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New boundaries for sustainability accounting? A case study of multi-entity accounting and reporting in the agrifood sector

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Abstract

Purpose – This study examines how accounting tools and techniques are used to create and support membership and reporting boundaries for a multi-entity sustainability scheme. It also considers whether boundary setting for this initiative helps to connect corporate activity with planetary boundaries and the SDGs.
Design/methodology/approach – A case study of a national agrifood sustainability scheme, analysing extensive documentary data and multi-entity sustainability reports. The concept of partial organising is used to frame the analysis.
Findings – Accounting, in the form of planning, verification, target setting, annual review and reporting, can be used to create a membership and a reporting boundary. Accounting tools and techniques support the scheme's standard-setting and monitoring elements. The study demonstrates that the scheme offers innovation in how sustainability reporting is managed. However, it does not currently provide a cumulative assessment of the effect of the sector's activity on ecological carrying capacity or connect this activity to global sustainability indicators.
Research limitations/implications – Future research can build on this study's insights to further develop our understanding of multi-entity sustainability reporting and accounting's role in organising for sustainability. The authors identify several research avenues including: boundary setting in ecologically significant sectors, integrating global sustainability indicators at sectoral and organisational levels, sustainability controls in multi-entity settings and the potential of multi-entity reporting to provide substantive disclosure.
Originality/value – This paper provides insight into accounting's role in boundary setting for a multi-entity sustainability initiative. It adds to our understanding of the potential of a multi-entity reporting boundary to support connected measurement between corporate activity and global sustainability indicators. It builds on work on partial organising and provides insight into how accounting can support this form of organising for sustainability.

Keywords Multi-entity reporting, Boundaries, Sustainability reporting, Agrifood sector, Partial organising, Agrifood sustainability scheme

Paper type Research paper

1. Introduction

The global agrifood sector has significant impacts in the areas of human rights, fair labour, land use, waste, water cycles, climate change and animal rights (Oteros-Rozas *et al.*, 2019). It has direct and measurable impacts on several planetary boundaries (Bebbington and

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Larrinaga, 2014; Schaltegger, 2018; Spence and Rinaldi, 2014) including biogeochemical flows, land-system change and the hydrological cycle (Rockström *et al.*, 2009). Nature and ecological changes also have significant impacts on the sector, particularly on farm enterprises (Ndemewah *et al.*, 2019). The sector could be part of the solution to complex, non-linear challenges (often termed grand challenges) including climate change, biodiversity, hunger and poverty (Moser *et al.*, 2021). New forms of organisations and organising [1] are emerging in many spheres, including the agrifood industry, to address these challenges (Bebbington and Unerman, 2020; Bodin, 2017; Etzion, 2018; Kaufmann and Danner-Schröder, 2022; Ostrom, 2012). These diverse forms of organising, including multi-entity initiatives, can tackle or reinforce these issues (Gümüsay *et al.*, 2022). Multi-entity accounting and reporting, particularly in ecologically significant sectors, has the potential to align corporate activity with global ecological and societal indicators and discharge accountability to a broad range of stakeholders (Antonini *et al.*, 2020; Bebbington *et al.*, 2019; Gibassier and Alcouffe, 2018; Miles and Ringham, 2020; Schaltegger, 2018). There is a growing stream of research in the organisation and management field on organising for grand challenges and recent calls for research in this area in the accounting literature (Annisette *et al.*, 2023; Busco *et al.*, 2023). However, relatively little is known about sustainability accounting and reporting at multi-entity level and its role in organising for sustainability. This paper examines how accounting is used to set a boundary around a multi-entity sustainability initiative (anonymised as FoodSmart) for the agrifood sector of a European country. In doing so it responds to calls for research on boundaries and boundary setting in sustainability accounting (Antonini *et al.*, 2020) and innovative accounting tools for sustainability (Schaltegger *et al.*, 2017).

Building on Rasche *et al.* (2013), we suggest that organising for sustainability can take both complete and partial forms: managing sustainability at organisational level (complete) and developing and participating in multi-entity initiatives such as sustainability standards and schemes (partial). We view FoodSmart as a novel form of partial organising for sustainability involving a broad range of agrifood entities. This study examines how accounting tools and techniques [2] are used to create and support membership and reporting boundaries for this form of organising for sustainability. Boundary setting has an important role to play in the visibility of an organisation's social and environmental impacts (Archel *et al.*, 2008; Miles and Ringham, 2020). The expansion of reporting boundaries beyond the traditional boundary of financial control – across, for example, multi-tiered supply chains – could increase corporate accountability for their sustainability impacts (Antonini *et al.*, 2020; Miles and Ringham, 2020). Organisational boundaries are coming under increasing scrutiny from supranational bodies, governments, regulators, NGOs and others (Antonini *et al.*, 2020; Bayne, 2022; Ringham and Miles, 2018). Yet, boundaries are rarely the subject of accounting research (Antonini *et al.*, 2020; Bayne, 2022; Miles and Ringham, 2020) and research to date has focused primarily on reporting boundaries around a single entity [3]. This paper contributes to the literature on sustainability accounting in three ways. First, it contributes to our understanding of the role of accounting in boundary setting for a multi-entity sustainability initiative. Second, it adds to our understanding of the potential of a multi-entity reporting boundary to support connected measurement between corporate activity and global sustainability indicators. Third, we modestly extend Rasche *et al.*'s (2013) work on partial organising for corporate social responsibility to the area of sustainability in the agrifood sector and provide insight into how accounting can support this form of organising for sustainability.

2. Literature review

2.1 Multi-entity accounting and reporting

Sustainability accounting research focuses largely on single entities (Bebbington *et al.*, 2019; Russell *et al.*, 2017), although a small number of studies have considered multi-entity

accounting and reporting. In a series of papers, Bebbington and colleagues illustrate the complexities of accounting and accountability for the activity of transnational corporations in the global seafood sector (Bebbington *et al.*, 2019; Blasiak *et al.*, 2021; Österblom *et al.*, 2022a, b). The authors document the development of the Seafood Business for Ocean Stewardship (SeaBOS) initiative, a coalition of the world's largest seafood companies. Their work highlights the difficulty of tracing environmental impacts to individual actors in a sector (Bebbington *et al.*, 2019) and corporations' reluctance to agree to science-based goals and to be held individually accountable (Österblom *et al.*, 2022b). Studies by Georgakopoulos and Thomson (2008) on the Scottish salmon farming industry and Russell and Thomson (2009) on the possibility of accounting for a sustainable Scotland also provide some insight into multi-entity initiatives and sustainability accounting. Russell and Thomson (2009) argue that accounting can be used to make aspects of sustainability "thinkable" and "governable". This suggests that there is potential for the more powerful actors in a sector to use the sustainability accounting process to influence other actors' behaviour. Georgakopoulos and Thomson (2008, pp. 1136-1137) found that social reporting practices were "explained by power differentials" and that salmon farming organisations' social reports "were designed to allow others to monitor compliance with voluntary and regulatory standards". The Scottish Salmon Growers Association gathered data on behalf of its members and used the reports to, among other things, lobby for regulatory reform. Georgakopoulos and Thomson suggest that the association sought to address what it saw as a power imbalance between producer organisations and political institutions and regulators. However, these studies do not explicitly consider boundaries, and little is known about how boundaries are expanded around such initiatives, the role of accounting in this process and the associated reporting.

2.2 Boundaries

A boundary can be loosely defined as "that which marks the edges of an entity; what separates the 'inside' from the 'outside', or a 'subject' from the world of 'objects'" (Roberts, 2021, p. 2). Boundaries function both as thresholds and as binding structures, separating the inside of an entity from the outside and maintaining the coherence and internal unity of the entity, respectively (Llewellyn, 1994; Power, 2018). Multiple types of boundaries can be determined: a boundary can be physical, such as planetary boundaries, or socially constructed, such as cultural or political boundaries. Boundaries are discussed across multiple fields, from geographic boundaries and borders (Newman, 2006) to culture and identity (Ryen and Silverman, 2000). They can be interrelated with flows, such as materials, services, information, financial interactions and waste, siphoned through multiple boundaries (Sarkis, 2012). Organisational boundaries are generally set in line with corporate ownership/control. This defines the membership of the organisation (the entities, e.g. subsidiaries or franchises, that are inside or outside the organisation's boundaries) and the limits of an organisation's accountability and responsibility (Antonini *et al.*, 2020; Miles and Ringham, 2020).

