The arrival of the CSRD and ESRS has intensified these demands, requiring firms to disclose detailed and auditable sustainability information (Arvidsson & Dumay, 2022; Nielsen, 2023). For organisations whose systems were built for financial reporting, meeting this standard is costly and complex, and the difficulty is greater still for SMEs with limited technical infrastructure.

A further methodological limitation is the absence, until recently, of common standards and methods. Sustainability accounting has long suffered from competing frameworks and inconsistent metrics, which undermined comparability between firms and over time (Schaltegger & Burritt, 2010). Tools such as environmental management accounting (Schaltegger & Burritt, 2010) and eco-control (Henri & Journeault, 2010) were developed precisely to address this gap, by giving firms structured ways to capture and manage environmental performance. Yet their diffusion remains limited, and the practical work of selecting, calculating and interpreting indicators continues to demand expertise that many firms don't possess right now.

4.3 Organisational and cultural barriers

Even where economic and technical obstacles can be addressed integration may stall for organisational and cultural reasons, and these are often the most decisive. Management control systems are embedded in organisational routines and carry the assumptions of the context in which they were built. They therefore tend to reproduce established ways of operating rather than absorb new objectives (Burns & Scapens, 2000; Hopwood, 1987). Introducing ESG criteria means altering routines, responsibilities and habits of thought that are deeply entrenched, which generates inertia and, at times, resistance. Research on change consistently shows that such resistance is a predictable organisational response rather than an anomaly, rooted both in individual dispositions toward change (Oreg, 2003) and in the way change is conceived and managed, including the legitimate concerns of those affected (Ford, Ford & D'Amelio, 2008).

Part of this inertia is a matter of expertise and identity. Management control and finance functions are staffed by professionals trained in financial analysis, for whom sustainability may lie outside their domain of competence and, sometimes, their sense of professional role. The skills required to measure and manage ESG performance differ from those traditional controlling, and the shortage of staff who can bridge financial and sustainability expertise is a recurring constraint. Indeed, accountants have frequently remained on the margins of corporate sustainability, shaped by routines and training that keep the subject at arm's length (Wenzig, Nuzum & Schaltegger, 2023). Where sustainability is seen as someone else's responsibility, typically a dedicated CSR or sustainability unit, it remains organisationally separate from the systems that guide the firm.

This separation points to a broader structural barrier, which is the frequent decoupling of sustainability from core management. In many organisations, environmental and social issues are handled by a specialised department that operates in parallel to finance and operations, with the result that sustainability is reported and communicated but only weakly connected to budgeting, investment and performance evaluation. Crutzen, Zvezdov and Schaltegger (2017) found exactly this pattern in large European firms, where sustainability control relied heavily on informal mechanisms, values, culture and leadership, rather than on the formal systems that drive day-to-day decisions. Integration, in such cases, stops at the reporting boundary.

Underlying all of this is organisational culture. Where firm's culture is built around financial performance, sustainability struggles to acquire legitimacy as a genuine management priority rather than a communication or compliance exercise, since the adoption of sustainability principles tends to depend on the presence of a culture in the first place (Linnenluecke & Griffiths, 2010). Conversely, and as the empirical cases will show, a culture in which environmental and social values are already embedded can make integration notably easier. Leadership is pivotal here, the commitment, or indifference, of senior managers strongly shapes whether sustainability is treated as central or peripheral (Crutzen, Zvezdov & Schaltegger, 2017). The role of culture and leadership is therefore double-edged, among the most powerful barriers when absent, and among the most powerful facilitators when present.

4.4 External and institutional barriers

Some obstacles could come from outside the firm. The regulatory environment, although a powerful driver of sustainability, is also a source of difficulty. The pace and complexity of regulatory change, and the cost of compliance with frameworks such as the CSRD, place a heavy burden on firms, which must continually adapt their systems and dedicate significant resources to reporting (Delgado-Ceballos et al., 2023). For SMEs especially, the administrative weight of compliance can erase the very investments in genuine integration that the regulation is meant to encourage, a paradox in which the rules designed to embed sustainability consume the resources needed to embed it (Johnstone, 2020).

Market and competitive pressures add a further constraint. In sectors where competition is driven by price, firms may hesitate to invest in sustainability if doing so raises costs without an immediate, visible return, particularly when competitors don't face equivalent obligations (Hahn et al., 2015).

The pressure to remain cost-competitive can discourage substantive integration, reinforcing the financial barrier described above.

Finally, the literature identifies risk of greenwashing as both a symptom and a cause of weak integration. Delmas and Burbano (2011) describe greenwashing as a decoupling between symbolic environmental communication and substantive environmental performance, driven by external, organisational and individual factors in a context of limited regulation. When external pressure appear sustainable outruns a firm's internal capacity or willingness to act, sustainability is managed as image rather than substance and remains confined to disclosure without entering the control systems that drive real decisions. Greenwashing is, in this sense, the visible trace of integration that has stopped at the reporting boundary.

4.5 Facilitating factors

The same literature that documents these barriers also identifies the conditions under which firms move beyond them. Three sets of facilitators recur.

The first is leadership and culture. Where senior management treats sustainability as a strategic priority and where environmental or social values are embedded in the organisation's identity, integration is markedly easier (Crutzen, Zvezdov & Schaltegger, 2017). Commitment at the top legitimises the reallocation of attention and resources, and an aligned culture lowers the internal resistance that otherwise slows change. This is especially visible in family-owned firms, where ownership tends to extend the time horizon and to bind the firm's reputation to the family's identity. Research shows that this type of enterprise in polluting industries achieve better environmental performance than their counterparts, precisely because environmental harm would damage the family's wealth, and they do so even in the absence of obvious economic rewards (Berrone, Cruz, Gomez-Mejia & Larraza-Kintana, 2010). As the cases will show, firms whose founding purpose or family heritage is bound up with environmental or social concerns tend to integrate ESG criteria more naturally than those for which sustainability is a later addition.

The second is the use of appropriate tools and the alignment of incentives. Dedicated instruments, like sustainability indicators integrated into existing dashboards, give firms the means to make ESG performance visible and manageable in the same register as financial performance (Henri & Journeault, 2010). Integration is reinforced when sustainability objectives are connected to planning, investment appraisal and, crucially, to reward and evaluation systems, so the managers are accountable for non-financial as well as financial results. The deeper the connection runs into these formal mechanisms, the less likely sustainability is to remain a parallel, symbolic activity.

The third is the constructive use of external pressure. Although regulation and market expectations are experienced as burdens, they also function as catalysts. Gond et al. (2012) show that the way control systems are used shapes how far sustainability is integrated, and that interactive use, in which sustainability becomes an object of genuine strategic dialogue, supports deeper integration. Institutional pressures can likewise stimulate environmental innovation rather than compliance, particularly when firms treat them as an opportunity (Berrone, Fosfuri, Gelabert & Gomez-Mejia, 2013). Regulation such as the CSRD, by forcing firms to measure and disclose, can trigger precisely

this kind of dialogue and build internal capabilities that later support substantive integration. External pressure, in other words, can either be absorbed superficially as compliance or harnessed as a lever for change, a distinction that runs directly into the empirical analysis.

4.6 Synthesis and analytical framework

Taken together, the literature suggests that barriers to ESG integration are rarely isolated. Financial, technical, organisational and external obstacles interact and reinforce one another: the dominance of financial logic is sustained by measurement difficulties, entrenched routines and competitive pressure, while greenwashing is the outward sign of integration blocked at the reporting stage. Facilitators, conversely, cluster around leadership and culture, the alignment of tools and incentives, and the constructive use of external pressure.

This review yields the analytical framework used in the empirical part of the thesis. The four families of barriers provide a grid for identifying which obstacles each firm encounters, while the facilitators help explain why some firms integrate ESG criteria more deeply than others. Above all, the literature points to integration as a matter of degree, ranging from sustainability confined to reporting and communication to sustainability genuinely embedded in budgeting, investment and incentives. The empirical question is where the four Walloon firms stand, and why they differ.

