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Environmental Management Accounting: The Missing Link to Sustainability?

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ABSTRACT

In this editorial, we review how environmental management accounting (EMA) and controls (EMCS) are linked with sustainability. We present six avenues for research to investigate further how EMA and EMCS can contribute to the missing link to sustainability. Finally, we present the four contributions to this special issue.

1. Introduction

The literature has long developed the concept of ‘environmental management accounting’ (Rikhardsson et al. 2005), and analysed its implementation (Bartolomeo et al. 2000; Lamberton 2000; Arjalies and Mundy 2013) and theorisation (Gond et al. 2012; Guenther, Endrikat, and Guenther 2016). A separate thread of the literature has focused on ‘accounting for sustainability’ (Bebbington 1997; Bebbington and Gray 2001; Bebbington 2009), and now advocates for ‘accounting for sustainable development’ (Bebbington and Larriaga 2014; Bebbington, Russell, and Thomson 2017). However, those two literatures have rarely crossed and we still do not fully understand the potential contribution of environmental management accounting (EMA) to a transition towards sustainability.

EMA is defined as

the management of environmental and economic performance through the development and implementation of appropriate environment-related accounting systems and practices. While this may include reporting and auditing in some companies, environmental management accounting typically involves life-cycle costing, full-cost accounting, benefits assessment, and strategic planning for environmental management. (IFAC 2005)

Environmental management control systems (EMCS) are defined as ‘a package of formal, information-based routines and procedures that managers use to maintain or alter patterns in organizational activities, specifically concerning the environmental aspects of organizational performance’ (Perego 2005, 8). Through this special issue, we question whether EMA and EMCS could be the ‘missing link to sustainability’. As Gray (2010, 48) rightfully critiques ‘most business reporting on sustainability and much business representative activity around sustainability actually have little, if anything to do with sustainability’. Schaltegger (2018) confirms that most academic work on EMA has had only very little to

do with the concept of 'sustainability' either – a statement also made by Bebbington and Thomson (2013) in their editorial of the Management Accounting Research special issue on 'Sustainable development, management and accounting: Boundary crossing', noting that none of the papers engaged with the sustainable development literature or the most recent thinking therein. Therefore, we endeavour to suggest that EMA could be the missing link to sustainability, if professional bodies, practitioners and academics alike accept to question their current practices to incorporate sustainability in shaping new tools and standards. Indeed, and despite many calls for corporations to improve transparency and accountability of their negative impacts on the environment, reporting has long been considered not sufficient enough to push organisations towards sustainability (Milne 1996). Therefore, bringing EMA closer to incorporating sustainable development could be a welcome move to reconcile organisations with sustainability.

We will first examine the term 'sustainability' and its interpretation by accounting scholars to better understand the necessary changes to be made to 'traditional' management accounting if we are to move EMA towards it. First, the concept of sustainability refers to biophysical thresholds or environmental bottom lines (Milne 1996). Second, the concept of sustainability necessitates the inclusion of extended time horizons (Milne 1996), notably because of the necessity to include the notion of equity between today's citizens and future generations (Bebbington 2001). Sustainability also requires considering both development and the environment together, meaning development of all must be sustained within the limits of nature (Bebbington 2001). 'Sustainability requires that values for environmental resources are to be based on shared social norms, public preferences', meaning that stakeholder engagement would be required in the discussion of new and enhanced EMA tools (Milne 1996, 147; Bebbington 2001). Finally, sustainability cannot be considered at the organisation's level only (Milne 1996), but must incorporate considerations of its impact on the environment beyond legal boundaries, including in its supply chain, usage by customers, and more widely on society. Despite calls to action, Antonini and Larrinaga (2017, 135) ascertain that in their recent sample of reports, 'organizational boundaries are restricted to organizations under financial control and not encompassing all organizations over which the reporting entity generates significant sustainability impacts' and environmental impacts of outsourced goods and services are also ignored. Milne and Gray (2013, 24) added that:

Long-term thinking, cumulative environmental impacts, multilevel analysis, and a proper understanding of the 'economic organisation' as located within wider ecological and cultural systems, suggests that we need radically different notions of 'success' as an important step towards what we might term 'control for sustainability' (our emphasis).

