Chapter 2
The CapSEM Model

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Abstract Organizations may feel pressurized to improve their sustainability performance and increase their orientation towards sustainability, but may not have either the knowledge as to where, or the capacity, to begin. This chapter therefore presents a systematized methodology of assessment and management tools for sustainability and environmental management known as the Capacity building in Sustainability and Environmental Management Model (the CapSEM Model). To help streamline their application for the business sector and industry, the methods and tools are positioned in relation to four levels of development: (1) *production processes*, (2) *products and value chains*, (3) *organization and management* and (4) *larger systems*, for example, industrial sectors or social systems.

The discussion and analysis of tools presented in this chapter and explained throughout this book, address the growing need to engage stakeholders and to consider environmental, social and economic impacts across the entire life cycles of products in business strategies and organization management. The CapSEM Model Levels move from incremental business tools and their application in production processes, to holistic tools for change in organizations and larger systems. The transition to sustainable societies is considered analogous to growth in both systems and performance complexity.

Extensively modified from Fet and Knudson (2021).

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2.1 Introduction

Responding to requirements for global sustainable development (SD) in society, information and teaching materials as well as significant environmental assessment tools for various industry sectors have been continuously developed and improved over the last 30 years. This chapter presents a systematized methodology for positioning some of these tools for the business sector and industry in relation to four levels of development: (1) *production processes*, (2) *products and value chains*, (3) *organization and management* and (4) *larger systems*, for example, industrial sectors or social systems. Organizations often do not have an overview of these tools, and the knowledge and capacity needed to implement them. Small and medium companies with more limited resources may especially find this challenging (Perez-Sanchez et al. 2003).

As internal and external requirements become increasingly stringent to meet growing sustainability challenges, companies and organizations need a holistic toolbox to help them navigate the interacting systems of SD, from triple-bottom-line aspects to geographic scopes and long-term dynamics. The Capacity building in Sustainability and Environmental Management Model (the CapSEM Model) is therefore presented as a methodological framework of the four Levels described above. These Levels move from incremental business tools and their application in production processes (Level 1) and value chains (Level 2), to more holistic tools for change in organizations (Level 3) and larger systems (Level 4).

The discussion and analysis of tools for assessing environmental impacts presented throughout this book, also address the growing need to integrate stakeholder views and social impacts, in addition to the environmental perspective, into business strategies and organization management.

The CapSEM Model attempts to integrate the different dimensions of systems, and the tools and their contribution to systemic change, thus resulting in an improvement in environmental and sustainability performance. The transition to sustainable societies is considered analogous to growth in both systems- and performance complexity. Before introducing the CapSEM Model, it is helpful to understand the basics of systems thinking in order to better appreciate the way in which the tools have been systemized within it. Systems thinking plays an important role in both the design and content of all chapters in this book.

2.2 Sustainability and Systems Thinking

A system can be described as a set of interrelating parts that perform functions internally, which overcome their individual limitations. Typical systems are industrial systems, ecosystems, product systems and so forth. Within each of these systems, there are sub-systems such as bio-regional systems, communities, or business sectors. The structure of a system defines relatively stable established pathways as a result of continuous interactions between different sectors. The pathways (for example, languages, cultural customs, economical routines, political decisions, and social codes) design particular circumstances specific to that system. They act as *patterns* in relation to *functions* as *actions*. Functions modify the existing structures by constituting new pathways and become established structures in time serving as templates for new action parameters.

Systems evolve by becoming more complex and more *intelligent*. The most sustainable systems are those which are the most complex and open. Systems, in turn, manage resources. Complex open systems are relatively stable because resources that enter from outside are processed through and assimilated via a function of their complex design, which can be called adaptability. Complex systems are more co-operative than simple ones since they have a wider range and therefore improved opportunities for reacting to changes and possibilities for such reactions. The system then interacts with the other system that provides, for example, new resources, yet still maintains its distinctiveness: it is a new system evolved from its prior form but modified by influence from the outside. Systems changes are also visible at a cultural level, for example, the emergence of industrialization led to massive changes in almost every culture. Some cultures were simply abandoned because of the effects of industrialization. Some appeared to maintain their traditional practices and beliefs within a new context, while others related better to an industrial system and metamorphized into novel, heterogeneous, yet co-operative, structures (Keitsch 2012).

