Management accounting for a circular economy: current limits and avenue for a dialogic approach

Selena Aureli, Eleonora Foschi and Angelo Paletta
Department of Management, Alma Mater Studiorum, University of Bologna, Bologna, Italy

Received 21 April 2022
Revised 7 November 2022
23 June 2023
22 November 2023
Accepted 22 November 2023

Abstract

Purpose – This study investigates the implementation of a sustainable circular business model from an accounting perspective. Its goal is to understand if and how decision- makers use management accounting systems, and what changes are needed if these systems are to support the transition toward a circular economy.
Design/methodology/approach – Dialogic accounting theory frames the case study of six companies that built a value network to develop and implement an innovative packaging solution consistent with circular economy principles. Content analysis was utilised to investigate the accounting tools used.
Findings – The findings indicate that circular solutions generate new organisational configurations based on value networks. Interestingly, managers' decision-making process largely bypassed the accounting function; they relied on informal accounting and life cycle analysis, which stimulated a multi-stakeholder dialogue in a life cycle perspective.
Research limitations/implications – The research provides theoretical and practical insights into the capability of management accounting systems to support companies seeking circular solutions.
Practical implications – The authors offer implications for accounting practice, chief financial officers (CFOs) and accounting educators, suggesting that a dialogic approach may support value retention of resources, materials and products, as required by the circular economy.
Social implications – The research contributes to the debate about the role of accounting in sustainability, specifically the need for connecting for resource efficiency at the corporate level with the rationalisation of resource use within planetary boundaries.
Originality/value – The study contributes to the limited research into the role of management accounting in a company's transition to circular business models. Dialogic accounting theory frames exploration of how accounting may evolve to help businesses become accountable to all stakeholders, including the environment.

Keywords Environmental management accounting, Dialogic accounting, Circular economy,
Bio-based and compostable plastics, Informal accounting, Sustainable and circular business models
Paper type Research paper

1. Introduction

Amidst a mounting shortage of raw materials and the need to efficiently utilise resources (Crippa *et al.*, 2019; European Commission, 2015; UNEP, 2015), academics, practitioners and policymakers have developed an interest in the concept of circular economy (CE) (Kirchherr *et al.*, 2017; Raworth, 2017). The CE concept has evolved from its environmental economy (Pearce and Turner, 1989) and industrial ecology origins (Preston, 2012) to represent a new approach to production that involves closed cycles of materials and

Funding: This work has received funding from the European Union's Horizon 2020 - Research and Innovation Framework Programme through the research project BIO-PLASTICS EUROPE, under grant agreement No. 860407.

Accounting, Auditing & Accountability Journal
Emerald Publishing Limited
0951-3574
DOI 10.1108/AAAJ-04-2022-5766

energy (Frosch, 1992; Ghisellini *et al.*, 2016). Contemporary understanding of CE is no longer limited to resource efficiency, but now models an economy based on redesign, reuse, shared ownership, repair, refurbishment and remanufacturing, with the aim to retain value along value chains (European Commission, 2015). CE models have the potential to create value, reduce costs, generate revenue, support legitimacy for companies (Park *et al.*, 2010; Tukker, 2015; Urbinati *et al.*, 2017) and provide environmental benefits (Lieder and Rashid, 2016; Moraga *et al.*, 2019; Murray *et al.*, 2017). It can be argued that CE is a paradigm shift reconnecting industry with natural capital and human communities (Yuan *et al.*, 2008) and links the economic cycle with planetary boundaries by aligning the use of raw materials with their regeneration rates (Korhonen *et al.*, 2018).

Within this framework, companies ("powerholders", to borrow the language of critical accounting researchers such as Bebbington and Gray, 2001; Dillard and Vinnari, 2019; Tanima *et al.*, 2020) can help decouple economic growth from resource consumption (Kjaer *et al.*, 2019), thus addressing current societal challenges (Antikainen and Valkokari, 2016; Korhonen *et al.*, 2018). However, doing so may require radical structural modifications in existing business models and sweeping organisational changes (Baker *et al.*, 2023; Cano-Rubio *et al.*, 2021). Specifically, firms must transition from: (1) creating economic value only to a multifaceted model of value offer; (2) single-to multiple-actor engagement; and (3) from firm-centric to network-centric or ecosystem operational logic (Boons *et al.*, 2013; Bocken *et al.*, 2019; Pieroni *et al.*, 2019; Ünal *et al.*, 2019).

Making these changes requires adequate management accounting systems that can support managers' adoption of a sustainable circular business model (SCBM) (Elgie *et al.*, 2021; Ghisellini *et al.*, 2016). Research is needed as, according to Baker *et al.* (2023, p. 600), the decision to adopt CE "require[s] evidence linking corporate practice and ecological conservation". Accounting systems should extend the area of intervention beyond the corporate borders and include meso-level effects (Aranda-Usón *et al.*, 2022). Yet, to date, methodologies, standards and metrics for implementing SCBMs and assessing their benefits along value chains and within ecosystems have been mainly proposed by management (not accounting) scholars and practitioners (Ghisellini *et al.*, 2016; Moraga *et al.*, 2019; Murray *et al.*, 2017; Webster, 2015). While some professional bodies have started issuing management system standards for CE (like the XP X30-90 standard), these standards generally lack rigour in terms of a foundation in theory and in accounting and performance measurement research (Lamberton, 2005; Marrone *et al.*, 2020; Unerman *et al.*, 2018).