2.3 Organisational boundaries and sustainability

Organisational boundaries may or may not be well-aligned with an organisation's operating reality and/or social and environment impacts (Antonini and Larrinaga, 2017; Archel *et al.*, 2008; Kaspersen, 2013). Given the voluntary nature of sustainability reporting guidelines, organisations have significant control over their reporting boundaries and carefully define and delimit these boundaries (Egels-Zandén, 2017; Ringham and Miles, 2018). In setting their reporting boundaries, corporations can determine the entities that are included in a reporting entity, the sustainability issues and performance portrayed, and the activities stakeholders may reasonably expect an organisation to report on (Antonini and Larrinaga, 2017; Antonini *et al.*, 2020; Egels-Zandén, 2017; Miles and Ringham, 2020). In doing so, they can omit the

majority of their impacts whilst claiming that they are comprehensively reporting in line with reporting guidelines (Archel *et al.*, 2008; Miles and Ringham, 2020). Responsibility for corporate actions and impacts outside an organisation's boundaries can be constructed as someone else's (Antonini *et al.*, 2020; Egels-Zandén, 2017). For example, accounting can be used to define spatial boundaries based on a reporting entity's geographical location. This can disconnect the entity's impact from global indicators like planetary boundaries, resulting in problem displacement and problem shifting (Larrinaga and Garcia-Torea, 2022). Thus, boundary setting for sustainability reporting is fundamental to the nature, scope and content of reporting. Different boundaries could offer completely different pictures of the sustainability performance of not just an organisation but whole sectors (Antonini and Larrinaga, 2017; Antonini *et al.*, 2020; Miles and Ringham, 2020). In transcending the organisation's formal boundaries, sector sustainability schemes may trigger the expansion of the traditional boundaries of accounting and reporting and allow for multi-entity reporting (Antonini *et al.*, 2020; Bebbington *et al.*, 2019; Schaltegger, 2018). However, to the best of our knowledge, in accounting research, boundary setting has been studied primarily from the perspective of reporting on a single organisation or a group of organisations with common ownership or control. Although reporting boundaries can be expanded to include, for example, upstream and downstream impacts of the supply chain, outsourced activities and life-cycle assessments, in practice organisations are slow to do so (Antonini and Larrinaga, 2017; Antonini *et al.*, 2020; Bayne, 2022).

In addition, there remains the core issue that single-entity actions and measurement may not be sufficient to address systemic sustainability challenges (Gray and Milne, 2002; Whiteman *et al.*, 2013). Gray and Milne (2002) argued, more than two decades ago, that we need to consider the cumulative effect of multiple organisations on ecological and social systems. Connected measurements across boundaries, from organisational to sectoral to national and then global level is also needed (Green, 2013; Ostrom, 2012). Yet, the field of sustainability accounting and reporting has remained intensely focused on single-entity actions and disclosures (Brown and Dillard, 2013; Michelon *et al.*, 2020; O'Dwyer and Unerman, 2016). The FoodSmart initiative involves multiple, diverse agrifood entities. It attempts to account for, and report on, the cumulative impacts of an ecologically significant sector by collating data from across the supply chain. Thus, it represents an important opportunity to examine multi-entity sustainability accounting and reporting and its role in organising for sustainability and connected measurement. We build on Rasche *et al.*'s (2013) partial organising concept to examine the role of accounting and reporting in this context.

2.4 Partial organising

Ahrne and Brunsson (2011) suggest that complete or formal organising involves four elements – membership, hierarchy, rules, and monitoring and sanctioning. Membership refers to who is allowed to join the organisation. Hierarchy obliges members to comply with central decisions. Rules are set for members, and compliance with these rules is monitored. Positive and negative sanctions can be applied. Partial organising takes place outside the organisation's formal boundaries. It involves multiple and diverse actors – firms, national and supranational institutions, producers, regulators, industry bodies and individuals (Rasche *et al.*, 2013) and can enable both the crossing and the creation of boundaries (Ahrne and Brunsson, 2011; Reinecke *et al.*, 2012; Sandholtz, 2012). Rasche *et al.* (2013) argue that organisations engage with corporate social responsibility through both complete and partial organising. Building on this work, we suggest that organising for sustainability can take both complete and partial forms: managing sustainability at organisational level (complete) and developing and participating in multi-entity initiatives such as sustainability standards and schemes (partial).

2.5 Partial organising for sustainability in the agrifood sector

Partial organising for sustainability is increasingly evident (Bodin, 2017; Etzion, 2018; Ostrom, 2012), with over 400 private sustainability initiatives in the agrifood sector alone (Von Hagen *et al.*, 2010). There is a long history of benchmarking and codes of practice in this sector (Jack, 2009; Van Der Vorst, 2005), often driven by powerful stakeholders such as large retailers. National governments have introduced a range of initiatives to tackle environmental issues and sustainability in the sector including certification schemes, schemes to encourage nature preservation on farms and quantitative targets, for example to control nutrient levels in soils (Jack, 2009). More recently, transnational sustainability schemes and standards for the sector have emerged. These schemes usually focus on a specific resource/product such as palm oil, soy or coffee, or on a particular issue like animal rights or fair prices for producers (Hale and Roger, 2014; Perez *et al.*, 2019). They include large global initiatives such as the Roundtable on Sustainable Palm Oil (RSPO), Marine Stewardship Council (MSC) and Roundtable on Sustainable Soy (RTSS). These initiatives bring together multiple organisations with a level of collective governance and accounting to coordinate the design, membership, rules and monitoring of these schemes, and standards (Meemken *et al.*, 2021; Slager *et al.*, 2012), but their accounting and reporting does not necessarily go beyond single-entity boundaries.

FoodSmart is self-described as "a sustainability programme for the national food and drink industry" (SC, 2015, p. 2). The semi-state body responsible for the international promotion of the agrifood sector, anonymised as Scheme Coordinator (SC), launched the FoodSmart scheme in 2012. It published Sustainability Reports in 2015 and 2016, followed by a Progress Update Report in 2020. SC is responsible for the scheme's ongoing management. The scheme involves multiple and diverse actors: primary producers, manufacturers, retailers and food service providers. SC has developed an environmental auditing and GHG foot-printing process for primary producers across the sector, including livestock, horticulture and fisheries. To be part of the scheme, producers are required to meet certain standards. SC also works with manufacturers, retailers and service providers who sign up to the scheme (members) to develop their environmental management accounting process and sustainability-related targets (including some minimum targets). Thus, several of the elements of organising (membership, rules and monitoring, and sanctioning) are present within the scheme, and we view FoodSmart as a form of partial organising for sustainability in the agrifood sector.

2.6 Partial organising and accounting

Rasche *et al.* (2013) argue that, as partial organising happens outside formal organisational boundaries, it creates challenges in relation to several elements of organising, including membership, monitoring and sanctioning. Membership can be based on participants having to sign up to join the "club" or ignored completely (Rasche *et al.*, 2013). Voluntary membership can lead to a weak form of organising, which needs to be supplemented by sanctions (Ahrne and Brunsson, 2011). However, Widerberg and Pattberg (2017) found that these sanctions are rarely applied. In addition, Wijen and Chiroleu-Assouline (2019) note that a diverse membership, including private, public and civil society actors, often results in tensions and conflict. The interests of more economically powerful members can be privileged, sidelining marginalised stakeholders, such as NGOs or indigenous peoples (Pichler, 2013). The proliferation of voluntary schemes led by powerful private actors has allowed the rules to be defined by those who agreed to abide by them (Giamporcaro and Gond, 2016; Perez *et al.*, 2019). As Reinecke and Ansari (2015) point out, this can lead to the initiative failing to achieve its objective(s). Stakeholders can also challenge the legitimacy of the initiative and its members (Schouten and Glasbergen, 2011; Slager *et al.*, 2012). A further concern is that these

initiatives could undermine international agreements, privileging soft ecological and social targets at the expense of more stringent regulation (Hickmann, 2017; Thistlethwaite, 2015).

The monitoring and reporting of member performance and the cumulative impact of the initiative are also problematic (Pattberg *et al.*, 2018; Utting and Zammit, 2009; Wijen, 2014). Widerberg and Pattberg (2017) found that data can be difficult to source. There can be a lack of methodological consistency across different initiatives that purport to measure the same thing. As Andrew and Cortese (2011) note, the benchmark for "good" corporate carbon performance, for example, varies widely. In addition, it is often unclear who is responsible for measuring and reporting on performance and enforcing sanctions if required (Pattberg *et al.*, 2018). Arguably, accounting has a role to play in both creating and addressing these challenges.

Prior work has argued that both financial accounting and management accounting have a role to play in boundary setting and maintenance at organisational level (Llewellyn, 1994; Power, 2018; Roberts, 2021). Accounting is implicated in both the binding and the threshold functions of boundaries (Llewellyn, 1994; Power, 2018; Roberts, 2021). Power (2018) argues that an entity assumption underpins modern accounting and shapes the (non)recognition and accounting of exchanges between the entity and its environment. In this way, accounting has a significant role to play in constructing thresholds, not only representing an entity but also performing it as a defined and formal accounting entity (Llewellyn, 1994; Power, 2018; Roberts, 2021). It delimits the physical/spatial and financial limits of an entity, defining what is internal and what is external, and what passes between the two as a transaction (Llewellyn, 1994; Power, 2018; Roberts, 2021). Accounting is also implicated in the binding functions of boundaries. Accounting tools and techniques can act like a magnet drawing together entities that do not share common ownership or legal boundaries: key performance indicators, for example, can align and integrate entities within a supply field (Thrane and Hald, 2006). The attention-directing, performance-monitoring and information-coding functions of accounting can contribute to the internal coherence or fragmentation of an entity (Llewellyn, 1994; Thrane and Hald, 2006) and shift the territorial boundaries of what is accounted for within an entity's boundary (Cuckston, 2017).