Most sustainability tools apply systems methodologies. A systems methodology can be described as research design based on the transdisciplinary study of the organization of phenomena, independent of their substance, type, or spatial or temporal scale of existence. Systems serve here as templates to investigate both the principles common to complex entities, and the models which can be used to describe them (Heylighen and Joslyn 1995).

Systems methodologies facilitate the comprehension of purposeful relations between heterogeneous performances. Using the reduction of wastewater as an example, a perspective which focuses on a single action would consider the construction of a reprocessing plant for sewage and the recycling of sludge to transform it into a usable by-product, as inefficient, far less direct and more expensive, than simply repairing wastewater tunnels. From a systems methodology perspective, however, the reduction of waste by implementing a recycling system is more efficient, given that it accomplishes many other things, e.g., reprocessing and by-product production, in addition to meeting municipalities' and consumers' needs (Keitsch 2012).

2.3 Capacity Building in Sustainability and Environmental Management Model (CapSEM)

The CapSEM Model can help companies understand their place and the relations of their actions within different levels of related systems. It is presented in Fig. 2.1. A systematic use of the tools in the toolbox helps companies investigate the potential for appropriate actions to change the environmental and sustainability

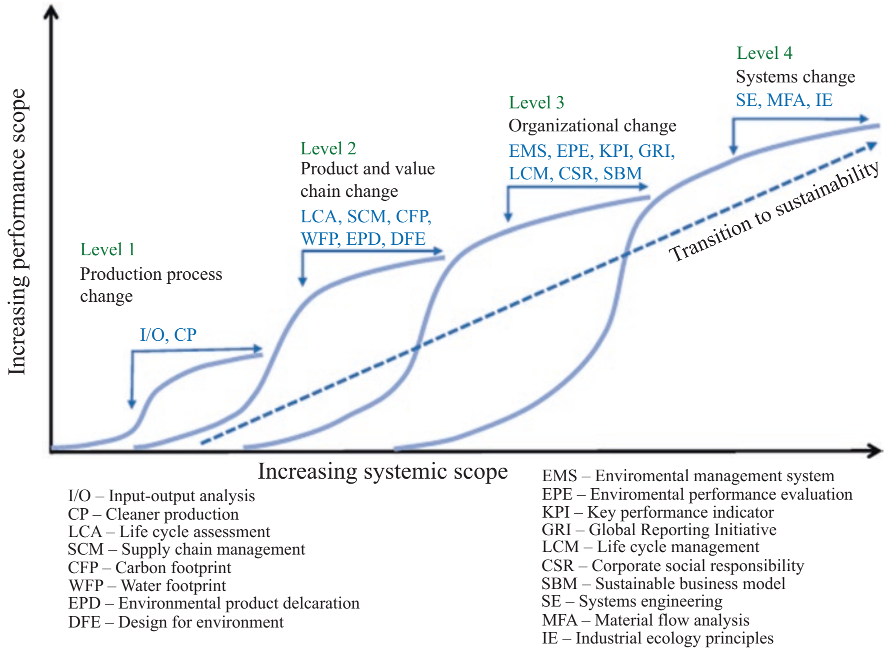

Fig. 2.1 Capacity building in Sustainability and Environmental Management (CapSEM) Model: a systemic approach towards sustainability. (Modified from Fet and Knudson 2021)

performance related to production processes (Level 1), products and value chains (Level 2) and strategic organizational actions (Level 3). The highest Level (Level 4) represents the larger societal or industrial system and a company's recognition of its place and responsibility within it. The waves in the model illustrate different Levels of performance of the systems under study, and the abbreviations are the acronyms for the different tools placed at the different Levels in the model. The term *change* is used here as meaning the reduction of negative impacts and increase of, or replacement with, positive impacts—ultimately leading to strong, proactive, and holistic sustainability as companies move toward the upper right of the model. As an organization traverses the Levels, knowledge and tools from the previous Levels are used as input to more extensive methods, meaning that each Level, in turn, encompasses the Level(s) below it.

