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Sustainability Accounting Learning Platform for a Green Economy

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Deliverable 2.3
Materials and resources of Module 3
Sustainability management accounting and control

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Executive summary

Work Package 2 (WP2) aims to produce high-quality and structured learning materials and resources on sustainability accounting. These materials and resources WP2 will be implemented in the online learning platform to populate the course syllabus on sustainability accounting. The materials are structured into three modules, each covering key sustainability accounting topics to train platform users on how to produce effective sustainability information.

The goal of **Deliverable 2.3 (D2.3)** is to produce the materials and resources of Module 3. This module focuses on the role of **management accounting and control for sustainability-related matters**. It will explore how management accounting can contribute to sustainable decision-making, as well as learn about the management controls that organisations can implement to foster sustainable behaviour. Specifically, the two units that integrate Module 3 are:

- **Unit 3.1. Sustainability management accounting**
- **Unit 3.2. Sustainability management control**

Each Unit consists of theoretical content, a set of small activities to foster users' engagement, case studies, short video pills on key concepts, a final evaluation test, and key references for consultation. All materials are produced in English. Their design has been guided by the orientation provided in D3.1 to ensure their adequacy to be implemented in the online learning platform and to exploit the functionality it provides for the learning process.

Each Unit has been produced as independent, yet theoretically connected, learning items that lecturers can use separately outside the learning environment, should they wish. Therefore, each Unit is provided as an independent element after this executive summary.

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Module 3
Sustainability management accounting and control

Unit 3.1
SUSTAINABILITY MANAGEMENT ACCOUNTING

Sustainability Accounting Learning Platform for a Green Economy

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List of acronyms

- BMA – Biodiversity Management Accounting
- CAT framework – "Context", "action", "transformation" framework
- CBAM – EU Carbon Border Adjustment Mechanism
- CMA – Carbon Management Accounting
- CSRD – EU Corporate Sustainability Reporting Directive
- EMA – Environmental Management Accounting
- GHG – Greenhouse gas emissions
- GRI – Global Reporting Initiative
- IA – Artificial intelligence
- ILO – International Labour Organisation
- IOM – International Organization for Migration
- ISO – International Organization for Standardization
- LCA – Life cycle assessment
- MFCA – Material Flow Cost Accounting
- OECD – Organization for Economic Cooperation and Development
- SBTi – Science Based Targets Initiative
- SMA – Sustainability Management Accounting

About this unit

Unit 3.1 explores the role of accounting in managing corporate sustainability by introducing the fundamentals of **Sustainability management accounting (SMA)**. As with management accounting in general, the purpose of SMA is to support managers in decision-making to improve the performance of the company. However, as a difference to conventional management accounting, practicing SMA provides a portfolio of context-appropriate management accounting tools which are not limited to considering financial performance measures but provide information on social, environmental, and economic measures to support well-informed and responsible managerial decision-making to improve sustainability performance. SMA emerged from Environmental Management Accounting (EMA; Burritt et al. 2023) and involves the planning, control and coordination of activities of social and environmental relevance (Gond et al. 2012), motivation of employees to engage with sustainability improvements, as well as internal and external communication responsibilities for different types and levels of managers (Schaltegger et al. 2015).

The content and learning activities in this unit build on earlier learning in the Account4GreenEco curriculum. Unit 1.1 introduced the concept of sustainability accounting as a means of redirecting human activities towards a more sustainable path, while Unit 1.2 focused on the main form of sustainability accounting practiced today, sustainability reporting. Unit 2.1 expanded on this knowledge by examining the regulation of sustainability reporting in the European Union, highlighting the importance of frameworks and directives in guiding organizational sustainability reporting. Unit 2.2 further developed this understanding by exploring the concept of social and environmental impact and its measurement, emphasizing the role of stakeholders in assessing organizational sustainability performance. Building on this foundation, Unit 3.1 introduces the fundamentals of SMA, which goes beyond conventional management accounting by providing a portfolio of context-appropriate management accounting tools that consider social, environmental, and economic measures to support informed and responsible managerial decision-making. By integrating the knowledge from the previous units, Unit 3.1 provides a comprehensive understanding of how accounting can be used to manage corporate sustainability and improve organizational performance.

In this unit, the scope of SMA is understood to address sustainability problems beyond organisational boundaries, and to consider an organization's links with its context and its contributions to sustainability transformations at the societal level. With that, the learning activities in this unit draw into question the conventional assumption of an internal scope for SMA. Contemporary frameworks, such as the multi-level Context, Action-formation and Transformative contributions (CAT) framework by Schaltegger et al. (2022) are discussed to support this multi-level notion of SMA, leading to a different way of thinking about corporate success and how to account for it.

Intended learning outcomes and competences

At the end of this unit, you should be able to:

- Understand key concepts related to sustainability management accounting (SMA).
- Have an awareness of the main SMA areas (like carbon, water, etc.), tools (like material flow cost accounting), and how they support managerial decision-making with regards to what types of business cases for sustainability exist (and how accounting can support creating them) and corporate sustainability (like how to link SMA with planetary boundaries).
- Identify the role of accounting for addressing sustainability problems beyond organizational boundaries.
- Reflect on the potential of SMA to contribute to sustainability transformations at the industry and societal levels.
- Reflect on the notion of “business case” in the context of sustainability.

1. Introduction to sustainability management accounting

Sustainability management accounting (SMA) aims to support corporate decision-makers in identifying environmental and social problems related to the business and to develop and implement effective and efficient solutions in an economic manner. SMA therefore transforms the traditional decision situation of actors from a state of being uninformed or wrongly informed about sustainability issues of the business to a state of being well-informed.

Conventional accounting systems either do not consider sustainability issues well or they even provide distorted information with regard to sustainability that guides managers to neglect sustainability issues, even in cases where their consideration would be economical. To achieve this transformation from being uninformed to being informed requires adequate methods of SMA that consider the decision situation of different actors in the company and what information can be most helpful to make informed decisions with regard to reducing negative sustainability impacts, increasing positive sustainability contributions in a way that also strengthens the economic performance of the company.

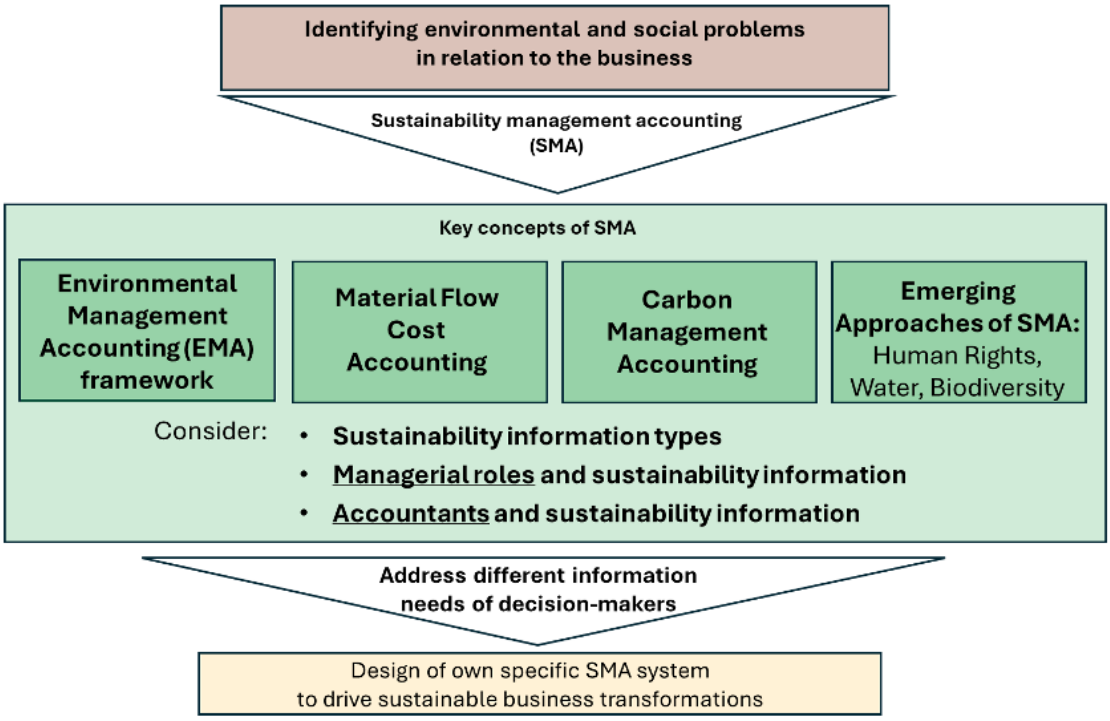
While most of the SMA approaches focus on improving organization-internal processes with regard to material and energy flows (and related costs; Stechemesser & Günther 2012; Christ & Burritt 2015), carbon emissions (Schaltegger & Csutora 2012), or water use (Christ & Burritt 2017a, b), modern SMA aims to translate what companies should measure and manage when acting in an Anthropocene (Jabot 2023). Therefore, in addition to the internal view, modern SMA explicitly considers social impacts and environmental impacts beyond organizational boundaries (Hörisch et al. 2020; Schaltegger et al. 2022). This includes the company's indirect impacts related to supply chains (e.g. Burritt & Schaltegger 2014), product use, etc. Today, SMA covers topics such as modern slavery and bad working conditions in supply chains (Christ et al. 2020), biodiversity impacts of products (Blanco-Zaitegi et al. 2022; Schaltegger et al. 2023) or impacts benchmarked against planetary boundaries (Schaltegger 2018).

To consider the diversity of sustainability topics, as for example expressed in the seventeen UN SDGs (covered in previous units of this course), and in light of the specialized roles of different management functions (e.g. procurement, production, logistics, marketing), SMA research and practice has developed multiple approaches and tools to serve the different information needs of decision makers in order to help them with useful information that relates well to realising their specific job duties in a more sustainable manner.

This unit is illustrated as in Figure 1. The most developed field of SMA is environmental management accounting (EMA) and here particularly, material flow cost accounting (MFCA) and carbon management accounting (CMA). Further emerging parts of SMA include human rights management accounting (including working conditions but also modern slavery issues), water management accounting and biodiversity

management accounting. Against the backdrop of increasing regulatory pressure and its considerable sustainability impact, sustainable supply chain management accounting is receiving increasing attention. Currently, most SMA approaches in practice are either deducted from regulatory pressures (thus reacting to the business context) or focus on internal optimisation of the organisation (thus improving and optimising the organisation's actions). To ensure that a company acts in the safe operating space of planetary boundaries and that it contributes effectively to sustainability transformations of markets and society, however, requires that companies develop transformative SMA in a comprehensive and systematic way.

Figure 1. Structure of the learning in this unit on SMA.



Source: Own elaboration.

Activity: What characterizes current sustainability accounting management practices? (see "Unit 3.1 Activity 1")

2. Fundamentals of sustainability management accounting

2.1. Key concepts of sustainability management accounting

Sustainability accounting focuses on collecting and reporting data on environmental and social impacts, often linked to economic information, with regard to reducing problems of unsustainability or contributing to sustainable development (e.g. Schaltegger and Burritt 2006, 2010). This involves examining the broader effects of sustainability management accounting (SMA) on a larger scale, including its potential to

drive **transformative change** and contribute to creating **solutions to planetary environmental and social challenges**. Thus, SMA includes forms of non-financial value creation in accounting, related to environmental and social topics.

While integrating social, environmental, and economic considerations is essential for sustainability, it remains somewhat abstract and insufficiently tangible for many corporate managers. Methods of material flow management and accounting still do not provide a clear picture of whether improvements in one area might compromise other sustainability goals. For instance, reducing greenhouse gases through reforestation may have further social and economic benefits but unintended consequences for biodiversity. Thus, sustainability accounting research and practice are challenged to develop new approaches to measure and assess the **interconnections between different sustainability goals and boundaries**. However, there is still very little research to address links between SMA and the impact on specific environmental outcomes beyond the organizational boundaries, and even less research that deals with how effective the application of SMA methods is in meeting social goals.

The main field of SMA that has been developed in research and that has been applied in corporate practices is **environmental management accounting (EMA)**. This module therefore starts with a framework of EMA to provide an overview of the field and then discusses the necessity to distinguish information needs of different actors in an organization in order to provide useful decision support for managers. Next, material flow cost accounting (MFCA) and carbon management accounting (CMA) are discussed in more detail before addressing further areas of SMA. The module closes with an outlook for further development of SMA towards a management information system that supports managers to transform their organisations and to contribute to sustainability transformations beyond organisational boundaries.

Activity: Can you identify some of the key ideas related to sustainability management accounting? (see "Unit 3.1 Activity 2")

2.2. The EMA framework

As with management accounting, **environmental management accounting (EMA)** aims to support decision-makers in improving the company's performance. As a difference from conventional management accounting, however, EMA considers environmental topics and physical measures, in addition to financial information. EMA covers a broad set of different management accounting tools providing information to support environmental and economic business development. It involves data collection, analysis, indicator development, and internal reports to support decision making by different groups of managers. "EMA can therefore be defined as a broad set of different accounting tools providing information to support management in improving the environmental and economic performance of the organisation, including its effects beyond organisational boundaries" (Burritt et al. 2023).

Given the large spectrum of different EMA tools, managers are challenged with the decision of which tool to use in different decision situations. The **EMA framework** developed by Burritt et al. (2002) systematises these tools according to decision-situations and helps organise EMA research and adoption in corporate practice (Figure 2). The EMA framework distinguishes sixteen decision situations and supports managers to choose from the EMA toolbox to find adequate EMA tools that support their decision-making. The **key dimensions of decision-making** are distinguished with regards to past- and future-orientation; repetitive routine vs. ad hoc decisions; monetary and physical accounting; and short-run operational and long-run strategic information. In order to be better informed, different types of managers need different accounting information in different decision situations that is commensurate with the authority, responsibility and accountability specific to their roles in the organization.

Figure 2. Comprehensive Framework of Environmental Management Accounting.

		Environmental Management Accounting (EMA)			
		Monetary EMA		Physical EMA	
		Short-term	Long-term	Short-term	Long-term
Past-orientated	Routinely generated	Environmental cost accounting	Environment induced capital expenditure and revenue	Material and energy flow accounting	Environmental capital impact accounting
	Ad hoc	Ex-post assessment of relevant environmental costing decisions	Ex-post inventory assessment of projects (including life cycle costing – LCC)	Ex-post assessment of short-term environmental impacts	Ex-post inventory appraisal of physical environmental investments (including life cycle assessment – LCA)
Future-orientated	Routinely generated	Monetary environmental budgeting	Environmental long-term financial planning	Physical environmental budgeting	Environmental long-term physical planning
	Ad hoc	Relevant environmental costing	Monetary environmental investment appraisal	Tools designed to predict relevant environmental impacts	Physical environmental investment appraisal

Source: Burrit et al. (2022).

It would exceed the purpose of this module to deal with each decision situation and EMA tool in detail. For further study, the detailed presentation and discussion of this EMA framework can be found in the corresponding book “Contemporary environmental accounting: issues, concepts and practice” by Stefan Schaltegger and Roger Burritt (2000).

In this module, the purpose and use of the framework shall therefore be illustrated with the example of a production manager: A production manager is responsible for

operational production and environmental impacts of a production facility. The tasks include identifying production optimisation for realising environmental improvement potentials (environmental material and energy accounting for short-term, past-oriented physical information; Figure 2; Burritt et al. 2002, 2023), financial consequences of such optimisation (environmental cost accounting for short-term, past-oriented monetary information), investments (physical environmental investment appraisal for future-oriented, ad hoc long-term physical information and monetary investment appraisal future-oriented, ad hoc long-term, monetary information) and implementation of improvement projects and activities (environmental long-term physical planning for future-oriented, routinely generated physical and financial long-term physical planning for future-oriented, routinely generated monetary information). Production managers therefore need detailed physical and monetary measures on material and energy flows of the existing production operations as well as of potential investments in improving production.

From an **accounting perspective**, different types of managers work with each other through both conventional and environmental management accounting practices to achieve environmental goals. Empirical investigations show both, that different managers or teams of managers need and apply different EMA tools in different combinations over time (Schaltegger et al. 2015), and that the development of the company-specific environmental and sustainability accounting system is case-specific (Herzig et al. 2012; Burritt et al. 2019).

While research and pioneering companies have developed and implemented many different EMA tools (Jasch 2006; Burritt et al. 2023), most companies have not (yet) institutionalised EMA to inform management adequately about their company's environmental impacts and economic implications. Rather, selected approaches have been implemented, mainly by sustainability managers, as parallel accounting systems in the company. Integration with the company's main management accounting system is therefore still a key project for many organisations.

Activity: Which are the key dimensions of decision-making according to the EMA Framework? (see "Unit 3.1 Activity 3")

2.3. Actors and their roles in sustainability management accounting

At present, it is mainly managers in organisations that are not accountants who use sustainability management accounting (SMA) (Schaltegger et al. 2015). **Managerial roles** can be broadly categorized into two types: general management and specific management. Top-level managers focus on developing and overseeing the implementation of overall corporate strategies. They have a supervisory role over other managers who are responsible for executing specific corporate strategies in their respective areas of expertise. To effectively oversee these strategies, top managers require general information that provides a broad understanding of the organization's

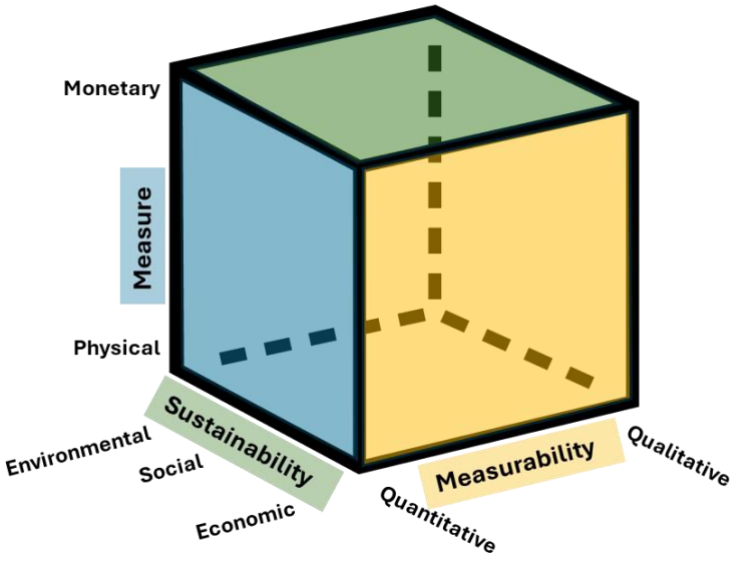
operations (Schaltegger & Burritt, 2006). In contrast, managers in functional areas such as marketing, production, procurement, and human resources are responsible for specific tasks and require more specific information.

In **sustainability management**, different management roles are contingent upon different kinds of sustainability information. While in many cases, the information needs of a certain managerial role are apparent from the position, description, and function of the role for the organisation; in some cases, it is less intuitive or apparent what types of sustainability information are needed.

Sustainability information types

Different types of **sustainability information can be characterised and identified along three dimensions** with regard to their (1) sustainability perspective, (2) measurability, and (3) measures (Figure 3). By definition, sustainability information should encompass environmental, social, and economic perspectives with the consideration of desirable and undesirable environmental, social, and economic outcomes as the basis for potential integration into useful measures, such as eco-efficiency or environmental footprints.

Figure 3. Characteristics of different types of sustainability information.



Source: Schaltegger et al. (2015).

When evaluating **environmental, social, and economic sustainability**, it is essential to distinguish between monetary and physical metrics. In this context, the Sustainability Balanced Scorecard (presented in detail in Unit 3.2) is a useful management tool for identifying the need for both monetary and physical metrics, as well as assessing the types of information required by various management roles for the effective implementation of sustainability strategies. For instance, when implementing policies for non-fossil fuel energy, physical metrics are required to measure compliance with

carbon emission reduction targets at the process level. However, to trade carbon credits for these reductions, monetary information is necessary to facilitate these transactions.

When considering **measurability**, sustainability information can be categorised as either quantitative or qualitative. Economic information, for instance, is often both quantitative and monetary, reflecting the idea that what gets measured gets managed. However, sustainability impacts are complex and multifaceted and cannot be fully captured by quantitative metrics alone (Gray, 1992). With regards to environmental aspects, issues such as biodiversity and ecosystem health are difficult to quantify, and likewise social aspects such as community wellbeing, working conditions, human rights issues, or consumer preferences often require deeper qualitative information to be integrated in management decision-making. However, even though qualitative sustainability information is important to support effective decision-making, its use for management control purposes is typically limited.

In principle, various combinations between the three information dimensions that are depicted in Figure 3 are possible. For instance, economic information is often expressed in currency **measures** and thus monetary and quantitative terms, but it can also be physical and qualitative, e.g. for the predicted increase in market share for green products. Similarly, environmental information may be physical and quantitative, like the volume of waste, but can also be monetary and qualitative, like the risk of liability due to noise complaints. Additionally, social issues like exploitative child labour can be characterized as qualitative, physical, and social information, highlighting the complexity and diversity of sustainability information.

Video: What is sustainability management accounting? (Link)

Activity: Are you able to show your knowledge about managerial roles and sustainability information types? (see "Unit 3.1 Activity 4")

Management roles and sustainability information

In addressing the question of what types of sustainability information are needed by different management roles in order to support them in effectively integrating sustainability considerations in decision-making within their domain of influence, Schaltegger et al. (2015) have distinguished **six general managerial roles** that are typically found within business organisations and that each has a different relevance in corporate sustainability. These include the functional areas of finance, marketing, process management, knowledge and learning, and the strategic areas of top management and extra-market-related management associated with the environmental and social aspects of business. To get a better understanding of the role-specific needs with regard to sustainability information, these six managerial roles can be characterised as follows (based on Schaltegger et al. 2015):

- **Finance manager role:** Managers with a finance role are primarily interested in monetary information related to sustainability, such as its impact on free cash flows and share price. This includes metrics such as sales and profitability of green and fair-trade products, revenue from recyclables, investments in pollution prevention technologies, and costs associated with sustainability reporting. While non-monetary information is also collected, managers tend to prefer economic and quantitative figures that can be easily related to monetary consequences.
- **Marketing manager role:** In marketing, providing selective and relevant information to customers is crucial for effective communication and exchange. Sustainability-related information is predominantly qualitative and physical in nature and may include details on whether a product's supply chain is free from exploitative child labour, or indicators on other specific sustainability topics that customers are aware of and that shape their purchasing behaviour.
- **Process manager role:** Managers responsible for internal processes, such as production, innovation, R&D, and procurement, tend to focus on quantitative data and physical process flows. This is because their roles often involve technical aspects and direct environmental impacts, which are typically measured in quantitative and physical terms. Examples of sustainability information in this context include material usage, waste quantity, energy consumption, emissions, and related cost consequences.
- **Knowledge and learning manager role:** Managers responsible for human resources and knowledge management are primarily interested in qualitative and physical traits that motivate and retain high-potential employees, such as employer reputation and working conditions. They also focus on social information that contributes to the company's knowledge base. Research has shown that using management accounting information can improve organizational performance by enhancing learning processes, and that organizational learning can improve the effectiveness of control systems within organizations.
- **Extra-market-related manager role:** Extra-market-oriented managers, who focus on external relationships, such as those in public relations, corporate communications, and corporate social responsibility, are primarily concerned with qualitative information about a company's social and environmental impact on society. This includes factors that affect the company's reputation, legitimacy, and societal communication, and ultimately influence its extra-market sustainability performance.
- **Top manager role:** Companies should have a dedicated executive, such as a Chief Sustainability Officer or Director of Sustainability, responsible for overseeing corporate social responsibility efforts. This role involves integrating sustainability information across various departments and providing top management with a comprehensive understanding of all types of information

that are dealt with by different managers. By doing so, the company's decision-making process is enriched with a sustainability-focused perspective, enabling more informed and strategic choices.