Milne (1996, 136) noted that management accounting 'is incomplete as generally practiced' by neglecting the external effects of corporate activities. Several attempts at correcting management accounting have been conducted early on, trying to both experiment accounting beyond the legal entity and within planet boundaries. For example, Gray (1992) proposed the construction of an 'account of sustainability' using the principle of 'sustainable cost calculation' to measure the additional costs to be borne by an organisation, if it was to not leave the planet worse off at the end of any given accounting period. Other examples of alternative costing methods include the experiments with full-cost accounting (Jones and Matthews 2000; Bebbington et al. 2001; Herbohn 2005;

Table 1. Sustainable development and new EMA and controls.

Issues	New EMA & Controls
Entity	Need to look beyond the boundaries of a legal entity
Time	Need to take intra and inter-generations' perspective
Eco-justice	Need to take into account development for all
Participation	Need to seek internal and external stakeholder engagement
Planet boundaries	Need to include planet boundaries through, for example, science-based targets

Antheaume 2007), or experiments with sustainability targets with sustainability thresholds using life-cycle analysis (Lamberton 2000). After those experiments, the authors conclude that organisations are still unsustainable or the accountings 'failed' (Lamberton 2000; Herbohn 2005). There is, therefore, the necessity to further analyse the different elements of EMA and EMCS that could lead to sustainability, and to conduct further experiments (Bebbington 2009) (Table 1).

From the current literature on EMA and EMCS as well as on sustainability, several future avenues for research have emerged as being salient to bring EMA and EMCS closer to sustainability:

- (1) First we shall deconstruct current EMA tools to better understand where their weaknesses lie and how they shall be reconstructed to bring us closer to sustainability (Brown and Dillard 2013), notably how could they include time and space issues better. According to Bebbington (2001, 146), 'the way in which a defensible, coherent and complete account of sustainable development could be created is some way off and depends on a great deal more experimentation and imagination'.
- (2) As the environmental management control literature is developing rapidly, we would like to question how more or less 'integration' brings organisations closer to being sustainable, and how more or less social controls (Johnstone 2018), informal or formal controls, belief systems would achieve a better 'sustainability package' (Ditillo and Lisi 2014).
- (3) Thirdly, research should endeavour to seek to understand the role of change-makers within organisations. The literature has investigated thoroughly the reasons why accountants do not engage with sustainability (Bebbington et al. 1994; Medley 1997; Lodhia 2003; Renaud 2014) while at the same time accounting bodies have constantly advocated, through numerous reports, that the accounting profession should play a role in ensuring organisations take a leadership position in relation to sustainability (CICA 1993; FEE 1995; CIMA 1997; ICAEW 2004; IFAC 2006; CIMA 2011; IMA 2016). However, accounting researchers have not yet investigated and researched change-makers in or around the accounting profession that either through everyday practice, or more profound institutional work, try to bring accounting and the accounting profession closer to its potential role in sustainability (e.g. 'Sustainability CFO: The CFO of the Future?' Gibassier, Garnier, and Arjalies 2018).
- (4) We encourage scholars to look beyond the organisation boundaries to see how a business organisation can use controls to fulfil sustainability within its own industry, its supply chain, by prompting its customers to a certain 'usage' of its products and encouraging end-of-life management, and, more broadly, how EMA tools and EMCS and governance from a business organisation can influence its externalities towards society as a whole.

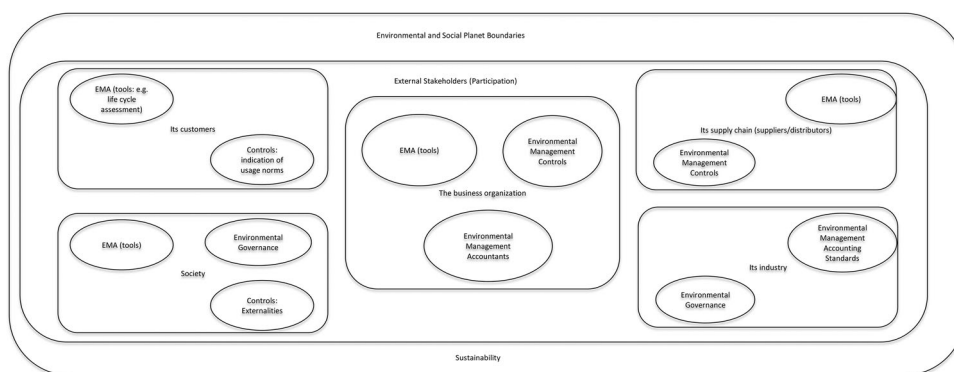


Figure 1. Research avenues into EMA, controls and governance for sustainable development.