Each axis in Fig. 2.1 describes a change in scope. The horizontal axis shows the scope of systems and begins at the simple production process at Level 1. Furthermore, it extends to the set of processes within the value chain of a product at Level 2. Then, to the organizational level (Level 3), to ingrain sustainability consciousness and commitment into the structural, reporting and organizational routines of the company through the implementation of management systems that use, for example, key performance indicators or certification schemes to help govern the production processes and product value chains at the lower levels. The scope of the systems on Level 4 can be defined as the sector that the organization is a part of, or as wide as a societal system, since all organizations are part of a larger system.

The vertical axis delineates the scope of performance, here meaning the potential for enacting the greatest sustainability impact across environmental and social dimensions. Level 1 focuses on the environmental impacts of material flows, while Level 2 widens its focus to the performance of the entire value chain and all of the processes within it. Furthermore, Level 3 adds aspects to be considered from a strategic level, such as management systems which may guide organizations through a shift to a higher level of sustainability performance over time. Since Level 4 system's scope depends on the context of the operation of the organization, a higher level of performance can be achieved under the holistic recognition of opportunities that come from improving system performance of each of the other systems at the subordinate levels. From a systemic perspective, these different levels of systems could be described as subsystems and system elements of the larger societal system.

2.4 Background to the CapSEM Model

The CapSEM Model has been developed in line with the progression and evolution of sustainability management over the past 30 years. The reader will therefore note both similarities and differences between the initial classification and ordering of tools and methods and should bear in mind the historical and transitory journey being traced.

A simplified classification of environmental performance improvement tools from 1997 across micro-, meso- and macro-levels is illustrated in Table 2.1. There are no stringent boundaries between these levels, and tools placed at one level are also appropriate at other levels. Their grouping, however, helps to communicate the main system scope of each tool.

Table 2.1 Simple classification of tools for environmental performance improvements

Levels	Appropriate tools/guidelines
Societal (macro)	Agenda 21 (1992), Kyoto protocol, policy frame works.
Industrial (meso)	Cleaner Production policies in broad sense, international protocols.
Corporate (meso)	Environmental Management (EM), Environmental Auditing (EA), Environmental Performance Evaluation (EPE), Green House Gas Management (GHGM).
Product (micro/meso)	Cleaner Production related to products, Life Cycle Assessment (LCA), Material, Energy; Toxicity (MET), Material Input per Service unit (MIPS), Life Cycle Costing (LCC), Design for Environment (DfE) Eco-labels, Carbon Footprints and Water Footprints of Products.
Corporate production process (micro)	Cleaner Production processes

2.4.1 Cleaner Production

Understanding the levels of processes, products, organizations and systems necessitates attention to Cleaner Production (CP), an approach that was introduced in the late 1980s in response to the Brundtland Report. In 1989, a working group at the United Nations Environment Programme (UNEP) defined CP as:

> The conceptual and procedural approach to production that demands that all phases of the life-cycle of a product or of a process should be addressed with the objective of prevention or the minimization of short and long-term risk to humans and the environment. A total societal commitment is required for effecting this comprehensive approach to achieving the goal of sustainable societies (Baas et al. 1990).

This definition clearly focuses on the principles of systems thinking and life cycle orientation. It also includes pollution prevention, waste minimization, source reduction, clean technologies and life cycle thinking, areas that refer to forms of preventative action that reduce the fundamental causes of environmental problems. The definition is more precise than earlier concepts of environmental protection such as pollution control, waste management, environmental control and waste disposal, which were attempts to solve environmental problems by reacting to the effects of pollutants, so called 'end-of-pipe solutions.'

The principles of CP can be summarized as *precaution*, *prevention* and i*ntegration*, ranging from the macro to micro scale. These principles require action in three major fields: *policies*, *processes* and *products*, illustrated in Fig. 2.2.

The top box in Fig. 2.2 denotes CP as a *policy* framework. This broad view has led to the integration of strategies and search for technological opportunities for improved environmental performance in all areas of the economy. While opportunities for efficiency improvement may be implemented under existing economic conditions and institutional structures, the considerable potential for CP, in many cases, involves institutional change, economic change and change in consumer behaviour. CP was therefore originally presented as a significant challenge to human society at technical, economic, institutional and societal levels (Jackson 1993).