Meanwhile, accounting researchers and professional bodies focus on the role of accounting in environmental sustainability and reporting (Burritt and Schaltegger, 2010; Correa *et al.*, 2023; ICAEW, 2004; IFAC, 2016), but have given limited attention to the concept of circularity. Most extant studies are primarily theoretical (Korhonen *et al.*, 2018; Larrinaga and Garcia-Torea, 2022; Marrone *et al.*, 2020; Scarpellini *et al.*, 2020; Scarpellini, 2022) and those few studies of the role of accounting in CE are mostly literature reviews (see for example, Di Vaio *et al.*, 2023). An exception is a special issue of *Accounting Forum*, "Accounting for the circular economy" (Arjaliès *et al.*, 2020), which highlighted the potential of existing environmental management accounting tools, as well as the need for new forms of accounting, to support a circular paradigm. Heikkilä (2023) argued that current accounting systems are vain in CE for their limitations in providing comprehensive information and connecting different stakeholders and value chains. As a result, emerging forms of self-generated accounting, such as vernacular accounting (Kilfoyle *et al.*, 2013; Goretzki *et al.*, 2018) have been investigated to strengthen information-sharing systems. Relatedly, Jørgensen *et al.* (2023) empirically demonstrated the inadequacy of current performance indicators and the potential of non-financial accounting (i.e. waste streams and resource accounting) in the shift to CE.

Marco-Fondevila *et al.* (2023) proved the need for new metrics when product-as-service business models are established.

However, while these studies identify the need for a change in accounting, they provide little guidance on how that should take place. Research is needed that develops new forms of accounting to support sustainable production and consumption patterns (Baker *et al.*, 2023; Larrinaga and Garcia-Torea, 2022; Voegtlin *et al.*, 2022), including providing relevant information and actionable insights for managers adopting CE strategies. Responding to calls for studies that explore how accounting, CE and management control intertwine (Correa *et al.*, 2023; Heikkilä, 2023; Nadeem *et al.*, 2018; Svensson and Funck, 2019), we aim to fill this gap by investigating the implementation of a SCBM from an accounting perspective. Our goal is to understand if and how decision-makers use management accounting systems to support the shift toward CE, which limitations they have, and how they should change to support the transition process toward CE.

We adopt a case study method (Siggelkow, 2007; Yin, 2017) to examine the management accounting systems used to support managers' decision-making in the specific phase of transitioning toward a SCBM. The interviews reveal that managers use self-developed informal accounting methods, bypassing accountants and official management accounting systems to a large extent. We also find that Life Cycle Assessment (LCA) is used as a non-financial accounting tool to both foster information exchange between actors across the entire value chain and to identify environmental impacts more broadly. Our analysis reveals that LCA spurred a dialogue that went beyond the mere measurement of greenhouse gas emissions along the value chain. Indeed, it created a "space" where stakeholders' needs and supply chain actors' concerns could be discussed, synthesised and internalised into the circular design process. Ultimately, the LCA facilitated a more participatory form of decision-making, consistent with a dialogic approach to accounting. This approach (Bebbington *et al.*, 2007; Gray, 2010; Bellucci *et al.*, 2019; Brown, 2009; Brown and Dillard, 2015) recognises stakeholders' multiple ideological orientations and values. It incorporates non-financial perspectives, is more democratic, and expands the scope of accounting systems beyond a company's borders. We find that this approach holds much promise in a shift towards a circular paradigm but is not fully applied in our case study organisations, advising management accounting systems have the potential to be more dialogic in the transition to CE.

In the following sections, we first review the existing literature to understand the relationship between CE and management accounting systems. We then outline our methodology followed by an analysis of the findings. Our findings are outlined in the section *n*. 5. We then discuss our findings, before concluding with their implications for research and practice, and the study's limitations that point to future research avenues.

2. Interplay between circular economy and management accounting

2.1 Sustainable and circular business models

Before we can understand how CE affects business models and accounting, it is necessary to first define it to frame our research context. Broadly, CE aims to maintain the value of resources for as long as possible (Bocken *et al.*, 2019; European Commission, 2015). Amongst many interpretations, Kirchherr *et al.* (2017, p. 225) describe CE as "an economic system that aims to accomplish sustainable development, which implies creating environmental quality, economic prosperity and social equity, to the benefit of current and future generations". Murray *et al.* (2017, p. 369) define it as "an economic model [. . .] to maximise ecosystem functioning and human well-being". These, definitions suggest a focus on waste reduction and prevention and the extension of product life cycles via a broad spectrum of restorative approaches such as reuse, repair, remanufacture, recycling and so on (Ellen MacArthur Foundation, 2018). The three key underlying principles are: (1) design

out waste and pollution; (2) keep products and materials in use; and (3) regenerate natural systems to move from a 'cradle-to-grave' approach to a 'cradle-to-cradle' approach (Braungart *et al.*, 2007; McDonough and Braungart, 2002). The Ellen MacArthur Foundation (2013) characterises CE model as not only restorative but regenerative, as illustrated in its butterfly illustration diagram, where biological materials enter the economy and return to the biosphere (Morseletto, 2020).

CE involves decoupling societies from fossil-based dependence and instituting renewable alternatives. This means transitioning to a bioeconomy that converts renewable biological resources (e.g. crops, forests and animals) into high value applications, including feed, materials, fuels and energy (Carus and Dammer, 2018; McCormick and Kautto, 2013). The benefits of a bioeconomy include: (1) minimising polluting processes associated with the extraction of fossil-based resources; (2) reducing harmful waste by using biodegradable and compostable products; and (3) promoting biodiversity (D'Amato *et al.*, 2017). In short, CE places sustainability and a harmonious relationship between ecology and human systems at its core (Bebbington *et al.*, 2019), relying on the restorative and regenerative capabilities of natural capital. It achieves this by embedding objectives of environmental and societal value creation (Moraga *et al.*, 2019).

At the organisational level, a shift to a restorative and regenerative economy takes the form of SCBMs, which integrate elements "from macro (global trends and drivers), meso (ecosystem and value co-creation) and micro (company, customers, and consumers) levels" (Antikainen and Valkolari, 2016, p. 8). SCBMs aim to: (1) create multiple values; (2) involve multiple actors; and (3) establish business logics based on networking and collaboration. Accordingly, SCBMs can be defined as business ecosystems that internalise stakeholders' needs and pursue a regenerative resource cycle (Spicer and Johnson, 2004).