- (5) We need to develop studies such as the research conducted by Rodrigue, Magnan, and Boulianne (2013) and Wijethilake, Munir, and Appuhami (2017) to better understand the influence of internal and external stakeholders on the development of EMA and EMCS.
- (6) Lastly, we argue that academics should engage our research closer with sustainable development thinking (Bebbington and Thomson 2013), that is include planet boundaries within the design of new EMA tools and, controls, systems and packages (Figure 1).

2. Deconstructing EMA tools and unlocking their potential

'Sustainability assessment tools, must be accurate, robust and based on sound theoretical foundations backed with empirical evidence if misleading policy messages are to be avoided' (Gasparatos, El-Haram, and Horner 2009, 247). Some EMA tools are more 'incremental' in nature, and therefore we need to understand the lock-ins and tight links between some innovations and the current 'regime', and how they could be 'unlocked' (Brown and Dillard 2013). Additionally, Bell and Hoque (2012) challenge researchers to critically assess the inertia created by existing accounting structures, processes and techniques and mainstream those conversations that provide challenges to the status quo. For example, Jones (2010) denounces the entity concept that artificially constructs entities as 'accounting units' where externalities are ignored and relationships between those entities and the environment go unrecorded. As another example, Gasparatos, El-Haram, and Horner (2009) critique tools that fall into a reductionist paradigm such as sustainability indicators. Despite their advantage in reducing and integrating the diverse issues affecting progress towards sustainability into a small set of numbers, and therefore simplifying decision-making processes, they often consider economic efficiency as their primary concern and avoid discussing issues such as equity (Gasparatos, El-Haram, and Horner 2009). The development of new and different tools that would account for sustainability face different issues such as the difficulty to account for different dimensions at the same time, the difficulty of boundaries and scales (organisation, territory ...) and the difficulty to include different time horizons within accounting (Antheaume 2013; Gibassier and Alcouffe 2018). For example, there is a lack of accounting tools that allows incorporating long-term effects of environmental decision-making, despite the recent development of

green capital expenditure mechanisms (Vesty, Telgenkamp, and Roscoe 2015). As Jones (2010, 130) reminds us 'accounting, as practiced in the modern corporation, is notoriously short-term in orientation, while environmental problems, such as global warming, have very long time spans. This *mismatch in periodicity does not make an easy marriage between accounting and the environment*' (our emphasis).

More and more critiques have arisen recently of different attempts to account for sustainability. For example, the Global Reporting Initiative (GRI), despite its call within its 'sustainability context' principle for companies to discuss 'the performance of the *organisation in the context of the limits and demands placed on environmental or social resources at the sector, local, regional or global level*' (our emphasis) (2013), has been criticised for 'never having really been about sustainability' (McElroy 2017). McElroy (2017) is concerned by the lack of implementation details provided by the GRI, notably about the 'thresholds' and 'allocations' elements of the sustainability context principle. He further states that the GRI has mainly been concerned with incrementalism that is 'measuring and reporting the incremental impacts of organizations of vital resources' (McElroy 2017). The academic literature has long exposed concerns about the GRI, where 'the concept of SD is reduced to simply giving basic information on the indicators that comprise the Triple Bottom Line, which unfailingly leads to a gap between corporate performance and corporate impacts' (Moneva, Archel, and Correa 2006, 122). The Sustainability Accounting Standards Board (SASB) has also been criticised in comments to its standards, stating that 'the term "sustainability standards" as used by the SASB was misleading, because "absolute and intensity metrics have been shown to be unfit for" the purpose of demonstrating the sustainability of an organisation' (2015).

Evidently, there is a need to understand how certain ways of posing general problems (the environmental crisis) such as those related to EMA comes to attain the status of self-evidence; or why it does not, and reciprocally, how it is that particular calculative technologies come to be seen as the appropriate way to solve these particular problems (Miller 1991). Moreover, studying EMA as innovations is firmly entrenched in the view that accounting can be changed (and should evolve), and therefore that we cannot mistake 'contingent accounting ideas, practices and institutions, local in space and time, as self-evident, universal and necessary' (Gomes et al. 2011, 397).

Despite our lack of understanding of the underlying ideas, values, cultural and historical contexts that have shaped the EMA tools that we have today, and probably our lack of willingness to challenge them further towards sustainability (see calls from Adams 2014 and Thomson 2014 for scholars and students to engage further in participating into EMA standards to influence them 'in the making' through at least commentaries or participation in working groups), some authors (Milne 1996; Bebbington 2001; Guenther, Endrikat, and Guenther 2016) have tried to capture features of existing tools that are leading those to close the gap towards being EMA 'for sustainable development' (see Table 2).