5. Methodology for case studies

5.1 Research design and case selection

This thesis adopts a qualitative, exploratory design based on a multiple-case study, a choice that follows directly from the research question and from the state of the literature. Because the operational integration of ESG criteria into management control systems, especially within industrial firms in a specific regional setting, remains under-explored, qualitative methods are better suited than quantitative ones, since they include meanings, processes and contextual nuance that standardised measures tend to stabilize (Eisenhardt, 1989). The study is interpretive in spirit. Rather than testing hypotheses, it seeks to understand how managers themselves perceive and experience the barriers to ESG integration in their own organisations, on the premise that obstacles such as financial dominance, measurement difficulty and cultural inertia aren't only objective facts but also lived realities, read differently depending on an enterprise's history, sector and culture. The aim, therefore, isn't statistical generalisation to all Walloon industrial firms but analytical insight into the mechanisms at work in particular cases, which is the recognised strength of the case study research.

A multiple-case design is appropriate here because it allows to examine the phenomenon in its real-life context, where the boundaries between ESG integration and the structure of the firm, its culture and history aren't categorical, and because comparing several enterprises reveals recurring patterns as well as instructive differences (Eisenhardt, 1989). The four firms were chosen through personal choices and orientation from the supervisor, both based on three criteria. All are industrial firms, the segment most exposed to environmental and regulatory pressure. All operate in Wallonia, which holds the regional and regulatory context constant and isolates organisational differences. And together they vary along dimensions the literature treats as influential, respectively their size, their ownership and the place sustainability has in the enterprise's goal, a variety that is the analytical engine of the comparison. The firms range from a large family-owned manufacturer to a mid-sized group whose activity depends on a natural resource, a long, established engineering group and a small, specialised company, and these contrasts are precisely what the analysis exploits.

5.2 Data collection and analysis

The primary data come from semi-structured interviews with professionals positioned at or close to the management control function, in finance, operations, site management and sustainability. The semi-structured format was chosen because it balances consistency and openness, since a common guide ensured that the same core themes were addressed in every firm while the flexibility of the format allowed respondents to develop what mattered in their context. The guide for interviews followed the themes of the literature review, like the firm's sustainability strategy, the structure and use of its control system, the integration of ESG criteria into planning, budgeting, investment appraisal and performance evaluation, and the obstacles and potential facilitators encountered. The interviews were conducted in varied formats according to each respondents' availability and preference, some by telephone and others by video call, with adding notes if it was necessary. They were all conducted in French, and the quotations reported later are translations, rendered as faithfully as possible. Where useful, interview material was set alongside publicly available such as sustainability reports from website, which offered an element of triangulation.

The material was analysed thematically, in the two movements standard to multiple-case research (Eisenhardt, 1989). Each case was first examined on its own terms to understand how those firm approaches integration and which barriers it encounters, and the cases were then compared to identify recurring themes and to explain the differences observed. Coding was guided by the analytical framework built in the literature review, the four families of barriers and the facilitating factors, while remaining open to themes that didn't fit these categories, an approach that moves productively between data and existing concepts rather than choosing one over the other (Gioia, Corley & Hamilton, 2013). The framework provided guidance without constraining the analysis.

5.3 Research ethics and integrity

Because the interviews touched on sometimes sensitive aspects of the respondents' own organisations, attention was paid to ethics and to the integrity of the data. Participation was voluntary and based on informed consent, with each respondent informed in advance of the academic and non-commercial goal of the research and of how the material would be used. Interviews were recorded only where the respondents agreed, and the respondents were free to decline any question or to ask that remarks be excluded, so that off-the-record comments and digressions unrelated to the research question were left out of the findings. To protect respondents, several of whom commented frankly on the internal limits of their organisations, individuals aren't identified by name and are referred to only by their function.

The integrity of the analysis rested on staying close to what respondents said, reporting their accounts faithfully and avoiding interpretations the data didn't support. This mattered even more because the gap between sustainability discourse and substantive practice is itself one of the phenomena under study, which made it important not to take favourable self-presentation at face value, and which is why interview accounts were read critically and, where possible, checked against public documents. The author also acknowledges a question of positionality, since access to several respondents was eased by personal and professional networks, a proximity that facilitated the interviews but could equally encourage favourable presentation, and that was therefore managed by giving weight to concrete practices and verifiable facts rather than to general statements of intent. The framework and conclusions are offered as the author's own interpretation of the evidence, as analytical insight rather than definitive findings, in keeping with exploratory aim of the research. The principal limitations of this design, namely the small purposive sample, the heterogeneity of the four firms, the varied interviews formats and the reliance on a limited number of respondents per firm, are taken up in the conclusion.

6. Empirical findings

This part presents the four cases. For each firm, it first sets out the organisational context, activity, size, ownership and the place of sustainability in the firm's purpose, and then examines how, and how far, ESG criteria are integrated into management control system. The cases are ordered from the most deeply integrated to the least in appearance, beginning with Knauf Insulation. A cross-case analysis follows in the next part. All quotations are translated from interviews conducted in French and the respondents' ideas are reported as faithfully as possible, and the analysis stays close to what was said.

6.1 Knauf Insulation

Knauf Insulation is the insulation materials business of the Knauf group, a family-owned multinational. The Visé site studied here began production in 1979 and was acquired by Knauf in 2002. The interviews were conducted with the sustainability director, who had spent twelve years at the site as plant director and has now moved into the role of regional sustainability director and with a supply chain manager, responsible for acquiring raw materials and ensuring optimization of processes. Two features of the firm frame everything that follows. Firstly, it manufactures construction materials, an activity with a direct environment footprint. Secondly, it is family-owned. The sustainability director repeatedly tied the firm's sustainability orientation to this ownership structure, explaining that a family company seeks to keep business viable for the long term, and that the owners recognise that a firm which neglects its staff, its neighbours and the environment will eventually be blocked. This long-term, ownership logic stands in clear contrast to the short-termism that the literature identifies as a barrier (Hahn et al., 2015).

The firm's commitment isn't only rhetorical but also embedded in its product history. When Knauf acquired the site, it judged that a producer of construction materials had to be more responsible, and it spent several years developing a new sugar-based binder to replace a known pollutant linked to health risks. This episode illustrates a point central to the case, Knauf sustainability is associated with the product itself, not attached to it.

What makes Knauf the most integrated of the four cases is that sustainability is built into the very structure through which the enterprise is managed. The two respondents described a strategic architecture resting on a base of four corporate values that are respect, partnership, commitment and entrepreneurship, above which sit four pillars: People and safety, continuous improvement, customer centricity, and sustainability. From these follow the firm's vision and mission, renewed every three years. Sustainability is therefore not a separate programme but one of the pillars of the strategy, and the company describes itself as guided by these values "well beyond the financial and production dimensions." This corresponds closely to what the literature calls integration through belief and cultural systems rather than through diagnostic indicators alone (Simons, 1995; Malmi & Brown, 2008).

Crucially, this cultural integration is reinforced by formal mechanisms, which is what distinguishes real embedding from symbolic commitment. The industry has appointed a dedicated sustainability engineer in each plant, responsible for collecting and reporting sustainability data. The reporting file has grown to between 100 and 130 indicators, updated monthly. To support this, the firm invested one million euros in energy meters installed throughout the plant, to separate flows and locate

losses. This investment in measurement infrastructure directly addresses the technical and data barriers emphasised in the literature (Burritt & Schaltegger, 2010; Gond et al., 2012). Knauf has, in effect, paid to make its environmental performance visible in managerial terms.