Different management roles require different kinds of sustainability information to make informed decisions. It is noteworthy that all the described management roles involve physical information. Operational managers generally use less monetary sustainability information. In contrast, the learning and oversight roles are characterised by a need for a range of different sustainability information types. Some management roles (finance, market, production) are very selective in their use of sustainability information. While, for example, nearly all managers with a finance role deal with quantitative sustainability information; qualitative sustainability information is only dealt with by a very small share of managers with a finance role. Finance managers deal with large amounts of environmental data in addition to the expected monetary data to promote decision-making about sustainability. One reason may be the increasing economic relevance of carbon emissions reductions and water scarcity. Overall, qualitative information is handled less frequently in finance than in other roles, such as marketing, production, or human resources. One reason may be the ease of quantification for financial aspects, whereas knowledge and learning-oriented activities, such as product development and HR, are harder to quantify.

Accountants and sustainability information

While regulatory pressure has led to an increasing involvement of accountants with sustainability reporting, accountants have in the past not been involved much in sustainability management accounting (e.g. Bebbington et al. 1994; Wilmshurst & Frost 2001) or only acted as “gatekeepers” when providing requested to top management by selecting environmental and social information that was collected by sustainability managers (Schaltegger & Zvezdov 2015). Empirical research has investigated the obstacles perceived by accountants as to why they are not involved (Wenzig et al., 2023), with key reasons including path dependencies and the perspective that sustainability issues are the responsibility of sustainability managers alone. Extant literature, however, highlights that **accountants could and should play a more important role in SMA**. Sustainability aspects are of increasing relevance for businesses, and accountants are professionals in collecting, managing, and reporting sustainability-related information (Gadenne et al. 2012; Schaltegger & Zvezdov 2015) to secure compliance with regulations, assess market demand, and serve media requests. With the development of new SMA tools (e.g. Burritt et al. 2023), accountants are challenged to further develop their portfolio of competencies to support good management decisions in corporate practice.

Summary and outlook

The emergence of new management roles drives further development and specialisation of SMA as these **new management positions require (different kinds of) SMA information**. Comprehensive accounting information systems need to address this. New management roles beyond general sustainability managers include sustainability officers and accountants at the top management level, as well as managers and accountants for specific areas such as modern slavery, carbon, biodiversity, water, corporate due diligence, human rights, supply chains, and sustainability communication, among others.

A mega-trend that is currently changing the landscape of SMA is **artificial intelligence (AI)**. Software developers aim to identify most social and environmental problems in supply chains on the basis of AI-based approaches, including blockchain technologies, that analyse internet information (Tavares et al., 2024). Such approaches can be expected to reduce the workload of sustainability managers and accountants but will not replace final decision-making for business development. So far, SMA research has not investigated the potential and challenges of this expected context change for further development of SMA.

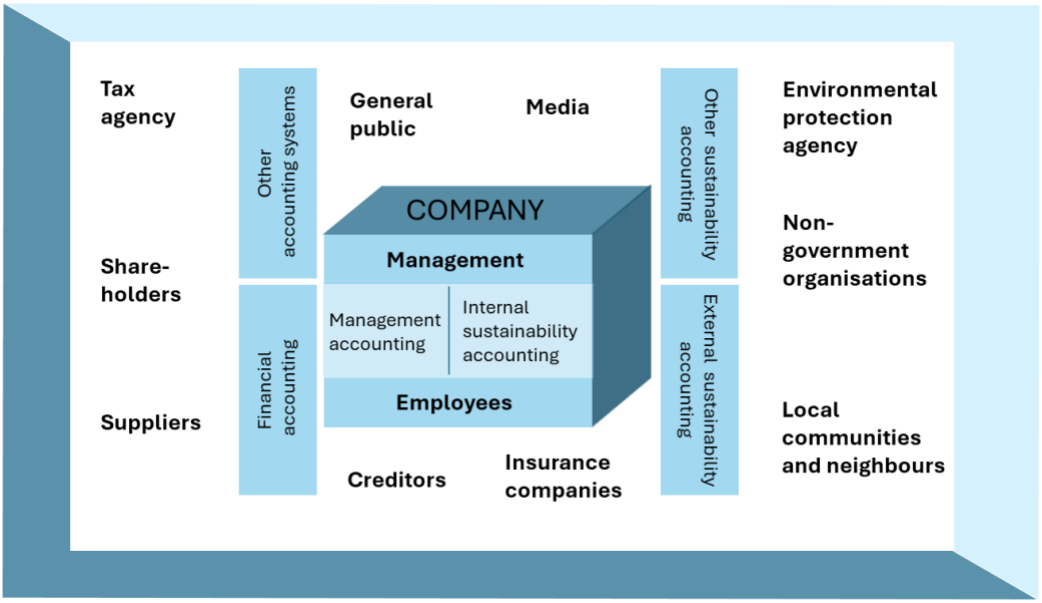
Activity: Do you understand the connection between different management roles and sustainability information? (see "Unit 3.1 Activity 5")

2.4. Accounting systems and stakeholders

Accounting systems play a critical role not only in providing information to internal managerial roles, but also in managing stakeholder relationships, as they also serve to satisfy the information needs of other stakeholders. A **company's stakeholders** are individuals or groups that have a vested interest in the firm's activities, either because they can influence the company's actions or because they are impacted by them (Freeman 1984, p. 41). The term 'stakeholder' indicates that these individuals or groups can benefit from or be exposed to risks associated with the company's activities – social, environmental, or financial.

Stakeholders can be categorised into **internal and external** groups. While internal stakeholders are, for example, employees and managers within the organisation, external stakeholders include government agencies, shareholders, environmental groups, suppliers, customers, local communities, and the general public (see Figure 4). The stakeholder concept is not only useful for understanding the varying information needs of different actors within and outside of an organisation in the context of sustainability, but it also helps to explain how different accounting systems have evolved and will continue to evolve in the future (Hörisch et al. 2020; Schaltegger & Burritt 2000).

Figure 4. Accounting systems and stakeholders.



Source: Schaltegger & Burritt (2000).

Accounting provides the most important corporate system for collecting and analysing information within a company. The concept of **being 'held accountable'** emphasises that someone has the duty to give an explanation for how resources have been used and what costs have been incurred. The process of 'being held to account' not only determines the power dynamics between those being held accountable and those holding them accountable but also strengthens and solidifies the power relationships between accountee and accountor.

Accounting systems are designed to **promote transparency**, making management and employees accountable for their actions, and facilitating the engagement of stakeholders in the process. This transparency can be further encouraged through sustainability compliance audits, enhancing trust and accountability within the organisation and in stakeholder relationships. As the penalties for undesirable environmental and social impacts have grown, so has the demand for environmental and social assurance and associated verification services. Voluntary self-assessments and self-informing sustainability management systems have also been added to the range of assurance options available to improve accountability in stakeholder relationships. A strong tendency to internalise external costs and environmental and social impacts, a main focus of SMA, now characterises the political landscape of industrialised countries. However, with most companies so far, this has not led to the comprehensive reflection of environmental impacts within management information systems.

The ongoing 'give and take' dynamic between corporate management and stakeholders influences the parallel development of different accounting systems, as different stakeholders require different accounting information to inform their decisions. The distribution of power between stakeholders and management influences

the type of accounting information provided, with more powerful stakeholders having a greater say in the process of lobbying for and setting accounting standards. The lobbying process and the resulting accounting standards reflect the relative power of each stakeholder group. Additionally, the question of who receives what information is crucial, as accounting systems play a significant role in the political context of corporate activities as well as in society.

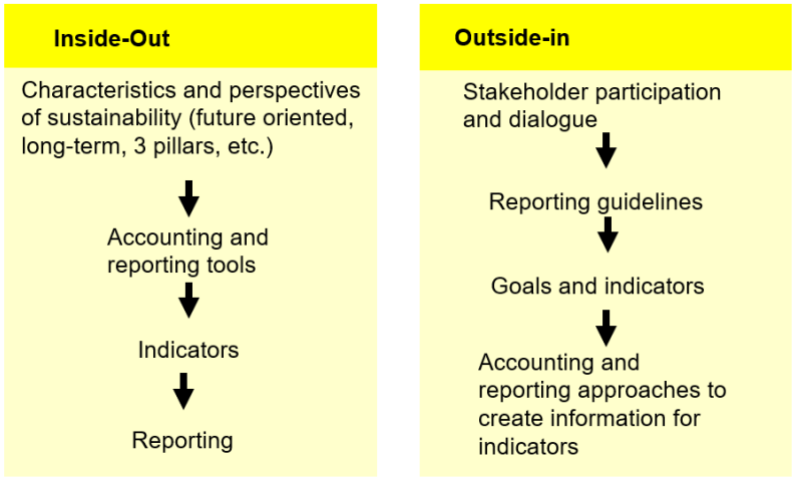
In contrast to external stakeholders, internal stakeholders, such as employees and management, typically derive most of their corporate financial information from management accounting, as shown within the boundaries of the company in the box in the centre of Figure 4. However, the information collected by the management accounting system may be subject to compromises to meet the requirements of external accounting standards, which can limit its usefulness for internal stakeholders. The issue with external financial reporting practices is the short-term focus of respective financial accounting measures, which can be at odds with the information needs of internal stakeholders, particularly in the context of corporate sustainability. Management accounting is, by design, much better suited to facilitate corporate sustainability, as it provides the data to support and guide internal decision-making and accountability.

The second internal accounting system shown in Figure 4 is internal sustainability accounting, so named because it is specifically designed to provide managers with the information they need to understand the social and environmental impacts of their company's activities. Internal accounting systems should be a prerequisite for external accounting, regardless of whether the information is financial or environmental in nature. Both internal and external stakeholders require the same type of information, but internal stakeholders need more detailed and extensive information to make informed decisions.

External stakeholders can be categorized into two main groups. The first group (shown to the left in Figure 4) is primarily concerned with the financial implications of a company's environmental impacts, such as reduced profits due to fines or increased revenues linked to a positive ‘green’ image. This group includes shareholders, suppliers, and tax agencies, who are the main addressees of conventional financial and 'other' accounting systems. The second group (shown to the right in Figure 4) is mainly interested in the impacts of a company's activities on the natural environment and on societal stakeholders. This group commonly includes non-market stakeholders, such as local communities and neighbours affected by company operations, non-government organisations, or environmental protection agencies, who are the main addressees of sustainability accounting and reporting. It is worth noting that the distinction between stakeholder groups is not necessarily very clear in reality. For instance, shareholders who are also ethical investors may have a strong interest in a company's social and environmental impact and may even be members of other stakeholder groups advocating for sustainable corporate practices.

In addition to the overview of accounting systems and stakeholders in Figure 4, another useful perspective for understanding the interrelationship between accounting systems and stakeholders is the consideration of **'inside-out' and 'outside-in' views** on sustainability management accounting as illustrated in Figure 5 (also see Schaltegger & Burritt, 2000; Schaltegger & Wagner, 2006). Both internal and external stakeholders are interested in understanding the financial consequences of environmental activities and the physical effects a company has on the natural environment. This can be viewed from two perspectives: an "outside-in" perspective, which examines how external factors affect the organization, and an "inside-out" perspective, which looks at how the organization impacts the environment. Ideally, accounting systems should integrate both kinds of impacts, but this requires that all environmental impacts be fully accounted for and internalized within the organization.

Figure 5. Inside-Outward and Outside-inward perspectives on sustainability management accounting.



Source: Schaltegger & Wagner (2006).

Activity: Can you identify the type of stakeholder? (see "Unit 3.1 Activity 6")

3. Specific areas of sustainability management accounting

3.1. Material flow cost accounting (MFCA)

The concept of MFCA

Material flow cost accounting (MFCA) is a management accounting approach that aims to provide a comprehensive understanding of the costs associated with material flows within an organization. According to **ISO standard 14051**, MFCA is a tool for the physical and monetary quantification of material flows and inventories in production processes and systems to reveal material flow-related savings potentials and

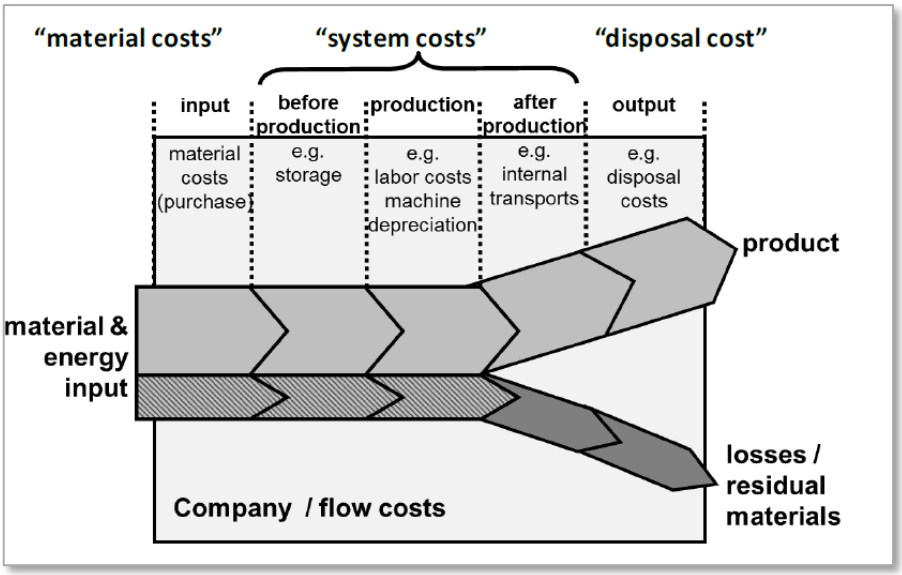
improvement measures. MFCA involves tracking and analysing the costs of material flows, including:

- Material acquisition costs (e.g., raw materials, energy, and water)
- Material processing costs (e.g., labour, equipment, and overheads)
- Material transportation costs (e.g., logistics, fuel, and transportation)
- Material storage costs (e.g., inventory holding costs)
- Material waste costs (e.g., waste disposal, recycling, and environmental impacts)

By analysing material flow costs, organisations can identify areas for cost reduction, improve efficiency, and make more informed decisions about material sourcing, production, and supply chain management.

In the context of sustainability accounting, MFCA serves **three distinctive objectives**. First, it increases transparency about the potential impact of material and energy flows on environmental performance and business success. Second, MFCA can help to bring about change by identifying and assessing opportunities for increasing material and energy efficiency and supporting "zero waste thinking". Third, MFCA supports informed and broad, comprehensive decision-making in production planning, process engineering, quality management, product design, and supply chain management (Herzig et al., 2012).

Figure 6. Distribution of the different types of costs in the flows to products and residual materials.

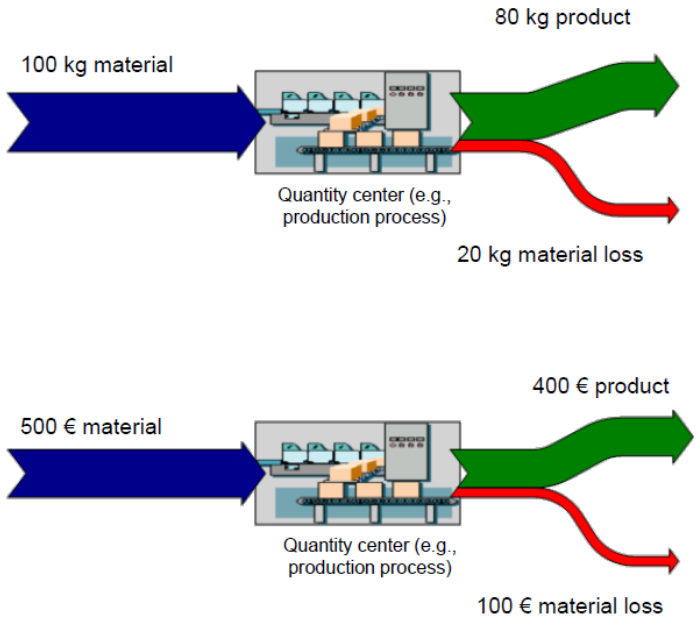


Source: Schmidt & Nakajima (2013).

Figure 6 shows the essential idea behind MFCA. In traditional cost accounting, all costs are typically attributed to the final product. In contrast, MFCA separates costs into two categories: those associated with the product and those associated with residual materials, depending on where the materials end up. Additionally, system costs such as

storage, processing, and transportation costs are also allocated between products and residual materials using relevant metrics. This allocation can be based on physical quantities, but need not be, as illustrated by Figure 6.

Figure 7. Illustration of the allocation of material flows and cost flows in MFCA.



While developing a mass balance flow model and allocating costs are crucial steps in the MFCA process, they are not the final goal. Management must summarise, evaluate, and interpret the results to identify areas for improvement. It is also important to communicate this data to relevant managers and staff who are familiar with the activities within their respective departments and business units. By doing so, potential improvement opportunities can be identified, and appropriate action can be taken. Regular re-evaluation of material flows, stocks, and costs is necessary to compare planned activities with actual results, facilitate continuous improvement, and ultimately enhance eco-efficiency, reduce costs, and minimize adverse environmental impacts (Herzig et al., 2012).

In summary, the MFCA process (including the preparation of a flow model, quantification of material and energy inputs, outputs, and stocks, and allocation of relevant costs), when combined with appropriate planning and a program for continuous improvement, aims to achieve **several important purposes**. These may include (see Christ & Burritt, 2015):

- Allowing areas of inefficiency to be identified and understood.
- Improved efficiency and a reduction in direct material costs.
- A reduction in the amount of waste generated and ecological impact.
- A reduction in other manufacturing costs (e.g., waste handling, treatment, and associated infrastructure costs).
- More accurate product costing.

- Incentives for innovation.
- Improved inter-departmental communication concerning resource use.
- Improved management control.

MFCA in practice

Material flow costs can be of **huge economic relevance** and are **often underestimated** before MFCA is applied. Figure 8 shows a simplified example with conventionally calculated environmental costs on the left side, with disposal fees and handling costs of waste. The column to the right shows, first, the same costs, and then, in addition, material flow related costs of purchasing material that ends up as waste, handling the respective material flows, additional depreciation costs of equipment that is larger than necessary because of having to process more material than if the production did not cause any waste at all (compared to zero waste production). While the example in Figure 8 is simplified, it represents the actual magnitude of a production company in the German steel industry. Large material flow-related costs have been reported for various material-intensive industries, including aluminium, automotive, electronics, building materials, and steel.

Figure 8. Simplified example of the relevance of material flow costs.

The conventional way of calculating environmentally-induced costs		The comprehensive way of calculating environmentally-induced costs	
Costs of waste disposal		*Costs of waste disposal*	
Fees	500,000	Fees	500,000
Disposal costs	300,000	Disposal costs	300,000
		First total	800,000
Total		*Environmentally-induced production costs*	
800,000		Logistics & transportation	150,000
		Additional personnel	250,000
		Additional depreciation	200,000
		Storage	100,000
		Second total	1,500,000
		Excess material input	
		Purchase	4,500,000
		Comprehensive total	*6,000,000*

Source: Schaltegger & Burritt (2000).

MFCA as a tool of sustainability management accounting

MFCA is a tool specifically designed to support the environmental management aspects of sustainability management accounting (SMA). To support the adoption of the MFCA tool internationally and to guide organisations in using it effectively, MFCA has been integrated into the international environmental management accounting standard ISO 14051 (ISO 2011). MFCA is considered one of the most basic tools for environmental

management accounting (EMA). The data generated by MFCA can be used as a basis to develop **more advanced EMA activities**, such as investment analysis, environmental impact assessments, and short- and long-term environmental budgeting (Christ & Burritt, 2015).

EMA places special emphasis on the use, flow, and ultimate destiny of energy, water, materials, and waste because these factors are directly linked to many of the environmental impacts of a company's operations. Additionally, the costs of purchasing materials are a significant driver of expenses for many organisations. Thus, by focusing on material and energy flows, as well as their related costs, MFCA provides a foundation by which opportunities for improved eco-efficiency and their implications for cost-efficiency are able to be more clearly articulated and understood.

In the context of SMA, MFCA is not an encompassing but a highly specific approach for companies to reduce materials and costs. To appreciate the potential and limitations of MFCA in relation to corporate sustainability, several aspects of MFCA are worth considering. MFCA is a type of tool that falls under the broader category of environmental cost accounting. Like environmental cost accounting, MFCA is typically considered a **monetary EMA tool**, but it relies on physical information about materials and energy flows. MFCA is generally used to analyse past performance, making it a past-oriented tool with a focus on short-term management. Having said that, the information provided by MFCA can be used to support the implementation of other future-oriented SMA tools (e.g., environmental budgeting). Regarding the scope of its application, MFCA may be particularly beneficial for organizations involved in manufacturing physical products; however, there is increasing recognition that its principles and practices can also be applied to non-manufacturing settings, such as service-oriented or nonprofit organizations. Within the description of ISO 14051 it is argued that “MFCA is applicable to any organization that uses materials and energy, regardless of their products, services, size, structure, location, and existing management and accounting systems” (ISO, 2011, p. 1). Finally, MFCA was initially developed to evaluate and improve material flows primarily within individual organisations, with the purpose of supporting eco-efficient decisions that enhance resource efficiency and improve both economic and environmental performance. However, there has been growing interest in applying MFCA techniques to **supply chain management** by extending MFCA to include both up and downstream supply chain partners. This expanded approach is also explicitly supported by the ISO 14051 standard (ISO 2011).

Activity: What is material flow cost accounting and what are its main contributions to sustainable management? (see “Unit 3.1 Activity 7”)

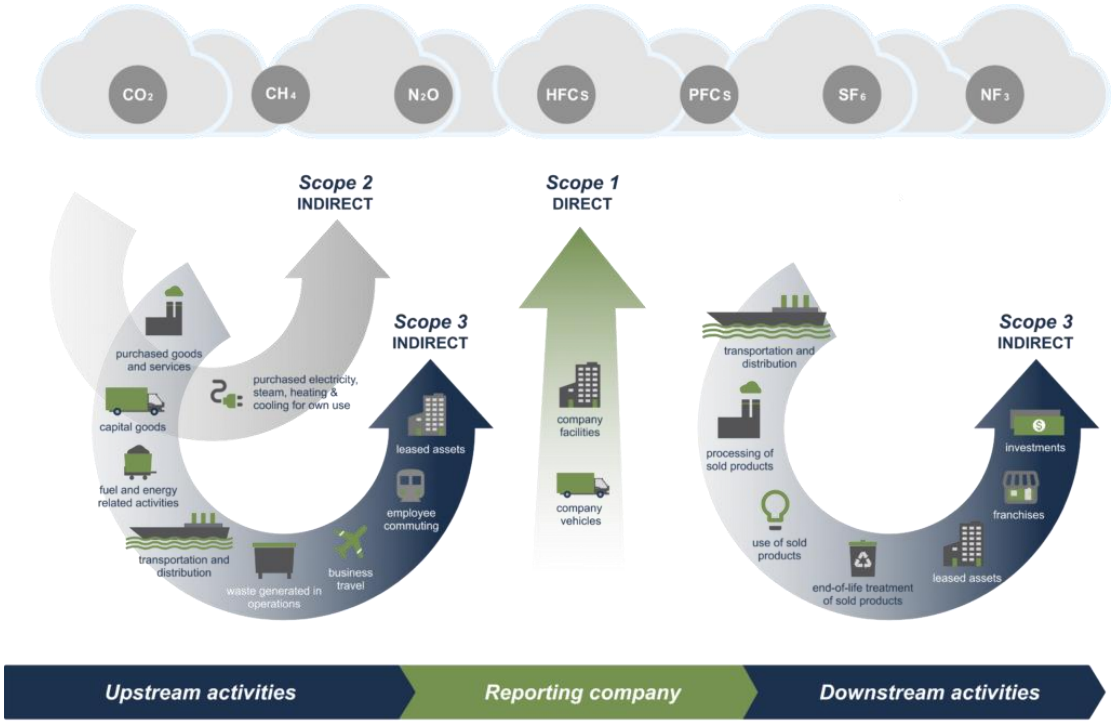
3.2 Carbon management accounting (CMA)

Carbon management accounting (CMA) is an often-used general notion that includes the measurement, reporting, and evaluation of the emissions of all relevant greenhouse gases (GHG) that contribute to the earth’s warming climate, including not

only carbon dioxide (CO_2), but also methane (CH_4), nitrous oxide (N_2O), and volatile hydrocarbons (e.g., HFCs, PFCs), as illustrated in Figure 9. As highlighted in the discussion of SMA above, an essential aspect of CMA is the preparation and provision of comprehensive and precise information on carbon emissions to guide managerial decision-making on **reducing scope 1, 2, and 3 emissions**.