While what Bebbington (2009, 189) stated nine years ago still holds true that 'there are fewer examples of organisations attempting to make decisions/take actions on the basis of some sort of systematic assessment of sustainable development', this might be an explanation for field research in that area to be seldom. However, it also means that we could call for researchers to be 'active (co-)creators of the accounting they are seeking to understand' (Bebbington 2009, 189). Bansal (2017a; 2017b) has called, through her NBS network, for more intervention research to be conducted and published in organisation journals,

Table 2. EMA tools and sustainable development.**Tools that go beyond the legal entity framework**

Environmental impact analyses
 Extended cost-benefit analyses
 Life-cycle assessment
 Full-cost accounting
 Sustainable cost calculation

Tools that take into account 'long-term' considerations

Green capital expenditure tools
 Long-term physical and financial environmental planning
 Life-cycle assessment
 Reward and compensation systems for which rewards are multi-year based

Tools that take into account intergenerational impacts

The use of Global Warming Potential 100 or 500 years
 Site restoration costing

Sources: Milne 1996; Bebbington 2001; Guenther, Endrikat, and Guenther 2016.

and Adams and Larrinaga-Gonzalez (2007) have set out to encourage further 'engagement research' in our area. We should welcome researchers who would want to introduce through practice engagement projects accounting for sustainable development, and then report back to academia. Engagement is a:

Privileged research method to investigate ethical, social and environmental accounting and accountability at the level of the organisation and its impacts on, and interactions with, other organisational processes, organisational structures and other aspects of organisational behaviour, organisational dynamics and institutionalisation processes. (Adams and Larrinaga-Gonzalez 2007, 335)

Furthermore, it is a good way to develop EMA tools towards sustainable development in conjunction with practitioners. This type of engagement – intervention research, participant observation, action research – would be fruitful in arenas that have less access to the relevant knowledge such as small and medium-sized enterprises or municipalities and territories.

3. Questioning the role of environmental management controls

EMCS may play a role in helping firms embrace sustainability as a strategic goal to better face their environmental responsibilities, pushing them in the direction of sustainability (Gond et al. 2012; Songini and Pistoni 2012; Lisi 2015). EMCS are considered a promising opportunity because they allow the incorporation of environmental issues into strategic plans and objectives (Guenther, Endrikat, and Guenther 2016).

First, a strong sustainability strategy can be delivered, according to Gond et al. (2012), through tight integration of all level of control systems (cognitive, organisational, technical) and an interactive use of control systems (configuration H, which they posit is rare in practice, although they cite Aviva, BT and EDF as examples).

Second, Ditillo and Lisi (2014) argue that there is a need for a deeper look at administrative controls as defined by Malmi and Brown (2008), that is organisational design and structure, governance and policies and procedures. Formal structures, Ditillo and Lisi (2014) argue, will facilitate the socialisation of sustainability managers, allowing them to regularly and personally interact with decision-makers to coordinate highly

interdependent activities. If the ownership of environmental sustainability appears quarantined to a specific department, this might hinder the possibility for sustainability to permeate the overall business conduct. They argue that horizontal and vertical integrative liaison devices are critical for sustainability given the ‘co-ordination challenge’ posed by sustainability. A high-level sustainability governance body, composed of top management and chaired by the CEO is also necessary to control (Ditillo and Lisi 2014). Finally, the inclusion of sustainability considerations within policies and procedures, such as supplier charter or capital expenditure policies will ensure full deployment of sustainability within an organisation (Ditillo and Lisi 2014).

Thirdly, Johnstone (2018) and Ditillo and Lisi (2014) further argue that corporate culture is a strong control for the embedding of the environment within organisations. This includes reference to the environment in mission and vision statements for example. Johnstone (2018) further posits that ‘social control is considered useful in ensuring the internalisation and embracement of environmental sustainability over time and space, beyond conventional organisational boundaries’. Table 3 reviews environmental management controls and their link to enhanced sustainability from the literature’s point of view, as well as their link to the sustainability literature in accounting (Bebbington 2001). The table includes the view of the two main management control frameworks used in the EMCS literature, Simon’s levers of control (1995) and Malmi and Brown’s package (2008).