The quest for CE through SCBMs is necessarily associated with business model innovation (BMI) (Foss and Saebi, 2017; Massa and Tucci, 2013; Ghisellini *et al.*, 2023). BMI entails delivering value in a new way (Lindgardt *et al.*, 2012) by diversifying or transforming supply chains, distribution processes, economic structures and organisational configurations (Alcouffe *et al.*, 2008; Geissdoerfer *et al.*, 2018). BMI relies on collaborative mechanisms that enable stakeholders "to learn from and with each other" (Stål *et al.*, 2022, p. 445), thus creating common value (Oskam *et al.*, 2021). In CE, BMI goes beyond the single entity border to stimulate "cooperation among different stakeholders, thereby rebuilding value chains around the logic of networks" (Ruggieri *et al.*, 2016). Transition to a circular economy requires the orchestration of a 'value network' (Parida *et al.*, 2019; Ricciotti, 2020) that engages key resources, activities and upstream partners to enhance a focal company's products and processes. BMI is often considered implicit (Lahti *et al.*, 2018; Liliani and Cao, 2020) because an ecosystem of organisations, rather than firms acting in isolation, is inherent to the cradle-to-cradle approach (Zott *et al.*, 2011). In a CE-oriented business ecosystem, value retention occurs through the interaction of multiple parties, such as end-users, government agencies, regulatory authorities and waste managers (Kanda *et al.*, 2021).

Unfortunately, the returns on investment for SCBMs have been ambiguous in the short term. Developing innovations is costly and resource allocations for co-creation processes in inter- and intra-organisational structures is difficult (Piila *et al.*, 2022). Thus, managers need relevant information to assess investment in SCBMs. Yet, according to Rodrigue and Picard (2022), managers find formal accounting procedures limiting and seek alternative management accounting systems to meet the needs of a more inclusive and holistic system that can support social and environmental progress.

2.2 Accounting for circularity and accounting for sustainability: research streams and limitations

There have been recent calls for management accounting studies to address CE in order to equip managers with adequate information for decision-making (Correa *et al.*, 2023; Heikkilä, 2023; Nadeem *et al.*, 2018; Svensson and Funck, 2019). Accounting research that addresses sustainability broadly and CE specifically can be categorised in two streams: critical accounting (Larrinaga and Garcia-Torea, 2022) and environmental management accounting (Burritt *et al.*, 2002; O' Dochartaigh, 2019; Hong *et al.*, 2018; Pieroni *et al.*, 2019; Scarpellini *et al.*, 2020; Zhou *et al.*, 2017). Critical accounting researchers argue that accounting, in its current form and practice, cannot support the movement toward sustainability (Antonini *et al.*, 2020; Baker *et al.*, 2023; Gray, 2010; Svensson and Funk, 2019), and advocate for a radical approach (Baker *et al.*, 2023; Larrinaga and Garcia-Torea, 2022). Environmental management accounting scholars (Scarpellini *et al.*, 2020; Schaltegger *et al.*, 2008) argue that accounting may gradually evolve to support sustainable development and suggest performing empirical qualitative studies to achieve incremental advancements in the research field.

Environmental management accounting is a quite flourishing research stream. However, a branch of its studies focussing on monetary tools has been largely criticised for seeing environmental impacts only in terms of costs and revenue streams (Burritt *et al.*, 2002; Schaltegger *et al.*, 2008; Burrit *et al.*, 2019). Similarly, proposals such as full-cost accounting (Fraser, 2012; Xing *et al.*, 2009) and the sustainability assessment model (Bebbington *et al.*, 2007) are contested because of the scale and complexity of translating ecological process into financial terms (Unerman *et al.*, 2018). Frame and O'Connor (2011) argue that monetising certain ecological results is impossible. Yet, Larrinaga and Garcia-Torea (2022) claim that monetary environmental management accounting tools are constrained by neo-liberal and capitalist cultures and spurred by cost and revenues only, unlike CE, which accepts that earnings may be reduced in certain circumstances to maximise ecosystem health (Antonini *et al.*, 2020; Bebbington and Larrinaga, 2014). Relatedly, physical (non-monetary) environmental management tools are also criticised as overly focused on inter-industry valuation of by-products and waste (Karlsson and Wolf, 2008; Pagotto and Halog, 2015), which frames CE as mere resource efficiency or recycling economy models (Qian, 2011; Seuring, 2004).

Arguably, environmental management accounting studies also rely on the assumption that introducing dedicated tools and practices will enable managers to easily understand the potential benefits of a SCBM implementation (Scarpellini *et al.*, 2020; Rieckhof and Guenther, 2018) but it is not clear how much these tools are incorporated into the decision-making process. For example, Bierer *et al.* (2015) evidence the use of LCA for sustainability reporting and eco-labelling, undervaluing its potential as a decision-making tool. In addition, stakeholders' concerns and users' needs are not fully addressed (Bocken *et al.*, 2019) while CE revolves around social and environmental expectations of stakeholders (Pieroni *et al.*, 2019; Ünal *et al.*, 2019).