- **Scope 1** refers to direct emissions of company-internal operations.
- **Scope 2** includes the measurement of emissions from purchased or acquired electricity, steam, heat, and cooling.
- **Scope 3** relates to the measurement and evaluation of indirect carbon emissions stemming from a company's entire value chain.

Figure 9. The GHG Protocol Scope 1, Scope 2, and Scope 3 emissions.



Source: GHG Protocol (2011).

Carbon emissions-related information is becoming increasingly relevant to the business operations of a growing number of companies for various reasons. First, instruments such as emissions trading systems, carbon credit schemes (e.g., the Clean Development Mechanism), or joint implementation measures have brought increasing attention to managers' information needs for reducing carbon emissions. Second, carbon emissions can be captured with standardised quantitative measures, which makes their integration into accounting systems much easier compared to qualitative information (i.e., on social aspects). Third, reporting on carbon emissions has become an essential topic to be included in various types of corporate and sustainability reports (e.g., those produced based on standards, GRI, and regulations, such as CSRD, as studied in Modules 1 and 2 of this course). Thus, the collection and management of information

on corporate greenhouse gas emissions has become an economically relevant topic for corporate management.

Carbon management accounting in the socio-economic context

CMA systems are being introduced to gather information in response to the growing regulatory, market and informational requirements being set down in a growing number of countries around the world as steps to meet the **Kyoto Protocol** and **Paris Agreement** requirements, to design sustainability reports in accordance with the Global Reporting Initiative (GRI) and to excel in sustainability ratings conducted for purposes of financial investment analysis (e.g., the Dow Jones Sustainability Index). Informed by the EMA framework, CMA can be systematised according to different decision situations (Burritt & Schaltegger 2010; Schaltegger & Csutora 2012).

While CMA entails all tools, structures, and procedures for managing carbon and greenhouse gas-related information in order to reduce negative impacts on the global climate, regulations in many countries have introduced strict measures with a focus on carbon dioxide (CO_2) emissions in particular. Thus, many companies have followed suit in turning their attention to the **reduction of CO_2 emissions** specifically. Although the huge importance of the topic is known, compliance-oriented companies tend to adopt approaches that aim for the least required emission reduction goals to avoid fines or public scrutiny. Pro-active companies, on the other hand, are actively engaging in managing carbon emissions beyond legal compliance. As different companies cause GHG emissions in production or are more affected by indirect carbon emissions in their supply chains (scope 3), companies approach different **aspects of carbon management in varied ways**:

- Many companies are dealing with greenhouse gas management accounting to create the necessary information requested in sustainability reports.
- Companies in the manufacturing sector or in the resources sector (particularly fossil fuels) have to focus on the physical quantity of greenhouse gases emitted, as this is directly related to the amount of emissions trading certificates needed.
- Other companies are interested in saving energy to reduce dependence on fossil fuels and to reduce the costs and cost fluctuations of oil and gas.
- Companies in the food industry, for example, seek to achieve a market advantage by labelling their products as carbon-neutral.
- Pioneering companies have committed themselves to reducing GHG emissions, in some cases in line with the Paris Agreement 1.5-degree goal and together with the Science Based Target Initiative (SBTi), to become carbon neutral as part of their sustainability ambition and to secure societal legitimacy.

CMA in the context of the EU Carbon Border Adjustment Mechanism (CBAM)

In 2024, the EU introduced the **Carbon Border Adjustment Mechanism (CBAM)**, a policy instrument to harmonise the conditions for production within and outside the EU and thus ensure fair competition for products that are subject to the EU emissions trading, the EU-ETS. As part of the EU's efforts to reduce GHG emissions and meet its climate goals, the CBAM aims to prevent companies from relocating their production to countries with lower carbon prices or no carbon pricing at all. By introducing a carbon border adjustment mechanism, the EU seeks to encourage other countries to adopt similar carbon pricing mechanisms and promote a global transition to a low-carbon economy. The CBAM will work by imposing a tariff equivalent to the EU's carbon price on imported goods, such as cement, steel, and aluminium, which will be calculated based on the carbon content of the goods.

The EU CBAM is a critical component of the broader framework of CMA, which aims to help organizations manage and reduce their GHG emissions. Within this framework, CBAM plays a key role in carbon pricing, encouraging organizations to reduce their emissions and adopt more sustainable practices to avoid the costs associated with the carbon border adjustment mechanism. By introducing a carbon price for imported goods, CBAM provides a financial incentive for organizations to manage their carbon footprint and improve their environmental sustainability. This is achieved through the integration of CBAM with other CMA tools and practices, such as carbon accounting software, life cycle assessment (LCA), and supply chain management. By combining these approaches, organisations can develop a comprehensive understanding of their carbon emissions and management practices and make informed decisions to reduce their environmental impact and improve their sustainability performance. Ultimately, CBAM is an essential component of the CMA framework, helping organisations to navigate the complexities of carbon pricing and management and to achieve their sustainability goals.

Different approaches to carbon management accounting

The previous examples illustrate different motivations for CMA, which accordingly require different approaches to CMA. Depending on whether a company focuses on carbon accounting of unsustainability or carbon accounting for sustainability improvements, different activities will be the focus of CMA (Schaltegger & Csutora, 2012):

- **Creating transparency and taking into account the unsustainability of the past and current operations:** What were and are the carbon impacts of the production processes, products, and supply chains? How substantial are these emissions compared to those that are scientifically and politically defined, or to their own carbon reduction goals, the goals and achievements of competitors, etc.? Which sources and drivers cause these carbon emissions? What are or will

be the costs of these carbon impacts (internally and externally) of carbon emissions?

- **Forecasting future GHG emissions:** What carbon impacts can be expected in the future if operations continue and business plans are achieved? How does this forecast relate to corporate goals? What will or could be the main sources and drivers of carbon impacts in the future? What costs will this cause (internally and externally)?
- **Identifying reduction potentials and evaluation of reduction measures:** What alternative, less carbon-intensive ways of production, sourcing, and product design, etc., exist or need to be developed and implemented? What would the carbon impacts and reductions of these alternative ways of production and organisation, alternative products and business models, etc., be for the company? What costs, revenues, and profitability trends would be related to the implementation of these alternatives?
- **Supporting the implementation of carbon management measures:** What operational measures are needed, and what further environmental and economic costs and benefits will the introduction of more carbon-friendly processes, products, and business models deliver (Lüdeke-Freund et al., 2017)? Have the implemented measures successfully reduced the climate impacts, and if not, why not, and what corrective activities are needed?

The first-mentioned activities aimed at creating transparency and forecasting GHG emissions focus on identifying and quantifying the undesired negative impacts associated with a company's activities. Hence, they support the creation of carbon accounts of unsustainability. While this static or comparative approach is essential for creating awareness and understanding, it must be complemented by more dynamic and enabling accounting procedures to effectively support corporate carbon reduction management.

The lastly mentioned activities to identify and evaluate reduction potentials and to support the implementation of carbon management measures are more pragmatic in nature, yet these are essential for carbon management accounting approaches to enable real change in organisational activities and to achieve an actual reduction of GHG emissions. Schaltegger and Csutora (2012) have emphasised **the interrelatedness of the basic roles of carbon accounting** with regard to creating transparency and supporting improvement, as outlined in Table 1 below.

Table 1. Characteristics of carbon management accounting tools.

	Carbon accounting of un-sustainability	Carbon accounting for sustainability improvements
Core functions of CMA	▪ Creating transparency about past and current operations ▪ Forecasting future impacts	▪ Identification of reduction potentials ▪ Evaluation of reduction measures ▪ Support of the implementation of reduction measures
Kind of accounting information associated with the core function:		
• **Physical or monetary**	▪ Physical	▪ Physical and monetary
• **Time frame**	▪ Past oriented (mostly), little future oriented information	▪ Present and future oriented (mostly), little past oriented information
• **Frequency of information**	▪ Continuously generated	▪ Ad hoc generated, project related ▪ Project management control supporting measures
• **Length of time**	▪ Long-term	▪ Short-term and long-term

Source: Schaltegger & Csutora (2012).

Activity: What is carbon management accounting? (see "Unit 3.1 Activity 8")

3.3 Further emerging approaches of sustainability management accounting

Human rights and modern slavery accounting

Human rights and corporate sustainability are increasingly intertwined, as companies are expected to **respect and protect the human rights** of their stakeholders, including employees, customers, and communities. This includes ensuring fair labour practices, preventing human trafficking and forced labour, and respecting the rights of indigenous peoples and local communities.

In recent years, there has been growing concern about modern slavery in **corporate supply chains**, an extreme form of exploitation related to work and working conditions. It involves controlling conditions whereby a company or contractor exercises behaviours equivalent to ownership over people using force, coercion, or deception to control another person's work and life, effectively treating them as a commodity. Non-government organisations such as the International Labour Organisation (ILO), Walk Free, or the International Organization for Migration (IOM) estimate there are currently 49.6 million people enslaved worldwide and of these 27.6 million are trapped in slavery in corporate operations and supply chains (Christ et al. 2023). This means that modern slavery is a pervasive issue that affects many of the products people consume and use every day, particularly in developed countries, including electronics, clothing, and even

pet food. The United Nations has set a goal to end modern slavery by 2030, as part of its Sustainable Development Goal 8.7. By extending the notion of accountability to include a company's supply chain, businesses are required to consider their relationships with suppliers and partners in new ways. This shift in accountability requires new management and reporting practices, with a significant impact on the accounting profession.

Modern slavery in business supply chains involves a range of practices, including violence, threats of violence to workers and their families, physical restriction, document retention, and debt bondage. These practices are thought to exist in virtually every country and industry, making it a global issue. Thus, every organisation that relies on a complex supply chain is at risk of indirectly supporting modern slavery. Efforts to identify and address modern slavery are often hindered by cultural and geographical distances between companies and their suppliers, as well as cultural norms that may tolerate or even encourage exploitation in certain contexts. However, the economic power of large buyers and multinational companies has led many countries to consider and implement laws that require reporting on modern slavery, with the goal of bringing about positive change.

As companies strive to address modern slavery in their supply chains, they must balance internal accountability with decisions on what to report externally. To effectively combat modern slavery, there is a need for companies to first build their internal capacity to recognize and address modern slavery risks, and then encourage their suppliers to do the same either by raising awareness, offering training, or making clear that suppliers will lose supply contracts if their activities, or those of their subcontractors, are found to be associated with modern slavery. However, this involves some ethical complexities, as companies may be tempted to allow modern slavery practices to continue in order to help victims maintain their employment. Additionally, detection of modern slavery is often made difficult if practices occur in a legal grey area, and perpetrators may use tactics such as threats, fraud, and corruption to cover up their activities. As a result, gathering accurate information about modern slavery practices across multiple tiers of suppliers, contractors, and subcontractors is a significant challenge for companies.

Drawing on existing global models by the OECD and the United Nations (OECD 2016; United Nations 2015; Christ et al. 2023) have formulated five steps to be considered as a **basic due diligence framework to help mitigate modern slavery**:

1. Identify and assess modern slavery risks in the entire value chain.
2. Design and implement an integrity strategy to respond to identified slavery risks.
3. Carry out internal audits to see/assess whether and how ethical codes and the integrity strategy contribute towards the elimination of modern slavery.
4. Carry out an independent third-party audit at identified points in the elimination of modern slavery.

5. Report the audit results and issue assurance statements, if any, on modern slavery and ensure transparency to the wider community.

In their recent analysis of the role of the accounting profession in mitigating modern slavery, Christ et al. (2023) conclude that the fight against modern slavery is a complex issue, but that the accounting profession has multiple arms and many tools it can draw upon in its mitigation. While current laws and regulations focus on **reporting** as a means of transparency and accountability, accountants can also use management accounting tools and techniques to identify and prevent modern slavery risks. **Audit and assurance** can likewise play a crucial role in providing advice and credibility to corporate efforts. To conclude, there is much potential for the accounting profession to make a real difference, but management accounting approaches to mitigate modern slavery are still in the very early stages of development.

Activity: What issue is of paramount important when managing the respect of human rights? (see "Unit 3.1 Activity 9")

Water management accounting

In recent years, corporate water accounting has become a pressing concern, with governments, NGOs, professional bodies, and corporations all taking notice. The **growing importance of water management** is driven by several factors, including the essential role water plays in supporting life on Earth, the increasing demand for freshwater due to population growth and economic development, and the impact of global warming on water resources. As a result, water is no longer considered a free good, and its value to society is being reflected in water markets, pricing, and trading schemes. Additionally, stricter regulations are being implemented to protect social and environmental systems. In addition, global corporations are the largest users of freshwater. Hence, water availability and low prices can no longer be taken for granted, and improved management of water resources is required (Christ & Burritt, 2017a).

How do we account for water? **Water accounting** provides critical information for water management, but it is fraught with challenges. One of the main issues is the lack of a commonly agreed definition of what water accounting is or what it involves. Additionally, water is a spatially and temporally specific resource that requires a local approach, unlike carbon, which can be addressed through more general measures. Furthermore, the reduction of water resources in high-water-stress regions is more significant than in low-water-stress regions, highlighting the need for targeted water management strategies. Moreover, water accounting must address both quantity and quality issues, making it a complex and multifaceted task.

Despite the above-mentioned challenges, a range of approaches to water accounting has been developed. One such approach is the **water footprint**, which considers the amount of water required to produce a particular product or service, known as virtual water. The Water Footprint Network is a non-profit organisation that

promotes the fair and smart use of the world's fresh water. It offers interactive tools, publications, events, and resources on water footprint assessment and reduction.

From a business perspective, water accounting is also closely tied to the idea of **virtual water**, which is a key consideration in water markets. In these markets, the value of water is determined by its scarcity and demand, making monetary information a crucial aspect of water accounting. By considering the business perspective associated with water use, companies can better understand the economic implications of their water management decisions and make more informed choices about how to manage their water resources.

Activity: How can accounting contribute to managing water use? (see "Unit 3.1 Activity 10")

Biodiversity management accounting

According to scientific research, **biodiversity loss** is the most pressing sustainability issue, with planetary boundaries in this area being exceeded at an alarming rate. However, in contrast to this scientific consensus, surveys among companies have found that they tend to rank biodiversity as the lowest among all sustainability concerns. Thus, **biodiversity management accounting (BMA)** is a relatively new and emerging sub-field of SMA. Based on definitions of SMA as outlined above, BMA can be operationalised as follows: BMA includes the collection, analysis, and communication of biodiversity information to managers with the aim of enabling and guiding decision-making that contributes to stopping biodiversity loss and to regenerating biodiversity. In that, qualitative and quantitative data is required to provide adequate information on what the business' impact on biodiversity is and what the current and future impact of biodiversity (loss) is on the business. Schaltegger et al. (2023) distinguish direct and indirect biodiversity and business impacts and related stakeholder perspectives of biodiversity accounting, as outlined in Table 2.

To assess the impact of business on biodiversity and vice versa, biodiversity accounting needs to consider a combination of quantitative and qualitative information about ecosystems, species, and the genetic pool. This approach requires a broader scope that extends beyond the company's boundaries. **Accounting for ecosystems**, for instance, means focusing on specific spatial areas, such as a watershed, even if this area is not under the direct influence of the company. For example, a company selling bottled water might measure and map the size of a watershed, identify the stakeholders influencing it, and assess the effectiveness of water purification processes, as well as the likelihood of the watershed continuing to provide clean drinking water in the future (Schaltegger et al., 2022).

Table 2. Distinguishing biodiversity and business impact perspectives, direct and indirect, examples are for illustrative purposes.

Directness of impacts and stakeholders	Direction of link between business and biodiversity	
	Biodiversity (loss) impact on the business	*Business impact on biodiversity*
(a) Direct impacts (e.g., on a food retailer)	Reduced availability and sales of certain crops	Sales of conventional crops incentivise farmers to use pesticides having negative effects on soil quality
Indirect impacts caused …		
(b) … through emissions	Lower (drinking) water quality due to wastewater	Polluted lake through emissions lowers water quality that impacts biodiversity
(c1) … at direct stakeholders (e.g., farmers)	Less bees reduce pollination service	Pesticide application kills insects, including bees
(c2) … at indirect stakeholders in the business environment (e.g., beekeepers)	Less honey production resulting from ill bees due to pesticide exposure	A small, reduced number of bee types used for honey production causes an imbalance of bee diversity resulting in bees illnesses
(c3) … at indirect stakeholders along the value chain (e.g., food retailer)	Less honey produced and less fruit for sale	Selling fruit from orchards applying pesticides contributes to killing of bees
(c4) … at further indirect stakeholder (e.g., future generations)	Reduced food diversity in the future	Future food retailers having less choice and more expensive fruit and honey as pollination is impacted through reduced number of pollinating bees

Source: Schaltegger et al. (2022).

Some of the key aspects of BMA, some of which are also posing considerable challenges to its implementation, include:

- **Valuing biodiversity:** It involves estimating the value of biodiversity, including the costs and benefits of conservation and management efforts.
- **Measuring biodiversity:** It involves developing metrics and indicators to measure the health and status of biodiversity, including species populations, habitats, and ecosystem services.
- **Accounting for biodiversity costs:** It involves identifying and quantifying the costs associated with biodiversity conservation and management, as well as the costs of biodiversity loss.
- **Developing biodiversity accounting standards:** It involves developing standards and guidelines for biodiversity accounting, including the development of biodiversity accounting frameworks and tools.

Developing and implementing biodiversity management accounting is a complex and challenging task due to the lack of data, methodological challenges, and limited awareness and understanding of the importance of biodiversity among stakeholders. Additionally, regulatory frameworks and standards for biodiversity management accounting are often lacking. Integrating BMA with existing accounting systems can also be challenging. Furthermore, monitoring and evaluating the effectiveness of

biodiversity management accounting systems requires long-term data collection and analysis, which can be difficult to achieve.

Activity: What are the challenges to implementing biodiversity management accounting? (see "Unit 3.1 Activity 11")

Video: What specific areas does sustainability management accounting cover? (Link)

Case study: Sustainability management accounting and stakeholders (see "Unit 3.1 Case Study 1")

4 Concluding notes: Towards a comprehensive approach to sustainability management accounting

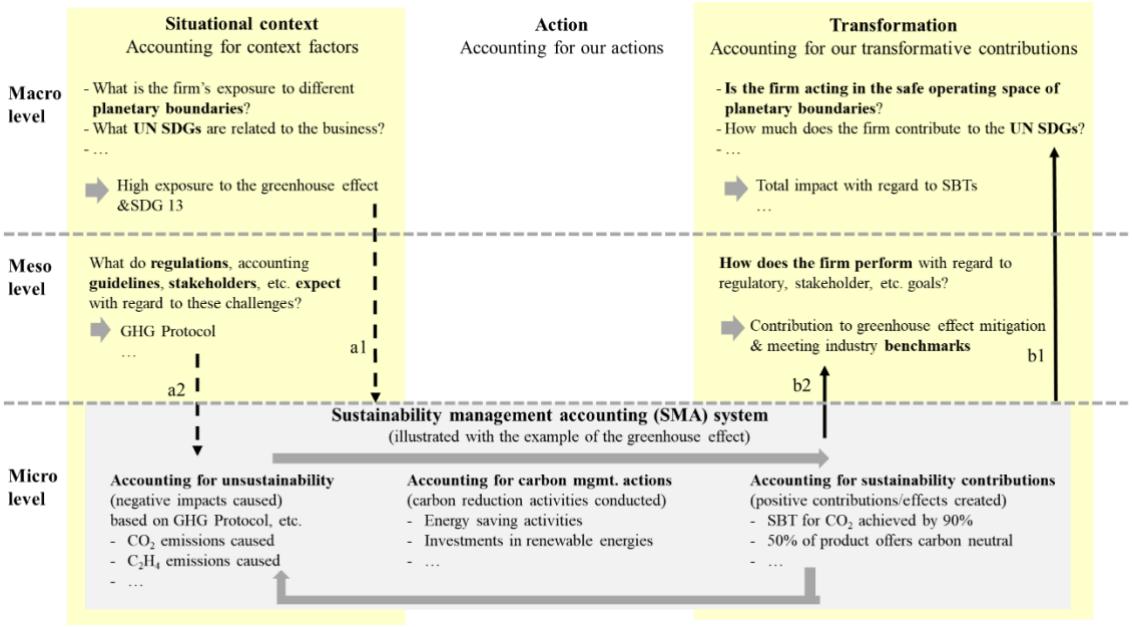
The existing **sustainability management accounting (SMA) research and practice** cover many useful, novel, and relevant accounting approaches. SMA focuses on providing information for concrete decisions aiming at improving the sustainability performance of a company. This is a large difference from most sustainability reporting developments that have remained at a superficial communication level and are confronted with greenwashing accusations (e.g., de Freitas et al., 2020) and/or large bureaucratic burdens that require a large amount of resources from sustainability and other managers that they do potentially distract companies from dealing with material sustainability improvements.

However, SMA research and practice are still overall rather patchy, deal with a multitude of accounting approaches, and are mostly characterised as either context- or activity-orientation. Against the backdrop of increasing regulatory pressure, many SMA developments are reactions to context changes, i.e., those related to or even deducted from international, EU, or national regulations, standards, guidelines, or industry initiatives. In these cases, SMA is positioned as a reaction approach to cope with external stakeholder pressure. While this development is creating increasing involvement of accountants with sustainability in the reporting domain, recent empirical research shows that the deducted information infrastructure approaches and the data supporting many sustainability metrics for reporting purposes is "variable and uneven" (Troshani & Rowbottom, 2024), and therefore of little to no use to support internal management decisions that require granular, reliable and adequate information that supports decisions related to the specific role of different types of managers (e.g. procurement, production, product development).

The most intensive methodological development of SMA is in the domain of **environmental management accounting (EMA)** with regard to flow cost accounting (MFCA) and carbon management accounting (CMA). Particularly, MFCA focuses on internal optimisation of the organisation, thus improving and optimising the organisation's actions. While many case studies illustrate impressive improvements

both with regard to reducing environmental impacts and costs (e.g. Jasch, 2006), and while MFCA has been so successful that even the ISO standard 14051 and regulations have spurred considerable dissemination, at least in some countries (particularly Japan), the question whether MFCA would help companies to reduce their negative environmental impacts sufficiently to act in the safe operating space of planetary boundaries or to achieve the UN SDGs has not been dealt with (Schaltegger et al. 2022). None of the practices has furthermore dealt with questions of how a comprehensive consideration of sustainability topics can be managed, how different EMA and SMA approaches could be linked with each other, and how they could contribute to the necessary sustainability transformation of markets and society. To ensure that a **company acts in the safe operating space of planetary boundaries** and that it contributes effectively to sustainability transformations of markets and society, however, requires that researchers and companies develop transformative SMA in a comprehensive and systematic way.

Figure 10. CAT framework for developing SMA (CMA as an example).



Source: Schaltegger et al. (2022).

Figure 10 conceptualises the current situation using a **multi-level CAT framework** for further developing SMA. The acronym "CAT" stands for situational "context", management "action", and sustainability "transformation", and illustrates the sustainability management and SMA challenge that companies have to be aware of and respond to contextual macro-level pressures (e.g., regulations and new scientific evidence about global problems) and meso-level pressures (e.g., stakeholder expectations, guidelines, industry initiatives) with company-internal actions (e.g., applying MFCA). The CAT framework particularly highlights that sustainable development will only be achieved and companies are only successful in their own sustainability transformation (Schaltegger et al. 2024) if they contribute effectively to achieving sustainability transformations at the meso-level (of markets, regions, and

industries) and at the macro-level (e.g., meeting the global UN SDGs and staying within planetary boundaries). As documented in multiple empirical studies (e.g., Herzig et al., 2012), SMA research and practice have, in spite of the focus on context and actions ("C" and "A"), already contributed to material improvements in many countries, industries and countries. That these backward-looking foci are not sufficient has become apparent in light of increasing sustainability problems both in the environmental and social areas, and in light of the intermediate report that the UN SDGs will most likely not be met. Future research and practice will, therefore, have to focus much more on developing SMA as an enabler of sustainability transformations beyond organisational boundaries if it is to become a key driver of sustainable development.