3. Research methods

The study adopts a context-sensitive approach that considers the wider agrifood context in which the FoodSmart scheme and accounting are situated (Antonini *et al.*, 2020; Ferguson *et al.*, 2016; Milne *et al.*, 2009). This approach recognises the infrastructure of global, transnational and national accounting frameworks in the agrifood sector and the broader social, political and environmental context in which the FoodSmart initiative has evolved. Several types of documentary data were gathered relating to the period 2012 (when FoodSmart was first proposed) to 2020. Gathering documentary data over time allowed us to consider the evolution of the scheme and reporting, the broader context around the Foodsmart scheme (Moog *et al.*, 2015) and the complex set of interactions involved in multi-entity boundary setting and reporting for sustainability (Eisenhardt *et al.*, 2016; Gatignon and Capron, 2023; Reinecke *et al.*, 2012). In addition, we have built our knowledge of the FoodSmart case over several years, including through discussions with SC staff, NGOs and sector experts, and attendance at SC and industry events and seminars.

3.1 Documentary data

Three types of documentary data were gathered and analysed for the study. Documents analysed are detailed in Table 1.

1. *Agrifood sustainability accounting and reporting*	
Transnational	○ FAO and UNSD (2020), System of Environmental-Economic Accounting for Agriculture, Forestry and Fisheries, SEEA AFF. FAO, Rome, https://doi.org/10.4060/ca7735en ○ IPCC (Intergovernmental Panel on Climate Change). (2006), 2006 IPCC Guidelines for National Greenhouse Gas Inventories, Prepared by the National Greenhouse Gas Inventories Programme, Eggleston, S.H., Buendia, L., Miwa, K., Ngara, T. and Tanabe, K. (Eds), Institute for Global Environmental Strategies (IGES), Japan ○ IPCC (Intergovernmental Panel on Climate Change). (2019), 2019 Refinement to the 2006 IPCC Guidelines for National Greenhouse Gas Inventories, Calvo Buendia, E., Tanabe, K., Kranjc, A., Baasansuren, J., Fukuda, M., Ngarize, S. *et al.* (Eds), IPCC, Switzerland ○ United Nations General Assembly (UNGA). (2021), Global indicator framework for the Sustainable Development Goals and targets of the 2030 Agenda for Sustainable Development. UNGA, New York
National	○ European Commission. (2023), Sustainable development in the European Union–Monitoring report on progress towards the SDGs in an EU context - 2023 edition, available at: https://ec.europa.eu/eurostat/web/products-flagship-publications/w/KS-04-23-184 (accessed 28 June 2023) ○ United Nations Framework Convention on Climate Change (UNFCCC). (2009), UNFCCC resource guide for preparing the national communications of Non-Annex I Parties, UNFCCC, Bonn
Sectoral	○ Organisation for Economic Cooperation and Development. (OECD) (2013), Food Waste, available at: https://stats.oecd.org/Index.aspx?DataSetCode=FOOD_WASTE (accessed 28 June 2023) ○ Organisation for Economic Cooperation and Development (OECD) (2017), Generation of Waste by Sector, available at: https://stats.oecd.org/Index.aspx?DataSetCode=WSECTOR (accessed 28 June 2023) ○ OECD (Organisation for Economic Cooperation and Development). (2019), Trends and Drivers of Agri-Environmental Performance in OECD Countries, OECD, Paris ○ The Economics of Ecosystems and Biodiversity (TEEB). (2018), Measuring what matters in agriculture and food systems: a synthesis of the results and recommendations of TEEB for Agriculture and Food's Scientific and Economic Foundations report, UN Environment, Geneva ○ UNFAO. (Food and Agriculture Organization of the United Nations) (2020), Sustainable Food Systems: Concept and Framework, FAO, Rome
Organisational	○ Capitals Coalition (2020), Draft TEEB for agriculture and food: Operational guidelines for business, available at: https://capitalscoalition.org/wp-content/uploads/2020/08/DRAFT-TEEBAgriFood-Operational-Guidelines.pdf (accessed 28 June, 2023) ○ Global Reporting Initiative (GRI) (2021), Sector standard project for agriculture, aquaculture, and fishing. Available at: https://www.globalreporting.org/standards/standards-development/sector-standard-project-for-agriculture-aquaculture-and-fishing/ (accessed 28 June, 2023) ○ Greenhouse Gas Protocol (2021), GHG Protocol Agricultural Guidance, World Resources Institute, Washington, DC ○ Science Based Targets (2021), Forest, Land and Agriculture (FLAG), available at: https://sciencebasedtargets.org/sectors/forest-land-and-agricultur (accessed 28 June, 2023)
2. *Agrifood policy*	
	○ European Union EU (2008), Sustainable consumption and production and sustainable industrial policy action plan – council conclusions, Council of the European Union, Brussels ○ European Commission (2019), The European Green Deal, European Commission, Brussels ○ European Commission (2020), A Farm to Fork Strategy for a fair, healthy and environmentally-friendly food system, European Commission, Brussels ○ European Commission (2020a), EU Biodiversity Strategy for 2030: Bringing nature back into our lives, European Commission, Brussels ○ European Commission (2021), The Common Agricultural Policy at a glance, available at: https://ec.europa.eu/info/food-farming-fisheries/key-policies/common-agricultural-policy/cap-glance_en (accessed 28 June, 2023) ○ National Agrifood Ministry (2010), National Food Policy 2020, Agrifood Ministry ○ National Agrifood Ministry (2015), National Food Policy, Agrifood Ministry ○ National Agrifood Ministry (2020), Climate and Agrifood Report, Agrifood Ministry ○ National Agrifood Ministry (2021), National Food Policy 2030, Agrifood Ministry

Table 1.
Documentary data

(*continued*)

3. *FoodSmart scheme*

Reports	○ SC (2015), FoodSmart Sustainability Report 2015, SC
	○ SC (2016), FoodSmart Sustainability Report 2016, SC
	○ SC (2020), FoodSmart Progress Update Report, SC
Charters	○ SC (2017), Manufacturing Sustainability Charter, SC
	○ SC (2017a), Retail and FoodService Sustainability Charter, SC
Other	○ SC (2012), Statement of Strategy 2012–2014, SC
	○ SC (2016a), 2015–2016 Export Performance and Prospects, SC
	○ SC (2016b), Statement of Strategy 2016–2018, SC
	○ SC (2018), Member Seminar Slides –Sustainable Packaging, SC

Source(s): Author's own creation/work

Table 1.

3.1.1 Agrifood sustainability accounting and reporting. This stage of the documentary data collection was guided by prior studies that identify sustainability indicators in the agrifood sector at global, national and sectoral level (Dickens *et al.*, 2019; Gerten *et al.*, 2020; Häyhä *et al.*, 2016; Heck *et al.*, 2018). We collected documents produced by key regulatory/standard-setting bodies such as the EU, UN and OECD. Searches using Google and Google Scholar were carried out for documents in the following categories.

(1) Emerging frameworks for sustainability accounting at multi-entity level, particularly in the agrifood sector

(2) Quantitative data relating to the agrifood sector's environmental impact

(3) Existing organisational sustainability accounting frameworks, e.g. Global Reporting Initiative (GRI), Science-Based Targets (SBTs).

We also conducted a number of general searches for the terms "sectoral sustainability accounting OR reporting AND Agrifood" and "supply chain sustainability accounting OR reporting AND Agrifood" to identify any relevant documents that did not fall into the three categories above. Analysis of these documents focused on identifying any connected measurements between the various levels. We tracked and described instances of connected measurement in each framework, model, report or dataset in Excel sheets and Word documents.

3.1.2 Agrifood policy. We collected documents relating to agrifood sustainability policy in the European country in question and at supranational level – both EU and global – including the performance measurement mechanisms used at national and international level. Table 1 lists the reports identified through search engines and discussions. We carried out further searches to find other relevant reports. We carefully read and discussed these documents to enable us to develop a deeper understanding of the (socio-historic) context in which FoodSmart operates.

3.1.3 FoodSmart scheme. We gathered documents relating to the FoodSmart sustainability scheme through several detailed reviews, conducted independently by both authors in 2016, 2018 and 2020, of the FoodSmart website. These included scheme charters, strategy statements, annual reports and other scheme documents.