Despite the growth in environmental management accounting research into CE in the last five years, recent studies call for new accounting metrics that clarify the interrelationships among the ecosystem actors operating within CE models (Nadeem *et al.*, 2018; Costa *et al.*, 2023; Jessea *et al.*, 2023). Researchers and practitioners often struggle to adapt their logic, routines and practices to CE principles and its goal of providing multiple values, engaging different stakeholders and establishing a network or ecosystem logic (Kwarteng *et al.*, 2022). Interestingly, non-accounting researchers have started to fill this void by developing a multitude of CE metrics (Hopkinson *et al.*, 2020; Saidani *et al.*, 2019). These metrics, which have not to date been adopted by the accounting discipline (Marrone *et al.*, 2020), differ significantly based on the evaluation criteria used (Janik and Ryszko, 2019). Given the different context of intervention, CE metrics can be distinguished in macro, meso and micro spatial levels tools (De Pascale *et al.*, 2021). The macro level, based mainly on material flow accounting (MFA)

techniques, captures the material and energy resource flows of cities, regions and states (Circle Economy, 2023; European Commission, 2018; Geng *et al.*, 2012; Nisa *et al.*, 2009). The meso level encompasses input-output oriented approaches, data envelopment analysis, material and substances flow analysis, and the MIND method, all of which serve to determine the economic and environmental advantages of inter-industry valorisation of by-products and waste (Karlsson and Wolf, 2008; Pagotto and Halog *et al.*, 2015). The micro level uses tools as a starting point to assess companies' corporate circularity rate and adjust their strategies (Veleva *et al.*, 2017). For example, the Ellen MacArthur Foundation's Circulytics tool evaluates an organisation's level of circularity across business processes and operations as a composite of corporate strategy, governance, know-how, skills and stakeholder engagement. Similarly, the World Business Council for Sustainable Development's Circular Transition Indicators (CTI) merges companies' circular material flows into business performance, risks and opportunities. Others, like the Eco-cost Value Ratio of Scheepens *et al.* (2016) and the Synthetic Economic Environmental Indicator of Fregonara *et al.* (2017), provide an estimation of monetary measurement to assess CE investment decisions.

Although most of these metrics and tools integrate cradle-to-cradle configurations and life cycle thinking, only some embrace multi-criteria analysis to simultaneously assess normative, political, technological, environmental, social and economic aspects and value creation for multiple subjects. In addition, system thinking, which facilitates the understanding of individual decisions and their effects on stakeholders and the wider systems of which a company is part (Pauliuk, 2018), is almost absent in existing CE metrics. This latter gap is partly addressed by the BS8001:2017, provided by the British Standard Institute, which maps CE's transformation potential from products and processes to BMI to connect the company with the system (BSI, 2017). Nevertheless, the BSI 8001: 2017 is centred on single organizations and therefore ill-equipped for a life cycle approach. The French body AFNOR (2018) offers some advancements with its X30-901 standard, which uses a 3*7 matrix to link the three dimensions of sustainability (environmental, social and financial) with sustainable procurement, industrial symbiosis, functional economy, responsible consumption and the extension of service life. This standard also integrates systemic analysis by mapping stakeholders to so-called internal and external contexts.

Given the inability of current accounting systems to comprehensively support CE-related decision-making, alternative forms of accounting have emerged, like vernacular accounting and silent or shadow accounting where managers use soft information not only for decision-making, but also to develop knowledge considered relevant in their work environment (Hall, 2010). Heikkilä (2023) illustrates how the complexity of a CE business environment and network requires information sharing across occupational tasks and how the lack of formal systems – or their inability to provide beneficial information – may trigger alternative and integrative forms of accounting. This approach reveals the need to fully rethink accounting systems, including tools but also techniques and procedures. Rodrigue and Picard (2022) find that sustainability managers want an accounting that is not siloed, but instead fosters inter- and intra-corporate collaboration to boost inside-out and outside-in techniques. Doing so would capture the intersection of many data sources, including external and non-financial information (Bjøornenak and Olson, 1999). Consistent with this concept, in the next section we explore the possibility for the accounting discipline of a stronger dialogue with stakeholders that render CE-related impacts more visible within company accounts (Cooper and Morgan, 2013).

2.3 The need to shift to a dialogic approach of accounting

The dialogic approach is a promising way for accounting to manage the complexities of CE while initiating a stronger dialogue with stakeholders (George *et al.*, 2021; Tanima *et al.*, 2023).

Bellucci *et al.* (2019) contend that dialogic theory recognises multiple ideological orientations and, therefore, when translated to the business domain, it can facilitate stakeholder engagement and a refinement of the value proposition around sustainability. It has the potential to ease the CE transition by involving business ecosystem actors in the process of preserving resources' value while ensuring human rights and economic stability.

When embedded in accounting, dialogic theory rejects the notion of a universal narrative (Brown, 2009) and instead seeks to stimulate divergent discourses. As such, it goes beyond monologic accounting (Kingston *et al.*, 2019; Tanima *et al.*, 2023), which is governed by neoliberal and neoclassical economic assumptions like maximising shareholder profits while taking-using-disposing resources at the highest rate possible (Bebbington *et al.*, 2007; Brown and Dillard, 2019). As noted by critical accounting scholars, dialogic theory emphasises alternative perspectives that stem from different stakeholders' needs, values and accountability demands (George *et al.*, 2021). Thus, the move to dialogic accounting is an attempt at leveraging democratic activity to resolve divergent perspectives (Burlaud and Colasse, 2011) and balance the trade-off between multiple aspects (Vinnari and Dillard, 2016). Accounting can "create sites that bring together [. . .] actors with different evaluative principles" (Chenhall *et al.*, 2013, p. 268), and thus has the power to create shared solutions, rather than impose the views of one specific social group or stakeholder.

Hence, the dialogic approach is consistent with the principles of CE, in empowering accounting to encourage societal change (Bebbington *et al.*, 2007; Bellucci *et al.*, 2019; Brown and Dillard, 2015) in pursuit of a more resilient society (George *et al.*, 2021). For accounting to empower change it should embed the key principles theorised by Brown (2009): (1) recognise multiple ideological orientations; (2) resist monetary reductionism; (3) be open about the subjective and contestable nature of calculations; (4) enable accessibility for non-experts; (5) ensure effective participatory processes; (6) be attentive to power relations; (7) recognise the transformative potential of dialogic accounting; and (8) avoid new forms of monologism.