Prevention requires actions to be taken that influence the potential causes of adverse effects, thereby averting those effects. Such actions do not address the

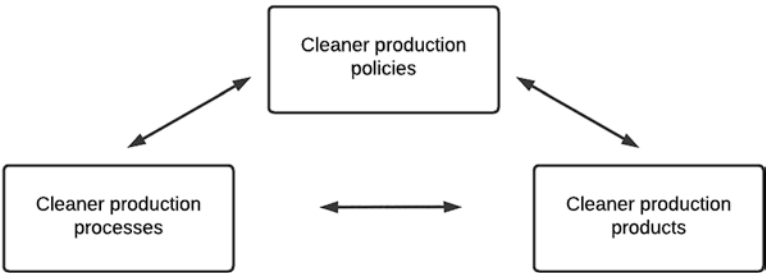

Fig. 2.2 Three major cleaner production action lines. (Fet 1997)

emissions themselves, but the *processes* that cause the emissions, presented in the bottom-left box of Fig. 2.2. Preventative measures are generally process-integrated measures, which attempt either to close material cycles within the process or to substitute hazardous materials used in the process with less hazardous materials. Closed material cycles or replacement of hazardous materials is then further reflected under the cleaner production of *products,* shown in the bottom-right box of Fig. 2.2. Prevention is thus seen to be a dynamic process within a spectrum of possible measures, rather than a specific type.

The CP model in Fig. 2.2 has laid the foundation for the largest set of resulting environmental performance frameworks developed since the cleaner production concept was first introduced in the 1980s. At an organizational level, here indicated mainly by the CP of processes (on the lefthand side in Fig. 2.2), the CP methodology has more or less developed from the guidelines from the United States Environmental Protection Agency's 'Facility Pollution Prevention Guide' (1992). The methodology presents a stepwise guide for establishing a company-wide pollution prevention programme. It outlines procedures for conducting a preliminary assessment by identifying opportunities for waste reduction or elimination. It then describes how to use those results to prioritize areas for a detailed assessment, how to use the detailed assessment to develop pollution prevention options, and finally, how to implement options that withstand feasibility analyses. This has, to a certain extent, contributed to the standardization of environmental management systems (EMS).

The CP of products (right-hand side in Fig. 2.2) addresses not only the production of a product, but also the upstream and downstream activities in the life cycle of the product. To achieve a full understanding of the potential for a cleaner product, a life cycle analysis of the product is required. Life cycle thinking and analysis provide another foundational concept of environmental performance management in the historical development of the CapSEM Model.

2.4.2 Life Cycle Analysis Tools

According to UNEP/SETAC (2005), the main goal of life cycle thinking is to reduce impacts in the resource extraction phase, production and use phase, and recycling phase in the form of emissions from/to the environment by simultaneously improving the social performance at various stages of a product's life. In this way, companies can achieve cleaner products and processes, a competitive advantage in the marketplace, and an improved platform to meet the needs of a changing business climate. A typical life cycle diagram can be found in the UNEP/SETAC Life Cycle Initiative (2007).

The life cycle assessment methodologies of Life Cycle Assessment (LCA), Life Cycle Costing (LCC), Material, Energy and Toxicity (MET) and Material Input per Service Unit (MIPS) are related to products and their life cycle chains including materials, production processes, distribution and disposal. Prior to such methodologies being used, companies that wanted to gain some understanding of key environmental issues linked to their products' value chains often started with simplified material flow analyses like MIPS or MET studies. MIPS was developed in Germany (Liedtke 1994) and set the rules for calculating the material inputs per service unit, also called the MIPS factor which provides an indication of how much material is wasted by each service unit. This laid the foundation for the functional unit thinking inherent in LCA. The MET matrix model was developed in the Netherlands with the idea of focusing on the materials, energy and toxicity of products (Van den Berg et al. 1995). A simple model helps to identify in which of the life cycle phases these aspects have the largest impact and thereby to see where and how to improve the products regarding them. This could be said to be a precursor to the LCA model. The most comprehensive tool for life cycle analyses is the LCA as presented by the International Organization for Standardization 14,040-standards (ISO 2006).