Both authors carefully and repeatedly read these documents. In addition, specific data in the annual reports, relating to membership and reporting boundaries, target setting, multi-entity performance data, accounting tools and techniques and connections to global indicators, was identified and coded. Codes were developed in an iterative manner and established in NVivo. Sentences were used as the coding units for narrative disclosure (Milne and Adler, 1999). Non-narrative disclosure, e.g. pictures, graphs, was coded using the

snapshot tool in NVivo. Both authors coded the reports independently. We carried out several sessions of consolidating codes and comparing the coded data to support confidence in inter-coder reliability. These sessions focused on disagreements and consolidating tree and sub-nodes, leading to a final dataset for analysis. Throughout this process, we remained open to any data that did not fit in or challenged the codes in the initial iterations of our analysis. To draw out themes from this data, an iterative analysis process was conducted. This involved going back and forth between the data and the literature on boundaries and sustainability reporting, gradually drawing out themes from the coding and comparing them with emerging theoretical insights (Eisenhardt *et al.*, 2016). Along with information from our discussions with SC staff and attendance at SC events and seminars, this allowed us to map the accounting tools and techniques used in the scheme, analyse the scheme's boundaries and identify attempts at connected measurement.

4. Case context

The FoodSmart scheme was initially motivated by research commissioned by SC in 2008 on trade customers' sustainability requirements. This work pointed to the "need for the industry to be able to prove its credentials" (SC, 2015, p. 8). In SC's 2012–14 strategy statement, the key strategic drivers are the growth targets set out by the government in its national agrifood strategy, including export growth, value added and primary output growth. The statement points to global population rise and increased demand for food production. It highlights this as an opportunity for the sector, but also notes the tension between reducing GHG emissions and expanding global food production. FoodSmart was proposed as "an umbrella food brand with verifiable sustainability and quality credentials at its core" to address this issue (SC, 2012, p. 15). The purpose of the scheme in the 2016–18 strategy statement is: "To enhance the reputation, based on the principles of sustainable development, of [nationality] food, drink and horticulture, among consumer and trade buyers in the marketplace" (SC, 2016, p. 5). Currently, 95% of agrifood manufacturers and up to 92% of producers in the country participate in the scheme.

FoodSmart has developed against the backdrop of increasing media, policy and civil society attention on the environmental impacts of the agrifood industry. Nationally, agrifood is the most greenhouse gas (GHG) intensive sector, responsible for over a third of annual national GHG emissions. It is also crucial to the economic and social fabric of the country, accounting for at least 10% of total exports and supporting approximately 250,000 jobs. FoodSmart has been the subject of regular criticism from NGOs and recently from the country's Environmental Protection Agency (EPA). These criticisms include the tension between the national government's continued ambitious growth targets for the agrifood sector and its climate action plan. The action plan includes a Net Zero by 2050 national GHG emissions target and national sustainable development goals (SDGs). They also point to the sector's considerable environmental impacts in areas such as water, waste and air pollution.

The sector faces contradictory economic and sustainability pressures from multiple stakeholder groups. National producer and industry associations historically had a significant influence on agrifood policy. They are now engaged in fierce media debates with NGOs and extensive lobbying of both the agrifood and environment government departments. Policy impacting the sector's economic and sustainability aspects is evolving rapidly. Some of these policies could have significant economic impacts for producers. The EU's 2020 Farm to Fork and Biodiversity strategies include targets such as a 50% reduction in pesticide and chemical use and the organic farming of 25% of the EU's agricultural land by 2030. If implemented fully, the Farm to Fork measures could reduce agricultural crop production by 20% (Noleppa and Cartsburg, 2021). Under the EU's updated Common Agricultural Policy (CAP), farmers will be subject to an "active farmer" check by their national government before they qualify for direct payments, which many producers rely on

for economic stability. The balance of power in the agrifood supply chain has historically favoured large companies, particularly supermarkets, at the expense of producers, who often struggle economically due to pressure from retailers to reduce prices (Bowman *et al.*, 2013; Jack *et al.*, 2018). Tensions within the industry are likely to escalate in the coming years. In December 2022, Farm to Fork was re-evaluated in the context of the agrifood supply chain issues caused by the 2022 war in Ukraine. Meanwhile, forthcoming EU regulations on mandatory sustainability reporting will require an estimated 50,000 companies in the region to disclose an unprecedented level of environmental and social information.

FoodSmart exists within a complex sustainability accounting and reporting infrastructure. A number of voluntary single-entity sustainability accounting and reporting frameworks, including GRI Guidelines, Greenhouse Gas Protocol and SBTs, provide specific guidelines for companies in the agrifood sector. Guidelines for agrifood companies have also been developed by The Economics of Ecosystems and Biodiversity (TEEB), in conjunction with the Natural Capital Coalition. TEEB has also developed a sectoral framework for evaluating the social and environmental impacts of agrifood systems, incorporating stocks, flows, outcomes and impacts. Other sectoral frameworks are provided by the UN's Sustainable Food Systems framework (UNFAO, 2020) and the OECD's agri-environmental indicators (OECD, 2019). At national and global level, nation states measure and report progress annually on key environmental or social indicators through multilateral treaties such as the UN Framework Convention on Climate Change (UNFCCC) and the UN's SDGs. Arguably, the most sophisticated system is UNFCCC's GHG accounting and reporting. This links transnational and national emissions through methodologies developed by the Intergovernmental Panel on Climate Change (IPCC, 2006, 2019). The UNFCCC framework also enables sectoral accounting: emissions are allocated to the sector that produces them, including the AFOLU sector – agriculture, forestry and land use (IPCC, 2006).

In this case, the EPA produces annual sectoral data for the agrifood sector for several of these environmental indicators, some of which are connected to national UNFCCC reporting. Sustainability scientists have developed models to scale the planetary boundaries framework to the agrifood sector globally (Gerten *et al.*, 2020; Heck *et al.*, 2018) but not nationally, as is the case with the UNFCCC methodology. Separately, the UN's System of Environmental-Economic Accounting (SEEA) (United Nations, 2014) links physical ecological flows including water, materials and waste to nation-state ecological accounting and provides a specific framework for the agrifood sector (FAO and UNSD, 2020). Figure 1 details the sustainability accounting and reporting frameworks in the agrifood sector and indicates areas of connection between the various frameworks.

5. Case narrative

Accounting and reporting for the FoodSmart scheme involves collecting and collating data on a range of environmental and social indicators from primary producers, manufacturers, retailers and food service providers. The data is aggregated in the FoodSmart reports published on SC's website. SC's accounting tools and techniques both reflect and construct the membership and reporting boundaries for the scheme. The scheme's operation, accounting and reporting is illustrated in Figure 2. These tools and techniques (detailed in the callout boxes in Figure 2) define the threshold for scheme membership and draw the members together. They also define the FoodSmart scheme as a formal accounting entity (Llewellyn, 1994; Power, 2018; Roberts, 2021) and create its reporting boundaries. As the membership and reporting boundaries expand, the tools and techniques, in particular the reports, reflect this expansion. Table 2 details the scheme membership, topics, targets and data reported in the FoodSmart reports (See Figure 2).

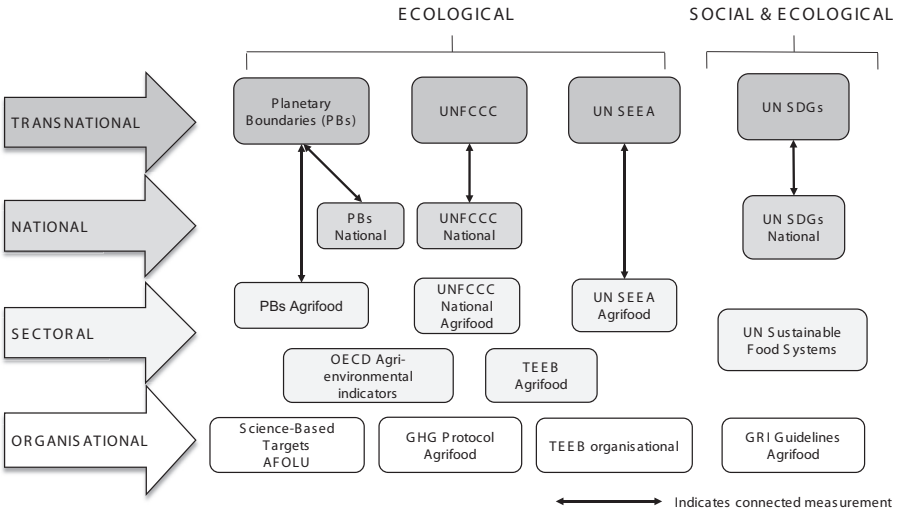


Figure 1.
Sustainability accounting and reporting frameworks in the agrifood sector