Empirical research on dialogic accounting mainly focuses on the application of these principles in public management contexts (Landi *et al.*, 2021; Holdaway, 2019) and particularly, in local government accounting systems like participatory budgeting (Aleksandrov *et al.*, 2018; Manetti *et al.*, 2021). NGOs have also experimented with dialogic accounting (Kingston *et al.*, 2019). Examples in sustainability accounting studies using dialogic theory in reporting domains are limited (Bellucci *et al.*, 2019; Brown and Dillard, 2019; Bebbington *et al.*, 2019; Tanima *et al.*, 2023; George *et al.*, 2021). Others (Bebbington *et al.*, 2007) call for new approaches to decision-making to support sustainable development initiatives, providing new assessment models based on an interdisciplinary approach that favours more participatory forms of decision-making.

In our research, taking a dialogic perspective to management accounting systems requires making the latter more democratic, incorporating non-financial elements and spreading the scope of analysis beyond a single company, consistent with CE. In this way, dialogic accounting may foster the collection and intersection of information from an ecosystem and consider all the elements that may influence a decision, including regulatory frameworks, technologies, social movements, and market and environmental trends (Tanima *et al.*, 2023). At the same time, accounting may empower stakeholders to become active agents of critical inquiry (Wong *et al.*, 2021) and help managers in CE transition (Baker *et al.*, 2023). To support this, accounting should be strongly connected to the use of scenario workshops, deliberative mapping, multi-criteria analyses, open space technologies, Q methodology and dissensus conferences (Brown and Dillard, 2015). These elements of action research can enable interactions with stakeholders and trigger the evolution of management accounting systems (Bebbington *et al.*, 2007; Frame and Brown, 2008; O'Dwyer, 2005) towards SCBMs.

3. Data and method

3.1 Case study

We adopt a case study approach to analyse a "contemporary phenomenon within its real-life context" (Yin, 1994). Specifically, we utilise a single case study methodology (Siggelkow, 2007; Yin, 2017) to explore a new phenomenon (Eisenhardt and Graebner, 2007) and bridge the theory–practice gap (Cardno and Piggot-Irvine, 1996): namely, the role of management accounting in supporting the shift to a SCBM.

We focused on the packaging sector because it uses more plastic than any other industry (PlasticsEurope, 2019) and is primarily responsible for marine pollution (Villarrubia-Gómez, 2018), suggesting it is a context highly-suited to experimenting with circular strategies (Batista *et al.*, 2018; Foschi and Bonoli, 2019). As the five-step waste hierarchy highlights (European Commission, 2015), circular strategies should prioritise resource prevention, which in this case means changing or eliminating packaging. As many products need to maintain the functional properties of packaging, like containment, protection, handling, delivery and preservation, rethinking packaging (Potting *et al.*, 2017) to meet recycling criteria is one of the most common practices in the sector (Finnveden *et al.*, 2013; Foschi and Bonoli, 2019; Tencati *et al.*, 2016). Given only half of plastic waste is mechanically recycled (PlasticsEurope, 2019), firms are exploring new solutions, such as compostability and biodegradability, which can facilitate a closed loop in the biological cycle (EllenMacArthur Foundation, 2013), reduce greenhouse gas emissions compared with oil-based chemicals (Harding *et al.*, 2007), and address the challenges of food contamination in material recovery facilities (Asgher *et al.*, 2020).

This case study focuses on six companies that are considered part of a value network (Peppard and Rylander, 2006; Ricciotti, 2020). The companies began to collaborate after the end-user company, Epsilon, initiated a project to develop new packaging for its bakery products. Epsilon acted as the network's focal company and involved all other partnering organisations (see Table 1).

We based our case study on a theoretical convenience sampling strategy (Voss *et al.*, 2002). First, we decided to focus on the Italian geographical context because the country is highly regarded for its large investments in bio-based industries, as well as its commitment to establishing well-functioning bio-waste governance and infrastructures (Morone *et al.*, 2015). Thus, Italy is among the frontrunners in the circular bioeconomy in the European market (Plastic Consult, 2021; Ünal *et al.*, 2019). Second, we chose the food industry because its packaging cannot be easily phased out and has a key marketing function. Finally, we chose Epsilon, and its network of partners and suppliers, based on a search of specialised media for outstanding companies in the adoption of sustainable packaging solutions.

Epsilon is an Italian food company whose mission is to 'change current production and consumption models to build a kind of development aligned with the ecosystem and communities'. It is committed to reducing the quantity of plastic used in packaging, in part motivated by compliance with the EU's 2030 vision of having 100% recyclable and/or reusable packaging (European Commission, 2018). We validated the case study choice after an investigation based on secondary data, from which the company emerged as a frontrunner in launching bio-based compostable plastic packaging in the national food market.

3.2 Data collection

Following the in-depth nature of a case study methodology (Masanet-Llodra, 2006), we first conducted a qualitative investigation based on document analysis and archival data (company reports, websites, etc.). This step provided background information on the packaging industry system, its key actors and trends.