2.4.3 Classifying Improvements in Environmental Performance

In parallel with the classification of the Cleaner Production processes, several attempts to classify a set of principles for improvements in environmental performance appeared in the literature. One approach classifies strategies as shown in Fig. 2.3 (Bras 1996; Fet 1997):

1. Environmental engineering (Bras 1996; Fet 1997)
2. Pollution prevention (United States Enviromental Protection Agency 1992)
3. Environmentally conscious design and manufacturing (Ehrenfeld 1994)
4. Industrial ecology (Graedel and Allenby 1995)
5. Sustainable development (Brundtland 1987)

Area 1 in Fig. 2.3 represents perspectives related to environmental engineering strategies to reduce negative environmental impacts within production and manufacturing processes. This area is concerned with a limited systemic scope in both time and environmental concern (i.e. only during the manufacturing process and life cycle stage).

Area 2 increases the temporal scope and involves pre-planning for the manufacturing phase to prevent pollution and negative impacts during the process. As mentioned previously, pollution prevention strategies arose through the initiatives launched by the US Environmental Protection Agency (1992), with the objective to reduce the environmental impacts of products by identifying them in the design phase. This way, impacts throughout the life cycle could be reduced through better planning at the product design stage. For example, better planning might consider techniques for assembly and material selection to help avoid negative impacts in the use and dismantling phases later in the product's life cycle. So, even though this

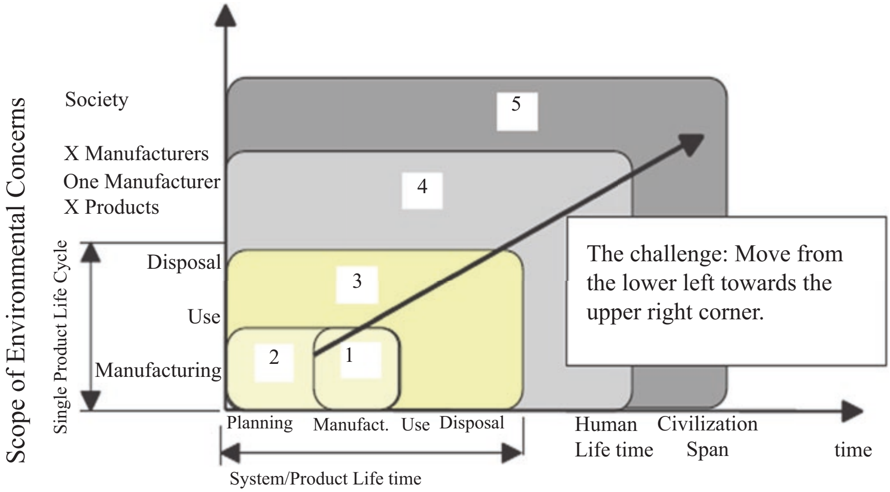

Fig. 2.3 Classification of environmental performance levels. (Modified from Fet et al. 2013)

space only has a limited system scope on planning and manufacturing, it helps build an understanding of potential problems that may arise later in the life cycle. It can be seen as a prelude to the later consideration of the entire life cycle of a product.

Area 3 expands the scope from processes related to manufacturing to the product as a whole and considers design to reduce negative impacts across its complete life cycle. The increase in consciousness of environmental concerns is illustrated through the additional consideration of the use and disposal phases. The wider consciousness is also reflected in the expanding temporal scope related to the gradual knowledge development of how to address the entire life cycle of products (Ehrenfeld 1994).

Area 4 broadens the system boundaries and understanding of impacts throughout the entire industrial system. This includes perspectives related to tracking material and energy flows according to principles of industrial ecology (IE), e.g., industrial symbioses and circular material flow models (Ehrenfeld 1994).

Finally, Area 5 represents the holistic consideration of environmental aspects over an extended timescale and beyond the firm and its network. This means considering aspects relevant for present and future generations and that address all stakeholders, and likely societal and political challenges over time.

To advance Fig. 2.3, a model for a systematic approach to environmental performance improvements was developed over many years (Fet 1997, 2002). Presented in Fig. 2.4, it shows adaptations from the first model, most notably the addition of specific tools and methods for life cycle-based environmental assessment management mapped along environmental performance improvement levels.