While we agree that environmental management controls (and more largely sustainability management controls) have been investigated to foster the integration of environmental concerns within the organisation at all levels and its strategy, there is from those considerations no definitive link with the possibility to say that the corporation is managed ‘to not leave the planet worse off at the end of any given accounting period’ (Gray 1992, 419; cited in Bebbington 1997, 376) What remains to be investigated is whether any given ‘system’ or ‘package’ of internal and external controls (see point 4) will lead corporations to include planet boundaries thresholds, consider the long-term (even intergenerational) impacts of their decision-making processes. Many questions remain unanswered: will that be achieved through more formal administrative controls? Social and informal controls? Or a stronger integration within traditional financial controls (such as when carbon is priced within capital expenditure decision-making systems)? What we already know, however, is that governance can take increase the time span taken into account by organisations, for example, when bonus is linked to multi-year achievement, or when indeed a formal mechanism such as capital expenditure approval is adapted to allow decisions for ‘greener’ investments to compete against less costly but also less environmentally friendly options.

4. Developing new roles in EMA

Professional accounting bodies have long advocated that accountants should be the ones to implement sustainability accounting within organisations (from CICA in 1993 to IMA in 2016), but at the same time accounting research surveys have repeatedly demonstrated that they are nevertheless not involved (Lodhia 2003). Caron and Fortin (2014) demonstrated the lack of formal training in CSR for accountants – stating that knowledge is mostly acquired informally and within organisations, rather than through university

Table 3. Environmental management controls and sustainable development.

Simons (1995)	Malmi and Brown (2008)	Management control systems	Goals	Literature link with sustainability enhancement	Link with sustainability
Belief controls	Cultural controls	Mission, statement and values	Specifying and communicating objectives	Informal controls*	Long-term
Belief controls	Cultural controls	Top management values	Specifying and communicating objectives	Informal controls*	
Diagnostic controls	Planning	Environmental long-range planning	Specifying and communicating objectives		Long-term
Belief controls	Administrative controls	Internal environmental operational structures /governance structure	Specifying and communicating objectives	Administrative controls**	
Boundary controls	Administrative controls	Internal environmental procedures	Specifying and communicating objectives	Administrative controls**	
Boundary controls	Administrative controls	Environmental policies	Specifying and communicating objectives	Administrative controls**	
Boundary controls	Administrative controls	Procurement environmental performance procedures	Specifying and communicating objectives	Administrative controls**	Wider than the legal entity
Diagnostic controls	Cybernetic	Environmental data collection	Monitoring performance	Administrative controls**	Long-term
Diagnostic controls	Administrative controls	Environmental investment appraisals	Monitoring performance		Long-term
Diagnostic controls	Cybernetic	Environmental budgeting	Monitoring performance		Long-term
Diagnostic controls	Cybernetic	Environmental life-cycle assessments	Monitoring performance		Wider than the legal entity
Diagnostic controls	Cybernetic	Environmental/Material flow cost accounting systems	Monitoring performance		
Diagnostic controls	Cybernetic	Competitive environmental benchmarking	Monitoring performance		
Diagnostic controls	Reward and compensation	Reward system based on multidimensional (including the environment) performance system	Monitoring performance		Long-term (if multi-year)
Internal control systems	Cybernetic	Environmental Key Performance Indicators	Performance Measurement systems		
Internal control systems	Cybernetic	Environmental performance evaluation systems	Performance Measurement systems		
Interactive controls	Cybernetic	Environmental balanced scorecard	Performance Measurement systems		

Notes: Informal controls* According to the literature, cultural controls are said to enhance sustainability performance

Administrative controls** According to the literature, administrative controls are said to enhance sustainability performance if structure correctly (for example, if top managers govern sustainability and if sustainability percolates all departments).

Sources: Gond et al. 2012; Arjalies and Mundy 2013; Dittilo and Lisi 2014; Wijethilake, Munir, and Appuhami 2017.

training of professional bodies' involvement (Caron and Fortin 2014). To solve this issue, it has been advocated that:

Due to the complexity of the task of measuring performance towards sustainable development, accountants need to form multidisciplinary teams together with professionals from the environmental and social disciplines, with the goal of evolving and interpreting the information set that provides relevant measures of sustainable development. (Lamberton 2000, 602)