Primary data was collected in interviews with various company leaders, who provided insight into the decision-making processes behind Epsilon's packaging solution and how

Companyname	Key information (non-consolidated financial statement for 2020)	Sustainability commitment	Position of the company in the value network	Interviewees
Alfa	256,605,234€ revenues 296 employees	Previous projects: fully oriented to offer bio-based, compostable and/or biodegradable chemicals and polymers with high renewable content since its establishment Disclosure: sustainability reports since 2008 and dedicated website section on sustainability	Raw materials producer that provides biopolymers	Head of strategic planning + head of corporate communication
Beta	31,532,000€ revenues 109 employees	Previous projects: provision of lightweight products to reduce materials and waste per unit of good Disclosure: dedicated website section on sustainability	Extruder that uses biopolymers to make the film	Sales manager + product manager
Teta	7,431,988€ revenues 42 employees	Previous projects: product offer based on mono-material recyclable flexible packaging Disclosure: dedicated website section on sustainability	Coated film manufacturer	Sales and marketing manager + executive director
Gamma	77,490,186€ revenues 180 employees	Previous projects: offer of paper-based recyclable multi-layer packaging with paper coming from responsibly managed forest supply chains Disclosure: No communication on sustainability	Designer and manufacturer of multilayer packaging	Member of the board +Executive director
Delta	871,892€ revenues 2,593 employees	Previous projects: experiment with sustainable materials prototyping Disclosure: No communication on sustainability	Packaging machinery manufacturer	Material technologist manager + after sales-field engineer/testing area
Epsilon	218,696,924€ revenues 706 employees	Previous projects: local wheat supply; use of recycled paper-based packaging; food waste reduction programs Disclosure: sustainability reports since 2019 and dedicated website section to sustainability	End-user company that packages and sells food products	Sales and marketing + executive director

Note(s): Companies' name has been changed to protect confidentiality
Source(s): Authors' own creation

Table 1.
Interview participants

accounting contributed. The interviews followed a semi-structured protocol, where the majority of questions were open-ended to encourage interviewees to introduce relevant aspects that researchers could have missed (Maykut and Morehouse, 2002). The questions focused on two key aspects: (1) the changes in the business model; and (2) the role of accounting tools used (or not used) to support managerial decisions and evaluate the impact from the introduction of bio-based solutions. Each interview lasted 70 min on average. Two authors participated in all the interviews and took personal notes to record impressions and grasp the "unsaid", which served to align the research method with the complex and multidisciplinary nature of the dialogic approach (Manetti *et al.*, 2021).

The researchers first approached the companies and asked to be connected with key informant(s) or "protagonist(s)" who promoted the transition toward bio-based plastics and had extensive knowledge of the process (see Table 1). In the second stage of the research, we obtained additional information from a round of interviews with each company's CFO. These were shorter interviews aimed at investigating the role of the accounting and financial staff in the evaluation phase of the new bioplastics business.

3.3 Coding

When analysing the transcribed interview text, we pursued the following objectives: (1) classifying the accounting tools and practices used to inform *et al.*, the decision to adopt circular packaging; and (2) examining the stakeholders involved in the creation of the value network consistent with the dialogic approach. We used Nvivo software to perform a content analysis of the interviews (Guthrie *et al.*, 2004; Krippendorff, 2004). We adopted a preliminary coding scheme (Beekhuyzen, 2010; La Torre *et al.*, 2018) to establish the purposes, functions, structures and goals of the accounting tools used. As a result, the codes used in this analysis refer to the nature (financial or non-financial), scope (company-based or network-based), aim (measure impact or monitor progress), function (support decision-making or communication) and frequency (ad hoc or routine use) of the accounting tools. We then refined the initial coding frame based on the context provided by the case study, which helped us distinguish the tools used for sense-making from those used for target-setting, as well as the tools devoted to fostering dialogue within companies (i.e. among departments and functions) or between companies (i.e. with partners in the value chain) in the network.

Although stakeholder theory (Fassin, 2009; Hannan and Freeman, 1984; Mitchell *et al.*, 1997) offers a theoretical framework for identifying company stakeholders, we did not use stakeholder classification models based on salience (as proposed by Mitchell *et al.*, 1997) or level of influence (Wagner *et al.*, 2012). The system-wide perspective required by CE makes the idea of primary or secondary stakeholders less relevant as some individuals might have no power from a managerial perspective (i.e. waste managers), but their work is important to value retention at the end-of-life. Therefore, we started the coding process by searching for subjects and alternative perspectives that the six companies considered during the process of change.

Following the recommendations provided by Cooper (1988) and Huberman and Miles (1994), we revised our pre-established coding scheme and validated it through discussion. One of the authors coded all the data, while a second author independently analysed the coded information. All discrepancies were continuously re-analysed and resolved (Massaro *et al.*, 2016; Milne and Adler, 1999) through periodic researcher meetings, which helped us build consensus about data codification (Bellucci *et al.*, 2019). Through these interactions, the researchers decided to adjust the unit of analysis (Smith and Taffler, 2000) from sentences to paragraphs when the contextual meaning was problematic (Steenkamp and Northcott, 2007).

To increase the reliability of the data, we triangulated information from the interviews with available archival data (i.e. annual reports, sustainability reports, news from specialised websites and the Internet generally). We also supplemented the verbatim interview text with

personal notes (taken by the two authors during interviews) that supported the identification of recurrent patterns (Krippendorff, 2004).

We used charts and queries to explore the data, integrating quantitative information during each re-read of the transcripts. We also enhanced the narratives with quotations, as suggested by Siggelkow (2007), because of their power in explaining how people make meaning from their experiences (Rabionet, 2011).

4. Findings

4.1 Business model innovation through a value network

All six companies in the network identified the packaging solution as a key element in their sustainability agenda and, further, that reciprocal collaboration was fundamental to implementing this solution. The collaboration started because the end-user organisation (Epsilon) was looking for more sustainable solutions that could create value for their customers, shareholders and the environment. To achieve its goal, the firm sought players beyond the traditional packaging supply chain. In doing so, Epsilon identified a gas barrier solution that would limit the oxygen transference between packed food and the atmosphere. This barrier usually stems from multilayer metallised plastic films, which lower the recyclability and compostability performance (Zabihzadeh Khajavi *et al.*, 2020). The technical solution to the specific challenge was provided by Teta, a company that became involved after Epsilon had several meetings and consultations with different partners. As highlighted by Epsilon, *"The technical challenges have been overcome by working in the supply chain that firstly brought the skills . . . and even if the key technical solution was provided by Teta, all the partners, their knowledge and collaboration were fundamental"*. Gamma labelled the strong collaboration among network partners as the *"innovation before innovation"*. Our case study parallels the situation described by Liliani and Cao (2020), as "*collaboration between packaging producers and product manufacturers was the key to improving product functionality and innovation in packaging technologies"*. This demonstrates that SCBMs often require new skills and capabilities from a network of stakeholders (see, Antikainen and Valkokari, 2016). The collaboration led to the development of new proficiencies among all actors involved in the supply chain, which made the transition toward CE more viable for all. Creating a value network was critical to building the knowledge necessary for BM change.