Sustainability also enters the firm's investment appraisal. Interviewees explained that a new machine is analysed in terms of its energy consumption, water consumption and safety risks, so that it doesn't degrade the company's targets. This is significant because investment appraisal is precisely the domain where, according to literature, ESG criteria most often fail to penetrate, remaining confined to reporting (Crutzen, Zvezdov & Schaltegger, 2017). At Knauf, by contrast, environmental and safety criteria are part of how capital expenditure is judged, alongside financial considerations. The case also shows the gradual organisational ascent of the sustainability function. The sustainability director recounted how the firm successively created roles that didn't previously exist, a group human-resources function, additional safety staff, a continuous improvement manager in each plant six years ago, and a sustainability engineer three years ago. He framed these as costs that the firm expects to recoup through fewer accidents and greater employee engagement. The trajectory, from no dedicated function to a sustainability director now operating at word level, illustrates how a control concern, once peripheral, can migrate toward the centre of the organisation.

Respondents were empathic that integration is, above all, a matter of changing mentalities, and that this is slow and effortful. The sustainability director described value workshops conducted six or seven years ago through which all employees passed, and he was candid that he had to part with people whose conduct didn't align with the company's values including, in his account, dismissals over racist behaviour and over refusal to follow safety rules. His point was that values function as a non-negotiable foundation, and that a manager must enforce them consistently or change won't occur. This echoes the literature's emphasis on leadership commitment as a decisive facilitator (Crutzen, Zvezdov & Schaltegger, 2017). At Knauf, integration advanced because senior management, in sustainability director's words, "got their shirts wet" to drive it.

He illustrated the dynamics of change with two analogies. Safety, he argued, followed the same path as the car seatbelt. From something only a minority accepted, enforced at first by "playing the police", to an internalised norm that people observe even when no one is watching. He gave a parallel operational example, a logistics task reorganised so that an operator moved pallets in trains of ten rather than two at a time, where initial resistance gave way, five years on, to employees refusing to revert. The recurring lesson he drew was that a project mustn't be deployed too fast without bringing the whole team along, far more time is lost to entrenched resistance than is saved by moving quickly. Resistance to change, in this account, is real but workable, provided the firm invests in communication and listening.

Interviewees directly addressed the question of greenwashing. They acknowledged that a firm's sustainability orientation may at first have been partly about image, "like greenwashing", but argued that it has since become genuine, because employees, clients and other stakeholders now expect authentic commitment, and a company announcing hollow targets would lose both customers and staff. This map onto Delmas and Burbano's (2011) account of greenwashing as a decoupling between communication and substance, while suggesting that, at Knauf, external expectations have pushed the firm toward closing that a gap rather than widening it.

The sustainability director also linked sustainability to performance in a way that supports the broadly positive association reported in the literature (Friede, Busch & Bassen, 2015), though he framed it through engagement rather than direct financial return. Giving meaning to work, he argued, motivates employees, who become more efficient and produce fewer complaints. The firm has secured, investment and recruited around a hundred young employees over five years.

Finally, they situated the company within a tightening but contested external environment, nothing both stringer regulation and geopolitical pushback including, in his telling, an instance of a US counterpart conditioning military contracts on the abandonment of diversity measures. Their views, and particularly the view of the sustainability director, were that European firms must hold to their values and protect their market, which positions external pressure as something to be managed strategically rather than passively absorbed.

Knauf represents the most advanced integration among the four cases. Sustainability is anchored in family ownership and product history, embedded in the firm's value-based strategy, supported by dedicated roles and substantial investment in measurement, and carried into investment decisions. The principal barriers encountered is neither financial nor technical but human, the difficulty of changing entrenched habits, and the firm's central facilitator is sustained, values-driven leadership. The case thus exemplifies integration achieved through the alignment of cultural and formal control mechanisms, rather than through reporting alone.

6.2 Spadel

Spadel is an industrial group that produces and markets natural mineral waters and natural beverages, operating several natural springs and several production sites across Europe. Its industrial process runs from water capture at the source, through laboratory quality control, to bottling, conditioning and distribution. Interviews were conducted in written form with the group's Chief Operating Officer, responsible for all industrial operations, and was supplemented by an internal analysis of integration barriers drawn from interviews with several Spadel managers conducted during the thesis of a previous student from HEC Liège, at the firm (Monville H., 2026).

What defines this case is the company's direct dependence on a natural resource. As the COO put it, in a sector where the principal resource is water, sustainable resource management is essential, and environmental questions form part of the company's very identity. Unlike firms where sustainability must be imported against the grain of the business, at Spadel environmental concern is intrinsic to the activity itself, which both motivates integration and shapes its priorities. The firm's operational performance is driven according to an explicit hierarchy, worker safety first, then product quality, then environmental impact, then industrial productivity. A hierarchy that itself signals where sustainability sits relative to other objectives.

The COO described a control system that has broadened progressively. Historically, performance was piloted mainly through classic financial and operational indicators, such as productions costs, volumes, overall equipment effectiveness (OEE), industrial productivity. Over the past decade or so, as economic, regulatory and societal pressures intensified, the firm extended its dashboards to

include non-financial indicators, like energy consumption, water consumption, CO2 emissions and worker-safety metrics. The COO noted that ESG issues were at first perceived as complementary initiatives or as corporate social responsibility, and only later became strategic elements, regarded today as a necessary condition for operating sustainability in the market. This trajectory, from peripheral add-on to strategic condition, mirrors the broader institutionalisation of sustainability described in the literature (Arvidsson & Dumay, 2022).

Spadel illustrates integration that reaches well beyond reporting. ESG indicators are tracked at three levels. Operationally, where plants monitor environmental and safety indicators in daily activity. At group level, where these are consolidated and analysed. And strategically, in reporting to general management and the board. They appear in managers' dashboards and are discussed in performance review meetings alongside financial and operational indicators. Most notably, the COO confirmed that ESG objectives are progressively integrated into strategic planning and medium-term investment plans, and that industrial projects are now assessed not only on financial profitability but also on their environmental impact and their contribution to the group's sustainability objectives. He gave a concrete example on a more energy-efficient piece of equipment may be preferred even at a higher initial cost, because it reduces energy consumption over the long term. On the criteria of the literature, this places Spadel among the firms where ESG criteria genuinely enter investment appraisal rather than stopping at disclosure (Crutzen, Zvezdov & Schaltegger, 2017).

The case also shows the stabilising role of governance. The COO described relatively stable ownership and leadership, which favours a long-term strategic vision and, in turn, facilitates the gradual integration of sustainability. An observation consistent with the literature's emphasis on leadership and continuity as facilitators (Crutzen, Zvezdov & Schaltegger, 2017). At the same time, he characterised the company, like many industrial companies, as relatively cautious in its strategic decisions, since industrial investments are large and long-lived. This prudence can slow transformations that require heavy investment.

Despite this advanced integration, the COO was clear that financial performance remains determinant. Asked whether a deterioration in ESG performance triggers the same internal reactions as poor financial performance, he answered that it can prompt discussions and corrective actions, but that organisational reactions aren't always as strong as in the financial case. This is a precise illustration of the financial barrier identified in the literature (Anthony, 1965; Otley, 1999). Even where ESG criteria are formally integrated, they don't yet carry the same weight as financial results when the two diverge. The same asymmetry appears in investment decisions, where return on investment, operational efficiency and cost reduction remain the principal approval criteria, even as environmental impact, brand image and the reduction of future regulatory risk are increasingly weighed alongside them.

The internal analysis of Spadel surfaced a set of barriers that map closely onto the families identified in the literature, and that are valuable because they are voiced by managers in different functions. A first is the operational tension between industrial throughput and environmental objectives. They observed that key indicators concern energy savings, whereas in production the priority remains output and line efficiency, which is a divergence of priorities across departments that can slow

environmental projects. This is the trade-off between economic and environmental logics that Hahn et al. (2015) treat as a structural feature rather than a passing friction.