Activity: Unit assessment (see "Unit 3.1 Activity 12")

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Additional materials

Accounting and Stakeholders

- Resource: Video "What Are Stakeholders?" – with Ed Freeman: https://www.youtube.com/watch?v=17hnaKFjDU8

Material Flow Cost Accounting (MFCA)

- Resource: Video "Improving decision-making through material flow cost accounting: the case of VietGreen company" by University of Kassel: https://www.youtube.com/watch?v=qhZKsq8FBUk and open access article on the case: https://doi.org/10.22434/IFAMR2020.0187

- Webpage: ISO standard 14051: https://www.iso.org/standard/50986.html

Carbon Management Accounting

- Webpage: About the World Business Council for Sustainable Development (WBCSD) and World Resources Institute (WRI) who jointly convened the GHG Protocol in 1998: https://ghgprotocol.org/about-wri-wbcsd

- Webpage: The UNFCCC Kyoto protocol: https://unfccc.int/process-and-meetings/the-kyoto-protocol

- Webpage: The UNFCCC Paris Agreement: https://unfccc.int/process-and-meetings/the-paris-agreement

- Webpage: Science Based Targets Initiative: https://sciencebasedtargets.org/

- Webpage: The EU Carbon Border Adjustment Mechanism (CBAM): https://taxation-customs.ec.europa.eu/carbon-border-adjustment-mechanism_en

Human rights and modern slavery accounting

- Resources by the International Labour Organisation (ILO) on forced labour, modern slavery, and human trafficking: https://www.ilo.org/topics-and-sectors/forced-labour-modern-slavery-and-trafficking-persons

- Webpage: Walk Free organisation: https://www.walkfree.org/

- Resources by the International Organization for Migration (IOM) on modern slavery: https://publications.iom.int/books/global-estimates-modern-slavery-

forced-labour-and-forced-marriage

- Webpage: UN Department of Economic and Social Affairs, Topic´: Employment, decent work for all and social protection (SDG 8): https://sdgs.un.org/topics/employment-decent-work-all-and-social-protection

Water accounting

- Webpage: water footprint network: https://www.waterfootprint.org/
- Resource: water footprint calculator: https://watercalculator.org/

Biodiversity accounting

- Resource: Video “Why is biodiversity important - with Sir David Attenborough” by The Royal Society: https://www.youtube.com/watch?v=GlWNuzrqe7U
- Resource: Video “How to value and account for ecosystems” by EU Environment: https://www.youtube.com/watch?v=4U9nbhzvOYI

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Unit 3.1
Sustainability management accounting

ACTIVITIES

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UNIT 3.1

ACTIVITY 1

SORT LETTERS

Sustainability Accounting Learning Platform for a Green Economy

2022-1-ES01-KA220-HED-000089844

Title	What characterizes current sustainability accounting management practices?
Module	Module 3. Sustainability management accounting and control
Unit	Unit 3.1. Sustainability management accounting
Heading/subheading after which it should appear	1. Introduction to sustainability management accounting

1. Activity 1

Question 1

Which is one of the issues that one of the most developed fields of SAM focuses on?

Carbon

Maximum time to solve the question: 30 seconds

Question 2

What do most sustainability management accounting (SAM) approaches focus on in practice?

Optimising

Maximum time to solve the question: 30 seconds

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UNIT 3.1

ACTIVITY 2

FIND THE WORD

Sustainability Accounting Learning Platform for a Green Economy

2022-1-ES01-KA220-HED-000089844

Title	Can you identify some of the key ideas related to sustainability management accounting?
Module	Module 3. Sustainability management accounting and control
Unit	Unit 3.1. Sustainability management accounting
Heading/subheading after which it should appear	2. Fundamentals of sustainability management accounting / 2.1. Key concepts of sustainability management accounting

2. Activity 2

Word 1

Which is the main field of SMA that has been developed in research and applied in corporate practice?

Environmental

Word 2

What aspects do the new approaches challenging sustainability accounting research focus with respect to sustainability goals and boundaries?

Interconnections

Word 3

Which type of change should we examine when considering the broad effects of SMA?

Transformative

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UNIT 3.1

ACTIVITY 3

PAIRS

Sustainability Accounting Learning Platform for a Green Economy

2022-1-ES01-KA220-HED-000089844

Title	Can you identify some of the key ideas related to sustainability management accounting?
Module	Module 3. Sustainability management accounting and control
Unit	Unit 3.1. Sustainability management accounting
Heading/subheading after which it should appear	2. Fundamentals of sustainability management accounting / 2.2. The EMA Framework

3. Activity 3

Statement: Can you identify some of the key ideas related to sustainability management accounting?

Pair 1

Word: past-orientation

Image**:** A4GE U3.1 A3.1_image

Time**:** 15 seconds

Pair 2

Word: future-orientation

Image**:** A4GE U3.1 A3.2_image

Time**:** 15 seconds

Pair 3

Word: repetitive routine

Image**:** A4GE U3.1 A3.3_image

Time**:** 15 seconds

Pair 4

Word: ad hoc decision

Image**:** A4GE U3.1 A3.4_image

Time**:** 15 seconds

Pair 5

Word: monetary accounting

Image**:** A4GE U3.1 A3.5_image

Time**:** 15 seconds

Pair 6

Word: physical accounting

Image**:** A4GE U3.1 A3.6_image

Time**:** 15 seconds

Pair 7

Word: short-run operational

Image**:** A4GE U3.1 A3.7_image

Time**:** 15 seconds

Pair 8

Word: long-run strategic

Image**:** A4GE U3.1 A3.8_image

Time**:** 15 seconds

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UNIT 3.1

ACTIVITY 4

ROULETTE

Sustainability Accounting Learning Platform for a Green Economy

2022-1-ES01-KA220-HED-000089844

Title	Are you able to show your knowledge about managerial roles and sustainability information types?
Module	Module 3. Sustainability management accounting and control
Unit	Unit 3.1. Sustainability management accounting
Heading/subheading after which it should appear	2. Fundamentals of sustainability management accounting / 2.3. Actors and their roles in sustainability management accounting

4. Activity 4

Question 1 (correct answer in bold green)

Which categories can be used to broadly classify managerial roles?

a. Environmental and marketing management.
b. General and specific management.
c. Strategic and operational management.

Question 2 (correct answer in bold green)

Which are the three dimensions used to characterise sustainability information?

a. Sustainability perspective, auditability, and measures.
b. Sustainability perspective, measurability, and orientation.
c. Sustainability perspective, measurability, and measures.

Question 3 (correct answer in bold green)

Which aspects are considered when assessing the sustainability perspective of information?

a. Economic, financial, and social.
b. Economic, environmental, and social.
c. Economic, environmental, and financial.

Question 4 (correct answer in bold green)

Which categories are used to classify sustainability information according to its measurability?

a. The information's quantitative and qualitative nature.
b. The information's quantitative and monetary nature.
c. The information's qualitative and physical nature.

Question 5 (correct answer in bold green)

Which categories are used to classify sustainability information according to its measure?

a. The physical and future-oriented nature of information.
b. The physical and monetary nature of information.
c. The monetary and future-oriented nature of information.

Question 6 (correct answer in bold green)

Which type of sustainability perspective is mostly associated with quantitative and monetary information?

a. **Economic.**
b. Environmental.
c. Social.

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UNIT 3.1

ACTIVITY 5

DOUBLE OR NOTHING

Sustainability Accounting Learning Platform
for a Green Economy

2022-1-ES01-KA220-HED-000089844

Title	Do you understand the connection between different management roles and sustainability information?
Module	Module 3. Sustainability management accounting and control
Unit	Unit 3.1. Sustainability management accounting
Heading/subheading after which it should appear	2. Fundamentals of sustainability management accounting / 2.3. Actors and their roles in sustainability management accounting / Management roles and sustainability information

5. Activity 5

Question 1 (correct answer in bold green)

What type of sustainability information is most relevant to finance managers?

d. Qualitative information about working conditions.
e. Monetary information related to free cash flows and share price.
f. Physical data on material usage and emissions.
g. Qualitative information about societal impacts.

Question 2 (correct answer in bold green)

What type of sustainability information is crucial for marketing managers?

a. Quantitative data on energy consumption.
b. Monetary metrics like revenue from recyclables.
c. Qualitative and physical information about supply chain ethics.
d. Social information about employee retention.

Question 3 (correct answer in bold green)

Which type of data is most relevant to process managers?

a. Qualitative information about employer reputation.
b. Monetary metrics like the costs of sustainability reporting.
c. Quantitative data on topics such as material usage and emissions.
d. Qualitative information about societal communication.

Question 4 (correct answer in bold green)

What type of information is most important for knowledge and learning managers?

a. Qualitative traits like working conditions and employer reputation.
b. Monetary metrics like the profitability of green products.
c. Quantitative data on energy consumption.
d. Physical data on emissions and waste.

Question 5 (correct answer in bold green)

What is the primary focus of extra-market-related managers?

a. Quantitative data on production processes.
b. Monetary metrics like investments in pollution prevention.
c. Qualitative information about social and environmental impacts.
d. Physical data on energy consumption and emissions.

Question 6 (correct answer in bold green)

What is the role of a Chief Sustainability Officer in a company?

a. To oversee production and procurement processes.
b. To integrate sustainability information across departments.
c. To manage customer communication about sustainability.
d. To focus on external relationships and societal impacts.

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UNIT 3.1

ACTIVITY 6

RELATIONSHIP BETWEEN IMAGE AND CONCEPT

Sustainability Accounting Learning Platform for a Green Economy

2022-1-ES01-KA220-HED-000089844

Title	Do you understand the connection between different management roles and sustainability information?
Module	Module 3. Sustainability management accounting and control
Unit	Unit 3.1. Sustainability management accounting
Heading/subheading after which it should appear	2. Fundamentals of sustainability management accounting / 2.4. Accounting systems and stakeholders

6. Activity 6

Concept 1

Indicate the concept: What type of stakeholder are employees?

Indicate the options **(correct answer in bold green)**.

h. Internal

i. External

Concept 2

Indicate the concept: What type of stakeholder are NGOs?

Indicate the options **(correct answer in bold green)**.

a. Internal

b. External

Concept 3

Indicate the concept: What type of stakeholder are suppliers?

Indicate the options **(correct answer in bold green)**.

a. Internal

b. External

Concept 4

Indicate the concept: What type of stakeholder are managers?

Indicate the options **(correct answer in bold green)**.

a. Internal

b. External

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ACTIVITY 7

COMPLETE THE PHRASES

Sustainability Accounting Learning Platform for a Green Economy

2022-1-ES01-KA220-HED-000089844

Title	What is material flow cost accounting and what are its main contributions to sustainable management?
Module	Module 3. Sustainability management accounting and control
Unit	Unit 3.1. Sustainability management accounting
Heading/subheading after which it should appear	3. Specific areas of sustainability management accounting / 3.1. Material flow cost accounting (MFCA) / MFCA as a tool of sustainability management accounting

7. Activity 7

Material **flow** cost accounting (MFCA) is a method used to analyse both the physical and **monetary** aspects of material usage and inventory within production processes. It aims to uncover areas for cost **savings** and process improvements related to material flows. In the realm of sustainability accounting, MFCA plays a triple role: it enhances **transparency** regarding how material and energy usage affects both environmental impact and business outcomes; it drives transformative **change** by pinpointing chances to boost efficiency and minimize waste; and it contributes to well-informed, data-driven **decisions** across operations such as planning, engineering, quality control, product development, and supply chain coordination.

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UNIT 3.1

ACTIVITY 8

QUIZ

Sustainability Accounting Learning Platform for a Green Economy

2022-1-ES01-KA220-HED-000089844

Title	What is carbon management accounting?
Module	Module 3. Sustainability management accounting and control
Unit	Unit 3.1. Sustainability management accounting
Heading/subheading after which it should appear	3. Specific areas of sustainability management accounting / 3.2 Carbon management accounting (CMA) / Different approaches to carbon management accounting

8. Activity 8

Question 1 (correct answer in bold green)

What does carbon management accounting (CMA) primarily involve?

a. Measuring only carbon dioxide (CO2) emissions.
b. Reporting on social aspects of sustainability.
c. Measuring, reporting, and evaluating greenhouse gas (GHG) emissions.
d. Managing financial accounting for carbon credits.

Question 2 (correct answer in bold green)

What are Scope 2 emissions?

a. Direct emissions from company operations.
b. Emissions from purchased electricity, steam, heat, and cooling.
c. Indirect emissions from the entire value chain.
d. Emissions from transportation only.

Question 3 (correct answer in bold green)

Why is carbon emissions-related information becoming increasingly relevant for companies?

a. It is essential for sustainability reports and regulatory compliance.
b. It is required for all financial reports.
c. It helps integrate qualitative social data into accounting systems.
d. It eliminates the need for emissions trading systems.

Question 4 (correct answer in bold green)

How do compliance-oriented companies typically approach carbon management?

a. By exceeding legal requirements.
b. By adopting the least required emission reduction goals.
c. By focusing only on Scope 3 emissions.
d. By eliminating all carbon emissions.

Question 5 (correct answer in bold green)

Which of the following is a benefit of Carbon Border Adjustment Mechanism (CBAM) for organizations?

a. It eliminates the need for carbon accounting software.
b. It reduces the need for sustainability reports.
c. It removes tariffs on imported goods.
d. It provides financial incentives to manage carbon footprints.

Question 6 (correct answer in bold green)

What is the primary focus of carbon accounting for unsustainability?

a. Identifying alternative, less carbon-intensive production methods.
b. Supporting the implementation of carbon management measures.
c. Quantifying the negative impacts of a company's activities.
d. Forecasting profitability trends of alternative business models.

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UNIT 3.1

ACTIVITY 9

ENIGMA

Sustainability Accounting Learning Platform for a Green Economy

2022-1-ES01-KA220-HED-000089844

Title	What issue is of paramount important when managing the respect of human rights?
Module	Module 3. Sustainability management accounting and control
Unit	Unit 3.1. Sustainability management accounting
Heading/subheading after which it should appear	3. Specific areas of sustainability management accounting / 3.3 Further emerging approaches of SMA / Human rights and modern slavery accounting

9. Activity 9

Question or sentence: Accounting practice that plays a crucial role in providing advice and credibility to corporate efforts about the respect of human rights.

Audit

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UNIT 3.1

ACTIVITY 10

SORT LETTERS

Sustainability Accounting Learning Platform for a Green Economy

2022-1-ES01-KA220-HED-000089844

Title	How can accounting contribute to managing water use?
Module	Module 3. Sustainability management accounting and control
Unit	Unit 3.1. Sustainability management accounting
Heading/subheading after which it should appear	3. Specific areas of sustainability management accounting / 3.3 Further emerging approaches of SMA / Water management accounting

10. Activity 10

Question 1

Accounting approach that considers the amount of water required to produce a particular product or service.

footprint

Question 2

The type of water to which accounting is closely tied from a business perspective.

virtual

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UNIT 3.1

ACTIVITY 11

HIDDEN WORD

Sustainability Accounting Learning Platform for a Green Economy

2022-1-ES01-KA220-HED-000089844

Title	What are the challenges to implementing biodiversity management accounting?
Module	Module 3. Sustainability management accounting and control
Unit	Unit 3.1. Sustainability management accounting
Heading/subheading after which it should appear	3. Specific areas of sustainability management accounting / 3.3 Further emerging approaches of SMA / Biodiversity management accounting

11. Activity 11

Question 1

Which of the challenges to implementing BMA involves estimating the value of biodiversity, including the costs and benefits of conservation and management efforts?

Valuing biodiversity

Question 2

Which of the challenges to implementing BMA involves developing metrics and indicators to measure the health and status of biodiversity?

Measuring biodiversity

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UNIT 3.1

ACTIVITY 12

QUIZ

Sustainability Accounting Learning Platform for a Green Economy

2022-1-ES01-KA220-HED-000089844

Title	Unit assessment
Module	Module 3. Sustainability management accounting and control
Unit	Unit 3.1. Sustainability management accounting
Heading/subheading after which it should appear	4. Concluding notes: Towards a comprehensive approach to SMA

12. Activity 12

Question 1

What is a key focus of modern Sustainability Management Accounting (SMA)?

a. **Considering social and environmental impacts beyond organizational boundaries.**
b. Improving only internal financial performance.
c. Focusing solely on carbon emissions within the organization.
d. Eliminating all regulatory pressures on businesses.

Question 2

What is the purpose of Sustainability Management Accounting (SMA)?

a. To focus solely on improving financial performance.
b. To provide distorted information about sustainability issues.
c. **To support decision-makers in addressing environmental and social problems while considering economic efficiency.**
d. To mitigate regulatory pressures related to sustainability.

Question 3

What is the primary focus of sustainability accounting?

a. Maximizing financial profits for organizations.
b. **Collecting and reporting data on environmental and social impacts.**
c. Developing marketing strategies for sustainable products.
d. Improving employee satisfaction in the workplace.

Question 4

What is one of the main challenges for sustainability accounting research and practice?

a. Developing methods to increase corporate profits.
b. Reducing the cost of implementing sustainability measures.
c. **Measuring and assessing interconnections between different sustainability goals.**
d. Improving the efficiency of traditional financial accounting.

Question 5

What is a key difference between Environmental Management Accounting (EMA) and conventional management accounting?

a. EMA focuses solely on financial information.
b. EMA is only used for long-term strategic decisions.
c. EMA replaces conventional management accounting entirely.
d. EMA includes environmental topics and physical measures in addition to financial information.

Question 6

What type of decision-making does material and energy flow accounting support according to the EMA Framework?

a. Long-term, future-oriented strategic decision-making.
b. Short-term, past-oriented physical decision-making.
c. Ad hoc investment planning for production expansions.
d. Organizational-level budgeting and forecasting.

Question 7

Which of the following is *not* one of the three dimensions used to characterize sustainability information?

a. Sustainability perspective.
b. Measurability.
c. Managerial responsibility.
d. Transparency.

Question 8

Why do top-level managers require general sustainability information?

a. To gain a broad understanding of the organization's operations.
b. To focus on specific tasks within functional areas.
c. To measure compliance with carbon emission targets.
d. To oversee technical processes in sustainability reporting.

Question 9

Why are sustainability impacts difficult to capture using quantitative metrics alone?

a. They are too simple to measure.
b. They are complex and multifaceted.
c. They are primarily monetary.
d. They are unrelated to management decisions.

Question 10

Which type of sustainability information is most relevant to finance managers?

a. Qualitative information about working conditions.
b. Monetary information related to free cash flows and share price.
c. Physical data on material usage and emissions.
d. Qualitative information about societal impacts.

Question 11

Why have accountants historically been less involved in sustainability management accounting (SMA)?

a. Regulatory pressure.
b. Insufficient tools for sustainability reporting.
c. Perception that sustainability is only the responsibility of sustainability managers.
d. Accountants' lack of interest in environmental issues.

Question 12

What is a key challenge for accountants in supporting sustainability management accounting (SMA)?

a. Managing customer communication.
b. Overseeing production processes.
c. Reducing the workload of sustainability managers.
d. Developing competencies to use new SMA tools.

Question 13

How is artificial intelligence expected to impact sustainability management accounting (SMA)?

a. It will reduce the workload of sustainability managers and accountants.
b. It will replace sustainability managers entirely.
c. It will eliminate the need for accountants.
d. It will make final business decisions automatically.

Question 14

What is the primary role of accounting systems in stakeholder relationships?

a. To reduce the workload of managers.
b. To eliminate external costs.
c. To provide information and promote transparency.
d. To replace sustainability audits.

Question 15

What does the term 'stakeholder' refer to?

a. Only individuals who invest in the company.
b. Only government agencies and shareholders.
c. Groups that are unaffected by the company's actions.
d. Individuals or groups with a vested interest in the company's activities.

Question 16

What is the main difference between internal and external stakeholders?

a. Internal stakeholders focus on societal impacts, while external stakeholders focus on financial impacts.
b. Internal stakeholders are part of the organization, while external stakeholders are outside of it.
c. Internal stakeholders require less detailed information than external stakeholders.
d. Internal stakeholders are primarily concerned with environmental impacts.

Question 17

What is the purpose of internal sustainability accounting?

a. To meet external accounting standards.
b. To focus on short-term financial reporting.
c. To provide managers with information on social and environmental impacts.
d. To replace external sustainability reporting.

Question 18

What does the concept of being 'held accountable' emphasize?

a. The duty to explain how resources have been used and costs incurred.
b. The need to reduce external costs.
c. The importance of short-term financial reporting.
d. The elimination of stakeholder influence.

Question 19

What is the main function of Material Flow Cost Accounting (MFCA)?

a. To determine marketing return on investment.
b. To manage human resource expenditures.
c. To quantify material flows in physical and monetary terms.
d. To calculate tax deductions for environmental practices.

Question 20

Which of the following is NOT a purpose of MFCA?

a. To improve eco-efficiency and reduce waste.
b. To increase transparency in material and energy flows.
c. To develop new advertising strategies.
d. To support informed decision-making in production planning.

Question 21

How does MFCA differ from traditional cost accounting?

a. It ignores overhead and system costs.
b. It uses estimates rather than physical data.
c. It excludes transportation and energy use.
d. It separates product-related costs from residual material costs.

Question 22

In which area has there been a growing interest in applying MFCA techniques?

a. Supply chain management.
b. Marketing and advertising.
c. Human resource management.
d. Product packaging design.

Question 23

What is the purpose of the EU Carbon Border Adjustment Mechanism (CBAM)?

a. To eliminate carbon pricing globally.
b. To harmonize production conditions within and outside the EU.
c. To reduce the cost of imported goods.
d. To promote fossil fuel use.

Question 24

What role does carbon management accounting play in sustainability reporting?

a. It eliminates the need for financial reporting.
b. It replaces life cycle assessments in all industries.
c. It provides structured information on GHG emissions for inclusion in corporate reports.
d. It limits data collection to qualitative social factors.

Question 25

What is the significance of Scope 3 emissions in Carbon Management Accounting?

a. They represent direct emissions from company-owned sources.
b. They include emissions from purchased electricity, steam, heat, and cooling.
c. They account for indirect emissions across the entire value chain, including suppliers and customers.
d. They are not considered in sustainability reporting.

Question 26

What is the role of carbon accounting for sustainability improvements?

a. To forecast future carbon impacts based on business plans.
b. To identify and implement less carbon-intensive production methods.
c. To quantify the negative impacts of past operations.
d. To compare emissions with competitors' achievements.

Question 27

Why are companies with complex supply chains at risk of indirectly supporting modern slavery?

a. Because modern slavery practices are limited to specific industries.
b. Because companies intentionally exploit workers in their supply chains.
c. Because modern slavery is only a concern for multinational corporations.
d. Because modern slavery practices exist in virtually every country and industry.

Question 28

Which of the following is part of the five-step due diligence framework to mitigate modern slavery?

a. Conduct internal audits to assess the effectiveness of ethical codes and strategies.
b. Terminate contracts with suppliers suspected of modern slavery practices.
c. Implement penalties for suppliers who fail to comply with labour laws.
d. Provide direct financial support to victims of modern slavery.

Question 29

What is one of the main challenges of water accounting?

a. The lack of tools to measure water usage.
b. The absence of a commonly agreed definition of water accounting.
c. The inability to track water usage in low-water-stress regions.
d. The lack of interest from corporations in water management.

Question 30

What is the primary goal of biodiversity management accounting?

a. To increase the profitability of businesses through biodiversity conservation.
b. **To collect, analyze, and communicate biodiversity information to stop biodiversity loss and regenerate biodiversity.**
c. To develop biodiversity accounting standards for regulatory compliance.
d. To measure the genetic diversity of species within ecosystems.