In recent studies, the role of new 'change-makers' has been theorised. For example, Renaud (2014) describes how the environmental controller acts as 'translator', as 'change agent', including outside of the organisational boundaries, working with suppliers in implementing carbon reduction strategies. Schaltegger and Zvezdov (2015, 351) who portray several types of 'gatekeeping' roles for accountants, demonstrate that in a constructive role, accountants can act as pro-active mediators: those 'accountants contribute substantially to the introduction and establishment of sustainability accounting by actively developing and engaging with other professionals in institutionalizing sustainability accounting procedures in the organization'. Finally, one of the authors' study on Sustainability CFOs (Gibassier, Garnier, and Arjalies 2018) demonstrates how a new kind of CFO engages externally to shape new sustainability accountings and internally to act as a bridge between their traditional accounting function and their new territory, sustainability. Despite this new trend in reporting on new 'change-makers' within the accounting profession, questions remain on the kind of training and knowledge an accountant should acquire to lead accounting towards contributing to sustainable development. Some competing professions – including engineers, could also continue to question the ability of the accounting profession to lead the actual change (Jonathan Watts in 2010 developed the idea that accountants could be agents of the revolution, and Gleeson-White in 2014 questioned the role of accountants in saving the planet). Should the future 'accountant for sustainable development' be a better-trained accountant, a hybrid accountant or an alien accountant? There are still puzzles to be solved. What kind of training will better develop the actors needed for sustainability? What kind of alliances and co-working needs to take place within organisations for accountants to become part of change management teams (or should they just refrain from taking part in sustainability)?

5. Looking beyond traditional controls into governance and governmentality in the supply chain, the industry and towards customers and society

While EMA tools and controls, as well as environmental management accountants and CFOs, are all important elements that could all be transformed to lead organisations on the way to contributing to sustainable development, we believe that controls and governance are also exercised outside of the realm of organisations and should be investigated. Dean (1999, 18) defines government as:

any more or less calculated and rational activity, undertaken by a multiplicity of authorities and agencies, *employed a variety of techniques and forms of knowledge, that seeks to shape conduct by working through our desires, aspirations, interests and beliefs*, for definite but shifting ends and with a diverse set of relatively unpredictable consequences, effects and outcomes (our emphasis).

Techniques of government can be accounting elements such as sustainability indicators, targets, budgets, charters and procedures. Accounting has the ability to render sustainability visible ‘through the application of systematic calculative rationality to facilitate the process of governing’ (Russell and Thomson 2009, 230). Looking, for example, at sustainability indicators chosen by an organisation to filter which suppliers to work with, they could if based on the elements developed in the introduction (e.g. long-term, based on planet boundaries), render visible the organisation’s view of sustainability as ‘strong’, while another set of sustainability indicators based on efficiency only could give an obscuring view of sustainable development embedded in ‘weak’ sustainable development (Russell and Thomson 2009). If sustainability accounting is reformulated through an economic regime of practice rather than social or environmental (Spence and Rinaldi 2014) one could ask how managers could shape their techniques of government differently, towards enhancing sustainable development. While we often think of an organisation’s links to its suppliers through contracts, standards and partnerships, we also would like to extend the reflexion on controls and governance to customers and competitors. As life-cycle assessment has often revealed that sustainability impacts relied on customer use (for example, with electronic devices or with garments), organisations have developed discourses on how to correctly shape our use of their products to enhance sustainability. Whether those discourses actually achieve their goal and what kind of discourses and techniques could govern customers to be ‘good citizens’ remain to be explored. We also need to further explore how organisations participate in standardisation processes and shape their own governance tools within their industry or across industries – and how they shape the way sustainability is understood and accounted for in the future (Berquier 2017). This is perhaps even more important in the sense that standards are shaped for the long-term.

6. The role of external stakeholders in driving EMA and EMCS towards contributing to sustainability

We would like to further the initial argument that ‘organizations should be expected to reinforce their environmental performance measurement mechanisms (only) when perceived stakeholders’ pressures intensify’ (Songini and Pistoni 2012; Rodrigue, Magnan, and Boulianne 2013; Lisi 2015, 30). This translates only a partial view of how stakeholders could drive the EMA and EMCS of business organisations to develop towards enhancing sustainable development – by ‘pressure’ only. Indeed, according to Frame and Cavanagh (2009, 196) ‘Stakeholder engagement in sustainability issues is critical for the legitimacy and quality of decisions and the admission of complexity and value-laden judgements in decision-making and accountability processes’. Therefore, we posit that further research is needed to develop a better understanding of the influence of stakeholders on the design of EMA tools, systems or packages within business corporations. While several studies (Durden 2008; Rodrigue, Magnan, and Boulianne 2013) have paved the way for a detailed understanding of the different influencing channels, by different groups of stakeholders, the papers fail to address the issue of sustainability. For example, we could question which types of interaction would help the organisation focus on addressing its externalities towards sustainability, and what stakeholders or coalition of stakeholders would achieve the right conversation at the level of the corporation. Frame and Cavanagh (2009, 196) notably argue that ‘stakeholders will need new forms of expertise in their