Source(s): Author's own creation/work

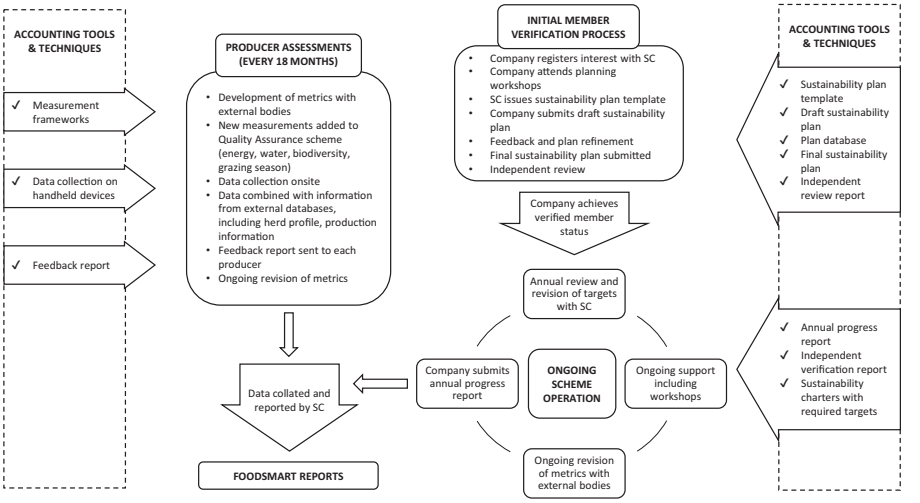


Figure 2.
FoodSmart scheme operation, accounting and reporting

Source(s): Author's own creation/work

5.1 Membership boundary

The membership boundary determines the agrifood organisations and producers that are part of the FoodSmart scheme. The scheme's membership boundaries expanded continually over the course of the study as more members, producers and supply-chain stages were added. The reports carefully document this expansion (see Table 2).

The process for setting the membership boundaries is different for member companies and producers. Companies must be verified through an initial planning and review process. Once this has been achieved, there is an annual reporting and verification process. The initial

	Sustainability report 2015	Sustainability report 2016	Progress update report
Report length	113 pages	128 pages	96 pages
Membership			
Supply chains stages	Producer Manufacturing	Producer Manufacturing Retail and Food service	Producer Manufacturing Retail and Food service
No. of producers audited	90,000	137,000	212,000
No. of members	Manufacturing (470)	Manufacturing (527) Retail and Food service	Manufacturing (587) Retail and Food service
No. of verified members	Manufacturing (122)	Manufacturing (218) Retail and food service (2)	Manufacturing (336) Retail and food service (10)
% of total food and drink exports	Almost 95% (members) 75% (verified members)	95% (members) 90% (verified members)	n/a
Topics			
	Environmental: ● Emissions ● Water ● Waste ● Energy ● Biodiversity ● Raw material sourcing Social ● Health and nutrition ● Community ● Employee wellbeing	Environmental: ● Emissions ● Water ● Waste ● Energy ● Biodiversity ● Raw material sourcing Social ● Health and nutrition ● Community ● Employee wellbeing	Environmental: ● Emissions ● Water ● Waste ● Energy ● Biodiversity ● Raw material sourcing ● Grassland Management ● Packaging Social ● Health and nutrition ● Community ● Employee wellbeing ● Farm health and safety Other ● Animal welfare
Targets			
No. of targets set	802 Biodiversity (46) Emissions (39) Energy (138) Raw materials (164) Social sustainability (208) Waste (119) Water (74)	1,649 Biodiversity (92) Emissions (53) Energy (252) Raw materials (395) Social sustainability (492) Water (139) Waste (232)	2,440 Biodiversity (103) Emissions (88) Energy (344) Raw materials (573) Social sustainability (659) Water (279) Waste (394)
Required targets (number)	Manufacturers: ● Raw materials sourcing (1) ● Manufacturing processes (1) ● Social sustainability (1)	Manufacturers: ● Raw materials sourcing (1) ● Manufacturing processes (2) ● Social sustainability (1) Retail and Foodservice: ● Sustainable sourcing (1) ● Operations (1) ● Health and nutrition (1) ● Social sustainability (1)	Manufacturers: ● Raw materials sourcing (2) ● Manufacturing processes (3) o Energy o Waste o Water ● Social sustainability (2) ● Health and nutrition Retail and Foodservice: ● Sustainable sourcing (2) ● Operations (3) ● Social sustainability (2)

(*continued*)

Table 2.
FoodSmart reporting 2015–2020: membership, topics, targets and data

	Sustainability report 2015	Sustainability report 2016	Progress update report
Data			
Intensity figures	Producers: ● Emissions ● Water Manufacturing ● Energy use ● Emissions ● Water use ● Waste	Producers: ● Emissions Manufacturing ● Energy use ● Emissions ● Water use ● Waste	Producers: ● Emissions Manufacturing ● Energy use ● Water use ● Waste Retail and Food service ● N/a
Absolute figures	Manufacturing: ● Energy use ● Emissions ● Water use ● Waste	Manufacturing: ● Energy use ● Emissions ● Water use ● Waste	

Source(s): Author's own creation/work

Table 2.

verification process functions as a threshold defining who is inside or outside the FoodSmart scheme. To be included, companies must produce a draft sustainability plan using a sustainability plan template provided by SC. The template has to be completed online using SC's database. Following submission of a company's draft plan, SC prepares a feedback report highlighting the areas that require further refinement. Several revisions of the plan may follow. The plan is then verified by an external assurance provider.

The producers' membership boundary is based on the SC's pre-existing quality assurance scheme. Additional measures (grazing season, fertiliser, feed, manure, housing, chemicals, energy, water and biodiversity) were added to the existing farm-assessment scheme. This on-farm data combined with carbon models developed by SC are used to disclose some limited aggregate carbon data in the FoodSmart report.

5.1.1 Setting and maintaining standards for members and producers. Once set, each member's targets are revised annually with SC. There is ongoing revision of targets in conjunction with external bodies such as the Carbon Disclosure Project and Carbon Trust. Each member company prepares an annual progress report, which is externally verified. Thus, SC requires all members to engage with initial and ongoing standardised planning, review and target setting. This facilitates the collation and reporting of aggregate data. Measurements from the progress reports are used to prepare the FoodSmart sustainability reports. Feedback reports for farmers are produced using data from the farm assessments, standards for producer membership of the scheme, information on herd profile and production information from external sources. The feedback report outlines the farm's current performance relative to its peers and its ranking based on the practices that influence its carbon footprint. The report also outlines the potential environmental and economic benefits of improved performance in areas where there is scope to do so.

5.1.2 Monitoring and sanctioning members. The ongoing monitoring of members is also supported by the annual review and target-setting process, along with the manufacturing and retail service charters. Through the charters, SC sets required targets in certain topic areas. The annual review process and ongoing support, such as workshops, introduce new topics and encourage or require members to engage with them. Standards are also evident here: members are encouraged to set targets in relation to all topics, but they are required to set at least one target in relation to a number of topics. The number of required targets per company has increased from three in 2015 to seven in the 2020 report. SC stipulates that one target must be a stretch target: "an ambitious target that represents a significant increase

over current levels of performance within a given area" (SC, 2020, p. 55). This requirement was consistent throughout the years of reporting.

A common criticism of sustainability schemes is that, as they are typically voluntary, there is little or no sanctioning for poor performance (Hickmann, 2017; Pattberg *et al.*, 2018). However, in the FoodSmart scheme we observe an element of sanctioning for producers, and the potential for sanctioning member companies. In the 2020 report, there is a notable change in tone in the section dedicated to producers, from one of inspiration and aspiration to one that is more authoritarian. This section becomes a discussion of what producers must do, designed to assure trade customers that best practice is followed, indicating the assertion of coercive power over producers. Producers who are not signed up to the sustainability assurance scheme forgo access to export opportunities in an industry that relies on export (previously this applied only to the quality assurance scheme for producers). Although members are not obviously subject to similar sanctions, the verification process ensures that members are only verified if they meet a certain standard. Existing members can be removed from the scheme if they do not comply with the ongoing target setting and annual progress reporting.

5.2 Reporting boundary

A reporting boundary determines the entities included in a report (entity boundary) and the sustainability issues and performance portrayed (topic boundary) (Antonini and Larrinaga, 2017; Antonini *et al.*, 2020; Egels-Zandén, 2017; Miles and Ringham, 2020). The scheme's reporting entity boundary is based on its membership boundary and encompasses manufacturers and producers – and some retailers and food service providers in the 2016 and 2020 reports. The member verification and annual review process and on-farm assessments are used to establish the reporting entity boundary and create mechanisms through which SC can collate and report aggregate data. The data included in each report relates to verified members and audited producers only. The reports disclose the scheme's membership and reporting entity boundaries: figures are given in the reports for members (those who have signed up to the scheme but have not yet completed the verification process) and verified members (those who have progressed through the target-setting and independent membership verification stages) (Table 2). For example, the 2016 report states that there are 527 registered companies (membership boundary) but 220 verified members (reporting boundary). The reports are also used to connect the scheme to other significant boundaries in the agrifood industry. The 2015 and 2016 reports explicitly link the scheme to the sector stating that verified members account for 75 and 90%, respectively, of total food and drink exports from the country. In the 2016 and 2020 reports, the FoodSmart scheme is explicitly linked to the supply chain, with connections shown between the farm, manufacturing and food service levels, and discussion of retail and food service members. Sub-sector boundaries are also set out in the reports at producer level, namely Beef, Dairy, Lamb, Pigs, Poultry, Horticulture, Seafood and Eggs, with a particular focus on Beef and Dairy in the producer sections. The 2015 and 2016 reports feature data on Beef and Dairy only, with Eggs and Horticulture added in the 2020 report. The 2016 report states that assurance schemes are under development for Lamb, Pigs, Poultry and Seafood, but these were not subsequently reported on in 2020. By 2020, producer audits account for 92% of beef production, 95% of dairy production, 95% of egg production and 70% of horticulture production. Reporting on performance, however, is restricted to intensity of GHG emissions per unit of production.

