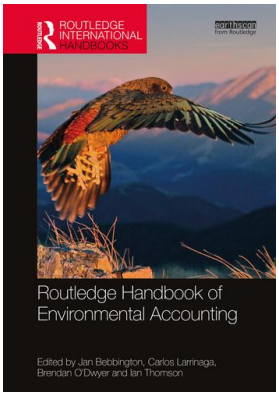


# Routledge Handbook of Environmental Accounting

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## Strategic environmental management accounting

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# STRATEGIC ENVIRONMENTAL MANAGEMENT ACCOUNTING

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## Introduction and outline of the field

Strategic management accounting (SMA) is defined as "the provision and analysis of information about a business and its competitors for use in developing and monitoring the business strategy" (Simmonds 1981, p. 26), thereby bringing accountants into "corporate strategic decision-making processes" (Cadez and Guilding 2008, p. 838.) SMA assumes that organisations are more likely to be successful if they adopt a long-term strategic orientation to attaining organisational goals and outcomes. Activities that sit within the domain of SMA include strategic business unit identification, strategic cost analysis, strategic market analysis and strategy evaluation (Govindarajan and Shank 1992; Dixon and Smith 1993; Langfield-Smith 2008) as well as benchmarking and multidimensional performance measures (Kaplan and Norton 1992; Lord 1996; Roslender and Hart 2002; Busco and Quattrone 2015).

A 2001 United Nations Report defined environmental management accounting as "the identification, collection, estimation, analysis, internal reporting, and use of physical flow information (i.e., materials, water, and energy flows), *environmental cost information*, and other monetary information for both conventional and environmental decision-making within an organization" (United Nations, 2001, p. 4, emphasis added). Gond et al. (2012) extended this definition, noting that "because management control systems (MCSs) support strategy, they can, if used appropriately, push organizations in the direction of sustainability. MCSs are central to strategy-making, as they shape the process of strategy emergence and support the implementation of deliberate strategies" (Gond et al. 2012, p. 206).

SMA is predicated on the need for accounting information to support strategic management, with some accounting techniques being better suited to this purpose. SMA techniques can be seen as a response to those who argue that management accounting techniques are short term, financially fixated, inward looking and controlling. As a result, SMA techniques incorporate non-financial dimensions, external factors, a range of expertise, measures of effectiveness and long-term goal-oriented thinking. SMA alters the role of management accountants from controllers to strategic business partners (Siegel et al. 2003) or guardians of strategy (Roslender and Hart 2002).

SMA research is typically concerned with problems with the alignment of strategy, management control systems and other contextual variables (Govindarajan and Shank 1992;

Langfield-Smith 2008) and offers the possibility for the inclusion of environmental strategy, environmental strategic goals, external environmental factors or environmental management control systems (Pondeville et al. 2013). There is a high degree of commonality between SMA, environmental management and environmental accounting. These include a concern with consequences over different timescales, aligning functions within organisations, concern with outcomes rather than efficiency, long-term orientation and monitoring of external contexts. For example, both SMA and environmental accounting systems incorporate life cycle costing techniques. Henri et al. (2016) reported on how life cycle assessment, originating as an environmental cost control mechanism, was integrated into SMA to help achieve environmental objectives. Another example is the development of Balanced Scorecards (Kaplan and Norton, 1992) into Sustainability Balanced Scorecards (Figge et al. 2002) as a way to incorporate the environment into SMA systems. Despite criticisms, Busco and Quattrone (2015) reported on the balanced scorecard's potential as a tool for strategy diffusion and control.

SMA openness for interdisciplinary integration within businesses (Roslender and Hart 2003) offers potential for the inclusion of the environment in strategic management processes. Indeed, Riccaboni and Leone (2010) examined how P&G made trade-offs between environmental decisions and market appeal of greener products, something that can be observed in Solvay and L'Oréal's current practices.