A second barrier is the difficulty of measuring certain ESG indicators, especially carbon emissions. They noted that the precise carbon impact of a plant isn't readily visible or directly usable at operational level, which limits the use of such indicators as genuine day-to-day directing tools. The problem is sharpest for indirect emissions. The hardest indicators concern scope 3, because they depend heavily on supplier data and are therefore less directly controllable. These observations are a concrete instance of the technical and methodological barriers emphasised in the literature (Gond et al., 2012).

A third, closely related barrier is the fragmentation of information systems. ESG data at Spadel come from multiple sources like industrial sensors, internal software, SAP, Excel files, and external partner or supplier data. Interviewees explained that safety data are consolidated in Excel files and that final consolidation occurs in an Excel dashboard, while some employees expressed the wish for a single tool able to aggregate all data, platforms and sources. The reliance on dispersed tools, and on Excel in particular, increases the workload and complexity of reporting. The data infrastructure problem that the literature identifies as a major obstacle to credible ESG measurement (Arvidsson & Dumay, 2022).

A fourth barrier is the organisational burden of ESG reporting itself. They noted that preparing for the CSRD with audits, data collection, the calculation of CO2 emissions, mobilises a great many people and represents a significant cost. This is a striking confirmation of the regulatory paradox discussed earlier (Delgado-Ceballos et al., 2023). The framework intended to embed sustainability also consumes substantial resources and can act as a brake in organisations whose teams are already stretched.

A fifth barrier is the cross-cutting nature of sustainability because ESG issues span operations, CSR, finance, HR, procurement and packaging, no single department holds full authority over them. They identified this transversality, and the coordination it requires across many actors, as the principal difficulty in driving sustainability, an organisational and cultural obstacle that complicates decision-making even when commitment is present.

Finally, the analysis shows a dependence on external pressures to accelerate change. They explained that the development of the bag-in-box format for bottle was an important advance but was also accelerated by string societal pressure around plastic, and added that profitability remains a central criterion, even though some projects could be launched with a five- or ten-year horizon. This last point returns directly to the financial barrier, which is that an ambitious sustainability strategy still operates within financial arbitration.

The COO identified several factors accelerating integration. Regulation, and the CSRD in particular, has strengthened non-financial reporting requirements and pushed the firm to structure its data-collection systems and formalise its ESG indicators. Stakeholders' expectations, from consumers, distributors and certain investors, reinforce the company's commitments. The energy crisis sharpened attention to energy efficiency, encouraging investment in technologies that reduce

consumption. And senior management plays a driving role in defining sustainability objectives and mobilising the organisation around them. Asked whether integration would have evolved similarly without external pressure, the COO judged that regulatory and societal pressures had probably accelerated it, and that the evolution would otherwise have been slower which is a candid acknowledgement that external forces have been a real catalyst rather than a mere constraint (Gond et al., 2012).

Looking ahead, the COO expected ESG integration to deepen, with better reporting tools, more systematic inclusion of ESG indicators in dashboards, and greater weight given to environmental impacts in investment decisions. Asked what he would change in the control system, he pointed to simplifying certain ESG indicators, improving data-collection systems, and, importantly, better linking environmental indicators to financial ones so that their impact becomes more visible in decision-making. This wish, to connect the non-financial to the financial register, is precisely what the eco-control literature proposes as the route to deeper integration (Henri & Journeault, 2010).

Spadel is a case of advanced but uneven integration. Sustainability is intrinsic to the firm's identity through its dependence on water, is embedded across operational, group and strategic levels, and genuinely informs investment appraisal. Yet integration is constrained less by a lack of commitment than by technical and organisational barriers which were described as the difficulty of measuring emissions, fragmented information systems, the cross-cutting nature of sustainability, and the heavy reporting burden, and it remains subordinate to financial performance when the two diverge. The case shows that even a firm whose core purpose aligns with environmental sustainability encounters substantial obstacles in turning that alignment into full operational guidance.

6.3 Mecafluid

Mecafluid is a medium Walloon firm founded around thirty years ago. It operates business-to-business, supplying industrial components that run on compressed air along with industrial valves and offering technical services such as installation and maintenance. The firm has two activities, the commercialisation of components and a department of technical services and solutions, and it builds control cabinets and occasional prototype machines on client request rather than running a heavy industrial process of its own. The interviews were conducted with the founder and director himself, which matters for the analysis because in a firm of this size the founder's personal values and the organisation's orientation are closely linked, and with a manager, quite new to the organisation.

This case is therefore the smallest of the four and the one where formal management control is least developed. Historically, the firm drove itself through a small set of indicators, beginning with headcount, then turnover and gross margin, and progressively adding individualised performance indicators by role. Deviser staff are assessed on the turnover they convert into orders, the conversion rate between offers and orders, and relative margin in percentage terms, while technicians are assessed on hours billed. This is a lean, financially and operationally oriented control system, with no formal ESG measurement layer attached to it.

What characterises Mecafluid is that environmental and social concern entered the firm informally and early, through the founder's outlook rather than through a deliberate management programme.

He explained that the firm had always paid attention both on well-being of the people working there and to ecological questions such as pollution and recycling in their processes. Concrete practices follow this. The firm recycles as much as it can, reuses suppliers' cardboard for its own shipments, and has soiled rags cleaned and reprocessed. He noted that this orientation intensified with the firm's ISO 9001 certification, which carries an ESG dimension, but that it preceded any external requirement and rested first on personal conviction, describing himself as someone oriented toward nature and especially toward the well-being of workers in the company.

The social dimension is the most visible. They both described a series of measures aimed at the team's well-being, including a ping-pong space, a billiards space, a small gym, an outdoor boules court, an area to eat outside in the sun, a coffee machine and weekly fruit deliveries. The founder also recounted the decision to close the company for a full day for a team-building event, taken because people no longer wished to spend a holiday day on a professional event, so the firm chose to absorb the cost itself rather than ask staff to give up leave. He framed the firm's future priorities in the same terms, intensifying attention to the team to strengthen the sense of belonging and cohesion, on the reasoning that since people spend eight hours a day at work it should be as pleasant as possible.

The environmental dimension, while less foregrounded, is real and forward-looking. They described a progressive shift to electric vehicles, the equipping of the building with photovoltaic cells, the use of heat pumps, and a objective of greater energy self-sufficiency. A particular clear example concerns the firm's compressed-air audit department, which has grown strongly. They explained that producing compressed air is very costly because a large share of the energy absorbed turns into heat, so leaks make the compressor run more and consume more energy, and that the firm now recovers this waste heat to produce hot water, for instance to heat showers, where previously water at seventy degrees was lost to the atmosphere. Here an environmental improvement and a cost reduction coincide, which is exactly the condition under which the literature expects sustainability to advance most readily in industrial settings (Henri & Journeault, 2010).

A notable feature of this case, and one that contrasts with the change-management struggles described at Knauf, is that they reported no internal resistance to these practices. The founder attributed this to the team having grown quickly and being young, and therefore more sensitive to this approach than his own generation. He went further, saying that he had encountered no obstacle and that it was rather the employees who came forward with proposals, which led him to describe them as accelerators of integration. This is a clear instance of culture functioning as facilitator (Crutzen, Zvezdov & Schaltegger, 2017), and it suggest that in a small firm with an aligned founder and a young workforce, the organisational and culture barriers that slow larger organisations may be largely absent.

On governance, the director was sole owner until 2021, when he chose to share the company with two associates, so that since then three people lead the firm. He stressed that he could have sold to the highest bidder had it only been question of money, but that he deliberately chose partners who share a vision of humane governance attentive to the material, financial and relational needs of the firm. The financial function, in his account, takes ESG considerations into account even

though its primary mission is financial. This points to a governance that is values-aligned at the top, which in a small firm is a powerful integrating force.