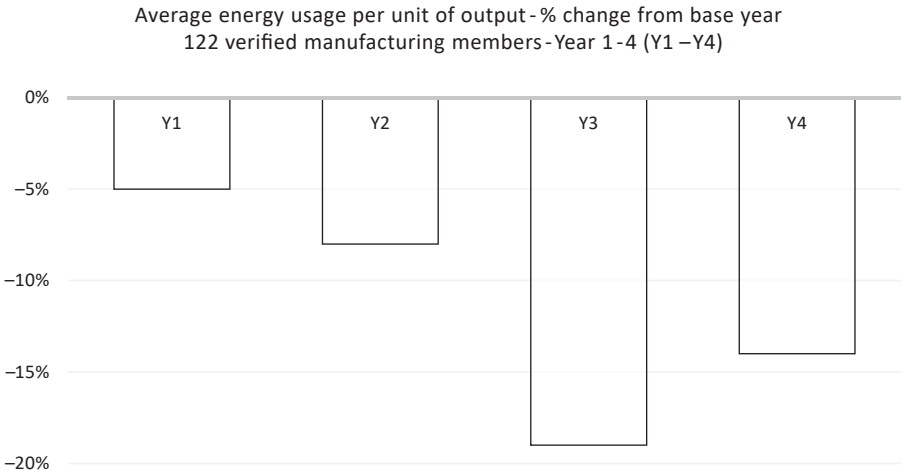
The accounting tools and techniques (for example, on-farm assessments, manufacturing and retail service charters, members' annual review and target setting) used to create and support the membership and the reporting boundary also support the topic boundary for the

reports, i.e. the sustainability issues and performance reported. Using the annual progress reports and the on-farm assessments, SC collects a wide range of data points for both producers and member companies involved in the scheme. Table 2 details the topics included in each report and the expansion of the topics covered by the scheme over time. The producer section of each report focuses on GHG emissions (all years), water (2015 and 2020) and biodiversity (all years). GHG emissions, specifically emissions per unit of beef and dairy, are reported every year. Water usage per unit for these products is reported in 2015 and 2020. In the 2020 report, three further topics are added: animal welfare, grassland management, and farm health and safety. No aggregate data at producer level is reported for any indicator in any of the FoodSmart reports. Manufacturing member companies are discussed under three headings: sourcing, manufacturing processes and social sustainability. The manufacturing processes section incorporates GHG emissions, energy, water, waste and biodiversity. Packaging is discussed in the 2020 report.

The FoodSmart reports present data on the targets set for each topic area, including the sub-topics within manufacturing processes – energy, emissions, water, waste and biodiversity – and reflect the expanding topic boundaries (see Table 2). Along with the reporting entity boundary, this allows for some multi-entity reporting on performance. An example of this is the aggregated absolute and intensity (per unit) data reported for members in relation to energy, water, waste and emissions in the 2015 and 2016 reports. Performance per sub-sector is also disclosed. Figures 3–5 present some anonymised graphs typical of the multi-entity reporting seen in the reports. All are based on graphs in the 2016 Foodsmart report and relate to 122 manufacturing companies. These companies were members of the scheme for the previous four years.

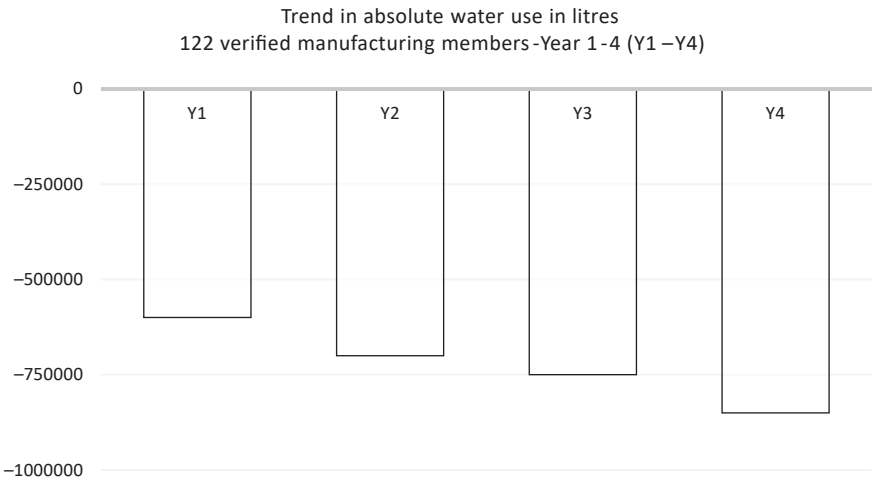
Figure 3 provides an example of intensity data. SC has calculated the change in average energy use per unit of output across the 122 members. The percentage decrease in energy intensity is shown relative to a common base year (year 0). Figures 4 and 5 present aggregated absolute data for the same companies.

Figure 4 shows a reduction in absolute water use, relative to year 0, across years 1–4 of the scheme.



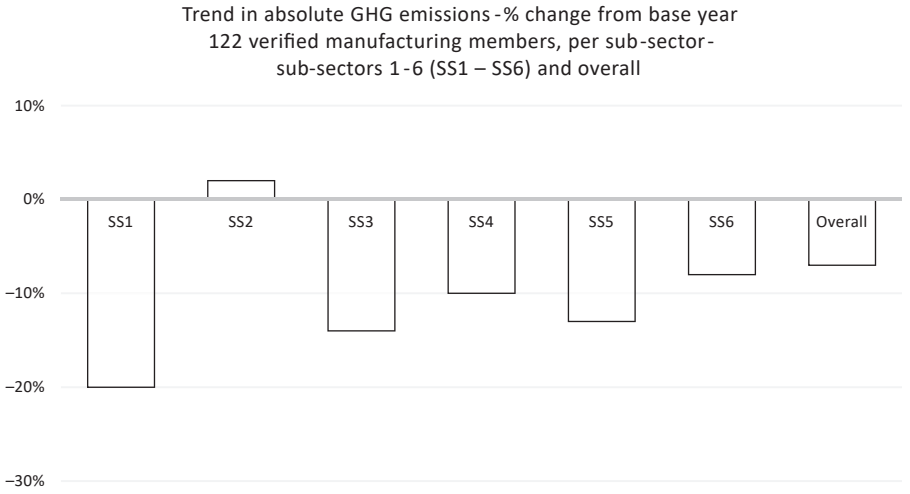
Source(s): Author's own creation/work

Figure 3.
Multi-entity reporting in the FoodSmart report – average energy use per unit of output (anonymised)



Source(s): Author's own creation/work

Figure 4.
Multi-entity reporting in the FoodSmart report – absolute water use (anonymised)



Source(s): Author's own creation/work

Figure 5.
Multi-entity reporting in the FoodSmart report – absolute GHG emissions (anonymised)

In Figure 5, the companies are broken down by sub-sector, with six sub-sectors identified. SC has aggregated year 4 GHG emissions data for the 122 companies and calculated the percentage increase or decrease in each sub-sector relative to year 0. The figure illustrates reduced absolute emissions in each sub-sector bar SS2. SS2 is the most emissions intensive sub-sector at producer level, accounting for almost half of the country's agrifood sector emissions. The report states that the increase in SS2 emissions corresponds with increased production in the sub-sector. Figure 5 also shows that, despite this outlier, a cumulative overall reduction in emissions was achieved across the 122 companies. The report does not specify whether these are Scope 1, 2 or 3 emissions. For manufacturing companies in the agrifood sector Scope 3 supply-chain emissions are by far the greatest source of emissions.