SMA research also exhibits an openness in terms of disciplinary and theoretical integration. For example, the work of Simons (1987, 1995, 2000) has greatly influenced SMA and a number of environmental management accounting research papers have analysed sustainability controls through this theoretical lens (Gond et al. 2012; Arjaliès and Mundy 2013; Renaud 2013; Wijethilake 2017 and see also Chapter 14 of this handbook). While diagnostic control systems helped achieve organisation's intended strategies, interactive control systems stimulated "emergent strategies in response to opportunities and/or threats within an organization's operating environment" (Caputo et al. 2017, p.5). Gond et al. (2012[BIB-029], p. 206) emphasised that interactive controls must also be developed as strategic levers "to focus actors' attention on key goals and support changes aligned with higher strategic objectives".

The integration of environmental accounting and SMA has created what is often labelled Strategic Environmental Management Accounting (SEMA). SEMA occurs when environmental elements penetrate SMA practices and tools. According to Gond et al. (2012), SEMA should not be an autonomous tool, but should inform formal management control mechanisms in order to "contribute to an effective integration of sustainability within strategy'" (Gond et al. 2012, p. 206). Formal controls elucidate strategic uncertainties and reveal strategic risks (a key topic for current environmental issues such as climate change, according to the Taskforce on Climate-related Financial Disclosures, see O'Dwyer and Unerman 2020). Moreover, the integration of environment into formal SMA will minimise organisation threats, and potentially allow environmental opportunities to be embraced (Gond et al. 2012). Johnstone (2019) noted that environmental control systems exist at the interface between strategy and operations, where they seek to improve environmental performance outcomes.

A strategic management perspective on environmental accounting surfaces a number of insights and areas of interest. They include:

- Exploration of the emergence and implementation of environmental strategy in organisational contexts
- Improving environmental decision-making and innovation
- Extending the timescale and factors to be incorporated in strategic decision-making

- Evaluating the effectiveness of formal and informal strategic decision and related performance measurement processes
- Reflexive relationships between SEMA and different stakeholders
- Changing role of management accountants – from controllers to strategic partners for the environment
- Challenging assumptions as to appropriate management accounting entities or cost objects
- How to stimulate environmental accounting innovations and the emergence of new strategic environmental accounting tools in relation to
    - Ranking and benchmarking
    - Structural cost management
    - Sustainable scorecards
    - Product footprinting
    - Life cycle costing
    - Environmental capex tools.

This chapter will proceed to review prior research in these areas in order to draw out areas of further research.

## Key questions developed in the SEMA literature

According to the literature, SEMA supports three SMA goals: the emergence and implementation of strategies (Chung and Parker 2008; Perego and Hartman 2009; Solovida and Latan 2017); improvement of decision-making processes (Vesty et al. 2015); and stimulation of innovation in search of new strategic opportunities (Renaud 2013). Each of these aspects will now be considered.

### *Emergence and implementation of strategy*

One of the main SMA and SEMA research topics has been the discussion of how firms adapt control systems to strategy, and vice versa: how performance control systems provide the channels to formalise emerging strategy (Simons 2000; Langfield-Smith 2005). Environmental strategy has been defined by Banerjee (2002, p. 181) as "the organization-wide recognition of the legitimacy and importance of the biophysical environment in the formulation of organization strategy, and the integration of environmental issues into the strategic process". In practice, this is achieved through a "set of initiatives that can reduce the impact of activities on the natural environment through a company's products, processes and policies, such as reducing energy consumption and waste, using sustainable ecological resources, and implementing environmental management systems" (Bansal and Roth 2000, p.717). The recent literature on environmental management systems (EMS) suggests that they have "a potential role in supporting top management's implementation of a proactive sustainability strategy by disseminating sustainability core values and measuring sustainability performance but also by minimizing sustainability strategic risks and avoiding uncertainties associated with sustainability strategies" (Wijethilake 2017, p. 570)

Solovida and Latan (2017) have, for example, tested if a company's environmental strategy had a positive influence on the use of EMA, through "providing information on their operational activities" (p. 613). Chung and Parker (2008) make similar conclusions in the case of the hotel industry, where environmental strategies could be effectively implemented with the

support of environmentally efficient resourcing. Moreover, this study found links between both environmental and financial outcomes through the achievement of operational enhancement, that is, the associated cost savings that come with a net reduction in environmental impacts. Chung and Parker concluded that there was the possibility to seek long-term, not just short-term ad hoc, benefits "through a strategic management approach to environment that includes a full spectrum of dimensions, from organizational philosophy to environmental and financial outcomes" (p. 283).