The clearest limit at Mecafluid concerns measurement. Asked whether the firm encounters difficulties in collecting tangible and usable ESG data, they acknowledged that it does, and that unlike its financial KPIs the firm has no real performance coefficient for its ESG policy. They mentioned that one could survey staff on what to improve and draw conclusions from it, and that this is done day to day through the new human-resources manager, but the firm hasn't formalised ESG indicators in the way it has formalised financial ones. This corresponds directly to the technical and methodological barrier identified in the literature (Gond et al., 2012), and it shows that even where commitment is strong, the absence of measurement tools keeps integration informal.

The barriers as the founder sees them. He was reflective about the obstacles to deeper ESG integration, and his answers reinforce the analytical framework in two ways. On operational constraints, he identified resource and supply questions rather than internal resistance, explaining his long-standing preference for buying locally, by which he meant within Europe, and his wish to avoid components produced directly in Asia, while acknowledging that this is difficult because even European suppliers incorporate parts from Asia and the market makes full local sourcing impossible. He also identified a revealing external barrier in the gap between what large clients' senior managements proclaim and what their buyers do. He observed that high-level managers express the wish for green, certified suppliers, including certifications such as EcoVadis, yet that now of purchase the buyer chooses on price and on the technical solution, so that being greener doesn't win the order if it costs ten per cent more. This is a concrete account of how competitive and market pressure undercuts substantive integration even when the rhetoric of clients appears to support it, and it qualifies the role of external pressure as a facilitator (Delmas & Burbano, 2011).

Most striking is the director's view of the deepest barrier, which he located in culture rather than in technology or supply. Asked what most obstructs deeper ESG integration in firms generally, he answered that in our culture finance comes before well-being and ecology in almost every case, that one is expected to make money rather than to plant trees or work less, and that although this is changing somewhat in younger generations, most people, himself included, still operate this way. Pressed to name the single principal obstacle, he answered plainly that it is money and the will to have money. This is the most direct statement of the financial barrier among all four cases, and it is significant precisely because it comes from a founder who is personally committed to social and environmental ends. His position wasn't that sustainability is unimportant, but that financial viability is what allows a firm to pay its people, invest and remain in the market, a sequence in which the financial necessarily comes first.

They also reflected on external crises and on scale. They recalled that the slowdown of industry during the pandemic produced a visible recovery of nature, with clearer waters within a couple of weeks, which they treated as a moment of awareness, while observing that once global supply chains were restored most actors returned to their prior habits of convenient sourcing. And they expressed a sense of the limits of individual action, noting that a country of eleven million inhabitants can do little to change the priorities of the world's largest powers, when insisting that one shouldn't give up

because, in his image, small streams make great rivers, and expressing confidence in younger generations.

Mecafluid is a case of real but informal integration. Environmental and social concern is real, predates external requirements, and is carried by the founder's values and a young, willing workforce, so that the cultural and change management barriers prominent elsewhere are largely absent. Integration spans both social practices, where it is strongest and most visible, and environmental measures, where it advances most where it coincides with cost reduction. Its limits are the absence of any formalised ESG measurement, the constraints of supply and competitive price pressure, and a clearly articulated cultural primacy of finance. The case shows that strong values can drive integration far in a small-to-medium firm, but that without measurement tools the result remains informal rather than systematically managed.

6.4 John Cockerill

John Cockerill is a diversified industrial group with more than two hundred years of history, having stood at the origin of the industrial revolution on the European continent. It operates across five sectors, namely defence, where it develops and manufactures military vehicle and weapon systems, energy, covering recovery boilers, biomass valorisation and renewable-energy solutions and maintenance, hydrogen, where it develops solutions to produce hydrogen by water electrolysis, industry, which builds machines for heavy industry and especially the steel sector such as surface-treatment lines, rolling mills and furnaces, and services, which offers maintenance in heavy industry. The interview was conducted with a member of the corporate development department, who had been the group's reference person on measuring and improving the environmental footprint of its solutions, and who therefore worked closely with the teams in charge of these questions before that role was discontinued.

This case differs from the previous three in two structural respects that shape everything else. First, sustainability has historically not been a management priority. Second, the group is, in the manager's own description, a kind of confederation of small and medium-sized enterprises, so that decisions aren't centralised and practices are far from homogeneous across countries and even between entities in the same building. These two features make John Cockerill the clearest case of integration that has advanced on paper without taking hold in operational guidance.

The respondent traced a clear formal trigger to the redefinition of the company's mission during a broader rebranding, when the firm returned to the John Cockerill name and reflected on its purpose, a process in which environmental questions appeared closely tied to its activities. In practice this produced an ESG or CSR team somewhere between 2017 and 2019. His account of what followed is telling. Not much happened, in the sense that responsibility rested each time on a single person, which is plainly too little to manage the subject at group level, and the function was attached to the communication department, which he judged unhelpful if the aim was for sustainability to be taken seriously and embedded in management practices rather than remaining superficial or looking like greenwashing. The successive post-holders stayed only months before leaving. This is a textbook illustration of the decoupling the literature describes (Delmas & Burbano, 2011), where sustainability is housed in communication and disconnected from the systems that drive the firm.

A more recent acceleration came when the respondent, in a new function, produced the firm's first carbon assessment with his intern. He stressed that this pilot, while improvable, demonstrated that serious methodologies existed and that the work required access to data and a form of data governance. From there the subject developed to the point where the group now has clearly defined team of around three people, a committee dedicated to corporate social responsibility within the board, and relays across the sectors to access information and pass on communications. The driving force throughout was external. He was explicit that the changing European framework imposed a series of obligations and supplied the arguments needed to obtain sponsorship from a top management that was convinced in principle but, in his words, neither facilitating nor obstructing.

The decisive observation in this case is that the carbon assessment and extra-financial reporting are now done seriously and methodically, with good data management, while structural change in operations remains hard to detect. He considered it too early and too difficult to say whether collaborators see real change beyond reporting and data collection, and he couldn't point to major signals a form of board-level engagement, but it sits apart from how the business operates.

This separation becomes sharpest on investment decisions. Asked whether durability enters decisions to buy new machines on its own initiative with sustainability in mind and that in about ninety-nine per cent of cases the question arises only when it derives from a client's specifications. Sustainability is present in the commercial exchange but isn't, to his knowledge, a criterion of variation in the firm's own investment choices. Here the contrast with Knauf, where a new machine is analysed for its energy and water consumption, and with Spadel, where a more efficient machine may be preferred despite a higher cost, could hardly be clearer. At John Cockerill, ESG criteria haven't penetrated investment appraisal, which is exactly the boundary at which literature finds integration most often halts (Crutzen, Zvezdov & Schaltegger, 2017).

The most striking evidence of the subject's fragile standing is that the corporate development member's own role was eliminated. The development department no longer regards having an expert on these questions as part of its missions, so the measurement and improvement of the environmental footprint of the group's solutions is no longer managed centrally, no longer the object of active awareness or training, and no longer a point of attention in development committees or in the design work of the group's engineering offices. He drew a sharp distinction between two separate subjects, namely what the company does and how it does it on the one hand, the product and the portfolio, and the reporting on ESG criteria for the organisation on the other. The reporting team is being reinforced, while the work on the environmental quality of the products themselves has effectively been dropped except when a client request arrives, at which point someone occasionally calls him to ask what a life-cycle analysis is. Integration has therefore not notably slowed down but partially regressed on the operational side, even as the reporting side consolidates.

The respondent was analytically precise about the obstacles, and his diagnosis aligns closely with the literature while adding nuance. He named two principal barriers. The first was a general management that, until very recently, didn't treat the subject as fundamental and approached it through a purely commercial and marketing lens, so that the driver remained classic commercial indicators rather than any intention to improve the environmental footprint. The second, which he

treated as more general, concerns motivation and indicators. Every employee, collaborator and partner is motivated by the same things, which are meeting their targets and ticking their boxes, and if those indicators contain nothing that accounts for extra-financial criteria, then those criteria will simply be ignored. This is a clear statement of the link between control systems, incentives and behaviour that the literature places at the centre of integration (Otley, 1999; Malmi & Brown, 2008), and it explains why reporting alone changes little.