Figure 2.4 suggests a series of environmental performance and management tools to be implemented for the purpose of moving to a higher level indicated by Areas 1–5 presented in Fig. 2.3. Readers should note that models presented in

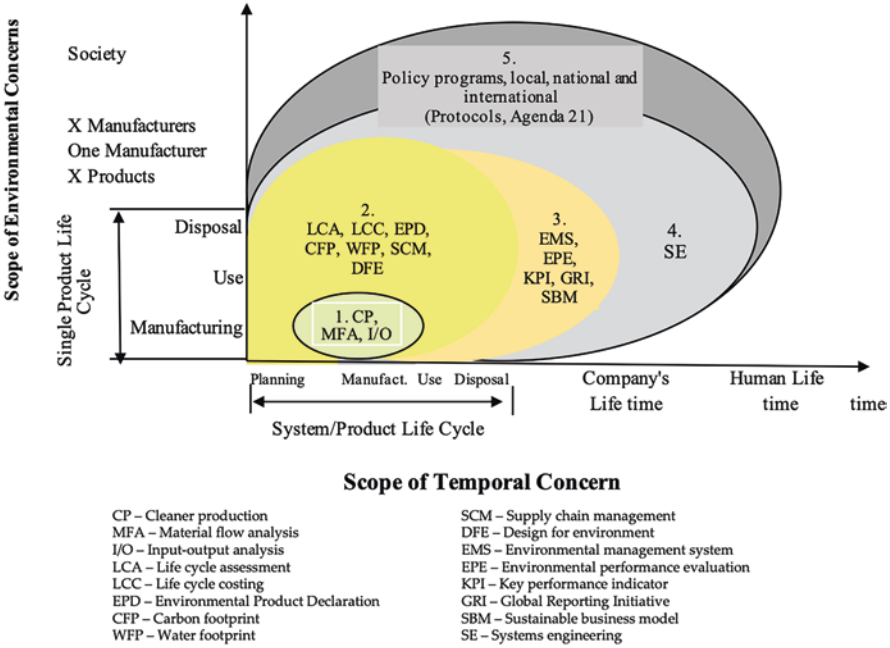

Fig. 2.4 Classification of methods and tools for environmental performance improvements. (Modified from Fet et al. 2013)

Figs. 2.3 and 2.4 focus mainly on environmental aspects of sustainability: they do not fully consider economic and other social aspects.

Figure 2.3, together with Fig. 2.4, are the starting points for the CapSEM Model (presented in Fig. 2.1). Each of the models has advanced the goal to guide companies and other organizations to systematically implement sustainability practices in their products and internal strategies while also building partnerships with the larger societal system.

As seen in Fig. 2.4, Area 1 contains the suggested tools of cleaner production (CP) and input-output analyses (I/O) to monitor the environmental impacts during production and manufacturing processes. In the CapSEM Model (Fig. 2.1), Level 1 encompasses production process-related changes for environmental accounting and (more sustainable) performance (e.g., principles of eco-efficiency (Fet 2003)). When setting objectives related to emissions, resource use and waste generation, companies must assess the current use and flows of materials in order to reduce consumption and waste in their production processes. The I/O method, therefore, fits in Level 1 as it measures baseline Levels for defining improvement and resource efficiency (Bringezu and Moriguchi 2002). Cleaner production (CP) is also located on this level, where source reduction is the objective rather than end-of-pipe solutions (Jackson 1993), thereby moving its placement further along the scales of system scope and performance. The focus on resource efficiency is often driven by economic and/or policy incentives, as these methods provide for diagnostic comparison and benchmarking of companies. Focus only on environmental aspects means that the Level 1 system does not explicitly consider the wider impacts on society. Its system boundaries are drawn at the firm level around specific processes.