Perego and Harmann (2009) also sought to understand the link between the strategic stance of an organisation and the environmental performance measures used. Overall, a more proactive environmental strategy appears to be associated with the use of environmental performance measures. More specifically, the links between strategy and management accounting systems operated indirectly through a greater focus on "environmental information quantified in financial terms" (Perego and Hartmann 2009, p. 417). The link between proactive environmental strategy and the use of environmental management control systems was also found by Wijethilake (2017) in a study of Sri Lankan companies.

It would appear that these links also arise in reverse. For example, Epstein and Roy (2001, p. 600) outlined how environmental management control systems provide "feedback information on potential environmental and social impacts, sustainability performance (at all organizational levels), sustainability initiatives, stakeholder reactions and corporate financial performance". Similarly, Riccaboni and Leone (2010) explored how management control systems have a role in implementation and translation of strategies, seeing benefit in the combined effects of formal and informal controls.

### *Improving decision-making processes*

Strategy alignment requires tools that better motivate employees to make the right decisions. Norris and O'Dwyer (2004) specified three components of strategic decision-making: objectives, performance measure systems and reward systems. They explored the motives and internal processes of managers that were taking "socially responsive decisions" linked to the informal control system of the company and documented cognitive dissonance and frustration arising from the lack of alignment of their actions with formal controls. In order to address such problems, Dutta et al. (2013) designed what they defined as a "proper" reward system: that is, a system that aligns strategic sustainability objectives with the environmental strategy. To do this they introduced a new metric, the "sustainability variance", which is "the externalities present in the organization's resource use" (p. 457). This data is then used to incentivise managers to reduce the variance (the cost to society), and to reduce deviance from social optimality (see also Chapter 16 of this handbook).

### *Stimulation of innovation*

Sustainable decision-making has also been identified as being enhanced by the use of product environmental footprinting and the use of environmental indicators that act as "hurdles" during product innovation (Riccaboni and Leone 2010; Gibassier 2014). Environmentally sound decision-making can also be developed through new capital investment accounts, such as the ones described by Vesty et al. (2015) and the "green capex" scheme of Danone (Gibassier 2014).

Renaud (2013) argued that "unlike diagnostic control, which is concerned with the smooth running of the organizational routine, interactive control can stimulate innovation and the search for new strategic opportunities" (p. 3). Interactive control has also been found to offer the

possibility for the development of new ideas and initiatives that focus on strategic uncertainties, and emerging threats and opportunities (Rodrigue et al. 2013). Renaud (2013, p. 3) further developed the idea that interactive controls are particularly suitable for environmental topics given the strategic uncertainties characterising the practice. Interactive controls have the potential to support green innovation given their focus on multiple interactions with stakeholders. This work also proposed four organisational archetypes that used interactive controls for radical or incremental green innovations. Eco-designers and eco-institutionalists both used interactive controls with high external dialogue with stakeholders, with the aim to develop radical green innovations. On the contrary, eco-managers and eco-educators both used interactive controls for tactical improvements (incremental innovations) and education of external stakeholders to environmental solutions. Arjaliès and Mundy (2013) studied French CAC 40 companies' reports and similarly found that interactive controls such as communities of practices and recurrent meetings between operational managers and senior managers were used "to reveal and debate emergent strategies and identify opportunities for innovation in relation to CSR activities" (p. 296).

## SEMA and links to environmental strategy

While SEMA research has developed in the last 15 years around traditional SMA themes, it has also addressed questions around integration (with financial control systems), stakeholders' role in designing key performance indicators and the role played by informal controls in furthering SEMA. The three following topics pertain to the specificities of dealing with environmental strategy in opposition to traditional business strategy.