Question 31

Which of the following is a challenge in implementing biodiversity management accounting (BMA)?

a. **Difficulty in integrating BMA with existing accounting systems.**
b. Lack of interest from businesses in biodiversity conservation.
c. Inability to measure biodiversity in high-water-stress regions.
d. Limited availability of biodiversity accounting frameworks.

Question 32

What does the acronym "CAT" in the CAT framework stand for?

a. Carbon Accounting Transformation.
b. **Context, Action, Transformation.**
c. Comprehensive Accounting Techniques.
d. Contextual Analysis Tools.

Question 33

According to the CAT framework, what is required for companies to achieve successful sustainability transformations?

a. Focusing solely on internal optimisation through MFCA.
b. Meeting stakeholder expectations at the company level.
c. **Contributing effectively to sustainability transformations at meso- and macro-levels.**
d. Developing sustainability metrics for reporting purposes.

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Unit 3.1
Sustainability management accounting

ROLE PLAY CASE

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Sustainability management accounting and stakeholders

Case Study 3.1.1

Module 3 Sustainability management accounting and control

Unit 3.1. Sustainability management accounting

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ROLE PLAY

Title: Sustainability management accounting and stakeholders

Context: Good morning, Boss! Before we can talk about the 150-year celebration for our family firm, I need to show you something else: The local action group is getting down to business, they have talked to the media and now there is an article in the newspaper saying that our factory for agricultural fertilizer is using too much water and that the chemicals in the fertilizers are poisening the soil in our beautiful mountain valley. I think we need to address this urgently, the major of our village has already called this morning. Have a look at the article in the attachement above!

Scenario: In front of the main entrance of a fertilizer company located in the Alps in Northern Italy. The name “Valle Verde Agricola” is visible above the entrance. The factory is located in a valley surrounded by farms with apple trees, vinyards, fields, and farm buildings. There are some modern machines, tractors, etc. in the fields. The mountains with remnants of glaciers are visible in the distance.

Character: Young-ish person in a gender-neutral checkered shirt, perhaps with the company logo on the shirt, and a label saying “CEO assistant”, holding up a newspaper towards the user.

Scene 1

Okay, boss, how shall we respond to this article and the action group’s concerns?

Response 1: Invite the action group to a meeting to discuss their concerns and provide information about the company's water usage and chemical emissions.

Go to:
Scene 2

Response 2: Ignore the article and focus on the company's core business.

Go to:
Scene 3

Response 3: Send a formal letter to the action group stating that the company is committed to sustainability and will consider their concerns.

Go to:
Scene 4

Scene 2

What information will you provide to the action group?

Response 1: Provide detailed information about the company's water usage and chemical impact, including data on water consumption, chemical emissions, and waste management.	**Go to:** Scene 5
Response 2: Provide general information about the company's sustainability efforts, without providing specific data or details.	**Go to:** Scene 4
Response 3: Refuse to provide any internal information, citing confidentiality and proprietary rights. Instead, we offer a presentation on the company's CSR efforts and highlight how important the firm is for the valley in providing jobs and supporting farmers with our products.	**Go to:** Scene 6

Scene 3

Two weeks have passed since the publication of the newspaper article. Spring has arrived and the weather has been unusually dry, sparking concerns of a draught. During the last week, the action group has been campaigning every day in front of your company, and today some farmers have joined in. The major calls again and asks: “What will you do to address the action group's concerns?”

Response 1: We will take this seriously and conduct a thorough review of the company's water usage and chemical impact, and to become transparent about the firm’s environmental footprint.

Go to:
Scene 5

Response 2: I will tell the major that our business has been serving the community for 150 years, and that the farmers need the fertilizers. If the action group gets no attention, they will give up. I decide to keep ignoring the action group’s concerns and focus on our core business.

Go to:
Scene 6

Response 3: We will develop a public relations campaign to address the action group's concerns and improve your company's image.

Go to:
Scene 4

Scene 4

The action group responds positively to your demonstrated willingness to address their concerns, and they stop campaigning in front of your company. But in an open letter that has been undersigned by many different stakeholders from the community, they demand more information on how exactly you will address corporate sustainability concerns. What will you do next?

Response 1: I will implement a few minor changes to our firm's operations to reduce water usage (e.g., closing some loops in the production line, and using rainwater for watering the company's green spaces), but it will be too expensive to conduct a comprehensive assessment of our company's water footprint.

Go to:
Scene 7

Response 2: I refuse to make any changes to our company's operations. After all, taken together, the farms in the valley are using much more water than our fertilizer company.

Go to:
Scene 6

Response 3: I need to gather sustainability information and include relevant internal managers and external sustainability experts in the process. I will create a new taskforce to conduct a life cycle assessment of our main products and establish a water footprint for our operations.

Go to:
Scene 5

Scene 5

The comprehensive analysis of our company's water footprint, and the life cycle assessment to assess the environmental impact of our agricultural fertilizer product is now complete. What will you do to engage with stakeholders and satisfy their sustainability information needs?

Response 1: Task our marketing team with preparing a firm brochure that illustrates our commitment to the valley, its farmers, and nature. The brochure will also state relative goals for reducing our water consumption over the next 30 years, and that we will donate 1% of our profits to protecting biodiversity.

Go to:
Scene 7

Response 2: Develop a comprehensive stakeholder engagement plan to communicate the results of our environmental impact analysis and our progress in reducing water usage and chemical impact.

Go to:
Scene 8

Scene 6

The village major is concerned about the development of the situation, and invites you to attend a town hall meeting to discuss solutions with the action group, farmers from the valley, and other community stakeholders. The media is also present at this public meeting. How do you approach the situation?

Response 1: In a formal written response, I will let the major know that I cannot attend the meeting due to my busy schedule, but telling that I'm working on improving the eco-efficiency of our products.

Go to:
Scene 9

Response 2: I realise that our firm is facing some serious risks to its longstanding reputation with the valley's stakeholders and possibly beyond. I'll attend the town hall meeting with our production manager and PR manager to listen to the major's and the action group's concerns.

Go to:
Scene 4

Scene 7

The action group is not satisfied with our company's progress on improving its environmental impact and a new newspaper article accuses our company of greenwashing. How do you manage the situation?

Response 1: The future of our firm is at risk if we cannot provide more transparent information and demonstrate more substantial progress on our environmental impact. To make a start, I will task an expert team to conduct a thorough review of our water usage and environmental impact.

Go to:
Scene 5

Response 2: I will engage our legal team to consider suing the newspaper for defamation.

Go to:
Scene 7 (Are you sure this is a good idea? Think again!)

Response 3: I'll keep implementing a few minor changes to our operations to reduce water usage and chemical impact. I'll work closely with our accounting team to estimate which sustainability investments we can afford without risking profitability. The newspaper article will soon be forgotten.

Go to:
Scene 9

Scene 8

What will you do to ensure our company‘s progress in improving its sustainability management, and how do you engage stakeholders?

Response 1: I will set up an environmental management accounting system to measure and monitor our direct environmental impacts to publish a sustainability report and share physical performance indicators on website to keep stakeholders informed.

Go to:
Scene 12

Response 2: Our firm cannot address the region’s water concerns alone. Accordingly, I’ll set up a sustainability management accounting system that integrates impacts beyond our organisation’s boundaries and proactively engage with the action group and the major to develop a water management plan for the valley.

Go to:
Scene 11

Scene 9

Our firm has refused to make any substantial changes to its operations. The action group is dissatisfied with our lack of commitment to sustainability, despite our promises to improve the eco-efficiency of our products. As a result, our reputation has suffered. If you could turn back time, would you like to try another approach?

Response 1: Yes, I am curious about other options. Please take me back!

Go to:
Scene 1 (Okay, try again!)

Response 2: No, I believe this is the best course of action if the company wants to remain competitive and keep providing jobs for the people of the valley.

Go to:
Scene 10

ENDING 1 - SCENE 10

Text: A hot summer has arrived, following a dry spring, marking the valley's third consecutive year of drought. Many farmers, who spent their savings last year to compensate for crop failures, are worried about the survival of their businesses. Tourists, once drawn by the valley's scenic landscape, now stay away due to prolonged drought conditions. The local council is running out of financial options to support the farming community. Concerned about protecting limited water resources, the local action group filed a lawsuit against Valle Verde Agricola. The court held our company accountable for the chemical impact on local water bodies and ordered costly clean-up procedures. This has increased operating expenses while damaging our reputation. As product sales drop, farmers are turning to regenerative agriculture, a field in which we have no expertise. After 150 years in business, Valle Verde Agricola now faces serious uncertainty about its future.

ENDING 2 - SCENE 11

Text: The implementation of a comprehensive sustainability management accounting system has revealed where substantial environmental improvements can be made and highlighted the impact of our products during use. The local action group welcomed our stakeholder engagement. A regional initiative formed to co-develop a water management plan, supported by scientists and sustainability experts who secured public funding. As part of the plan, farmers are turning to regenerative agriculture and collaborating with our developers to create organic fertilizers and soil methods—unlocking new business opportunities and improving our reputation. I feel optimistic about the future of our firm and valley communities, as do farmers and other stakeholders. The water management plan has improved soil water retention and revitalized waterways. The valley is steadily becoming more resilient to climate change.

ENDING 3 - SCENE 12

Text: After the implementation of the environmental management accounting system, our internal water consumption has significantly decreased. Our product developers have identified opportunities for reducing the chemical load of our best-selling fertilizer product, which has improved its environmental impact and led to cost savings. In the valley, a hot and dry summer has arrived, prolonging the draught conditions that local farmers have already been struggling with during the last two years. This is increasingly putting financial strain on the farms and agribusinesses, which t reduce their spending. Sales for our products are plummeting. The action group has stopped campaigning against us, but a recent newspaper article accused our firm of greenwashing due to our products' impacts on soils and waterways when used on the regional farms. We are concerned for the future of our firm and the future of the farms in the valley, and wonder what we could do to improve the situation.

Voce Alpina

Valle Verde Agricola Faces Scrutiny Over Environmental Impact

Local Action Group Demands Answers on Water Usage and Chemical Emissions

A group of concerned citizens, farmers, and environmental activists has been making waves in the Dolomites region, calling for greater transparency and accountability from local businesses. At the center of the controversy is Valle Verde Agricola, a family-owned chemical company that is set to celebrate its 150th anniversary of producing agricultural fertilizers for farmers and agribusinesses of the region.

The company has been accused of contributing to the region's environmental problems through its water usage and chemical emissions. The local action group, which has been joined by mayors, school students, and journalists, has been demanding answers from Valle Verde Agricola on its plans to reduce its water usage and chemical impact. "We're not just talking about the company's impact on the environment," said a spokesperson for the action group. "We're talking about the future of our region and the health of our communities. We need to know what Valle Verde Agricola is doing to address these concerns."

Valle Verde Agricola has so far declined to comment on the matter. The company has been operating in the region for decades, and it's unclear how much of an impact they have had on the environment. The situation has sparked a heated debate in the region, with some calling for greater regulation and others arguing that the company is being unfairly targeted. Whatever the outcome, one thing is clear: the people of the Dolomites region are demanding greater accountability from their businesses, and Valle Verde Agricola is at the center of the storm.

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Module 3

Sustainability management accounting and control

Unit 3.2

SUSTAINABILITY MANAGEMENT CONTROL

Sustainability Accounting Learning Platform for a Green Economy

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List of acronyms

- BSC – Balanced Scorecard
- COSO – Committee of Sponsoring Organizations of the Treadway Commission
- CSR – Corporate social responsibility
- CSRD – Corporate Sustainability Reporting Directive
- CSDDD – Corporate Sustainability Due Diligence Directive
- ICIF – Internal Control-Integrated Framework
- SBSC – Sustainability balanced scorecard
- SMC – Sustainability management control
- UN SDGs – UN Sustainable Development Goals

About this unit

Unit 3.2 extends previous learnings on sustainability management accounting (SMA) by discussing management control approaches that help guide management decisions and employee behaviour towards sustainability. The unit begins with the difference between reducing negative and creating positive contributions to sustainability (Dijkstra-Silva et al., 2022) and sustainability transformation. Based on this foundation an **introduction to sustainability management control (SMC)** (e.g., Corsi & Arru, 2021; Lueg & Radlach, 2016; Mio et al., 2022; Schaltegger, 2011) and interlinkages to (management) accounting and reporting (Maas et al., 2016) are provided.

While the focus of sustainability management in general and sustainability accounting and reporting in particular have been on reducing harm (i.e., reducing emissions, waste, water, etc.; child labour, bad working conditions, etc.) this unit also provides a reflection on what can be understood by **positive sustainability contributions** and their importance for **transformative sustainability management**. Most management control literature, including the SMC, has focused on improving the environmental (and social) performance of organisations (Battaglia et al., 2016; Corsi & Arru, 2021; Johnstone, 2019) by reducing negative environmental impacts. However, as sustainable development is a societal vision, as for example expressed by the UN Sustainable Development Goals (UN SDGs), and in the context of planetary boundaries, of which six are exceeded at present (as explained in Unit 1.1), the question becomes urgent, whether reducing negative environmental and social impacts at the organisational level is sufficient to achieve sustainable development at the global scale. Sustainability management accounting and control are therefore challenged to address whether the organisation contributes effectively to achieving macro-level sustainability goals (Schaltegger et al., 2022). Positive sustainability impacts, therefore, include corporate contributions to achieving fundamental, macro-level societal and environmental goals, such as the SDGs, and working within the safe and equitable operating space of planetary boundaries.

This unit then elaborates key approaches of management control, including the sustainability balanced scorecard (Figge et al., 2002; based on Kaplan & Norton, 1992), levers of sustainability control (Gond et al., 2012; based on Simons, 1994), and packages of sustainability control (Crutzen et al., 2017; based on Malmi & Brown, 2008). In the second part, you will be familiarised with the **sustainability balanced scorecard (SBSC)** as a strategy implementation approach to systematically organise the measurement and management of strategic and operational sustainability targets (Hansen & Schaltegger 2016, 2018). The **levers of control** framework and its application to sustainability are discussed next (Gond et al., 2012). The **packages of control** approach is discussed in the third part of this unit and opens the scope from formal to include informal controls (Crutzen et al. 2017).

Intended learning outcomes and competences

At the end of this unit, you should be able to:

- Understand what is meant by 'positive sustainability' as a difference from the most common perspective of reducing risk and harm.
- Have an overview of the key frameworks of sustainability management control.
- Understand and utilise the sustainability balanced scorecard, the levers of control, and the packages of control as a strategy implementation and management control approach.
- Use various sustainability management control approaches to assess and develop the integration and implementation of sustainability targets in companies.

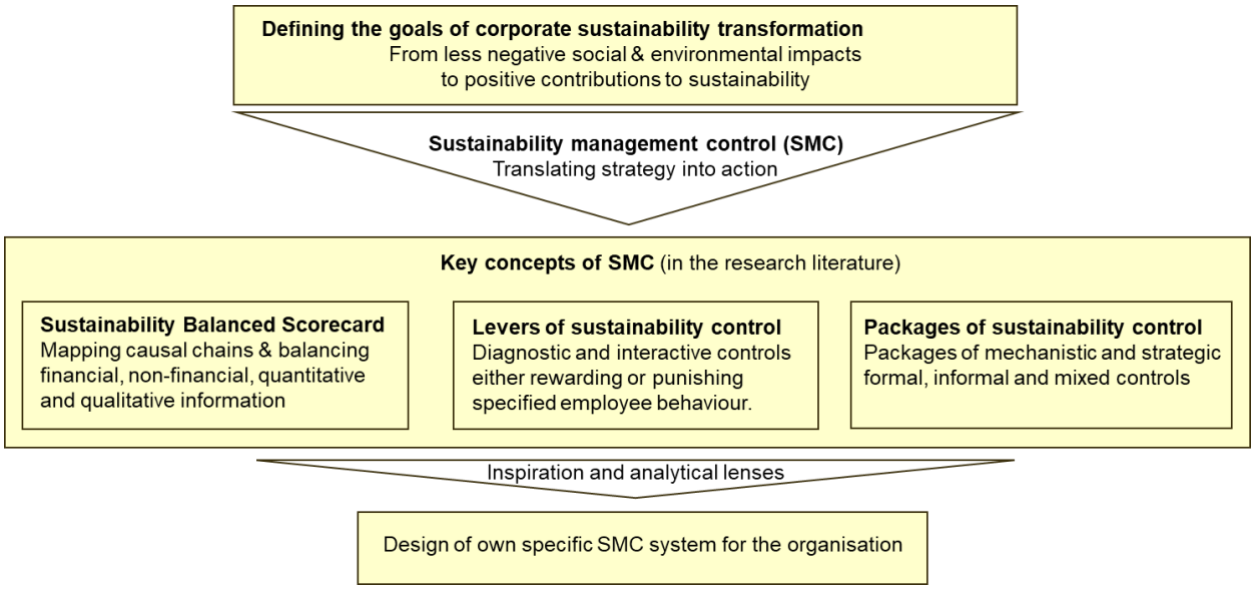
1. Introduction to sustainability management control

Management controls can be described as a means to guide an organisation towards strategic and operational goals (Ferreira & Otley, 2009; Gond et al., 2012; Langfield-Smith, 1997; Ouchi, 1977; Simons, 1994). Driven by the growing interest in concepts such as corporate social responsibility (CSR) and corporate sustainability (Marrewijk, 2003; Schaltegger & Burritt, 2005), a growing body of academic literature on management control for sustainability has emerged (e.g., Epstein & Wisner, 2005; Figge et al., 2002; Gond et al., 2012; Hansen & Schaltegger, 2014; Henri & Journeault, 2010; Perego & Hartmann, 2009; Schaltegger, 2011; Schaltegger & Wagner, 2006; Riccaboni & Leone, 2010).

Sustainability management control (SMC) is often considered a part or sustainability management accounting. More precisely, the purpose of SMC is to guide behaviour in the organisation based on indicators that are created through sustainability management accounting. In the literature, the understanding of SMC has, however, changed over time from an indicator-based guiding employee and management behaviour to a more comprehensive package of sustainability controls with an internal consulting and mirroring purpose that aims to entice or even force management to reflect whether the organisation is developing sustainability as strategically intended.

Figure 1 illustrates the structure of this unit. While management control research and practice have tended to focus on reducing risks and harm, a change in perspective for defining the goal of SMC is proposed, shifting towards creating positive contributions of the company to sustainable development beyond organisational boundaries.

Figure 1. Structure of the learning in this unit on SMC.



Source: Own elaboration.

In light of this recent SMC perspective, a reflection is needed on what the purpose of sustainability management, reporting, accounting, and management control is and

whether the indicators, measurement, and management approaches are supporting decision-makers and the organisation to move in the right direction to become sustainable. So far, the main focus has been on reducing harm (i.e., reducing the negative environmental and social impact of a company, see Battaglia et al., 2016; Corsi & Arru, 2021; Johnstone, 2019). As becoming less harmful is psychologically not necessarily most effective to motivate sustainable behaviour, and as reducing negative environmental and social impacts in the context of already exceeded planetary boundaries is not sufficient to achieve sustainable development, a reflection on what **positive contributions to sustainable development** could mean (Dijkstra-Silva et al., 2022) is necessary. SMC aims to help guide an organisation in contributing to macro- (e.g., UN SDGs) and meso-level (e.g., sustainable market and industry) sustainability goals (Schaltegger et al., 2022).

The purpose of translating strategy into action has conventionally informed the management control literature, and also in the sustainability management domain. Based on this initial fundamental reflection about what should be pursued with SMC, this learning unit introduces key frameworks of SMC proposed in the research literature, highlighting their strengths and weaknesses.

- First, the **sustainability balanced scorecard (SBSC)** (Figge et al., 2002; Hansen & Schaltegger, 2016; based on Kaplan & Norton, 1992) is introduced. While the balanced scorecard (BSC) has had a strong influence on management approaches in research and practice, both the BSC and the SBSC are rarely implemented in a textbook manner. Key elements, like the development and use of key performance indicators, cause-and-effect chains, and even strategy maps, have, however, influenced management control practices.
- Second, the **levers of sustainability control framework** (Gond et al., 2012; based on Simons, 1994) is discussed. This approach possesses analytical qualities and provides a framework for structuring investigations of what companies consider in their sustainability management. Although empirical evidence for (broad) implementation in corporate practice seems to be missing, the approach extends and emphasises the view on more qualitative issues than the (S)BSC.
- Third, the **packages of sustainability control framework** (Crutzen et al. 2017; based on Malmi & Brown 2008) is presented. The framework provides a comprehensive collection of different types of controls. Particularly, the packages of sustainability control approach emphasises the relevance of informal controls in addition to formal controls (Maas et al., 2016).

The following overview of different concepts of SMC aims to provide a toolbox and analytical lens to design a company-specific SMC system in practice with the purpose of supporting management in contributing to sustainable development beyond organisational boundaries.

Activity: What is sustainability management control? (see "Unit 3.2 Activity 1")

2. From less negative to more positive sustainability contributions

Both in research and corporate practice, sustainability performance is primarily understood as preventing or reducing negative impacts (Shevchenko et al., 2016; Wettstein, 2010). This perspective, however, contributes at best to minimising harm and is constrained because even when organisations reduce their negative social and environmental impacts, negative impacts still remain (Dijkstra-Silva et al., 2022). In light of already exceeded planetary boundaries and the social and environmental problems underlying the UN SDGs, a reduction of causing additional harm (every year) does not lead to sustainable development (Ergene et al., 2020; Shevchenko et al., 2016; Whiteman et al., 2013). A car, for example, that causes fewer air emissions still pollutes every time it is used. While relative sustainability improvements have a soothing effect on additional harm caused, harm is still caused and increases the underlying global problems (Milne & Gray, 2013).

The current view of both sustainability reporting and accounting focuses on communicating and measuring sustainability performance from the perspective of becoming 'less bad'. Such a **"reduction of negativity" perspective neither helps guide an organisation effectively in the direction towards sustainability**, nor is it necessary. If major challenges are to be adequately addressed, companies must be motivated and enabled to create fundamental positive contributions toward sustainability that solve existing environmental and social problems at the macro-level (e.g., solving the problem of exceeded planetary boundaries) and the meso-level (e.g., transforming the mass market to ensure sustainable production and consumption) beyond organisational boundaries (Schaltegger et al., 2022).

As the purpose of SMC is to guide an organisation and its members towards sustainable behaviour, the psychological implications of the perspective that an SMC approach implies are of high relevance. Psychological studies highlight the importance of positive goals and achievements to establish and maintain motivation. While preventing negative impacts is dealing with a 'necessary evil', achieving positive results and receiving positive feedback is key to creating entrepreneurial passion (Gielnik et al., 2014), motivation, and sustainability improvements (Hörisch et al., 2020). The prevailing focus of sustainability reporting and accounting on the prevention of harm ignores motivational implications.

Overcoming the limitations of the current view requires purposefully **addressing sustainability performance as a positive goal**. While a single company can mostly not solve global sustainability problems, every organisation can still, in its range of influence, contribute effectively to solving these problems. On the positive side, firms can create new technologies to foster renewable energies and the energy transition and contribute to health and better education. Multiple cases of sustainable entrepreneurship (e.g.,

Parrish, 2010; Schaltegger & Wagner, 2011; York & Venkataraman, 2010) illustrate the potential of companies to make a considerable difference. The Grameen Bank, for example, has contributed effectively to eradicating poverty (Battilana & Dorado, 2010; Yunus, 1999), and various companies in the regenerative energy sector contribute to a sustainability transition of this industry.

SMC is therefore challenged to introduce a **sustainable entrepreneurship perspective** beyond a risk perspective alone, by guiding an organisation towards creating positive sustainability contributions that extend beyond organisational boundaries (Dijkstra-Silva et al., 2022; Schaltegger et al., 2022). The following sections introduce key frameworks of SMC following this approach.