However, although members' required targets increase over time, less data is reported on the members' performance on these targets. In 2015 and 2016, some absolute data at multi-entity level was disclosed, including combined figures for verified members on energy usage, water usage, waste and emissions (see Figures 4 and 5). In 2020, only intensity data for these categories is reported. Emissions are discussed as part of the energy section and no emissions figures are provided. The 2015 and 2016 reports disclose data on both target setting and performance on targets. The 2020 report discloses data on target setting (number of targets set, examples of targets in each category and breakdowns of the types of targets set within each topic) rather than performance. There is further variability in the extent of the reporting for each category, depending on how many members set targets in that category. For example, in 2015 the raw materials category covers 122 verified members compared with 38 in the emissions category. Data on member companies is restricted to manufacturing companies. No data was reported for retail and food service members in the reports, aside from the number of targets set by member companies in 2020.

5.3 Connection to global and national indicators

Our analysis of sustainability accounting and reporting frameworks in the agrifood sector shows that connected measurement between global and national level is emerging, for example through frameworks such as UNFCCC emissions accounting. However, similar frameworks do not appear to exist to connect organisational activity with these indicators (Bebbington and Larrinaga, 2014; Howard-Grenville, 2021). Accounting and reporting at multi-entity level, through an initiative such as FoodSmart, has the potential to provide this missing link and connect global indicators and organisational impacts.

There are some attempts in the reports to engage with a number of frameworks or indicators at global, supranational and national level. Figure 6 illustrates the attempted connections between the FoodSmart reports and the global sustainability accounting and reporting frameworks identified in Figure 1. A mixture of global ecological and social indicators are mentioned, with little consistency across reports. The 2016 and 2020 reports explicitly reference the SDGs. In the 2016 report, it is suggested that FoodSmart aligns with

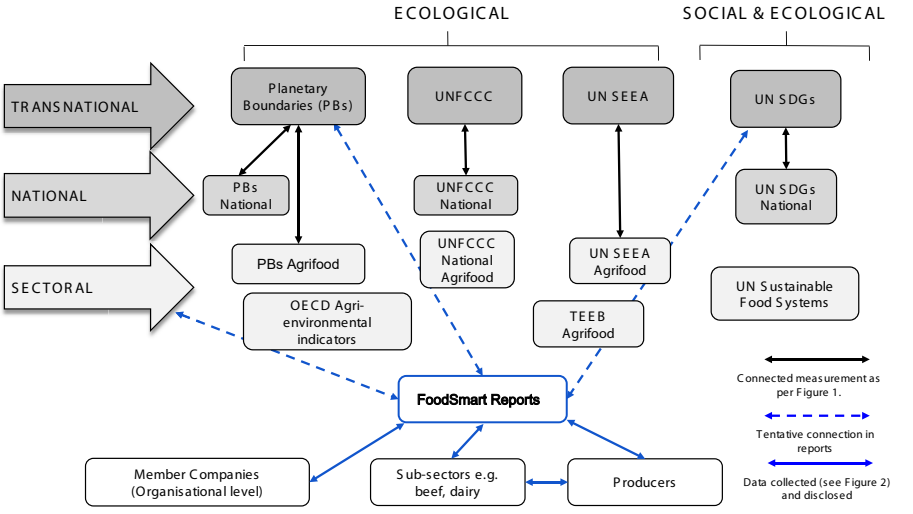


Figure 6.
Attempted connections between the FoodSmart reports and global frameworks

Source(s): Author's own creation/work

nine of the goals: Good Health and Wellbeing, Clean Water and Sanitation, Affordable and Clean Energy, Sustainable Communities, Responsible Consumption and Production, Climate Action, Life Below Water, Life on Land and Partnership. There are no details given on this alignment. The 2020 report states that FoodSmart now aligns with 15 of the 17 SDGs, with the addition of diversity and inclusion and packaging target areas for members. The report briefly describes how FoodSmart aligns with each SDG. It also disclosed that SC has joined the UN Global Compact to further support its engagement with the SDGs.

The reports do not refer explicitly to the planetary boundaries. However, they engage to an extent with six of the nine boundaries, with Freshwater use, Climate change and Biosphere integrity (in the form of biodiversity) discussed in relation to both producers and member companies. By the 2020 report, members are required to set targets for water use but not for GHG emissions or biodiversity. Novel entities are addressed through setting waste and packaging reduction targets for companies, and setting at least one waste target is mandatory. Biochemical flows are touched on through very brief mentions of nitrogen and phosphorus levels in water. Land-system change is addressed in the form of efforts to encourage forestry planting on farmland in 2015, but not in subsequent reports. The reports also refer to supranational policies and legislation such as the EU Nitrates and Water Framework Directives. At national level, GHG emissions from the agricultural sector and the national biodiversity plan are cited in all three reports. In the 2015 and 2016 reports, a direct link is made between the FoodSmart data and national emissions reported by the country's EPA. It is noted that raising the standard of GHG management on farms could result in a 3% (2015) and a 7% (2016) reduction in national emissions from the agrifood sector. Apart from this reference, the FoodSmart measurements are not explicitly connected with the EPA's national environmental data, despite the volume of data collected by SC and the extent of the sector covered by the scheme.

6. Discussion

6.1 Boundary setting, partial organising and accounting

The FoodSmart initiative represents what is to the best of our knowledge a unique attempt to account for sustainability at sectoral level in the agrifood industry. Sustainability accounting research has been concerned chiefly with the "central organising tendencies of economic entities" (Russell *et al.*, 2017, p. 1436). We need to reconsider the idea of the accounting entity from ecological and systems perspectives to recognise that human activity takes place within complex interconnected socio-bio-physical systems (Russell *et al.*, 2017). To do so, we need to move beyond the organisational boundary (Russell *et al.*, 2017) and consider the collective impacts of ecologically significant sectors (Bebbington *et al.*, 2019). The case narrative demonstrates how a membership and a reporting boundary (entity and topic) can be created for a multi-entity sustainability scheme in such a sector.

The FoodSmart case demonstrates that accounting, in the form of planning, verification, target setting, annual review and reporting, can be used to create a membership boundary and a subsequent reporting boundary. In line with Antonini *et al.* (2020), we find that these boundaries are not necessarily stable or completely settled. The membership, entity and topic boundaries of the scheme continually expand over the course of the study. The reports carefully document this expansion. Thus, in contrast to Antonini *et al.*'s (2020) study showing that corporations often fail to disclose how boundaries are set, the setting of the scheme's entity boundary is clearly disclosed. The sustainability charters, target setting and annual performance reviews play an instrumental role in expanding the topic boundaries for the report. They create visibility for new topics, such as packaging, as the scheme evolves. These tools along with the farm assessments create the potential to aggregate performance data for the sector. However, there is no substantive disclosure of performance evident in the reports

studied. This is consistent with Antonini *et al.*'s (2020) findings on the problematic nature of sustainability reporting boundary setting and the difficulties of aggregation and exclusion.

The accounting tools and techniques also support the standard-setting and monitoring elements of partial organising within the FoodSmart scheme. SC progressively expands the rules of the scheme and applies monitoring along with elements of sanctioning, enabled by the range of accounting tools and techniques employed in the scheme's operation (see Figure 2). However, in line with previous studies (Giamporcaro and Gond, 2016; Wijen, 2014), we observe that uneven power dynamics appear to have developed between SC, producers and member companies (manufacturers, retailers and food service organisations). Sanctions, or the threat thereof, are imposed in different ways for different scheme participants. In the case of producers, SC uses the threat of sanctions (being cut off from the export market) to oblige producers to join the scheme. Members are encouraged to join the scheme. The reports are used to record the expanding membership boundary of the scheme (see Table 2) and highlight the benefits for members, including the credibility provided by the extensive auditing and verification process. This suggests that the scheme reinforces the typical power relations of the agrifood sector, where companies exert coercive power over producers (Jack *et al.*, 2018).

6.2 Sustainability accounting and reporting innovation

The case narrative demonstrates that the FoodSmart scheme and reports offer some much-needed innovation in sustainability accounting tools (Schaltegger, 2018; Schaltegger *et al.*, 2017). The narrative demonstrates that accounting tools and techniques are implicated in setting and supporting both membership and topic boundaries for multi-entity sustainability reporting. The scheme brings together multiple actors at producer, manufacturer, and retail and food service levels (accounting for approximately 95% of the activity in the sector), and the reports have the potential to present a substantive account of social and environmental interactions in the agrifood sector. SC has developed an accounting system that supports the scheme's reporting entity and topic boundaries and allows data to be gathered and collated from multiple, diverse actors, including large manufacturers and small family farms. The earlier reports, particularly the 2015 report, provide some insight into what substantive multi-entity sustainability reporting could look like. For example, they provide some aggregate data for agrifood manufacturing companies' absolute GHG emissions. In addition, SC continually expands the topic boundaries. In effect, this iteratively creates a framework for sustainability reporting in the agrifood sector. In some ways, this framework goes beyond existing global indicators. Global indicators such as the planetary boundaries and SDGs are not definitive or infallible measures of progress towards sustainability (Bebbington and Unerman, 2018; Spangenberg, 2017). The planetary boundaries framework developed by Rockström *et al.* (2009) is wholly environmentally focused. It does not take into account, for example, the lived reality of producers in the agrifood sector. The FoodSmart reports include sections on issues such as economic sustainability for producers and animal welfare. These issues would not fall under the planetary boundaries framework but would be considered indicators of progress on the SDGs. Finally, the accounting process with a semi-state body (rather than powerful commercial actors) acting as coordinator of the increasingly broad range of stakeholders involved in the scheme is an additional innovation in sustainability accounting. SC has developed robust elements of the scheme around planning, review and verification. This illustrates the potential for sustainability controls to operate in a multi-entity setting and provides insight into the accounting tools and techniques required for this.