### *Integration of sustainability into strategy*

The first specific topic developed in the SEMA literature is the question of integration between non-financial and financial control systems. Gond et al. (2012) defined integration as "the interplay of these systems with regular management control" (p. 209). Caputo et al. (2017, p. 5) argued that if environmental control systems "remain peripheral and decoupled from core business activities, they fail to reshape organizational strategy to integrate sustainability". Proactive corporations are more likely to integrate sustainability control systems with traditional systems (Ditillo and Lisi 2016).

Gond et al. (2012) and Caputo et al. (2017) claimed that integration encompasses three dimensions: technical, organisational and cognitive. Technical integration is achieved when, for example, common calculability infrastructure allows information to be gathered for both the financial and environmental performance. For example, the System Applications and Products (SAP) system that gathers both financial and climate change accounts at Danone (Gibassier 2014) transforms them into a common source of information for different performance measurement purposes.

Organisational integration occurs when environmental accountability resides in an organisation and system design allows the dissemination of information to facilitate analysis and discussion of environmental topics. This could manifest in new teams such as the "finance for sustainability" at Olam, or the ESG accounting team at Orsted (see Egan and Tweedie 2018 and Johnstone 2019) or innovations in institutional roles such as "Chief Value Officers" (King and Atkins 2016).

Finally, cognitive integration refers to knowledge exchanged and assimilated on the environment. While accountant's environmental knowledge is often acquired though practice (Caron

and Fortin 2014), there are calls for integration within accountancy curriculum (Boulianne et al. 2018). These calls have also been made by others in the context of environmental accounting (Gray 2013; Wyner, Wellner and Wynder 2013).

The three types of integrative dimensions can coexist in the same organisation compensating and/or reinforcing each other as bridges between traditional MCS and sustainability-orientated control systems (Gond et al. 2012). This could take the form of integrating environmental variables in performance measurement and compensation (Dutta et al. 2013) or the development of green market-oriented products (Riccaboni and Leone 2010). Multidimensional environmental integration can also be integral to organisational systems, such as the one from Proctor and Gamble, that allows global sustainability targets to be broken down into objectives for each country, team and individual, mirroring traditional performance systems (Riccaboni and Leone 2010).

Gond et al. (2012) theorised eight integration configurations, which range from a dormant decoupled strategy, where systems operate in parallel and neither are mobilised to deploy any kind of strategy to an integrated sustainability strategy. In an integrated sustainability configuration, the business strategy and sustainability strategy overlap completely, with interactive control systems that fully support strategy making. While at the time of their research this last ideal type was rare, it could become more common with the advancement of integrated environmental performance systems and new roles such as "sustainability accountants" and Chief Value Officers. However, other studies of integration warn that "strong cognitive (and organisational) barriers have gradually stifled the cognitive enablers and have not enabled sustainability to be fully integrated into the organisational strategy" (Battaglia et al. 2016, p. 213).

### *SEMA and stakeholder interactions*

Traditional management control systems usually evaluate performance in line with the interest of shareholders and are not well equipped to integrate environmental or social metrics (Bonacchi and Rinaldi 2007). However, interactive controls are particularly well suited to extending interactions "beyond the organization, focusing attention and initiating dialogues" (Rodrigue et al. 2013, p. 303). Pondeville et al. (2013) demonstrated that stakeholder pressure positively influences both the degree of corporate environmental proactivity, but also the development of informal environmental management control systems. Notably, Pondeville et al. (2013) emphasised the role of employees in supporting a proactive environmental strategy, concluding that companies "should ensure employees' involvement, perhaps by rewarding environmental improvements in their day-to-day activities" (p. 328). Formal controls were influenced mainly by market stakeholders, with regulatory stakeholders tending to influence environmental information systems (Pondeville et al. 2013).