Importantly, he resisted the language of resistance. He stressed that this wasn't a question of an active lack of will, but that sustainability was simply never a priority, the thing left on the back burner to be dealt with later. The chief difficulty, in his account, lay in operationalisation and in the overload, it represented for teams who couldn't see a clear return on the time they invested. He also rejected the idea that the cost framing was inevitable, arguing that it was wrong to see sustainability only as a cost rather than an opportunity, since a company like John Cockerill can convince clients to use its solutions, especially where these helps clients meet their own regulatory obligations.

Looking ahead, the member of corporate development was candid that without external imposition there would be no active or proactive work on these questions. He thought the recently changed general management more inclined to act proactively but doubted that the environmental criterion would become a principal differentiating marker rather than one consideration among others. He made a subtle point here that bears on the whole study. If a product is developed because a commercial opportunity points that way rather than out of an environmental intention, the product won't even be designed in the same manner, because the relative weights placed on design elements and innovation, performance indicators differ, so the outcome necessarily differs. In other words, whether sustainability is a genuine objective or a by-product of commercial logic changes the result itself, not its label.

Asked what he would change in the control system, he answered that sustainability should enter as a criterion at the level of management control in the broad sense, in the control of projects and of the group's activities, in the same way the financial performance is evaluated, using tools that already exists such as life-cycle analyses and carbon assessments for environmental criteria and the various calculators available for social criteria. He added at once that, with a magic stick he would do this, while recognising that it isn't operationally feasible as things stand. Finally, he didn't think the industrial sector itself was a problem, observing only that in industry, less than in business-to-customer settings, the questions of marketing, packaging and appearing green carry less importance.

John Cockerill is the case of weakest operational integration among the four. A serious and consolidating reporting framework, complete with a board-level CSR committee, coexists with an almost complete absence of ESG criteria in investment decisions and product design, and the central expert role was removed. The barriers are organisational and political rather than technical, namely a long-standing financial and commercial primacy, the absence of ESG content in the indicators that drive behaviour, the overload of operationalisation, and a decentralised structure that prevents homogenous practice. The respondent's judgement that nothing proactive would happen without external imposition captures the case precisely, and it stands as the mirror image of Knauf, where values, leadership and formal mechanisms have carried integration into the heart of how the firm is run.

7. Cross-case analysis

The four cases were selected precisely because they confront the same challenge from different starting points and reading them side by side reveals patterns that no single case makes visible. This part compares the firms along the analytical framework built in the literature review, first by situating them on a spectrum of integration, then by examining how the four families of barriers and the main facilitators play out across the sample.

7.1 Degree of integration

The clearest finding is that ESG integration is a matter of degree rather than a binary state, exactly as the literature suggests (Gond et al., 2012). The four firms occupy distinct positions on a spectrum running from sustainability confined to reporting and communication to sustainability embedded in the decisions that pilot the firm.

At one end stands Knauf, where ESG criteria are anchored in the company's values, supported by dedicated roles and investment in measurement, and carried into investment appraisal, so that integration reaches the operational and strategic core. Close to it sits Spadel, where sustainability is intrinsic to the firm's identity through its dependence on water and genuinely informs dashboards, planning and investment, though it remains constrained by measurement and coordination difficulties and subordinate to financial performance when the two diverge. Mecafluid occupies a different kind of position, with integration that is real and value-driven but informal, strong on social practice and on environmental measures that coincide with cost-savings, yet without any formalised ESG measurement. At the far end lies John Cockerill, where serious reporting framework coexists with an almost complete absence of ESG criteria in investment and product decisions, and where the central expert role was removed.

This ordering matters because it shows that the firms differ less in whether they report on sustainability, which all of them now do, than in how far that reporting penetrates management. The decisive boundary, repeatedly identified in the literature, is investment appraisal (Crutzen, Zvezdov & Schaltegger, 2017). Knauf and Spadel have crossed it, Mecafluid does so informally and only where environmental and financial logics align, and John Cockerill hasn't crossed it at all.

Dimension	Knauf Insulation	Spadel	Mecafluid	John Cockerill
Size & Ownership	Large, family-owned	Large, stable ownership	Mid-sized, founder is the director	Large, decentralised group
Dominant ESG dimension	Social and environmental, integrated	Environmental, resource-driven	Social mainly, then environmental	Focused on reporting
Place of sustainability	Core value and strategy pillar	Intrinsic to identity	Founder's personal values	Late, externally triggered
Reaches investment decisions	Yes	Yes	Informally, when they are aligned with cost	No
Formalised ESG measurement	Strong	Moderate, fragmented	Largely absent	Strong for reporting only
Principal barrier	Change of mentalities	Measurement and coordination	Lack of measurement tools	Financial and commercial primacy
Principal facilitator	Values-driven leadership	Resource dependence and stable governance	Founder values and young workforce	External regulation

7.2 Economic and financial barriers across the cases

The dominance of financial logic appears in every case, but with revealing differences in intensity. It is most explicit at John Cockerill, where sustainability was long seen as a cost rather than an opportunity and where, in the respondent's account, the driver of decisions remained classic commercial indicators. It is openly acknowledged at Mecafluid, where the founder stated plainly that in our culture finance comes before well-being and ecology and named money as the principal obstacle, a statement even more striking because he is personally committed to social and environmental ends. At Spadel it surfaces as an asymmetry, since the COO confirmed that poor ESG performance doesn't trigger reactions as strong as poor financial performance

Knauf is the apparent exception, and the reason is instructive. The financial barrier is weakest there not because the firm ignores costs but because family ownership reframes the time horizon. The sustainability director and the supply chain employee tied the firm's orientation to the owners' wish to keep the business viable for the long term, which loosens the short-termism that the literature treats as central to the financial barrier (Hahn et al., 2015). In other words, the same financial logic that blocks integration elsewhere is rendered compatible with sustainability where ownership extends the horizon over which returns are judged. The financial barrier, then, is universal in presence but variable in force, and what varies it most is type of ownership and time horizon.

7.3 Technical and methodological barriers across the cases

Measurement difficulty is the most evenly shared barrier, but the cases show that it bites differently depending on what a company is trying to measure and with what resources. Spadel offers the richest evidence, with managers pointing to the invisibility of a plant's precise carbon impact at operational level, the difficulty of scope 3 emissions that depend on supplier data, and the fragmentation of information system across sensors, SAP and Excel files. Mecafluid shows the same barrier in its starkest form, since the firm has no real performance coefficient for its ESG policy at all, in contrast to its precise financial KPIs.

The two large firms reveal that this barrier can be overcome with investment. Knauf addressed it directly by spending a million euros on energy meters to make its flows visible and by appointing a sustainability engineer to report more than a hundred indicators monthly, and John Cockerill built a serious carbon-assessment methodology with proper data governance. The difference between these two, however, shows that solving the measurement problem is necessary but not sufficient. John Cockerill measures yet doesn't manage, which means that data quality alone doesn't produce integration. Measurement is a precondition that the firms meet to very different degrees but crossing it doesn't guarantee that the resulting information will be used.

7.4 Organisational and cultural barriers across the cases

This is the category of barriers that most sharply separates the cases, and the comparison suggests it is the most decisive. The contrast between Knauf and John Cockerill is the clearest in the study. At Knauf, culture functions as the principal facilitator, with values treated as a non-negotiable foundation enforced through workshops and, where necessary, dismissals, and with sustainability built into the strategy as a clear pillar. At John Cockerill, the organisational configuration works against integration, since the ESG function was first lodged in communication, then staffed by a succession of short-lived single post-holders, and finally, in its products-facing form, removed altogether, while the decentralised confederation of SMEs structure prevents homogenous practice.