Operationally, the design of the innovative packaging affected the BM of all partners in different ways, from changing their supply chain to renovating their organisational configurations (Geissdoerfer *et al.*, 2018). For example, Epsilon redesigned the customer value proposition by offering its bakery products wrapped in a bio-based and compostable packaging that "*is green and simplifies the waste disposal procedure for end customers*". In this way, consumers would not need to properly separate or clean the packaging components before throwing them away, as everything can be put in the organic waste bin in accordance with the local waste governance.

Some minor differences in business dynamics aside, each partner's BM transformation involved two key aspects: (1) offering (and communicating to the public) a product that responds to customers' desire for more sustainable solutions with properties of renewability, biodegradability and compostability that reduce negative environmental impact (i.e. the value proposition); and (2) relying more on partners (i.e. the value network) to co-develop alternative solutions.

4.2 The role of accounting systems in supporting decision-making for CE

4.2.1 Marginal role of accountants and mainstream accounting. The managerial literature on BMI treats assessments of revenues and cost streams as essential to designing innovative

solutions (Amit and Zott, 2012; Johnson, 2010). In our case, however, many partners described the decision to adopt bio-based compostable plastics as a "*leap into the dark*" because it was "*impossible to estimate clients and revenues in the business plan*". Thus, when we asked about the accounting information collected, the managers stated that their determination "*was not rooted on accounting information but mainly made based on a gut feeling*". Their goals were to satisfy a new consumer demand while building their reputation on environmental issues: "*in this way we also create a great value for Eastern countries where mechanical recycling is somewhat lacking*".

Decision-makers largely bypassed the entire accounting function to realise the new packaging solution, as they believed that accountants could only provide financial information that was impossible to forecast in this case. One interviewee of Teta clearly stated: "*Our CFO was not involved when taking this strategic decision . . .* [because] *. . . it was not possible to define a ROI or an internal rate of return to achieve*". Notably, the lack of involvement of CFOs and accounting and finance departments suggests that managers perceive CFOs as mere 'number crunchers' who translate risks, opportunities and projects in monetary terms, thus lacking the ability to "*talk the circular economy language*" (as expressed by the executive director of Gamma). While some argue that accountants play the role of changemakers (see King and Atkins, 2016), our results suggest – in line with other researchers (Scarpellini *et al.*, 2020; Rodriguez and Picard, 2022; Halari and Baric, 2023) - the marginal role of accounting in the transition process towards SCBMS. As the manager of Teta revealed, "*we didn't leverage the CFO's tools because they would surely undermine the collaboration*". The project partners sought to create multifaceted value; not only in terms of new revenue streams, but also expansions in internal knowledge, social capital, and value for customers and the environment. Discussion of ROI and margins used by CFOs would seem irreconcilable with these goals. In short, managers considered accountants as only be able to translate CE investments into economic performance (see, Whetan and Douglas, 2021), while the pursuit of CE requires firms to reconceptualise their priorities, risks and revenues (Mentik, 2014).

To confirm that accountants and accounting tools were not integral to the six companies' efforts at circularity, we asked for a round of interviews with each company's CFO. Notably, half of them tersely responded that they could not support the development of the new packaging solution because of the "*difficulties in assessing the financial aspects associated to the new product from the design to the end-of-life*". They acknowledged that critical activities, like preparing budgets, analysing the costs of various product characteristics, and raising awareness about the financial risks involved (Lee and Wang, 2020), were "*simply not possible nor required by managers*". Other CFOs confirmed that they lacked "*enough expertise in sustainability and circular economy*" to be involved.

4.2.2 The rise of informal accounting. At the same time, we observed that the most important contribution to decision-making came from informal accounting (Clancy and Collins, 1979) collected and prepared by managers. As in Heikkilä (2023) and Kilfoyle *et al.* (2013), informal accounting here assumes the form of self-made configuration based on quali-quantitative items, commonly adapted by employees and managers to deem relevant with their needs to create bottom-up knowledge. Specifically, informal accounting mainly refers to market analysis, insights obtained from discussions with clients, investigations into consumers' perceptions, technical performance evaluations and rough estimates of human resources in terms of skills and competences.

In our case, we detected the use of informal accounting from the early stages of the project, similar to Feeney and Pierce's (2018) study on accounting information in new product development. Market and consumer information were considered the most relevant and accurate indicators of the new product's potential, since they ultimately justified the start of the new bio-based business. Importantly, informal accounting emerged at company level as the main source of information useful for managers' decision-making, as well as at network

level when partners started to share information within the so called "Open Lab". The Lab was a physical and virtual space for innovation, R&D and testing activities. Although launched by Delta, the Lab was open to other companies in the value network to foster technical and non-technical knowledge exchange. The Lab facilitated interactions among the supply chain partners, with periodic meetings going beyond technical aspects to also discuss environmental and economic issues. Through a multi-dimensional dialogue, the partners debated the different ways of performing calculations. This boosted the companies' awareness that suppliers and customers bring not only their technical knowledge and skills, but also their values and viewpoints on the role of businesses in contributing to sustainable development in the CE context. As reported by one interviewee, "*the discourse went beyond collaboration"* – unfolding in a manner similar to stakeholder engagement – *"because we involved customers and suppliers that can influence how the decisions are carried out or be affected by them*".