The diverse needs of stakeholders are not always easy to design into SEMA tools, regardless of the benefits that such integration generates. Mir and Rahaman (2011) concluded that in their case organisation, the choices of environmental indicators satisfied some stakeholders (management and regulatory authorities) while leaving unresolved conflicts related to other stakeholder needs. This issue was also addressed by Bonacchi and Rinaldi (2007) who proposed a "dart board" for integrating stakeholders needs. In their work, they argued (following the Rawlsian concept of justice) that "the loss of utility suffered by one stakeholder cannot be justified by a gain of utility achieved by another stakeholder" (p. 464).

Finally, organisations could influence their network of stakeholders towards more sustainable futures, whether it is through leadership in ratings, influencing industry norms, participating in business "clubs" (Bebbington et al. 2020), or influencing consumption patterns through activism (e.g. in the case of Patagonia). This offers the potential of SEMA to become influential in the

broader fields of sustainable governance (Gibassier and Alcouffe 2018; Rinaldi 2019) or sustainable stewardship (Bebbington et al. 2020).

### *The role of informal controls*

Informal controls can be broadly defined as norms and values, beliefs and traditions that guide behaviours (Norris and O'Dwyer 2014; Johnstone 2018). For example, Riccaboni and Leone (2010) described the progressive inclusion of sustainability principles into the organisational culture of P&G through ad hoc initiatives, leadership commitment and internal communications through their sustainability newsletter. According to Norris and O'Dwyer, informal controls work well when they are congruent with formal controls, that is, when both encourage similar behaviours (Norris and O'Dwyer 2004). To the contrary, informal controls can trigger cognitive dissonance and become detrimental when they strongly support social objectives, while formal controls reward based on profit and turnover, consequently relaying mixed messages (Norris and O'Dwyer 2004). Moreover, formal environmental controls that align with informal controls would need to include enabling design features that motivate employees (Johnstone 2019), reflecting employees' individual values.

## SEMA tools

Cadez and Guilding (2008) provided a list of SEMA techniques, which they distinguished from conventional EMA tools. They identified the characteristics they expected such tools to possess: namely, they assumed that SEMA tools will have a strategic orientation (implying a long-term future-oriented time frame) and an external focus. These tools are further considered here.

### *Strategic environmental cost management*

Parker (2000) emphasised the potential contribution management accountants could make through environmental costing. With clear organisational "green strategies", accountants would have the necessary templates to design relevant costing systems. The more proactive green strategy, the more integrated the environmental costing could be. Costing not only includes financial costing of environmental impacts already present in financial accounts, but also highlights potential attempts at "full costing" (see also Chapter 16 of this handbook), and monetisation of environmental impacts for capital appraisal. Full costing entails attempts to estimate probable future costs, calculating future valuations, and contingent liabilities.

In 2016, Henri et al. distinguished between executional cost management and structural cost management when analysing the association between environmental costs and financial performance. Both executional (e.g. short-term tactics such as cost reductions) and structural cost management (e.g. re-engineering of the value chains) are considered necessary if strategic cost management is to optimise strategic performance. In their paper, Henri et al. (2016) considered environmental cost tracking as "the identification and accumulation of specific internal costs related to the protection of the environment" (p. 271) which formed part of the implementation of environmental initiatives to master operational control over activities that have an impact on the environment. Their results demonstrate the indirect association between tracking environmental costs (that helps reduce costs for the strategy) with financial performance, and the direct association of environmental initiatives with financial performance. Their paper however ignored externalities (full cost) and the possibility of enhancing environmental performance in its own right.

### *Sustainability balanced scorecard*

The balanced scorecard is an emblematic SMA tool that has been used to coordinate the translation of business strategy, provide a long-term focus and bridge the gap between operational and strategic planning (Kaplan and Norton 1992; Busco and Quattrone 2015). These functions are achieved through the translation of the strategy into four perspectives, namely, financial, customer, business process and learning (Figge et al. 2002). The balanced scorecard is believed to be particularly well suited for integrating economic, social and environmental business goals by integrating the (so-called) "soft factors" such as environmental and social objectives into the core of management systems instead of being "add-ons" (Figge et al. 2002).