6.3 Connecting to ecological and social indicators

Currently, there is little understanding of how much-needed linkages between business activity and ecological and societal indicators can be created. Our analysis of emerging

agrifood reporting frameworks at multiple boundaries (see Figure 1) illustrates that there are some clear connections between national and supranational boundaries. These connections are supported by accounting and reporting mechanisms such as the UNFCCC GHG emissions reporting. It was more difficult to identify linkages between organisational reporting and national, sectoral or ecosystem boundaries. Arguably, multi-entity reporting at sectoral level has the potential to create connections across boundaries and link organisational reporting to sectoral, national and even ecological reporting. However, although creating a boundary enables connections to be made, that does not mean that they will be (Antonini *et al.*, 2020). FoodSmart is an attempt to create a sectoral boundary for economic activity that has global ecological impacts. The case narrative demonstrates that the FoodSmart reports tentatively engage with aspects of the planetary boundaries and the SDGs. However, they do not link scheme members' activity to these frameworks at either global or national level. SC highlights their close working relationship with the EPA. It links their targets to the EPA's GHG emissions data for the sector in the 2015 and 2016 reports, thereby linking national, sectoral and organisational reporting. But this linkage is absent from the 2020 report. The case narrative demonstrates that the sustainability reporting boundary has been extended only partially beyond single-entity reporting. There is inconsistent and incomplete disclosure of information year on year and no substantive connection to broader indicators such as the EPA's annual GHG emissions data for the sector.

The FoodSmart scheme is at present a patchwork, ground-up approach to multi-entity sustainability accounting and reporting, with limited engagement with sustainability indicators at national or global level. To report on sector level sustainability, it would be necessary to account for the cumulative ecological impact of activity in the sector. This would require the aggregation of data from multiple levels of a global supply chain, including agri-ingredients processing, farm, retail and food services, consumption and waste (Bebbington and Larrinaga, 2014; Gray and Milne, 2002; O'Dochartaigh and Maughan, 2017). The producer and manufacturing level data reporting provides an expanded but incomplete view of the sector. Furthermore, the "entanglement of potentially responsible entities" means that it is difficult to isolate the responsibilities of one particular actor (Bebbington *et al.*, 2019, p. 168). SC leverages coercive power to highlight producer responsibility, but sustainability science research suggests that corporations are the keystone actors in ecologically significant sectors (Bebbington *et al.*, 2019). Thus, the scheme demonstrates how a multi-entity reporting boundary can be created and offers innovation in how sustainability reporting is managed, but does not currently offer a cumulative assessment of the effect of the sector's activity on ecological carrying capacity or fulfil its potential to connect this activity to global sustainability indicators.

7. Conclusions

This paper examines how accounting tools and techniques are used to create and support membership and reporting boundaries for a multi-entity sustainability scheme. It also considers whether the creation of such a boundary allows for multi-entity sustainability accounting. The paper contributes to our understanding of accounting's role in boundary setting for the scheme. In addition, it adds to our understanding of connected measurement between corporate activity and global sustainability indicators. The paper also builds on Rasche *et al.* (2013) on partial organising and provides insight into how accounting can support this form of organising for sustainability.

The FoodSmart scheme is one example of organising for sustainability. Multiple and diverse forms of organising involving policymakers, governments, corporations, NGOs, consumers and other actors have emerged to address sustainability and other grand challenges (Gümüsay *et al.*, 2022). New regulatory and private governance infrastructures are

in place in the agrifood and other sectors. Accounting can help or hinder these efforts. It can make issues visible, calculable and comparable and coordinate efforts to address them (Miller, 1994; Miller and Power, 2013; Power, 2015). Further engagement with the work on organising for grand challenges (see Howard-Grenville and Spengler, 2022, for a review) offers a potentially fruitful avenue for understanding the role of accounting in these diverse forms of organising. For example, Ferraro *et al.* (2015) propose three types of robust action strategies – participatory architecture, multivocal inscription and distributed experimentation – as means to address grand challenges. They argue that these strategies are well matched to the complexity, uncertainty and evaluativity of these challenges. Gehman *et al.* (2022) revisit these strategies and identify three mechanisms (scaffolding, future imaginaries and distributed actorhood) within these strategies as promising directions for further research. Work is needed to understand the role of accounting in these strategies and mechanisms.

In addition, further work is required in several other areas, including integrating global sustainability indicators with sustainability accounting frameworks in other ecologically significant sectors and sustainability assurance in multi-entity settings. Research on the institutional work supporting boundary setting for multi-entity sustainability accounting and reporting is also needed. Building on Albareda and Waddock (2018) and Bayne (2022), further research on standard-setting for sustainability accounting and reporting could provide insight into the key boundary setting actors in ecologically significant sectors and the related implications for regulatory capture and accountability.

In the case of the FoodSmart scheme, several avenues have still to be explored. Despite its potential, the FoodSmart initiative does not succeed in substantively linking activity in the sector to national global sustainability impacts, and the reports disclose less data over time. Better quality reporting could address these issues. However, the scheme is subject to contradictory economic, societal and institutional pressures, in a similar way to individual corporations and managers. Current economic structural arrangements expect corporations and their managers to pursue and deliver short-term financial gains; stakeholders, however, are increasingly concerned about the impact of corporations on the social and natural environment (Cho *et al.*, 2015). In response, individual organisations engage in hypocrisy in their external sustainability disclosures with notable differences between disclosures ("what we say") and decisions and actions ("what we do") on sustainability (Cho *et al.*, 2015). This severely limits the prospects of corporate accounts of sustainability ever evolving into substantive disclosures (Cho *et al.*, 2015). It is possible that such limitations are endemic and can extend to industry level (Tregidga *et al.*, 2014). The vulnerability of multi-entity reporting to the same limitations as organisational level reporting needs to be examined.

In addition, "opportunities for change emerge at the intersection of conflicting fields and logics" (Ferraro *et al.*, 2015, p. 364). Contested industries and issues are useful contexts to explore how the ecological impacts of organisations are framed and legitimised or de-legitimised (Dey and Russell, 2014). They attract attention from diverse sources such as the media, policy and communities (Dey and Russell, 2014). The FoodSmart scheme has attracted attention and criticism from the media, NGOs, the EPA and other stakeholders. This has heightened the visibility of conflict between actors in this contested sector (Dubash, 2021). Further research is needed to understand whether and how this allows for dialogue, conflict resolution and accountability (Tregidga and Milne, 2022) in the sector. Counter accounts to the FoodSmart scheme have also emerged from various sources. Do new reporting boundaries trigger counter accounts and provide new avenues for accountability? Further work is required to understand how these counter accounts are created and the interplay between these accounts and the original reports. There is also scope for research on how sustainability schemes support or challenge power relations in the agrifood supply chain and how this impacts producers' lived reality in light of increasing economic pressures (Bowman

et al., 2013; Jack *et al.*, 2018). Finally, the case illustrates the potential for sustainability controls to operate in a multi-entity setting, building on work in single-entity sustainability management control (e.g. Bouten and Houtzée, 2013; Gibassier and Alcouffe, 2018). More research is required to understand the role of management controls at multi-entity level and to provide insight into whether and how multi-entity management accounting can support change towards sustainability in this ecologically significant sector.

Notes

1. These forms of organising include new regulatory infrastructures, supranational coordination and collaboration platforms, standard-setting bodies, social movements and new private governance infrastructures such as multi-stakeholder networks and partnerships (Ferraro *et al.*, 2015; Kaufmann and Danner-Schröder, 2022).
2. Accounting tools and techniques allow for the identification, collection, analysis, reporting and interpretation of monetary and non-financial information on the activities of an entity or a group of entities. For example, environmental management accounting tools and techniques identify, collect, analyse, report and interpret physical information on the use, flow and fate of the environmental aspects of an entity's activities (e.g. emissions, raw materials and biodiversity) and monetary information (e.g. environment-related costs) (Burritt *et al.*, 2002, 2019; Gunarathne *et al.*, 2023). For this paper, the accounting tools include on-farm assessments and feedback reports, sustainability charters with required targets, sustainability plans, independent verification reports for members and annual progress reports. Techniques such as carbon modelling are incorporated in these tools.
3. For this study, a single-entity reporting boundary is viewed as a boundary around a single organisation or a group of organisations with common ownership or control (Antonini and Larrinaga, 2017; Antonini *et al.*, 2020).

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