Video: Sustainability management control and positive contributions to sustainable development (Link)

Activity: What does changing the perspective to positive contribution require to achieve sustainable development? (see "Unit 3.2 Activity 2")

3. Key frameworks of sustainability management control

3.1. Sustainability balanced scorecard

The sustainability balanced scorecard: Multiple performance perspectives

Awareness about the limitations of measuring organisational success only with financial metrics has increased interest in multidimensional performance measurement and management systems. The **balanced scorecard (BSC)**, and its further development to manage sustainability issues, the **sustainability balanced scorecard (SBSC)**, addresses multidimensional performance measurement and management in a systematic manner. The aim of the (S)BSC is to **"translate strategy into action"** (Kaplan & Norton, 1992) with a top-down approach that transforms strategic goals into key performance measures to manage several management areas that have been identified as key for the successful implementation of a strategy.

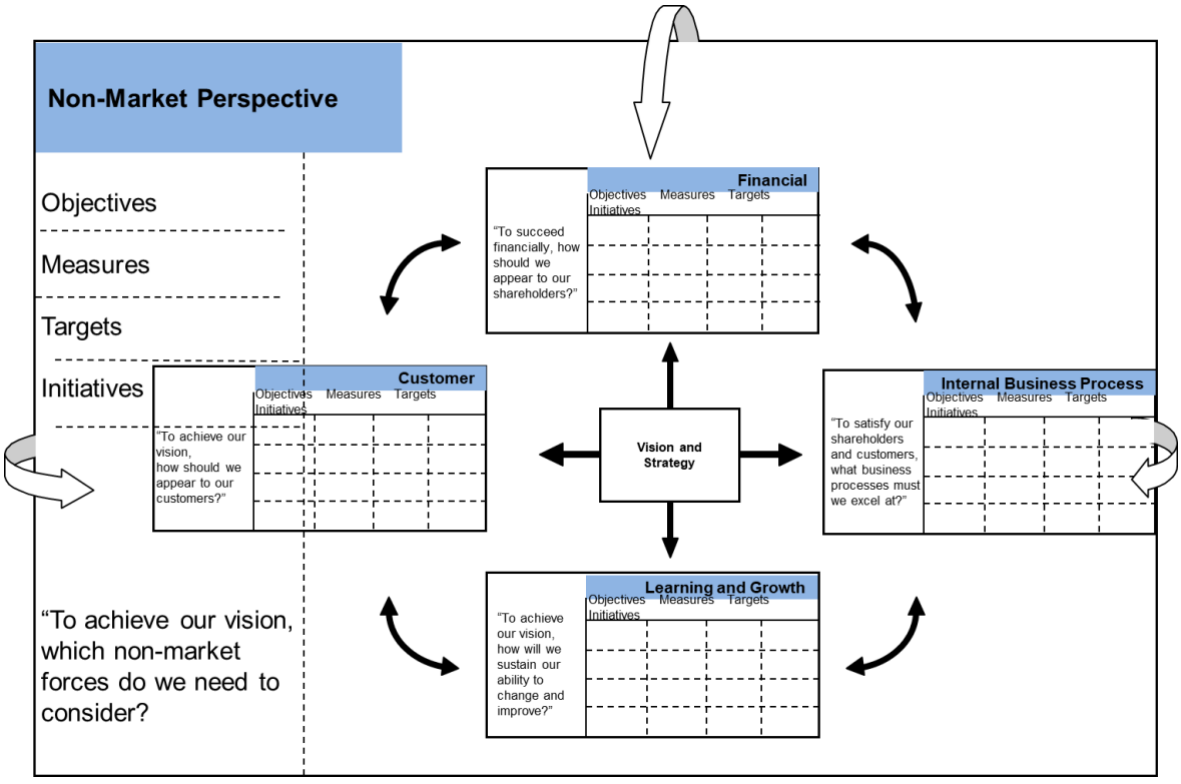
The SBSC usually distinguishes **four or five key perspectives** of success that are interlinked through cause-and-effect chains (see Figure 2). These perspectives are:

- The **financial perspective** focuses on the financial implications (in monetary terms) of sustainability initiatives.
- The **customer perspective** considers the impact of sustainability issues on customer relationships, satisfaction, purchasing, etc.
- The **internal processes perspective** focuses on company-internal processes and systems, including innovation processes, procurement, production, logistics, and other related areas that support or are linked to sustainability initiatives.

- The **learning and growth perspective** deals with knowledge acquisition, employee motivation, development of the organisation's capabilities, etc., relating to sustainability issues.
- The **non-market perspective** examines the impact of sustainability issues on the market framework through political processes, regulatory pressures, media, and other channels, ultimately influencing the business environment of the company, corporate success, and the implications for corporate sustainability. This perspective is often added as the fifth one.

The BSC, as proposed by Kaplan and Norton (1992), is maybe the most popular management control framework in research and practice that combines different relevant perspectives for business. The BSC is a strategic measurement and management approach that aims to **'balance' financial and non-financial, short-term and long-term, as well as qualitative and quantitative success measures**. By breaking down the strategy into key operational action areas interconnected via cause-and-effect chains, the BSC aims to operationalize the strategy by linking operational non-financial and financial activities and indicators. With this approach, the BCS helps operationalise the strategy and align corporate activities according to their strategic relevance.

Figure 2. The original sustainability balanced scorecard.



Source: Figge et al. (2002).

Despite its multiple performance perspectives, the BSC is still mostly championed by the financial control department in practice (Hansen & Schaltegger, 2016). Environmental and social objectives have been largely neglected in the BSC. Figge et al. (2002), therefore, proposed developing a **sustainability balanced scorecard (SBSC)** to

consider strategically relevant environmental and social goals more explicitly. The SBSC is a framework for measuring and managing sustainability performance based on the conventional BSC framework, but with a focus on sustainability metrics. The SBSC is often viewed as a starting point for incorporating environmental and social aspects into the company's main management system.

Activity: How can we manage and monitor multiple sustainability-related dimensions of business? (see "Unit 3.2 Activity 3")

The sustainability balanced scorecard: Linking internal processes with market logics

The sustainability balanced scorecard (SBSC) aims to **identify the major strategically relevant social and environmental issues** of a business and to describe the causal contribution those issues make to the successful achievement of the firm's strategy. By assessing **cause-and-effect chains top-down** from the financial perspective via the customer (market) perspective, internal processes, and the learning and growth (organisational development) perspectives, the SBSC seeks to represent the **causal contribution of social and environmental aspects explicitly and, therefore, controllably.**

The key idea of the original SBSC that follows the original top-down logic of the BSC is that:

- Financial success requires market success. Only when customers are convinced (therefore, this perspective is mostly labelled "customer" perspective) and buy the company's products, can financial success be achieved.
- Market success, in turn, requires excellent internal processes, i.e., outstanding innovation processes, production processes, procurement, etc.
- Products have to be created, produced, communicated, and delivered in a customer-convincing way (i.e., be cheap, have the features that customers desire, be available at convenient places, and in time).
- Last but not least, internal processes can only be outstanding if the management and employees are motivated and develop knowledge for the company that allows it to grow and develop successfully as an organisation.

While this fundamental cause-and-effect chain is developed top-down, it works **bottom-up in practice** from the company's workforce and knowledge capabilities to internal processes, market success with customers to financial success. In addition, other causal chains may exist that, for example, link the internal process perspective directly with the financial perspective (e.g., as production costs are directly linked to the cost structure of the company). The whole picture of cause-and-effect chains constitutes a strategy map that aims to support the measurement and management of causal relationships to ensure the organisation's success. Each perspective is supported with

key performance indicators that allow measuring whether progress is made in this area and that a positive contribution is created for the next perspective to the top.

Activity: Which perspectives are relevant in the sustainability balanced scorecard? (see "Unit 3.2 Activity 4")

The sustainability balanced scorecard: A strategic tool

As explained in the previous sections, the sustainability balance scorecard SBSC aims to "translate strategy into action" (Kaplan & Norton, 1992) by developing KPIs based on the cause-and-effect chains that reflect the rationale for how the company's strategy shall be realized.

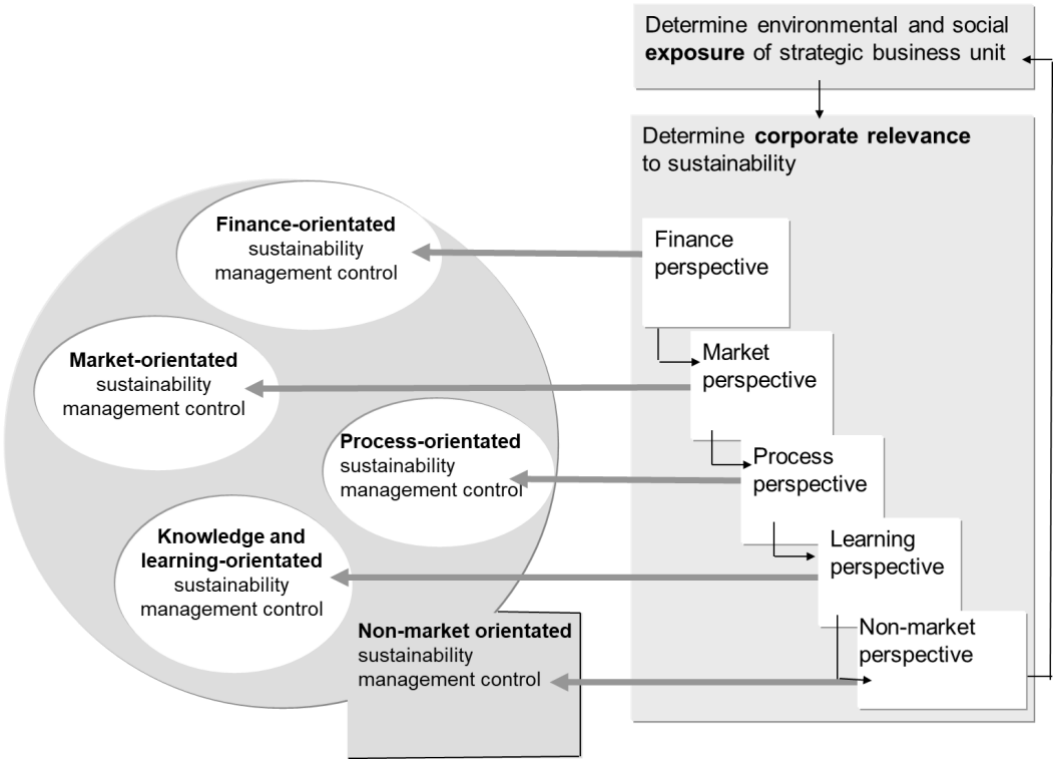
To create the necessary data and make improvements with regard to the KPIs, the **information needed to manage each (S)BSC perspective** needs to be backed up with a more operative level of management control that includes the monitoring, collection and aggregation of data as well as decisions and actions (Schaltegger & Burritt, 2006) that lead to operational improvements reflected in the KPIs (as Figure 3 shows).

The basic cause-and-effect chain to the right represents the fundamental rationale of the SBSC. The environmental and social issues that are of strategic relevance are determined **top-down** in the development of the strategy map with its causal chains. All KPIs in each perspective have to be further managed on a more **operational level**, which is shown to the left in Figure 3, and that leads to distinguished operational control systems for finance-oriented, market-oriented, process-oriented, knowledge and learning-oriented, and non-market-oriented sustainability management controls. These operational controls are focused on improving the KPIs of the SBSC.

Finance-oriented sustainability management control deals with the relationship between sustainability issues and financial success (e.g., sustainability influence on the cost structure of the company, investment decisions, fees, and fines, etc.). Similarly, market-oriented deals with sustainability and customer topics, process-oriented with innovation, procurement, production, logistics, etc., processes, and environmental and social issues influencing each other, etc.

These operational controls are largely managed by functional departments (such as the finance department and marketing and sales department), but require coordination by managers responsible for top-level sustainability management control within the company.

Figure 3. Operative sustainability management controls supporting the SBSC.



Source: Schaltegger (2010).

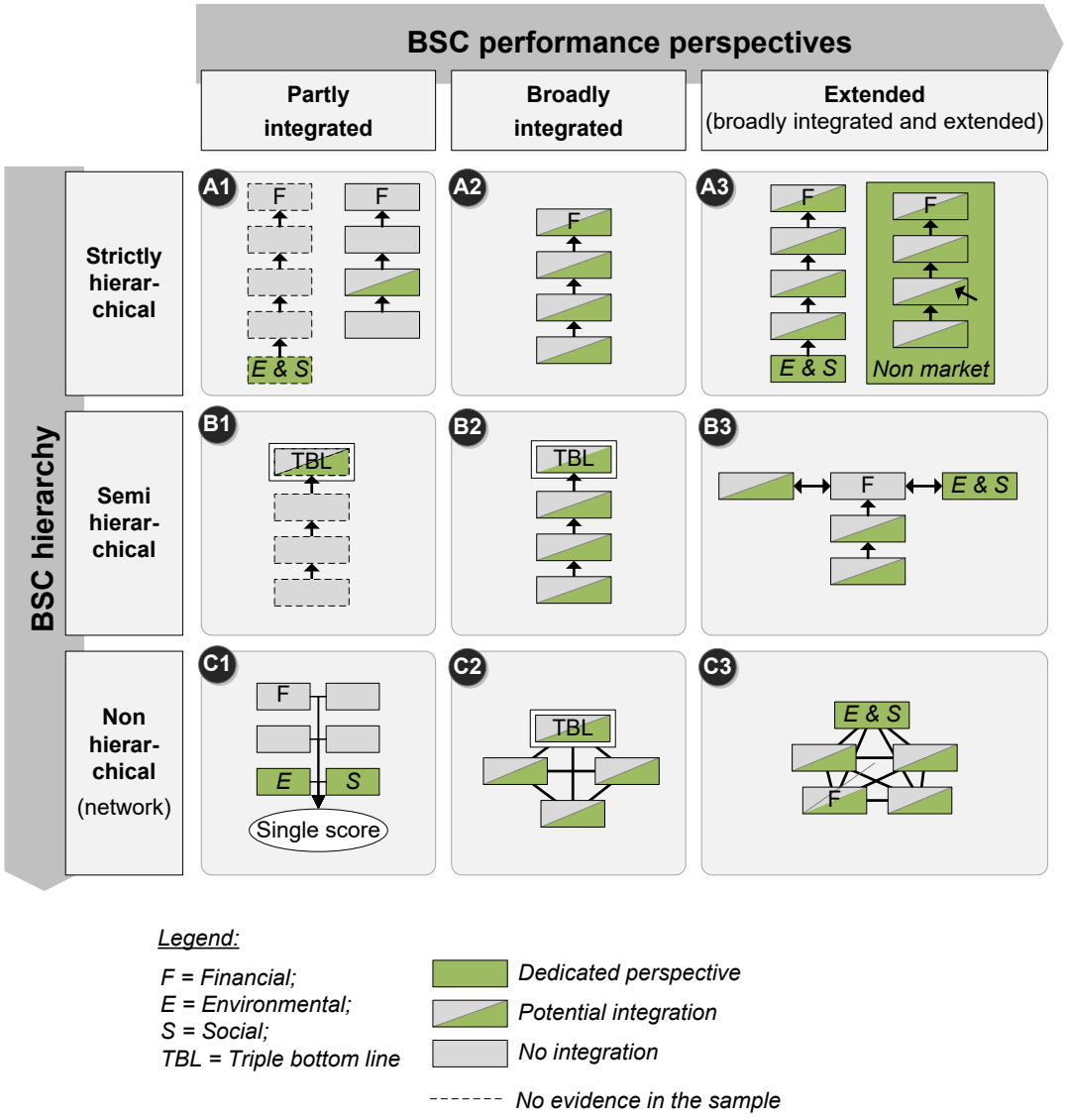
Activity: How are strategic sustainability issues determined for developing the sustainability balanced scorecard? (see "Unit 3.2 Activity 5")

The sustainability balanced scorecard: Architectures

Given that the sustainability balanced scorecard (SBSC) considers environmental and social objectives explicitly, it employs a **stronger multidimensional** character of performance management than the balanced scorecard. Whereas the original approach for an SBSC was still very much top-down organised towards ensuring the economic success of the company, further research has resulted in **multiple SBSC architectures** (as Figure 4 shows) representing different strategies and how they could be operationalised through the SBSC.

While some architectures are close to the conventional BSC architecture based on a strict hierarchy of performance perspectives to operationalise strategic objectives, ultimately leading to financial success (e.g., Figge et al., 2002), other SBSC frameworks propose the introduction of new perspectives (Epstein & Wisner, 2001), or even network-like architectures (van Marrewijk, 2003).

Figure 4. Framework of SBSC architectures.



Source: Hansen & Schaltegger (2016).

Hansen and Schaltegger (2016) propose a **typology of SBSC architectures** based on **two dimensions**: hierarchy and integration of environmental and social objectives in the SBSC perspectives.

- **Hierarchy** distinguishes between 'strictly hierarchical', 'semi-hierarchical', and 'non-hierarchical'.
- **Integration** distinguishes between 'partly integrated', 'broadly integrated', and 'extended'.

The framework displays a **spectrum of SBSC architectures** from more conventional and more advanced, network-based architectures. The diversity of SBSC architectures reflects multidimensional performance measurement systems and procedures that allow for the adoption of a sustainability management control approach that fits the character of the organisation (e.g., whether profit-oriented or care-oriented) and its particular success factors.

The SBSC has mainly focused on quantitative, measurable aspects of sustainability performance. Although the SBSC could also consider qualitative aspects as well, it does, in practice, mostly represent a formal, information-based sustainability management control approach and often relies strongly on quantitative social and environmental information, in addition to conventional accounting information.

Activity: What are the dimensions of the sustainability balanced scorecard architecture? (see "Unit 3.2 Activity 6")

The sustainability balanced scorecard: Benefits and limitations

The sustainability balanced scorecard (SBSC) offers several **benefits**, including a very **systematic, structured approach** to managing sustainability issues with regard to improving sustainability performance as well as financial performance. The SBSC also helps increase **transparency for management and employees** by providing a clear understanding of how sustainability issues are embedded into a cause-and-effect chain influencing the organisation's key goals and by making explicit how sustainability performance improvements are linked to economic performance improvements. The aim of this approach is to support **better decision-making** by providing decision-makers with a clear understanding of the financial and non-financial implications of sustainability aspects.

Implementing an SBSC, no matter what architecture is adopted, requires a range of steps that also bring benefits to organisations. First, the definition and clarification of **explicit sustainability goals** as well as **key sustainability metrics** through key performance indicators (KPIs). Second, the development of a **system for collecting and reporting data** allows measuring performance with regard to these KPIs, by establishing a sustainability reporting system. Third, the SBSC implies that organisations must **regularly monitor and evaluate** sustainability performance against established metrics and targets.

However, the SBSC also has some **limitations** that need to be considered. Management controls include all corporate approaches that managers use to formally and informally ensure that the behaviour and decisions of their employees are consistent with the organisation's objectives and strategies (Chenhall, 2003; Malmi & Brown, 2008; Simons, 1994). While approaches, such as a budgeting system or a strategy scorecard, are management controls (Malmi & Brown, 2008), management control systems transcend pure decision-support systems and also explicitly address informal controls (Malmi & Brown, 2008; Otley, 1984). The BSC and SCBSC, however, do **not mostly explicitly address the role of organisational culture and soft factors** that have been identified as key aspects of employee and management behaviour. Informal and cultural controls are SMC aspects that the frameworks of "levers of control" and "packages of control", which we will cover in the following sections of this unit, aim to address explicitly.

Activity: What are the benefits and limitations of the sustainability balanced scorecard? (see "Unit 3.2 Activity 7")

3.2. Levers of sustainability control

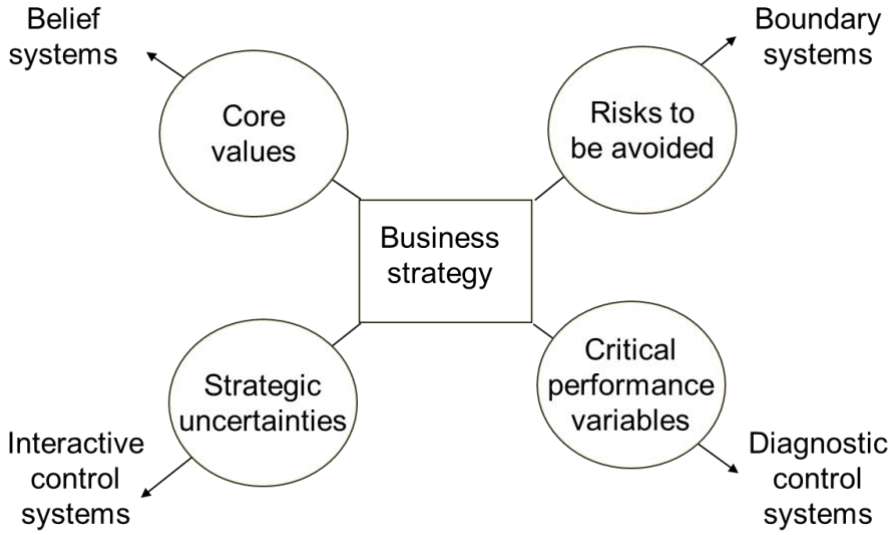
Introduction to the levers of sustainability control framework

In light of the original behavioural goal of sustainability management control, qualitative aspects, such as organisational culture, etc., need to be considered more explicitly. **Controls** can be social or technical and address strategic or operational performance, while considering strategic boundaries or operational boundaries (Tessier & Otley, 2012). Controls can be used diagnostically or interactively by either rewarding or punishing specified employee behaviour. The "levers of control" concept, developed by Robert Simons (1994), considers these distinctions and describes four key mechanisms that companies use to implement their strategies and achieve their goals, including qualitative aspects relating to organisational culture. The levers of control approach (Figure 5) extends the information-based approach of the balanced scorecard, particularly by including belief and boundary systems of the organisation. Simons (1994) distinguishes the following **four key control systems**:

- **Belief systems** represent the core values of the organisation.
- **Boundary systems** relate to risks to be avoided.
- **Interactive control systems** deal with strategic uncertainties.
- **Diagnostic control systems** address critical performance variables.

The mechanisms relating to these control systems are referred to as **"levers of control"** because they **exert control over the company's activities** by influencing employee (and management) behaviour.

Figure 5. Levers of control.



Source: Simons (1994).

1. The first lever of control is **beliefs**, referring to the values and assumptions that prevail within a company. By promoting certain beliefs and values, a company can influence its employees to exhibit behaviours that are necessary to achieve the company's objectives.
2. The second lever is **boundaries**, which "delineates the acceptable domain of strategic activity for organisational participants" (Simons 1994, p. 39). This lever refers to all kinds of limits the company must consider in its management decisions and activities, including regulatory limits imposed by governments, "rules of the game" set by investors, standard setters, investment analysts, clients, etc., or that entail important reputational ESG and greenwashing risks. As Widener (2007) argues, "the boundary system communicates the actions that employees should avoid". Boundary controls translate external constraints into internal organisational limits.

   The purpose of both belief and boundary controls is to allow employees freedom to innovate and achieve goals within pre-defined areas. Both systems shall motivate employees to search for new opportunities while the beliefs system does so in a positive way through inspiration (e.g., with a mission or vision statement) whereas the boundary system does so in a negative way, emphasising constraints and limits (e.g., through a code of conduct) (Simons, 1994; Widener, 2007). While the belief system translates external market and societal opportunities for the company, the boundary system considers and translates regulations and external societal pressures for the organisation. By establishing beliefs and boundaries in the organisation, a company aims to influence employee behaviour.
3. The third lever is **activities**, which focuses on specific activities undertaken within a company to achieve the organisation's objectives. By defining and monitoring activities, a company can influence its employees to produce certain action-related results.
4. The fourth lever is **rewards**, which refers to incentives for employees and compensation when specifically defined performance targets are achieved. Introducing rewards aims to influence employee behaviour considered necessary, efficient, and or effective to achieve the company's objectives.

Activity: What is the levers of sustainability control framework? (see "Unit 3.2 Activity 8")

Levers of control as an action-oriented framework

With his levers of control framework, Simons aims to offer an **action-oriented framework of control** that guides strategy regarding both innovation and profitability (Simons, 1994). Management control systems are "the formal, information-based routines and procedures managers use to maintain or alter patterns in organizational

activities" (Simons, 1994, p. 5). The levers of control framework, therefore, addresses **formal information aspects of management control systems**. The rationale of the levers of control framework is that, by using these four levers of control, companies can implement their strategies and achieve their goals. By combining the underlying mechanisms of these four levers, explained in the previous section, management can influence employees to exhibit behaviours that are considered necessary to achieve the company's objectives.