A sustainability balanced scorecard can take three different forms: a specific environmental and/or social scorecard, the extended model with the addition of an extra perspective into conventional scorecards, or the integration of social and environmental objectives within the four existing scorecard perspectives (Figge et al. 2002). A recent literature review of these different forms confirmed that these variants of balanced scorecard remain relevant, but that in profit-driven businesses, the extended model is preferred (Hansen and Schaltegger 2016). A significant challenge with the design of sustainability balanced scorecards is the integration and commensuration of its different dimensions into a performance system designed to achieve all strategic objectives of the organisation.

However, given that balanced scorecards are typically composed of leading and lagged performances, this offers some useful insights for strategically accounting for environmental impacts. Epstein and Wisner (2001) proposed that a facility's emissions were a lagged measure of process efficiency, and a leading indicator of environmental costs (drawing from a case study with Bristol-Meyers). They also found that balanced scorecards are consistent with the learning perspective inherent in ISO 14001 certifications and product life cycle reviews, aligned with internal business process improvements and makes visible the financial benefits of investing in remediation and prevention projects.

### *Product footprinting for strategic decision-making*

Since the 1970s, one of the main environmental accounting tools has been product life cycle assessment (Gibassier 2017; see also chapters 15 and 17). For example, this tool has been used to account for a single environmental impact, such as product carbon footprinting (Gibassier and Schaltegger 2015), or through product labelling (Berquier 2017). Riccaboni and Leone (2010) reported how the "Product Sustainability Assessment Tool" provided the necessary data to take decisions on sustainable product development through greater visibility of each proposed innovation's financial, social and environmental consequences. This tool was used by an internal multi-stakeholder team from finance, health, safety and the environment and external relations to evaluate the results from different viewpoints (Riccaboni and Leone 2010). It was noted that despite the greater visibility and granularity of information there remained difficulties in evaluating different combinations of effects and trade-offs.

### *Environmental capital expenditure tools*

Since the 1990s many organisations have attempted to develop ways to "green" their capital investment decisions often through including full cost assessment tools (Gibassier 2014). Modifying capex approaches have been identified as a critical component of green finance

(A4S 2017). For example, Vesty et al. (2015) worked on the implementation of a "green capex" tool within an organisation in Australia and demonstrated how a representation of carbon (by way of monetised greenhouse gas emissions) became a pivotal actor in the organisation through its integration in the investment decision-making process. By integrating emissions avoided through management initiatives, environmental leadership could be quantified and linked to long-term management. The use of environmental capital expenditure tools were also part of the SEMA developed at Danone, 'green capex' criteria included tonnes of $CO_2$ saved per million of Euros of investment and a $CO_2$ payback period using a calculated saving of 15 euros per tonne (Gibassier 2014).

### *Rankings and benchmarking*

A key development in SEMA has been the emergence of rating agencies that seek to benchmark the environmental, social and sustainability performance of organisations. For example, the World Benchmarking Alliance[1] has developed benchmarks for key transformative systems to track the achievement of the Sustainable Development Goals. Concerns over the expansion of rating agencies prompted the consulting agency SustainAbility to produce their *Rate the Raters to* analyse these approaches and produce confidence scores in the ratings produced (SustainAbility 2020). This analysis identified that rating agencies use different methodologies of inclusion, exclusion, declared performance or solicited performance to assign performance categories.

Prior to this study, Chelli and Gendron (2013, p. 200) observed that ratings alter the "conceptions, attitudes and behaviours of companies in terms of sustainable development" and also adopt rationales that reflected the interests of the financial industry and focused on financial materiality (Déjean et al. 2004). Any rating or rankings are substantially affected by the methodology used and biased by any privileged perspectives. Examples exist regarding organisations using elements of these rating methodologies to frame "good" environmental performance or use their rankings as a way to advertise their credentials. While rankings and benchmarking might form part of SEMA, the ways in which they do so are not entirely evident and an area of further research.