interactions with more traditional forms of expertise in order to co-produce knowledge about sustainability', and therefore corporations should foster within their interaction with stakeholders' 'ideological pluralism and value diversity' (Frame and Cavanagh 2009). They further insist on the necessity to engage with a broad range of stakeholders to capture all possible impacts and facilitate an understanding of all factors that could influence the achievement of sustainability (Frame and Cavanagh 2009). While the literature has demonstrated the influence of top management commitment and values (Norris and O'Dwyer 2004; Wijethilake, Munir, and Appuhami 2017) on the implementation of social and EMCS, it has also demonstrated the necessity for a group of different stakeholders to engage with an organisation. Different types of stakeholders will influence different types of controls at different levels of the organisation (e.g. training for accountants in sustainability by professional accounting bodies) – a combination of influence on control mechanisms that could lead to enhanced sustainability.

7. Engaging with sustainable development science

Milne (1996, 154–155) is categorical: 'unless they are integrated with *mechanisms that recognize potential ecological limits*, even recent management accounting developments that expand their focus to capture environmental externalities will prove insufficient' (our emphasis). Therefore, Bebbington and Thomson (2013) state that we can use the models of the interaction between human and natural systems such as 'planet boundaries' (Rockström et al. 2009), as well as international frameworks such as the Sustainable Development Goals, to start looking at the evolution of the natural world. These scientific papers and international consensus warn us on the status of our planet both environmentally and socially.

Recently, corporations have advocated for business organisations to anchor their endeavour in a sustainable development trajectory, meaning the targets they promise to achieve should be (1) context-based and (2) include a fair share of their impact on a given environmental or social planet boundary (Thomas and McElroy 2016). The most well-known example is the development of different methodologies to calculate 'science-based' targets for climate action or water (Pacific Institute 2017). As of today, 339 companies have pledged to determine their ambition using 'science-based' GHG emissions reduction targets.¹ Two groups of practitioners are pushing for this trend to extend beyond GHG emissions to other boundaries. McElroy and Martin in their book 'the MultiCapital Scorecard' have demonstrated that another type of accounting could be possible and have been looking for implementation terrains. The Reporting 3.0 consultancy is developing the formation of a multi-stakeholder Global Thresholds and Allocations Council (GTAC), 'to establish an authoritative approach to reporting economic, environmental and social performance in relation to generally accepted boundaries and limits'.² As per Schaltegger (2018), EMA could play a role in disaggregating planet boundaries and other environmental thresholds into organisational indicators and targets.

8. Special issue's contributions to EMA – the missing link to sustainability

The four papers selected for this special issue all address the question of the missing link between EMA and sustainability from different perspectives. One of them offers a

theoretical reflection, another one presents a literature review and the remaining two are empirical studies. Altogether, they provide distinct, yet complementary, contributions to the literature on EMA and offer new ways to explore the links between EMA and sustainable development.

The first paper, by S. Schaltegger, is entitled 'Linking environmental management accounting. A reflection on (missing) links to sustainability and planetary boundaries'. This personal commentary specifically addresses the question of both existing and missing links between EMA and ecological sustainability. The author argues that since EMA focuses on issues of the natural environment it needs to be put into the context of ecological issues of sustainability and should not be blamed for bypassing other sustainability issues such as social ones. The paper, therefore, focuses on examining links between EMA and aspects of the natural environment based on the concept of planetary boundaries (see our point 1). After discussing the concept of planetary boundaries in the corporate accounting context, Schaltegger establishes links between EMA and the nine following planetary boundaries: climate change, global freshwater use, chemical pollution, nitrogen cycle, phosphorus cycle, ocean acidification, biodiversity loss, land use change, stratospheric ozone layer depletion and atmospheric aerosol loading. The author also identifies existing research addressing these specific links. Finally, the paper draws conclusions for further EMA research and practice. One key contribution for EMA is to help translate and disaggregate the macro-level goals into corporate-level targets and managerial action plans.