Simons describes old management control approaches as being top-down, standardised, focused on implementations according to plan, limiting surprises, and keeping things on track. He distinguishes and characterises his approach as empowering employees, customising control to the specifics of the organisation, and focusing on continuous innovation (Simons, 1994).

While not considering sustainability explicitly, Simons' approach resonates implicitly with some aspects of the distinction between negative and positive aspects of performance (as highlighted in a previous section of this unit). He classifies belief and interactive controls as **"yang", or positive**, inspirational forces; while the boundary and diagnostic controls are **"yin", or negative** forces ensuring compliance with orders. According to Simons, challenges for managers to control their organisation are to find innovative solutions that overcome tensions between the positive and negative aspects of controls.

Activity: What is the orientation of the levers of sustainability control framework? (see "Unit 3.2 Activity 9")

Applying levers of control to corporate sustainability

As companies may face anxieties of altering organisational practices towards sustainability, sustainability control systems are often introduced in parallel to existing, conventional, financially oriented management control systems. Once established and when the benefits of sustainability controls become visible, management, however, often develops the desire and is challenged to align or integrate different control systems. To address tensions between sustainability management control and conventional management control, the levers of control framework has been used in sustainability research for **diagnostic purposes** and to discuss modes of **integrating conventional management control systems and sustainability control systems** (Gond et al. 2012).

The levers of control approach can be used to distinguish **eight different configurations of the relationship between sustainability and conventional management controls use** (Gond et al., 2012):

- **Dormant**, decoupled sustainability and conventional corporate strategies.
- **Strategy emergence** through sustainability by changing the use of sustainability management control from a diagnostic to an interactive use.

- **Compliance-driven sustainability** strategies driven by external pressures.
- **"Schizoid" sustainability** strategies with contradictory sustainability and conventional strategies in parallel within the organisation.
- **Dormant, integrated** strategies with strong ties between both sustainability and conventional strategies but not being mobilised.
- **Sustainability-driven** strategies, where the company's strategy is driven by sustainability.
- **Peripheral sustainability integration**, where sustainability is only used for diagnostic purposes for the conventional management strategy.
- **Integrated sustainability** strategies with a high integration and overlap of both strategies.

Gond et al. (2012) discuss possible mechanisms for sustainability integration or marginalisation with regard to the relationship between the different control systems and strategies.

From a practical perspective, the boundary control lever resonates with the **Committee of Sponsoring Organisations of the Treadway Commission (COSO) Internal Control-Integrated Framework (ICIF)** (COSO, 2025). The ICIF was originally issued in 1992 and updated in 2013 (ICIF-2013). It was developed as guidance to help improve confidence in all types of data and information (COSO 2025). The COSO model defines **internal control** as "a process effected by an entity's board of directors, management and other personnel designed to provide reasonable assurance of the achievement of objectives in the following categories: operational effectiveness and efficiency, financial reporting reliability as well as applicable laws and regulations compliance" (COSO 2025). The ISIF framework distinguishes **five components to support the achievement of an entity's mission, strategies, and related business objectives**:

1. **Control the environment** (e.g., exercise ethical values, create organisational structure, policies, procedures, etc.).
2. **Risk assessment** (e.g., perform risk identification and analysis).
3. **Control activities** (e.g., follow policies and procedures, improve security).
4. **Information and communication** (e.g., measure the quality of information and the effectiveness of communication).
5. **Monitoring** (e.g., ongoing monitoring, separate evaluations).

All five components are influenced by sustainability issues. In 2023, COSO issued supplemental guidance for organisations to achieve effective internal control over sustainability reporting.

The increasing amount of sustainability regulations (as explained in unit 2.1 of this course), particularly as regards to reporting (e.g., Corporate Sustainability Reporting Directive - CSRD, Corporate Sustainability Due Diligence Directive - CSDDD) may create a strong regulation-focused, adaptive approach and negative atmosphere to sustainability management that focuses on boundary controls. The COSO framework focuses on regulations and information related to boundaries of the business, but also

acknowledges the potential to transform external pressures and limitations into value: “Internal controls have value beyond compliance and external financial reporting. Effective internal controls can help an organisation articulate its purpose, set its objectives and strategy, and grow on a sustained basis with confidence and integrity in all types of information” (COSO 2025).

Extending the risk management view addressed by boundary controls with business opportunity development, the levers of control framework proposes additional belief controls to conceptualise the role of mission statements and strategic envisioning for positive motivation. The levers of control framework highlights the necessary **balance between different types of controls** (negative and positive, diagnostic and interactive) for internal sustainability management control. This includes the explicit consideration of ‘positive’ motivational aspects of belief-oriented controls. Such a more balanced sustainability management control approach may motivate and force management to explicitly think about and develop positive aspects of transforming regulatory pressures into organisational development and business opportunities.

The levers of control framework can thus help researchers and practitioners for both diagnostic purposes to identify points of interaction and alignment, as well as for managing an interactive use of the two control systems. The levers of control approach can help to structure both analysis and interaction, with the second representing a more advanced step as it supports the integration of sustainability management with conventional management.

Activity: How does the levers of control framework relate to corporate sustainability strategy? (see “Unit 3.2 Activity 10”)

Benefits and limitations of the levers of control framework

The levers of control approach has several **advantages**. Particularly, it provides a structured framework aiming to:

- **Reduce complexity** to improve decision-making.
- **Increase flexibility** by offering management to tailor the control mechanisms to specific needs and circumstances
- **Improve the alignment** of organisational activities with strategic goals.
- **Promote transparency** and improve information (flows) through higher visibility of organisational activities.
- **Enhance behavioural accountability** of employees and managers
- **Improve risk management and organisational learning** to enhance performance and reduce risks.

However, the levers of control approach also faces several **weaknesses**, including:

- **Overemphasis on formal information-based control** can reduce innovation, creativity, and flexibility.

- **Insufficient consideration of soft and human factors** (like leadership styles) in practice as a consequence of what information exists in the organisation and how it is used (as information is not as easy to create for all levers).
- **Tendency to over-emphasize risk** in the entire control system
- **Bias on compliance** with potential implications on trust and motivation of employees.
- **Lack of explicit consideration of external factors of influence**, such as customer preferences, regulatory developments, media attention, etc.

While both frameworks, the sustainability balanced scorecard and the levers of sustainability control, address highly relevant perspectives that need to be considered in sustainability management control, they both have **drawbacks with regard to comprehensiveness**. Given the complexity, dynamics, and broad spectrum of aspects and implications that sustainability issues encompass, a comprehensive management control approach is necessary to capture sustainability as fully as possible. The following section covers the packages of sustainability control, which aim to provide a framework that attempts to cover a broad spectrum of controls (but has other drawbacks, as discussed at the end of that section).

Activity: What are the benefits of the levers of control framework? (see "Unit 3.2 Activity 11")

3.3. Packages of sustainability control

The packages of sustainability control

Malmi and Brown (2008) introduced the management control framework of **packages of control** to describe various types and combinations of control mechanisms, including formal and informal controls, that companies (can) use to manage their operations. **Formal controls** entail purposefully designed, information-based, and explicit sets of structures, routines, procedures, and systems that help managers ensure corporate strategies and plans are implemented by their employees or, if they are modified when necessary and useful. Among formal controls, accounting controls have been most in the focus of research (Langfield-Smith, 1997).

In contrast to formal controls, **informal controls** do not guide behaviour through explicit, verifiable measures, but rather address shared values, beliefs, and customs in guiding employee and management behaviour (Norris & O'Dwyer, 2004; Simons, 1994). Behavioural theories of organisations (Cyert & March, 1963) have emphasised the relevance of informal controls for long. Values, beliefs, and customs influence employees through a subtle reading of symbols, informal structures, and signals in the organisation (e.g., Pfeffer, 1992), which are transmitted by managers and other employees. In contrast to formal influence, informal influence on organisational decisions and activities is not prescribed formally by supervisors and upper-level management.

The packages of control framework makes the distinction between formal and informal controls (Abernethy & Brownell, 1997; Otley, 1984) explicit, and distinguishes **four packages of control**:

- **Packages of mechanistic formal controls** are characterised by a high degree of formalization, standardization, and centralization. They are typical of companies with a strong hierarchical structure that focuses on efficiency and cost control.
- **Packages of organic, informal controls** are characterised by a low degree of formalization, standardization, and centralization, and are often used in companies with a flat organisational structure focusing on innovation and flexibility.
- **Packages of strategic formal controls** entail strategic planning, goal-setting, and performance measurement, aiming to coordinate and align different business units of the organisation.
- **Empirical packages of formal and informal controls** that can often be seen in organisations operating in rapidly changing environments, requiring a high degree of flexibility, adaptation, responsiveness, experimentation, and learning.

Malmi and Brown (2008) emphasise that the choice of control packages depends on the company's specific context, goals, and strategy, and that a combination of these packages is common. Companies can choose these packages and controls to create a tailored control system addressing specific circumstances and goals.

Activity: What are the packages of control? (see "Unit 3.2 Activity 12")

Benefits and limitations of the packages of control framework

The packages of control framework can be considered a further development or extension of Simon's levers of control approach, studied before in this unit. While Simons distinguished important individual levers of control, Malmi and Brown aim to include a comprehensive range of different controls that allow companies to tailor specific combinations of control packages. The "packages of control" framework has several **strengths**:

- It provides **comprehensiveness** as a collection of different formal and informal controls.
- It supports management in **designing a company's control system** tailored to the organisation's needs.
- It helps improve the **effectiveness of the company's management control system** by emphasising strengths and different application areas for different controls.
- It facilitates the **adaptation of the control system flexibly** to changing conditions, requirements, and goals.

- It has **diagnostic and evaluative value** in identifying a range of controls, their strengths and weaknesses, and in characterising specific packages of controls used within an organisation, as well as in analysing how these controls are and can be combined**.**
- It supports a **nuanced understanding of control**, which helps to explain differences between management control approaches in practice, depending on context, strategy, goals, etc., and to recognise that different control mechanisms are used in different contexts and for different purposes.
- It provides a basis for **management learning** to adapt and further develop the management control system.
- Overall, these strengths can help management to **improve organisational performance and achieve better outcomes**.

The packages of control approach also faces several **weaknesses**, such as:

- It may be considered **oversimplistic** as it "just" categorizes control mechanisms into four packages without interlinking them well, and may not capture the complexity of real-world control systems.
- It is **not based on empirical evidence**, apart from a limited number of case studies, which may not be representative of all organisations (size, strategy, culture, etc.) and all contexts (regulatory, cultural, social, etc.).
- The previous point can cause **difficulties in adapting the management control system** to changing circumstances (e.g., changing regulations, market conditions, customer preferences, etc.).
- It may be **difficult to apply** as no clear guidance on how to choose controls among the multitude of proposed possible controls is provided.
- It is **not very clear about how to measure the effectiveness** of control and how to evaluate the effectiveness of management decisions and companies' actions.
- It does **not specifically address organisational learning**, particularly with regard to the development and implementation of control mechanisms. This limitation includes that the approach may not be adequate to consider leadership quality.

In sum, the packages of control framework provides a broad overview of types of controls and may be considered most comprehensive compared to other management control frameworks. Management controls include all devices and systems managers install and use to formally and informally ensure that the behaviour and decisions of their employees are consistent with the organisation's objectives and strategies (Malmi & Brown, 2008; Simons, 1994). Management controls, therefore, transcend pure decision-support systems (Malmi & Brown, 2008; Otley, 1984). Approaches, such as a budgeting system or a strategy scorecard, are considered management controls (Malmi & Brown, 2008), but creating a comprehensive sustainability management control

system requires going beyond using single controls.

Activity: What are the weaknesses of the packages of control framework? (see "Unit 3.2 Activity 13")

Video: What are the key approaches to sustainability management control? (Link)

Case study: Informal sustainability controls (see "Unit 3.2 Case Study 1")

4. Concluding notes: An outlook on sustainability management control

Sustainability management control (SMC) refers to the processes and systems used by organisations to manage and control their sustainability performance. Research on SMC is a rapidly growing field that has evolved over the past two decades. In their literature review, Berry et al. (2009) identify SMC as an important emerging theme. However, even though a growing body of literature argues that management control is essential for corporate sustainability (Norris & O'Dwyer, 2004) the focus of SMC research has been on conceptual (and often prescriptive) papers (e.g., Figge et al., 2002; Gond et al., 2012; Schaltegger, 2011) while empirical studies investigating corporate management control practices in the context of sustainability are either based on single case studies (Hamprecht et al., 2005) or a small selection of cases (Crutzen et al., 2017; Epstein & Wisner, 2005; Henri & Journeault, 2010). This partly explains the scepticism raised about the existence of these sustainability management controls in practice, especially regarding their role in supporting sustainability within organisations. Norris and O'Dwyer (2004) state that "recent evidence suggests that, among firms taking specific steps to instil (sustainability) into organisational decision making, most focus only on the first component—specifying and communicating objectives—and even here the efforts are incomplete with respect to the communication aspect". This indicates a prevailing focus on reporting (Bui & De Villiers, 2017; Traxler et al., 2020) even for SMC, while most companies are still not engaging strongly with respect to other key components of SMC, such as establishing an organisational sustainability culture and incentives to motivate sustainable behaviour of managers and employees.

In practice, management control is furthermore strongly oriented towards **managing risks for the business and reducing harm** (Lüdeke-Freund et al., 2017). Achieving sustainable development, however, requires moving beyond harm reduction and **creating positive contributions to sustainable development** beyond organisational boundaries.

To implement SMC, we need to address the key question of how a particular SMC approach can be adapted to fit the specific context and type of organisation. Hansen and Schaltegger (2016) propose that, depending on the character of the organisation (e.g., whether profit- or care-oriented) and its particular factors of success and performance perspective, a different sustainability balanced scorecard (SBSC)

architecture might be suitable. Their framework aims to support management in deciding on the most suitable SBSC architecture for their type of organisation. Informed by the packages of control approach, Crutzen et al. (2017) show that companies tend to either focus on formal or on informal management controls, while they could not find an indication for a balanced consideration of informal and formal controls. The question, however, of what SMC framework (SBSC, packages of control, or levers of control) might be **most suitable and work best for a particular type of company and context is yet to be addressed**. Nevertheless, the absence of behaviour-related SMC components can be expected to impair a firm's formal efforts at instilling adequate behaviour among employees.

If SMC is taken seriously as an approach to effectively guide an organisation towards sustainability, then a more comprehensive management approach is needed. This unit provided an overview of key frameworks of SMC that adopt a **more comprehensive perspective**, extending beyond reporting and addressing the core of what needs to be dealt with to establish a sustainability accounting and management system that is seriously directed towards pursuing material sustainability contributions for organisational development and beyond organisational boundaries.

A reflection on the introduced key SMC frameworks reveals that establishing management control may lead to an overemphasis on the importance of formal control mechanisms, while neglecting other factors that influence organisational performance, such as informal and cultural aspects, as well as soft factors related to leadership and business context. In tendency, the management control frameworks also face a scaling challenge for large companies

Last but not least, this overview of different concepts of SMC, with their strengths and weaknesses, is intended to inspire you and to provide an analytical lens to design a company specific SMC system in practice that considers specificities of the organisation, the industry and the business environment in order to support management to create positive contributions to sustainable development beyond organisational boundaries.

Activity: Unit assessment (see "Unit 3.2 Activity 14")

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Additional materials

Levers of sustainability control

- Webpage. the COSO Internal Control-Integrated Framework (ICIF): https://www.coso.org/guidance-on-ic

- Webpage: The European Corporate Sustainability Reporting Directive (CSRD): https://finance.ec.europa.eu/capital-markets-union-and-financial-markets/company-reporting-and-auditing/company-reporting/corporate-sustainability-reporting_en

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Unit 3.2
Sustainability management control

ACTIVITIES

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UNIT 3.2

ACTIVITY 1

COMPLETE THE PHRASES

Sustainability Accounting Learning Platform for a Green Economy

2022-1-ES01-KA220-HED-000089844

Title	What is sustainability management control?
Module	Module 3. Sustainability management accounting and control
Unit	Unit 3.2. Sustainability management control
Heading/subheading after which it should appear	1. Introduction to sustainability management control

1. Activity 1

Sustainability management **control** (SMC) is frequently viewed as a component of sustainability management accounting. Its primary function is to influence organisational behaviour by utilising **indicators** generated through sustainability management **accounting** processes. Over time, however, scholarly perspectives on SMC have evolved. Initially conceived as a system for guiding the actions of employees and managers through **performance** indicators, SMC is now increasingly seen as a broader framework of sustainability controls. This expanded approach functions like an internal consultancy and **mirroring** mechanism, designed to prompt—if not compel—management to critically assess whether the organisation's sustainability efforts align with its **strategic** objectives.

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UNIT 3.2

ACTIVITY 2

FIND THE WORD

Sustainability Accounting Learning Platform for a Green Economy

2022-1-ES01-KA220-HED-000089844

Title	What does changing the perspective to positive contribution require to achieve sustainable development?
Module	Module 3. Sustainability management accounting and control
Unit	Unit 3.2. Sustainability management control
Heading/subheading after which it should appear	2. From less negative to more positive sustainability contributions

2. Activity 2

Word 1

Planetary concepts (in plural) that have already been exceeded.

Boundaries

Word 2

Approach that, combined with a risk perspective, challenges sustainability management control to guide firms towards making positive contributions.

Entrepreneurship

Word 3

Psychological element that is established and maintained by highlighting positive goals.

Motivation

Word 4

The type of goals that should be pursued to effectively direct organisations towards sustainability.

Positive

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UNIT 3.2

ACTIVITY 3

SORT LETTERS

Sustainability Accounting Learning Platform for a Green Economy

2022-1-ES01-KA220-HED-000089844

Title	How can we manage and monitor multiple sustainability-related dimensions of business?
Module	Module 3. Sustainability management accounting and control
Unit	Unit 3.2. Sustainability management control
Heading/subheading after which it should appear	3. Key frameworks of sustainability management control / 3.1. Sustainability balanced scorecard / The sustainability balanced scorecard: Multiple performance perspectives

3. Activity 3

Question 1

Management tool that has been further developed to measure and manage sustainability performance.

Scorecard

Maximum time to solve the question: 30 seconds

Question 2

he element that the balanced scorecard seeks to translate into action.

Strategy

Maximum time to solve the question: 30 seconds

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UNIT 3.2

ACTIVITY 4

WORD SEARCH

Sustainability Accounting Learning Platform for a Green Economy

2022-1-ES01-KA220-HED-000089844

Title	Which perspectives are relevant in the sustainability balanced scorecard?
Module	Module 3. Sustainability management accounting and control
Unit	Unit 3.2. Sustainability management control
Heading/subheading after which it should appear	3. Key frameworks of sustainability management control / 3.1. Sustainability balanced scorecard / The sustainability balanced scorecard: Linking internal processes with market logics

4. Activity 4

Can you find the six words that relate to the interlinked perspectives of the sustainability balanced scorecard?

Words

1. Financial
2. Customer
3. Market
4. Internal
5. Chain
6. Learning

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UNIT 3.2

ACTIVITY 5

FROM HIGHEST TO LOWEST

Sustainability Accounting Learning Platform
for a Green Economy

2022-1-ES01-KA220-HED-000089844

Title	How are strategic sustainability issues determined for developing the sustainability balanced scorecard?
Module	Module 3. Sustainability management accounting and control
Unit	Unit 3.2. Sustainability management control
Heading/subheading after which it should appear	3. Key frameworks of sustainability management control / 3.1. Sustainability balanced scorecard / The sustainability balanced scorecard: A strategic tool

5. Activity 5

Question

Order the perspectives of the SBSC based on the top-down (highest-lowest) approach to identify key strategic sustainability issues.

1. Finance
2. Market
3. Process
4. Learning
5. Non-market

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UNIT 3.2

ACTIVITY 6

HIDDEN WORD

Sustainability Accounting Learning Platform
for a Green Economy

2022-1-ES01-KA220-HED-000089844

Title	What are the dimensions of the sustainability balanced scorecard architecture?
Module	Module 3. Sustainability management accounting and control
Unit	Unit 3.2. Sustainability management control
Heading/subheading after which it should appear	3. Key frameworks of sustainability management control / 3.1. Sustainability balanced scorecard / The sustainability balanced scorecard: Architectures

6. Activity 6

Question 1

Dimension of the SBSC architecture that can be classified ‘strictly’, ‘semi-’, and ‘non-’.

Hierarchy

Question 2

The lowest level at which the integration dimension of the SBSC can be classified.

Partly

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UNIT 3.2

ACTIVITY 7

RELATIONSHIP BETWEEN IMAGE AND CONCEPT

Sustainability Accounting Learning Platform for a Green Economy

2022-1-ES01-KA220-HED-000089844

Title	What are the benefits and limitations of the sustainability balanced scorecard?
Module	Module 3. Sustainability management accounting and control
Unit	Unit 3.2. Sustainability management control
Heading/subheading after which it should appear	3. Key frameworks of sustainability management control / 3.1. Sustainability balanced scorecard / The sustainability balanced scorecard: A strategic tool

7. Activity 7

Concept 1

Indicate the concept: Decision-making

Image: A4GE U3.1 A7_1.jpg

Indicate the options **(correct answer in bold green)**.

a. Benefit
b. Limitation

Concept 2

Indicate the concept: Transparency

Image: A4GE U3.1 A7_2.jpg

Indicate the options **(correct answer in bold green)**.

a. Benefit
b. Limitation

Concept 3

Indicate the concept: Organisational culture

Image: A4GE U3.1 A7_3.jpg

Indicate the options **(correct answer in bold green)**.

a. Benefit
b. Limitation

Concept 4

Indicate the concept: Sustainability objectives

Image: A4GE U3.1 A7_4.jpg

Indicate the options **(correct answer in bold green)**.

a. Benefit
b. Limitation

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UNIT 3.2

ACTIVITY 8

DOUBLE OR NOTHING

Sustainability Accounting Learning Platform
for a Green Economy

2022-1-ES01-KA220-HED-000089844

Title	What is the levers of sustainability control framework?
Module	Module 3. Sustainability management accounting and control
Unit	Unit 3.2. Sustainability management control
Heading/subheading after which it should appear	3. Key frameworks of sustainability management control / 3.2. Levers of sustainability control / Introduction to the levers of sustainability control framework

8. Activity 8

Question 1 (correct answer in bold green)

Which concept describes the four key mechanisms companies use to implement strategies and achieve goals?

c. Balanced scorecard.
d. Levers of control.
e. Operational boundaries.
f. Strategic boundaries.

Question 2 (correct answer in bold green)

What do belief systems represent in the levers of control framework?

a. Core values of the organisation.
b. Risks to be avoided.
c. Strategic uncertainties.
d. Critical performance variables.

Question 3 (correct answer in bold green)

How do belief and boundary systems motivate employees?

a. By providing financial incentives.
b. By allowing freedom to innovate within predefined areas.
c. By punishing undesirable behaviours.
d. By focusing solely on technical controls.

Question 4 (correct answer in bold green)

Which control system deals with strategic uncertainties?

a. Belief systems.
b. Boundary systems.
c. Interactive control systems.
d. Diagnostic control systems.

Question 5 (correct answer in bold green)

What is the purpose of rewards in the levers of control framework?

a. To punish undesirable behaviours.
b. To address strategic uncertainties.
c. To delineate acceptable domains of activity.
d. To incentivise employees for achieving specific performance targets.

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ACTIVITY 9

ENIGMA

Sustainability Accounting Learning Platform for a Green Economy

2022-1-ES01-KA220-HED-000089844

Title	What is the orientation of the levers of sustainability control framework?
Module	Module 3. Sustainability management accounting and control
Unit	Unit 3.2. Sustainability management control
Heading/subheading after which it should appear	3. Key frameworks of sustainability management control / 3.2. Levers of sustainability control / Levers of control as an action-oriented framework

9. Activity 9

Question 1

What type of orientation does Simons' levers of control framework emphasize to guide strategy on innovation and profitability?