## The environmental accountant as strategic business partner for the environment

This chapter has concerned itself with the role of management accountants as supporters of organisations' strategies with respect to the natural environment. There is some evidence that accountants may need support to fulfil this role effectively. For example, Schaltegger and Zvedov (2015) and Egan and Tweedie (2018) explored the role of accountants within organisations and expressed concern about the ability of environmental accountants to become strategic business partners. For example, Egan and Tweedie (2018) suggested that accountants' professional habitus, and the necessity to maintain distinctive professional expertise, impairs their engagements in sustainability. At the same time, Egan and Tweedie (2018) were hopeful that "given sufficient investment in material and symbolic capital over time, alongside sufficient organisational support to engage with other professionals" (p. 1768), accountants might play a greater strategic role in the future.

In this vein, Johnstone (2019) raised the idea of accountants as boundary spanners, who with sufficient autonomy and empowered with their personal sustainability knowledge could

participate in facilitating sharing experience and strategic intent with others inside an organisation. These accountants can be seen as change agents able to play the role of facilitator, catalyst or activist (Johnstone 2019). Indeed, a recent study of "sustainability CFOs" (IMA 2018) demonstrated how some companies have created a specific strategic role to integrate finance with sustainability, which supports the boundary spanner role noted by Johnstone (2019). Similarly, King and Atkins (2016) called for a Chief Value Officer, a strategic role recently embraced by the International Federation of Accountants (IFAC) and the International Integrated Reporting Council (IIRC) (2019) and defined on the IIRC's website as "ensuring that all relevant aspects of value creation and destruction are accounted for and communicated to boards, management, and external stakeholders". Collectively these new accounting roles share common ground with the SMA aspiration of the accountant as a strategic business partner. However, this is empirically underdeveloped in the SEMA literature.

## Conclusion

In this chapter various important themes for environmentally focused SMA have been considered. It has been argued that SEMA is well placed for encouraging long-term environmental thinking within the strategic performance system of organisations (Arjaliès and Mundy 2013). SEMA can be seen as extending beyond organisational boundaries by reaching out to competitors (Chelli and Gendron 2013) and through life cycle footprinting to consumers (Berquier 2017). It also demonstrated that SEMA primarily relied on interactive controls with internal stakeholders while having some connection to external stakeholders (Renaud 2013; Rodrigue et al. 2013). In many ways, SEMA has co-evolved alongside knowledge of sustainable development (Gibassier and Alcouffe 2018). A stronger integration of planetary boundaries (Schaltegger 2018) and intergenerational equity could help bring SEMA even closer to a strategic integration of sustainable development. This chapter has outlined research on the link between environmental/sustainability strategy and controls, and the integration of financial and non-financial controls in organisational strategy.

There are, however, further avenues for research in SEMA. First, Crutzen et al. (2017) opened an avenue for research into the extent to which the connection of both formal and informal management controls could better support organisations achieve their environmental objectives. Second, it is also puzzling why, despite the environment being a good candidate for interactive control (Renaud 2013), there is relative lack of practice in that area. Third, further research is also warranted into the decoupling of financial management control systems and environmental control systems: a phenomenon that Riccaboni and Leone (2010) have suggested arises through the contextual nature of environmental goals that require a decentralised structure of management control systems. Johnstone (2019) further suggests that system design needs to be flexible and malleable to adapt to environmental performance outcomes, specifically because they extend over time (and generations) and physical space (which can be different from organisational space). She also emphasises the need for further research into how "bottom-up" development of environmental control systems might emerge in dynamic environments which may (in turn) allow environmental control systems to respond better to organisational needs. An employee-driven strategic environmental control system could also play the role of developing competence in environmentally sound behaviours and solutions (Wijethilake 2017). Finally, further research in the role of "sustainability accountants" as business partners could further help understand the cognitive barriers that accountants have to be effective actors in this space (Battaglia et al. 2016; Egan and Tweedie 2018).

## Note

1 https://sdg2000.worldbenchmarkingalliance.org/.

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