In Area 2 in Fig. 2.4, the tools for the purpose of environmentally conscious product development are life cycle assessment (LCA) (Nordic Council of Ministers 1992), life cycle costing (LCC), supply chain management (SCM) (Igarashi et al. 2013), carbon footprint of products (CFP) and water footprint of products (WFP) (Fet and Panthi 2012), environmental product declaration (EPD) (Fet et al. 2009b), and design for environment (DFE). By expanding from the boundaries of a single process, Level 2 in the CapSEM Model focuses on product- and value chain-related changes. This means a focus on a product or service and all activities and processes along its value chain. The methods in Level 2 include LCA, which quantifies material flows (from Level 1) across the full life cycle of a product. Results from an LCA are quantified and weighted in terms of environmental impact. The weighted criteria can then be used to implement changes for more sustainable SCM upstream in the value chain. In addition, the quantified impacts can be used to perform carbon- or water-foot printing of a product, or to reach standardisation for acceptable levels of environmental impact, e.g., EPDs. The principles of DFE, e.g., design for recycling or dismantling, can transform the value chain, accounting, and planning for reduced environmental impact through the full life cycle of the product and its materials. Social-life cycle assessment (S-LCA) could also be placed on Level 2, to track social impacts through the life cycle of a product (Huertas-Valdivia et al. 2020). Such methods are younger in their methodological development and can be difficult to quantify. However, further developing both quantitative and qualitative indicators to measure social sustainability impact is essential to reach holistic sustainability as mandated in the SDGs.

Area 3 in Fig. 2.4 presents tools to be used by companies to improve their strategic approach for being more environmentally conscious, e.g., by implementing environmental management systems (EMS) (Fet and Knudson 2017), environmental performance evaluation (EPE), key performance indicators (KPI), the Global Reporting Initiative (GRI) (Fet et al. 2009a), and business models for sustainability (BMfS) frameworks (Boons and Lüdeke-Freund 2013; Joyce and Paquin 2016). To further increase the comprehensiveness and scope of aspects considered, Area 3 (Fig. 2.4)/ Level 3 (Fig. 2.1) move toward the implementation of methods for stronger sustainability within an organization’s management systems and strategy. The transition from Levels 1 and 2 into Level 3 represents an important advancement of management and monitoring for sustainability, allowing the incorporation of more social aspects. The organization must now widen its view beyond the firm itself, or its associated value chains, and track and report on its impacts in relation to the past, to its competitors, and for its long-term survival.

To make and monitor strategic changes across a company’s operations, tools and methods for organization-level changes help address more complex sustainability challenges. Meeting these challenges might include establishing management systems to monitor goals for reducing negative environmental impacts and engaging further with stakeholders and customers. It also means looking beyond the value chain for effects of the organization on its employees and global and local environments in the long-term. Level 3 tools, therefore, include EPE, life cycle management (LCM) and EMS for benchmarking, meeting goals and continuous improvement (e.g., through ISO14001). Corporate social responsibility (CSR) embraces the triple bottom line of sustainability and is one approach to stakeholder engagement (Carson et al. 2011; Skaar and Fet 2012). Establishing KPIs is an essential step in setting these goals, and companies can use a range of indicator frameworks from national systems to large, standardized reporting and communication systems such as the GRI. Methods from Levels 1 and 2 can be used to collect the data required for measuring the KPIs: demonstrating the knowledge development path represented by the CapSEM Model. BMfS are also placed on this level as they can help firms conceptualize their current value flows (environmental, economic, and social) and identify areas to innovate for sustainability (Evans et al. 2017).

To achieve sustainable development in the long-term perspective, Areas 4 and 5 in Fig. 2.4 present the policy programmes and international regulations that help to set goals for a larger societal system. The highest level in the CapSEM Model, Level 4 also focuses on systems-related changes. This includes the most comprehensive assessment of sustainability aspects, both environmental and social, and for the company to see itself as one actor in a complex network of actors. While Levels 1–3 focus mainly on environmental aspects, Level 4 (and the higher degrees of the Level 3) command the inclusion of stakeholders and their long-term needs. Here, systems engineering (SE) is suggested as a helpful methodology to address these challenges and includes the principles of industrial ecology, e.g., principles of industrial symbioses and circularity (Sopha et al. 2009). Material flow analysis (MFA) is also placed on this level because it is an analytical model for measuring the material flows in larger systems, e.g. industrial systems together with societal interactions in the bio geosphere (Bringezu and Moriguchi 2002). The acronym MFA has also been used for material flow accounting most often used at manufacturing processes as in Fig. 2.4. In the first version of the CapSEM Model, MFA was on Level 1 (Fet and Knudson 2021). The model was later modified with MFA at Level 4 to indicate that MFA is a broader concept, also covering the economic system and bulk flows through a system, often presented by macroeconomy indicators.