The second paper, by L. Johnstone, is entitled 'Theorising and modelling social control in environmental management accounting'. It offers a systematic review of the way social controls are presented in the empirical EMA literature and acts as a useful framing mechanism. It can be considered as a first step towards offering a systematic definition of social control and its properties, based on an extant mapping process of the literature, and specific to EMA as the missing link to sustainability. Four thematic properties of social controls are identified by the author: (1) knowledge about environmental issues; (2) commitment to environmental issues; (3) communication via interaction, dialogue and transparency of environmental issues; and (4) a corporate culture that fosters education, training and awareness of environmental issues; determined under the condition of available resources. Johnstone also acknowledges the need for future empirical research on social controls regarding its position and properties and considering the fuzziness of what the concept entails. Finally, the author argues for the necessity of moving beyond functionalist, technical conceptualisations of control levers and systems, as well as beyond intra-organisational contexts to affect truly sustainable futures.

The third paper, by Crutzen, Bounnazef and Qian (2018), is entitled 'Developing sustainability mobility controls: the case of four Belgian local governments'. This paper empirically explores the links between management controls, strategy and sustainability in the context of the public sector. The authors use institutional theory as a theoretical lens and the concept of control packages as an empirical grid of analysis to explore how institutional influences enable or constrain the development of sustainability mobility controls in four Belgian local governments. The results of this comparative exploratory case study show that the four local governments plan, implement, and control their sustainability mobility strategies differently, depending on their specific practices and routines, and the interactions between relevant actors. Even if sustainability is key a strategic

component for the urban development of all four governments, their understanding of the link between sustainability, management controls and mobility strategy differs according to local challenges. Institutional influences are both enabling and constraining the development of management controls in each case. The authors show that political support and regulations enable control planning. However, limits in the support of mobility actors, and weak decision power for mobility managers, constrain the monitoring and updating of control indicators. Finally, the results seem to suggest that control, strategy and sustainability in the public sector require the adoption of interrelated management controls to highlight the challenge in developing practical devices and systems that managers can use to ensure consistency between behaviours, decisions, strategies and objectives.

The fourth paper, by Baker, Cohanier and Gibassier (2018), is entitled 'Environmental Management Controls at Michelin – how do they link to sustainability?'. The purpose of this paper is to study the evolution of environmental management controls of the Michelin Company, and see how, or if, they bring Michelin closer to a contribution to sustainability. Using the sustainability control package framework initiated by Ditillo and Lisi (2014) from Malmi and Brown's 2008 work, the authors analysed the different types of controls and how they form a different package over time that gradually expended beyond the organisation's boundaries to extend governance over suppliers, customers and the industry through the design of a 'sustainable mobility' strategy.

9. Conclusion

To conclude, we would like to emphasise that further EMA and EMCS research can be undertaken in several areas. First, we will not achieve sustainability without engaging with small and medium enterprises (SMEs). These types of organisations require particular attention and a different set of tools and controls to approach their particular situation. While the literature on SMEs and corporate social responsibility is well developed (Spence 2007; Baumann-Pauly et al. 2013), this is less the case in management accounting for sustainable development. Furthermore, we encourage further research in ecosystem work that would take into consideration management accounting for sustainable development within a given territory, emphasising a connected way to control or govern sustainability shared between cities, municipalities, citizens and its economic constituencies (business organisations). We think that further research is warranted on how a business organisation can organise and imagine its control system outside of its legal entity that is how can it lead and incentivise suppliers, customers and competitors to achieve sustainability. While several authors have started investigating how informal and social controls can play a decisive role in leading to engagement with sustainability (Ditillo and Lisi 2014; Johnstone 2018), they call for further engaged research within organisations on those topics. We will also not achieve EMA 'for sustainable development' without changing, creating and imagining new tools and controls that incorporate the notions evoked in our introduction. We posit that academics should engage with practice to further develop those tools and controls, test them within organisations and report back to academia and practice with further results. Finally, we want to encourage scholars to engage with change-makers in and around the accounting profession to understand who they are and how their role can be furthered, and identify how we can educate and develop more

future change-makers (through our own education role) so that they would no longer be exceptions but become present in each and every organisation.

Notes

1. Science-based targets Website <http://sciencebasedtargets.org/methods/> (accessed January 27th, 2018).
2. Reporting 3.0 website <http://reporting3.org/gtac/> (accessed January 27th, 2018).

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