Mecafluid demonstrates how a small firm can largely escape this barrier. Because the founder's values and a young workforce are aligned, the change management struggles that consumed years at Knauf were simply absent, with employees acting as accelerators rather than obstacles. This points to an interaction the literature underplays, namely that organisational size mediates the cultural barrier. In a small firm an aligned leader can diffuse values directly; whereas a large firm must build formal system and invest heavily in change management to achieve the same alignment, as Knauf did and John Cockerill didn't. The cultural barrier is therefore not fixed obstacle but one whose height depends on the fit between leadership values, workforce disposition and organisational scale.

7.5 External and institutional pressures across the cases

External pressure operates in all four firms, but the cases show that the same pressure produces opposite effects depending on internal conditions, which is the most analytically interesting pattern in the sample. Regulation, and the CSRD in particular, was named as a driver at Spadel and as the decisive trigger at John Cockerill, where the respondent judged that without external pressure no proactive work would occur. Client expectations played the same triggered role at Mecafluid, where

demands for certifications such as EcoVadis pushed the firm to formalise what it already did informally.

Yet external pressure also reveals its limits and its contradictions. At Mecafluid the founder exposed the gap between what large clients' senior management proclaim and what their buyers do, since the buyer ultimately chooses on price, so that being greener doesn't win the order. At Spadel the regulatory framework that drives integration also imposes a heavy reporting burden, with the CSRD mobilising people at significant cost. The cases confirm the regulatory paradox identified in the literature (Delgado-Ceballos et al., 2023). The crucial difference lies in what firms do with the pressure. Knauf and Spadel absorb it and convert it into capability, while John Cockerill complies at the reporting boundary without converting compliance into operational change. External pressure, in short, is a necessary catalyst but never a sufficient one, because its effect is filtered through the internal facilitators a firm already possesses.

7.6 Summary

Read together, the four cases suggest that the barriers to ESG integration don't operate independently but interact, and that their combined effect is mediated by a small number of internal conditions. Financial logic is present everywhere but is softened by long-term leadership. Measurement difficulty is shared but surmountable with investment, though solving it doesn't by itself produce integration. The organisational and cultural barrier is the most decisive, and its height depends on the fit between leadership, workforce and size. External pressure triggers movement in every case but determines outcomes in none, because firms convert it into substance only where internal facilitators already exist. The variable that recurs across all these patterns is leadership anchored in values, present at Knauf and Mecafluid, stabilising at Spadel, and historically absent at John Cockerill (for sustainability concerns). This is the thread the discussion takes up in relating the cases back to the literature.

8. Discussion

The purpose of this part is to bring the empirical findings into dialogue with the literature reviewed earlier. The aim isn't to restate the cases but to ask what they confirm, what they nuance, and where they add something, the literature completes. Three broad themes organise the discussion, which are the persistence and conditionality of financial dominance, the place of measurement in integration, and the central role of leadership and culture. A final section draws out implications for how we understand barriers to ESG integration in industrial firms.

8.1 Financial dominance

The literature treats the dominance of financial logic as the most fundamental barrier to ESG integration, rooted in control systems built around profitability and short-term results (Anthony, 1965; Otley, 1999) and reflected in a structural tension between economic and sustainability objectives (Hahn et al., 2015). The cases confirm this strongly. Financial primacy surfaced in all four companies, from John Cockerill, where sustainability was long seen as a cost rather than an opportunity, to Spadel, where poor ESG performance doesn't give reactions as forceful as poor financial performance, to Mecafluid, where the founder named money as the principal obstacle. On the face of it, this is a clear empirical endorsement of the literature.

The cases also nuance the picture in a important way. Financial dominance isn't a constant of equal weight everywhere but a force whose intensity depends on ownership and time horizon. Knauf shows this most clearly, since family ownership reframes the horizon over which returns are judged and thereby reconciles financial prudence with sustained investment in sustainability. This observation connects to a strand of the literature on ownership and long-term orientation that the barriers literature tends to treat separately, and it suggests that the financial barrier is better understood as function of how a firm defines the relevant time horizon than as a fixed preference for financial over non-financial goals. Where ownership lengthens the horizon, as at Knauf and to a degree at Spadel with its stable governance, the apparent conflict between financial and sustainability logics reduces itself. Where the ambition stays short and commercially driven, as historically at John Cockerill, the conflict intensifies. The contribution here is to specify a condition, namely time horizon, under which the financial barrier rises or falls, rather than treating it as a uniform obstacle.

8.2 Measurement

A second major theme in the literature is the technical difficulty of measuring ESG performance, given its qualitative, multidimensional and uncertain nature (Gond et al., 2012), and the consequent value of dedicated tools such as environmental management accounting and eco-control (Burritt & Schaltegger, 2010; Henri & Journeault, 2010). The cases confirm that measurement is a genuine and pervasive barrier, vividly so at Spadel, where managers described the invisibility of a plant's precise carbon impact, the dependence of scope 3 on supplier data, and the fragmentation of information systems, and at Mecafluid, which has no real ESG performance coefficient at all.

The cases add a finding that qualifies the implicit logic of the eco-control literature, which tends to present better measurement as the route to deeper integration. The comparison of Knauf and John

Cockerill shows that this is only half true. Both firms invested seriously in measurement, yet only Knauf turned that information into operational advantage. John Cockerill measures well and uses it less. Measurement, therefore, is best understood as a precondition that enables integration without causing it. The decisive question isn't whether a firm can measure its ESG performance but whether the resulting information is connected to the decisions and incentives that drive behaviour. This echoes the insight, present in Spadel's own diagnosis, that environmental indicators need to be linked to financial ones to become visible in decision-making, which is precisely what eco-control proposes in principle (Henri & Journeault, 2010) but which firms achieve only when other conditions are met. The contribution is to separate two things the literature sometimes conflates, namely the capacity to measure and the willingness to use what is measured.

8.3 Leadership and culture as a decisive variable

The literature identifies leadership commitment and organisational culture as powerful facilitators and notes that sustainability control often relies on informal mechanisms such as values and leadership rather than formal systems (Crutzen, Zvezdov & Schaltegger, 2017). The cases don't confirm this, as they place it at the centre. Across the sample, the variable that best explains why firms occupy different positions on the degrees of integration is leadership anchored in values. It is the engine of integration at Knauf, where management drove cultural change through workshops and enforced values as a non-negotiable foundation, and at Mecafluid, where the founder's convictions diffuse directly through a small and willing organisation. It is stabilising at Spadel, where continuity of ownership supports a long-term view. And it was historically absent at John Cockerill, where the subject sat on the back and where, tellingly, the function rose and fell with the presence or absence of a committed individual and the non-pushing value of the upper management for those concerns.

The cases also enrich the literature by showing how leadership and culture interact with organisational size. Crutzen, Zvezdov and Schaltegger (2017) found that large firms rely heavily on informal mechanisms, and the present study suggests why the relationship between informality and integration depends on scale. In a small firm such as Mecafluid, informal value-driven control is sufficient, because an aligned founder can shape the whole organisation without formal system. In a large firm, informal commitment must be translated into formal mechanisms to take hold, which is the difference between Knauf, which built dedicated roles, measurement and change management routines around values, and John Cockerill, where commitment in principle never acquired the framework needed to operationalise it. This connects directly to the idea of a control package (Malmi & Brown, 2008), since Knauf succeeded by aligning cultural controls with planning, measurement and administrative controls, whereas John Cockerill activated only the reporting element and left the others untouched. The contribution is to show that the facilitating power of leadership and culture isn't unconditional but depends on whether, at a given scale, values are backed by formal controls that turn intention into routine.