2.5 A Systematic Approach to Using the CapSEM Model

Systems engineering (SE) is introduced as an overall process at Level 4 to better consider stakeholder opinions and involvement in a holistic transition process. SE can be viewed both as a discipline and process (Fet 1997). As a discipline, SE concerns taking the holistic life cycle perspective and bringing in aspects from other disciplines as needed in a multidisciplinary context. SE as a process concerns "bringing a system into being" accompanied by an understanding of challenges to the system during its life cycle (Blanchard et al. 1990).

A six-step SE-methodology introduced suggests the following steps (Fet 1997):

1. Identify stakeholders and their needs related to sustainability performance (of a system, hereunder also an organization or the society as a system).
2. Define requirements for the achievements of stated needs.
3. Specify current performances related to environmental, social and economic aspects.
4. Analyze and optimize performance according to needs and requirements.
5. Suggest solutions according to stated needs and requirements.
6. Verify the suggested solutions against 1. and 2.

These six steps can be used for each area in Fig. 2.1. The complexity of stakeholder involvement and therefore sustainability aspects to be addressed along the development from the lowest to the higher levels, will increase. Thus, an initial step should be to describe the system under study by e.g., a production flow-diagram, a product tree and the supply chain of the product, or the organizational chart of a company. The steps in the SE-process can be undertaken in several cycles until the most sustainable performance has been achieved. For simplicity, SE is placed at Level 4 in the CapSEM Model to illustrate that it yields to the lower levels, but also because the increased scope required for Level 4 represents the most advanced form of SE. The use of SE is elaborated on in Part II Chap. 12.

2.6 Conclusion

The CapSEM Model comprises a spectrum of tools and methodologies for transitioning towards sustainability. It does not mandate that a company place itself within one level. Rather, it shows the way the tools and perspectives are linked and build upon each other. Additionally, it provides an example toolbox of methods that can be applied for improved sustainability in an organization depending on its level of ambition or maturity. The CapSEM Model demonstrates how the different dimensions of systems and tools can be integrated to contribute to increased environmental and sustainability performance. Transitions can be achieved within organizations using the tools presented first in Fig. 2.4 and advanced since the early 1990s.

Numerous scholars have suggested categorizations of environmental performance and sustainability methods (e.g., Robèrt et al. 2002; Singh et al. 2009; Mura et al. 2018). The CapSEM Model, however, classifies analytical methods and tools in a practical way that can serve as an entry- or positioning point for companies. Its development has paralleled the historical growth in concern for the environment and is a result of engagement with companies of various maturity levels and outlooks over the period.

As an organization moves between levels, tensions or limitations may be identified in relation to requirements or assumptions in methods at other levels. This may be due to the limited scope of certain methods that are unable to capture aspects across all SD dimensions. In many cases, tough decisions must be made between sustainability trade-offs and requirements that the organization has a clear strategy to guide their priorities.

Part II of this book describes the tools presented across the CapSEM Model. Part III will test the tools across different sectors and the different dimensions of sustainability. Part IV will analyse usability, feasibility and flexibility of the tools for different stakeholders to encourage development of the model as systematic progress towards stakeholder involvement and actions for checking the achievements of initially formulated needs and requirements. The CapSEM Model needs, for example, to take stakeholders into consideration when specifying accurate level boundaries.

Nevertheless, it has proven to be helpful for business and organizations that struggle to find a systematic approach toward implementing sustainability. No matter what drives this implementation within an organization, sustainability entails complex problems and challenges (e.g., Lang et al. 2012, Schaltegger et al. 2013, Brandt et al. 2013) that require transdisciplinary, collaborative, and holistic thinking across triple-bottom-line principles, long-term systemic reasoning and wide stakeholder engagement. The CapSEM Model is a conceptualization of methods and tools to help companies address these challenges, and to identify their implicit opportunities for sustainable development.

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