Action

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UNIT 3.2

ACTIVITY 10

RELATIONSHIP BETWEEN IMAGE AND CONCEPT

Sustainability Accounting Learning Platform for a Green Economy

2022-1-ES01-KA220-HED-000089844

Title	How does the levers of control framework relate to corporate sustainability strategy?
Module	Module 3. Sustainability management accounting and control
Unit	Unit 3.2. Sustainability management control
Heading/subheading after which it should appear	3. Key frameworks of sustainability management control / 3.2. Levers of sustainability control / Applying levers of control to corporate sustainability

10. Activity 10

Statement 1

Sustainability control systems are often introduced alongside conventional, financially oriented management control systems.

Image: A4GE U3.1 A10_question.jpg

Indicate the options **(correct answer in bold green)**.

g. True
h. False

Statement 2

Dormant, integrated strategies involve strong ties between sustainability and conventional strategies that are actively mobilised.

Image: A4GE U3.1 A10_question.jpg

Indicate the options **(correct answer in bold green)**.

a. True
b. False

Statement 3

The COSO framework defines internal control as a process designed to provide reasonable assurance of achieving objectives in operational effectiveness, financial reporting reliability, and compliance with laws and regulations.

Image: A4GE U3.1 A10_question.jpg

Indicate the options **(correct answer in bold green)**.

a. True
b. False

Statement 4

The levers of control framework can help structure both analysis and interaction between sustainability and conventional management control systems.

Image: A4GE U3.1 A10_question.jpg

Indicate the options **(correct answer in bold green)**.

a. True
b. False

Statement 5

The levers of control framework focuses solely on negative and diagnostic controls, excluding belief-oriented controls.

Image: A4GE U3.1 A10_question.jpg

Indicate the options **(correct answer in bold green)**.

a. True

b. False

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ACTIVITY 11

PAIRS

Sustainability Accounting Learning Platform for a Green Economy

2022-1-ES01-KA220-HED-000089844

Title	What are the benefits of the levers of control framework?
Module	Module 3. Sustainability management accounting and control
Unit	Unit 3.2. Sustainability management control
Heading/subheading after which it should appear	3. Key frameworks of sustainability management control / 3.2. Levers of sustainability control / Benefits and limitations of the levers of control framework

11. Activity 11

Pair 1

Word: Flexibility

Image**:** A4GE U3.1 A11_1.jpg

Time**:** 15 seconds

Pair 2

Word: Transparency

Image**:** A4GE U3.1 A11_2.jpg

Time**:** 15 seconds

Pair 3

Word: Accountability

Image**:** A4GE U3.1 A11_3.jpg

Time**:** 15 seconds

Pair 4

Word: Learning

Image**:** A4GE U3.1 A11_4.jpg

Time**:** 15 seconds

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UNIT 3.2

ACTIVITY 12

FIND THE WORD

Sustainability Accounting Learning Platform for a Green Economy

2022-1-ES01-KA220-HED-000089844

Title	What are the packages of control?
Module	Module 3. Sustainability management accounting and control
Unit	Unit 3.2. Sustainability management control
Heading/subheading after which it should appear	3. Key frameworks of sustainability management control / 3.3. Packages of sustainability control / The packages of sustainability control

12. Activity 12

Word 1

Packages of controls often seen in organisations operating in rapidly changing environments.

Empirical

Word 2

Packages of controls characterised by a high degree of formalization, standardization, and centralization.

Mechanistic

Word 3

Packages of controls characterised by a low degree of formalization, standardization, and centralization.

Organic

Word 4

Packages of controls entailing planning, goal-setting, and performance measurement to coordinate business units.

Strategic

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UNIT 3.2

ACTIVITY 13

WORD SEARCH

Sustainability Accounting Learning Platform for a Green Economy

2022-1-ES01-KA220-HED-000089844

Title	What are the weaknesses of the packages of control framework?
Module	Module 3. Sustainability management accounting and control
Unit	Unit 3.2. Sustainability management control
Heading/subheading after which it should appear	3. Key frameworks of sustainability management control / 3.3. Packages of sustainability control / Benefits and limitations of the packages of control framework

13. Activity 13

Identify the words that relate to some of the weaknesses of the packages of control framework.

Words

7. Simplistic
8. Application
9. Learning
10. Evidence
11. Adaptation

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UNIT 3.2

ACTIVITY 14

QUIZ

Sustainability Accounting Learning Platform for a Green Economy

2022-1-ES01-KA220-HED-000089844

Title	Unit assessment
Module	Module 3. Sustainability management accounting and control
Unit	Unit 3.2. Sustainability management control
Heading/subheading after which it should appear	4. 4. Concluding notes: An outlook on sustainability management control

14. Activity 14

Question 1

What is the primary purpose of Sustainability Management Control?

a. To reduce financial risks in the organisation.
b. To guide organisational behaviour using indicators from sustainability management accounting.
c. To implement corporate social responsibility policies.
d. To create marketing strategies for sustainability.

Question 2

What shift in perspective is proposed for the goal of Sustainability Management Control?

a. Focusing solely on reducing risks and harm.
b. Increasing profitability through sustainability measures.
c. Limiting the scope of sustainability to environmental factors.
d. Creating positive contributions to sustainable development beyond organisational boundaries.

Question 3

Which framework emphasises the relevance of informal controls alongside formal controls in sustainability management?

a. Balanced scorecard.
b. Sustainability balanced scorecard.
c. Levers of sustainability control framework.
d. Packages of sustainability control framework.

Question 4

What is the main limitation of the current perspective on sustainability performance?

a. It focuses on creating positive contributions to sustainability.
b. It primarily emphasises preventing or reducing negative impacts, which still leaves harm unaddressed.
c. It ensures the complete elimination of negative impacts.
d. It prioritizes solving global sustainability problems at the macro-level.

Question 5

What is a key psychological implication of focusing on positive sustainability goals?

a. **It helps establish and maintain motivation through positive achievements.**
b. It reduces the need for entrepreneurial passion.
c. It ignores the importance of preventing negative impacts.
d. It discourages companies from addressing major challenges.

Question 6

What is the primary aim of the Balanced Scorecard as proposed by Kaplan and Norton?

a. To focus solely on financial metrics for organizational success.
b. **To translate strategy into action through a top-down approach.**
c. To prioritize environmental and social goals over financial goals.
d. To eliminate the need for performance measurement systems.

Question 7

Which of the following is NOT one of the key perspectives of the sustainability balanced scorecard?

a. Financial perspective.
b. Customer perspective.
c. **Technological perspective.**
d. Learning and growth perspective.

Question 8

What is the main difference between the balanced scorecard and the sustainability balanced scorecard (SBSC)?

a. The SBSC focuses exclusively on financial metrics, while the BSC includes non-financial metrics.
b. **The SBSC incorporates environmental and social goals, while the BSC primarily focuses on financial and operational goals.**
c. The SBSC eliminates the need for cause-and-effect chains, unlike the BSC.
d. The SBSC is only used for short-term performance measurement, while the BSC is used for long-term strategies.

Question 9

According to the sustainability balanced scorecard, what is required for financial success?

a. **Market success with customers.**
b. Outstanding internal processes.
c. Motivated management and employees.
d. A reduction in production costs.

Question 10

Which perspective in the SBSC directly contributes to market success with customers?

a. Financial perspective.
b. Learning and growth perspective.
c. Non-market perspective.
d. **Internal processes perspective.**

Question 11

What is the fundamental rationale of the sustainability balanced scorecard?

a. The relationship between departments.
b. **The identification of cause-and-effect chains.**
c. The financial success of the company.
d. The operational improvements in logistics.

Question 12

Which of the following is an example of finance-oriented sustainability management control?

a. Customer satisfaction analysis.
b. Monitoring production logistics.
c. **Evaluating sustainability's impact on cost structure.**
d. Employee training programs.

Question 13

Who is usually responsible for coordinating top-level sustainability management control within a company?

a. **Managers responsible for sustainability management control.**
b. Functional departments like finance and marketing.
c. External consultants.
d. The company's shareholders.

Question 14

What does the sustainability balanced scorecard explicitly consider that gives it a stronger multidimensional character of performance management than the balanced scorecard?

a. Financial objectives.
b. Environmental and social objectives.
c. Marketing strategies.
d. Employee satisfaction.

Question 15

What are the two dimensions used to classify the sustainability balanced scorecard architectures?

a. Profitability and sustainability.
b. Quantitative and qualitative aspects.
c. Hierarchy and integration of environmental and social objectives.
d. Economic and social success.

Question 16

What type of information does the sustainability balanced scorecard primarily rely on in practice?

a. Qualitative social and environmental information.
b. Quantitative social and environmental information.
c. Employee feedback and surveys.
d. Marketing and sales data.

Question 17

What is one of the primary benefits of the sustainability balanced scorecard?

a. It eliminates the need for financial performance metrics.
b. It provides a systematic approach to managing sustainability issues.
c. It focuses solely on informal controls within organisations.
d. It disregards the cause-and-effect chain influencing organisational goals.

Question 18

Which step is required when implementing a sustainability balanced scorecard?

a. Ignoring sustainability metrics.
b. Avoiding regular monitoring of performance.
c. Defining explicit sustainability goals and key performance indicators.

d. Eliminating the need for data collection and reporting systems.

Question 19

What is a limitation of the sustainability balanced scorecard?

a. It explicitly addresses informal controls.
b. It focuses on financial and non-financial performance improvements.
c. It does not explicitly address the role of organisational culture and soft factors.
d. It eliminates the need for management control systems.

Question 20

What is the original behavioural goal of sustainability management control?

a. To focus solely on technical aspects.
b. To explicitly consider qualitative aspects, like organisational culture.
c. To ignore strategic boundaries.
d. To reward all employee behaviours.

Question 21

What is the purpose of boundary systems in the levers of control framework?

a. To inspire employees through a mission statement.
b. To delineate acceptable domains of strategic activity.
c. To address critical performance variables.
d. To reward employees for achieving targets.

Question 22

What is the focus of diagnostic control systems?

a. Core values of the organisation.
b. Risks to be avoided.
c. Critical performance variables.
d. Strategic uncertainties.

Question 23

What is the primary focus of Simons' levers of control framework?

a. Standardised, top-down management approaches.
b. Limiting surprises and keeping things on track.
c. Ignoring formal information aspects of management control systems.
d. Offering an action-oriented framework to guide strategy on innovation and profitability.

Question 24

According to the levers of control framework, which strategy involves contradictory sustainability and conventional strategies operating in parallel within an organisation?

a. Dormant, decoupled strategies.
b. Compliance-driven strategies.
c. Schizoid sustainability strategies.
d. Integrated sustainability strategies.

Question 25

What characterises sustainability-driven strategies according to the levers of control framework?

a. Sustainability is used only for diagnostic purposes for conventional management strategies.
b. Sustainability is the primary driver of the company's overall strategy.
c. Sustainability and conventional strategies are decoupled and dormant.
d. Sustainability strategies are driven by external pressures.

Question 26

Which of the following options is an advantage of the levers of control approach?

a. It reduces innovation and creativity.
b. It promotes transparency and improves information flows.
c. It overemphasises risk in the control system.
d. It lacks consideration of external factors like customer preferences.

Question 27

What is a weakness of the levers of control approach?

a. It enhances behavioral accountability of employees and managers.
b. It improves risk management and organizational learning.
c. It aligns organizational activities with strategic goals.
d. It tends to over-emphasize risk in the control system.

Question 28

What is the primary characteristic of packages of mechanistic formal controls?

a. A focus on innovation and flexibility.
b. A high degree of formalization, standardization, and centralization.
c. Strategic planning and goal-setting.

d. A combination of formal and informal controls for adaptability.

Question 29

Which type of package controls addresses shared values, beliefs, and customs to guide employee behavior?

a. Informal controls.
b. Formal controls.
c. Accounting controls.
d. Strategic formal controls.

Question 30

What is one key strength of the packages of control framework?

a. It is based on extensive empirical evidence from diverse organisations.
b. It provides clear guidance on how to choose controls among the proposed options.
c. It supports management in designing tailored control systems for organisational needs.
d. It focuses exclusively on formal controls for better standardisation.

Question 31

What is a key weakness of the packages of control framework?

a. It provides a nuanced understanding of control mechanisms.
b. It helps improve organisational performance and outcomes.
c. It facilitates the adaptation of control systems to changing conditions.
d. It lacks empirical evidence beyond a limited number of case studies.

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Unit 3.2

Sustainability management control

ROLE PLAY CASE

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ACCOUNT 4Green Eco

Informal sustainability control

Case Study 3.2.1

Module 3 Sustainability management accounting and control

Unit 3.2. Sustainability management control

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ROLE PLAY

Title: Informal sustainability controls.

Context: Ah, there you are, our new sustainability manager of “Krumble”. Great to finally meet you in person! I wanted to touch base with you about your first week on the job. I understand you've been meeting with our executive board, the department heads, our production managers and some employees, and getting a sense of our sustainability efforts. A couple of our executives told me, that you noticed some inconsistencies, is that right? I find this really curious; can you tell me more about it based on your notes (they are attached on the top of this screen)?

Scenario: A hallway inside the premises of food processing firm “Krumble” that makes and sells healthy oat cereal cookies, with the production line somewhat visible in the background (maybe through a window in the wall?). There are certificates on the wall in the hallway to demonstrate EMAS certification, and sustainability awards. Maybe a poster with the SDGs, too?

Character: CEO of the firm, business attire with well-taylored suit, possibly with visible logo of the firm or some symbolism that is linked to the identity of the firm.

Scene 1

Question from the CEO: A couple of our executives told me, that you noticed some inconsistencies, is that right? I find this really curious; can you tell me more about it?

Response 1: Yes, sure! Shall we meet in your office?
I will fetch my notes.

Go to:
Scene 2
(You take a brief look at your notes)

Scene 2

So, now that you have had a week to get to know “Krumble”, people of the organisation, and key sustainability activities and outcomes, what do you want to report to me?

Response 1: I’m impressed with the sustainability performance of the company (I do not want to bring up any problems after only one week of working for the firm).

Go to:
Scene 3

Response 2: I have noticed some inconsistencies: While the company has taken genuine steps towards corporate sustainability, some of the behaviours that I have observed seem to be really at odds with this, and there does not seem to be much enthusiasm for sustainability within the firm.

Go to:
Scene 5 (Interesting, tell me more!)

Scene 3

I am pleased to hear that you assess the sustainability performance of “Krumble” so highly. So, what next steps are you planning in your role as sustainability manager?

Response 1: I will focus my work on making sure that “Krumble” complies with all national and international sustainability reporting directives. This is already a big task and will fill my time.

Go to:
Scene 14 (I am pleased we have an expert for this in the house now.)

Response 2: There are still some minor changes that could be undertaken to improve the image of the company. For example, cars should park at the backside of the building, and there should only be bike parking near the front entrance.

Go to:
Scene 4 (Oh, why are you suggesting that?)

Scene 4

Some of our executives commute more than 20 km every day, and have additional client visits for which they need their cars. I think it is just practical if they can park in front of our building. Why is this something we should change?

Response 1: See, with regards to its operations, “Krumble” does have a strong sustainability performance. But having SUVs parked by the main entrance sends a different signal to employees, clients and business partners. And now that we are speaking of it, I have noticed some other consistencies.

Go to:
Scene 5 (I see, tell me more!)

Response 2: You are probably right. The executives are very committed to ensure that production meets the KPIs of the sustainability balanced scorecard (SBSC), so it doesn’t matter where they park. What really matters are the sustainability performance indicators that we publish in our annual reports.

Go to:
Scene 14 (I am glad to hear we are on the same page with this.)

Scene 5

Ah, I see. There is a mismatch at “Krumble” between the sustainability performance of our business operations and how our sustainability performance is perceived by our business partners, clients, and even our own employees. How would you solve this mismatch?

Response 1: Given that the sustainability balanced scorecard (SBSC) only includes the financial perspective and market perspective, we need to bring in a new tool and maybe even hire a consultancy firm to help us with this.

Go to:
Scene 5 (Are you sure? I thought the SBSC is more comprehensive and integrative than that? Let’s think again.)

Response 2: We can build on the SBSC that Krumble has already implemented, because the SBSC helps to measure and manage sustainability performance from multiple perspectives, including the perspectives on finances, customers, internal processes, learning and growth, and non-market aspects.

Go to:
Scene 6

Scene 6

Fantastic, I am pleased to hear that we can build on the sustainability balances scorecard (SBSC) to improve sustainability awareness and behaviours at “Krumble”. So, I guess, we just add some performance indicators about sustainable behaviours to our SBSC, such as for the modes of transport that our employees use to commute to work?

Response 1: Yes, that would be my suggestion.

Go to:
Scene 14

Response 2: No, to consider behavioural aspects, we should discuss levers of control for a moment.

Go to:
Scene 7

Scene 7

Ah, yes, I have heard of the levers of control concept. Controls can be used diagnostically or interactively by either rewarding or punishing specified employee behaviour. What key variables and systems does this include again?

Response 1: The levers of control concept connects belief systems that represent organization's core values, boundary systems that consider the risks to be avoided, interactive control systems that deal with strategic uncertainties, and diagnostic control systems that address critical performance variables.

Go to:
Scene 8 (That's right, now I remember!)

Response 2: The levers of control concept connects financial controls, marketing controls, operational controls, and human resources controls to provide a comprehensive overview of sustainability performance.

Go to:
Scene 7 (Is that right? I thought levers of control also include qualitative aspects such as values and belief systems? Let's think again.)

Scene 8

Yes, by including these four aspects, levers of control can influence employee and management behaviour. So, how can this concept help “Krumble” to improve organisational behaviour with regards to sustainability?

Response 1: It will help to better organise the information from the sustainability balanced scorecard, so that we can better communicate our sustainability achievements to our shareholders and other stakeholders.

Go to:
Scene 8 (Wait, but I thought levers of control is about íncentivsing behaviour change? Let’s think again.)

Response 2: It provides a systematic approach to 1) address informal aspects of organisational behaviour, 2) define the domain of strategic sustainability activities, 3) define and monitor organisational sustainability activities, and 4) incentivise employees to achieve defined sustainability targets.

Go to:
Scene 9 (This all sounds great to me!)

Scene 9

I am a bit concerned that the levers of control concept overemphasises formal information-based control and neglects “soft” and human factors. I can see how this concept is really helpful for diagnostic purposes and communication. But I am concerned that we cannot guide behaviour change with levers of control alone. What do you think?

Response 1: I am convinced that implementing levers of control will provide “Krumble” with the systematic approach to sustainability management that it needs. The employees will prefer this focus on formal measures and a highly structured framework. This will also improving our sustainability reporting.

Go to:
Scene 14 (Oh, I see… Well, I trust you as the expert on this.)

Response 2: Indeed, while levers of control help us and the executive team to address the relevant perspectives of sustainability management at “Krumble”, I want to talk with you about packages of control to guide employee behaviour.

Go to:
Scene 10 (This sounds interesting. Please, tell me more!)

Scene 10

So, can you please explain to me how packages of control work?

Response 1: Sure, packages of control simplify sustainability management control by only focusing on informal behavioural aspects, because that is the best way to influence employee behaviour.

Go to:
Scene 10 (Are you sure? What about the formal controls that we just discussed? Give it a thought!)

Response 2: Sure, packages of control add informal controls that guide behaviour to a set of formal controls in order to create a tailored sustainability management control system addressing specific organisational circumstances and goals.

Go to:
Scene 11

Response 3: Oh, wait a minute, I need to look up the components of the framework before I can answer that.

Go to:
Scene 10 (Okay, fetch your notes and let me hear more about your view.)

Scene 11

And how exactly can packages of control help with incentivising more sustainable behaviours and raise sustainability awareness amongst our employees?

Response 1: Informal approaches including participatory involvement from all management levels and dialog about sustainable transport will incentivise environmentally friendly choices like carpooling, cycling or public transport. Formal controls can work complimentary to that, but are not as effective alone.

Go to:
Scene 12

Response 2: One way would be for our company to invest in sustainable transport by buying e-bikes for every employee. This would be expensive in the beginning, but it will be worthwhile for the firmin the long-run.

Go to:
Scene 11 (This would indeed be very expensive for the company, and it is questionable whether this approach would be effective for incentivising more sustainable choices for employees commuting to work. Try again!)

Scene 12

What limitations of the packages of control framework do we need to consider when we implement this at “Krumble” company?

Response 1: There is not much to consider, this framework really does provide the complete package for organisations that seek to enhance their sustainability performance.

Go to:
Scene 12 (Not quite, there are limitations to consider. Try again!)

Response 2: Limitations to consider include the risk of oversimplification of complex organisational and behavioural contexts. Packages of control also do not offer clear guidance on how to measure the effectiveness of control mechanisms for sustainability performance. We need to carefully consider this.

Go to:
Scene 13

Scene 13

So, what specifically do you propose to further improve the sustainability performance of our company and to raise awareness about it with our employees, customers, and business partners?

Response 1: As effective formal sustainability controls are already in place, I would focus more on informal controls to promote a strong sustainability culture at “Krumble”. This will motivate more sustainable employee behaviour and have a strong signalling effect to customers and business partners.

Go to:
Scene 15 (Okay, this sounds really good!)

Response 2: While it might be desirable to achieve a shift towards a strong sustainability culture at “Krumble” in the long-run, this will be a risky and complex. Hence, I suggest focusing on what “Krumble” is already doing well: Formal sustainability controls and compliance.

Go to:
Scene 14 (Oh, okay. Well, I trust your expertise on that. But I am wondering if a culture shift is really out of reach?)

ENDING SCENE 14

Context: After this exchange with the CEO, your activities as sustainability manager have focused on extending formal controls, further implementing the sustainability balanced scorecard and ensuring compliance with reporting guidelines. Executives and department heads have continued to be forthcoming with information and KPIs on their business units, but there is still no strong identification with the sustainability commitments at “Krumble”. Occasionally, they complain that your requests for information and compliance may have been excessive. They start to question if all the implemented sustainability measures are really necessary. The firm's sales performance has been steady, but a new competitor has emerged with a bold sustainability initiative and customers were starting to take notice. Key retailers have started to order less from our company, stating that customers are starting to demand more sustainable brands. The executives are calling a meeting to get some answers from you…

ENDING SCENE 15

Context: After this exchange with the CEO, you develop an action plan to promote a strong sustainability culture at “Krumble” to address how sustainability performance is communicated throughout the firm and with customers and business partners and develop a participatory initiative to improve sustainable behaviours (e.g. in the choice of transport when commuting to work), and other workplace incentives promoting sustainability values throughout all management levels. At the anniversary of the firm, the CEO celebrates the success stemming from that: "We have seen an increase in sales from customers who are looking for firms that share their values, and our business partners are taking notice of our commitment to sustainability. The employees were smiling and chatting with each other, clearly pleased with the progress the company had made. The CEO concluded her speech: "We are proud of what we have achieved, and we are committed to continuing to improve our sustainability performance”.

Krumble
Wholesome Baked Goods

Notes of the conversations and observations of the past week:

- ✓ Sustainability Balanced Scorecard (SBSC) in place ✓
- ✓ Production facility has received EMAS certification ✓
- ✓ Executives and department heads are committed to meeting eco-efficiency measures and sustainability performance indicators ✓
- ✓ All of the food and beverages offered in the company canteen are of high quality and with a focus on sustainable and regional products ✓
- × Despite the strong commitment to meeting performance indicators stated in the SBSC, executives and departments heads do not consider "Krumble" as a sustainable company ×
- × Hardly anyone within the company considers "Krumble" as a sustainable organisation or consciously thinks about the sustainability or unsustainability of their actions or decisions ×
- × "Krumble" does not have a reputation for sustainability amongst customers or business partners ×
- × Prime parking spots right next to the main entrance of the company seem to be always taken up by SUVs owned by some members of the executive board, even though some members of the company leadership are committed cyclists and never drive a car to work ×