8.4 Implications

Taken together, these findings carry both theoretical and practical implications. Theoretically, the study suggests that the barriers to ESG integration are best understood not as a list of independent obstacles but as a system in which a few internal conditions, principally ownership and time horizon,

organisational case, and value-based leadership, govern how strongly the generic barriers bear on a given company. The same financial logic, the same measurement difficulty and the same external pressure produce significantly different outcomes depending on these conditions, which is why firms facing an identical regulatory and regional environment occupy such different positions on the integration spectrum. This reframing is consistent with the view that integration is a matter of degree and configuration rather than presence or absence (Gond et al., 2012), and it locates the explanatory weight in the interaction between barriers and internal conditions rather than in the barriers alone.

Practically, the cases suggest that firms seeking deeper integration should treat measurement as a starting point rather than an end and should concentrate on connecting non-financial information to the decisions and incentives that drive behaviour, since indicators that appear in no one's targets will be ignored, as we observed in the John Cockerill's case. They also suggest that the lever with the greatest reach is leadership willing to embed sustainability in the company's values and, in larger organisations, to back those values with formal roles, measurement and change management rather than relying on commitment principle. For policymakers, the regulatory paradox visible at Spadel can also consume the very resources that substantive integration requires and they secure real change only where firms are equipped to convert compliance into management. The limits of these implications, given the small and purposive sample, are taken up in the conclusion.

9. Conclusion

This thesis set out to understand why so many industrial firms that report extensively on sustainability continue to make decisions through a predominantly financial lens. Its central question asked what barriers limit the integration of ESG criteria into management decision-making. To answer it, the study combined a review of the literature on management control and sustainability with a qualitative, multiple-case study of four firms that differ in size, ownership and the place sustainability holds in their purpose.

The first contribution of the study is to locate, precisely, where integration tends to slow down. All four firms now report on sustainability, so the meaningful difference between them doesn't lie in disclosure but in how far the disclosure reaches into the decisions that allocate resources. The decisive boundary is investment appraisal. Knauf and Spadel have carried ESG criteria across it, Mecafluid does so informally and only where environmental and financial logics coincide, and John Cockerill hasn't crossed it at all, maintaining a serious reporting function alongside an almost complete absence of ESG criteria in investment and product decisions. Integration, in other words, is a matter of degree rather than presence or absence as we observed before.

The second contribution concerns the barriers themselves. The literature describes financial dominance, measurement difficulty, organisational and cultural inertia and external pressure as the principal obstacles to integration, and the cases confirm that all four are real. Financial dominance is present everywhere but is reduced when time horizon of returns is lengthens. Measurement difficulty is shared but surmountable through investment and the capacity to measure doesn't produce integration, since that measurement must be connected to decisions. The organisational and cultural barriers emerge as the most decisive parameter, and it depends on the fit between leadership values, workforce disposition and willingness, and organisational scale. External pressure, finally, triggers movement in every firm but determines the outcome in none, because firms convert regulatory and market pressures into substance only where internal facilitators already exist.

Running through all these findings is a single recurring variable, which is the leadership. It is the engine of integration at Knauf, where management drove culture and embedded sustainability as a pillar of strategy, and at Mecafluid, where founder's convictions diffuse directly through his willing organisation. It is a stabilising force at Spadel, where continuity of ownership sustained long-term view. For John Cockerill, it operates differently as leadership isn't leading to sustainability concerns as the historical ownership doesn't want to. This is connected to the work of Malmi & Brown (2008) demonstrating that sustainability advances only when cultural controls are aligned with planning, measurement and administrative controls rather than activated in isolation.

Taken together, these observations offer an answer to the research question that is deliberately analytical rather than prescriptive. The barriers limiting ESG integration in Walloon industrial firms aren't primarily technical, but organisational and cultural, and their effect on managerial decision-making depends on leadership. Where it is favourable, the generic barriers identified in the literature are lowered and integration reaches into management. Where it isn't, sustainability stops at the reporting boundary, however serious reporting itself may be. This is consistent with the guidance that shaped the research, which sought insight into how integration unfolds rather than a single verdict on whether firms integrate ESG criteria.

These conclusions must be read in the light of the study's limitations. The sample is small and was selected purposively, so the findings can't be generalised statistically to the wider population of Walloon industrial firms, and their value lies in analytical insight and comparison rather than in representativeness. The four firms also differ considerably in size and sector, which enriches the comparison but limits the extent to which they can be treated as strictly equivalent cases. The evidence rests mainly on interviews with a limited number of respondents per firm, which introduces a risk of social desirability bias, since managers may present their firm's sustainability efforts more favourably than internal practice warrants. This risk is itself analytically interesting, given that the gap between sustainability disclosure and substantive integration is one of the phenomena the study examines. Finally, the interviews varied in format and depth across firms, which means that the cases aren't documented with perfectly uniform detail.

These limitations open several avenues for future research. A larger sample of firms drawn from single sector would allow the comparison to hold size and activity more nearly constant and would test whether the internal conditions identified here. Longitudinal research following firms over time would be especially valuable, since the present case study captures integration at a single moment, whereas the cases suggest that the integration is a trajectory shaped by leadership and change management over years. Quantitative work could test whether the conditioning role of time horizon for returns on the financial barrier holds across a broader sample. And further study of the reporting boundary itself, of why some firms convert reporting capability into operational steering while others don't, would address what this study identifies as the central unresolved question. Pursuing these directions would deepen understanding of a transformation that regulation has made unavoidable but that firms, as these four cases show, are navigating in notably different ways.

10. List of resource persons

Website from the four firms:

- Knauf Insulation: <https://knauf.com/fr-BE>
- Spadel: <https://www.spadel.com/fr>
- Mecafluid: <https://www.mecafluid.eu/fr/>
- John Cockerill: <https://johncockerill.com/fr/>

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12. Note for Utilisation of AI

Artificial intelligence was used to rephrase some elements of this thesis, but also to have the transcriptions from the interview directly from Microsoft Teams, or the audio tool of the computer. All the ideas described in the report were imagined and written by the author thanks to all the documentation mentioned in the bibliography and the interviews. Some scientific articles have been resumed for a better understanding of some paragraphs by artificial intelligence too. ChatGPT was the tool used for those purposes.

EXECUTIVE SUMMARY

Maximum 300 mots/words

Sustainability has become a central concern for industrial firms, reinforced in Europe by the Corporate Sustainability Reporting Directive and its principle of double materiality. Yet a clear gap persists between what firms report and how they are run. Environmental, Social and Governance (ESG) indicators have multiplied, but they rarely reach the management control systems that genuinely steer organisations, which were historically built around financial logic. This thesis examines that gap. Its central question asks what barriers limit the integration of ESG criteria into the management control systems of Walloon industrial firms, and how these barriers shape managerial decision-making.

The study combines a review of the literature on management control and sustainability with a qualitative, multiple-case study of four firms differing in size, ownership and sector. Drawing on semi-structured interviews, it reads each case against an analytical framework distinguishing four families of barriers, namely economic and financial, technical and methodological, organisational and cultural, and external and institutional, together with the factors that facilitate integration.

The findings show that integration is a matter of degree rather than presence or absence, and that the decisive boundary is investment appraisal. The four firms occupy distinct positions on this continuum. Crucially, the generic barriers do not operate independently but form a system whose force is governed by a few internal conditions, principally ownership and time horizon, organisational scale, and value-based leadership. Financial dominance is universal but softened by long-term ownership, measurement is necessary but not sufficient, and leadership anchored in values emerges as the decisive variable.

The thesis contributes by shifting attention from disclosure to internal steering, and by showing why firms facing an identical regulatory environment integrate sustainability so differently.

MOTS-CLÉS/KEYWORDS: ESG Integration, non-financial indicators, sustainability, barriers, management control systems.

NOMBRE DE MOTS/WORD COUNT: Executive summary: 276 / Report: 16781 words



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