The rise of informal accounting at network level was mainly motivated by the difficulty of converging a range of different information into a single tool able to detect all the implications associated with the use of the innovative material. Indeed, as reported by Teta: *"there are so many criteria and so much confusion on how to assess sustainability that we started to study all possible threats and opportunities, collected data and tried to learn from this broad picture how to redesign the packaging in accordance with the properties of the material"*. Although based on casual links, Delta described the stimulation of this new mindset before the new technology development as *"an innovation before innovation"*. However, it must be noted that the Lab was only open to supply chain partners. Informal accounts were not shared or discussed with other stakeholders, like waste managers or consumers' associations who might provide insightful information about the consumption and recycling behaviour (Du Rietz, 2022). Therefore, while circularity was among the aspirations of the new packaging, the value network apparently missed the connection with actors having less power in the relationship.

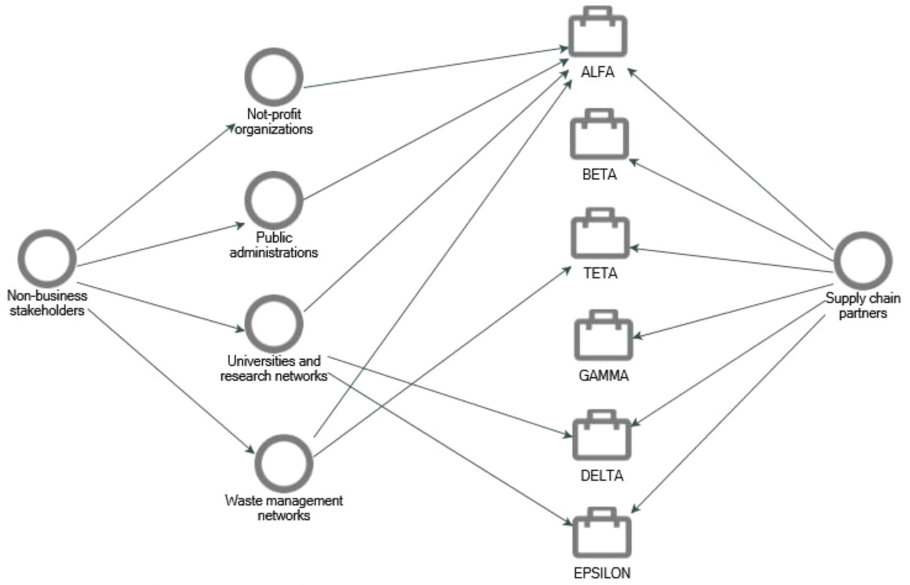
4.2.3 The use of Life Cycle Assessment as a non-financial environmental management accounting tool for decision-making. Besides informal accounting, the LCA methodology also promoted the exchange of qualitative, non-financial and scientific information to make joint assessments of the sustainability implications of the proposed circular solution. The LCA methodology expanded the discussion beyond environmental sustainability matters to the life cycle of the product and the system in which it was supposed to circulate. As a non-financial (non-monetary) environmental management accounting tool that allows measurement of the carbon footprint of a product along the whole value chain, LCA helped convince the managers in the network to change their business model (see Table 2).

Building the LCA at the network level created an opportunity for dialogue and engagement with stakeholders. Specifically, the LCA calculations "*brought to the table of discussion two key aspects: 1. The environmental impacts associated with technological and business choices and 2. The implications of consumer behavior and waste management governance"*. Indeed, the LCA made clear that preserving the material characteristics across the value chain depends on consumer behaviour and municipalities' guidance for waste management companies. The interviewed companies understood the importance of including business and non-business stakeholders alongside the value chain partners. As pointed out by Alfa: *"It is also necessary to mention the important collaboration with the organic waste treatment plants, with which the dialogue is always open in order to have compostable products suitable for* the needs of those who manage them". Other stakeholders, such as non-profit organisations and public administrations (see Figure 1) and their stakeholders, indirectly entered the discussion. They asked questions about land use, biodiversity loss and the potential for pollution of ecosystems. In this way, the LCA

Table 2. Characteristics of the accounting tools and systems that emerged from the content analysis

	A: Supporting communication	B: Supporting decision-making	C: Ad hoc use	D: Routine use	E: Measuring impacts	F: Monitoring progress	G: Sense-making	H: Target-setting	I: Financial	J: Non-financial	K: For inter-company dialogue	L: For intra-company dialogue	M: Company-based	N: Network-based
1. Supporting communication	100%	0%	20%	20%	0%	0%	0%	0%	0%	60%	0%	0%	40%	0%
2. Supporting decision-making	0%	100%	50%	29%	36%	7%	36%	14%	43%	71%	29%	0%	64%	36%
3. *Ad hoc* use	8%	54%	100%	0%	15%	23%	23%	8%	15%	85%	46%	0%	38%	46%
4. Routine use	9%	36%	0%	100%	36%	9%	0%	27%	27%	82%	27%	0%	64%	27%
5. Measuring impact	0%	56%	22%	44%	100%	11%	22%	22%	56%	67%	0%	0%	78%	22%
6. Monitoring progress	0%	17%	50%	17%	17%	100%	0%	67%	67%	67%	33%	0%	67%	50%
7. Sense-making	0%	100%	60%	0%	40%	0%	100%	0%	60%	40%	20%	0%	80%	20%
8. Target-setting	0%	33%	17%	50%	33%	67%	0%	100%	83%	50%	17%	0%	83%	0%
9. Financial	0%	67%	22%	33%	56%	44%	33%	56%	100%	44%	11%	0%	89%	33%
10. Non-financial	13%	42%	46%	38%	25%	17%	8%	13%	17%	100%	33%	8%	54%	38%
11. For inter-company dialogue	0%	33%	50%	25%	0%	17%	8%	8%	8%	67%	100%	8%	8%	83%
12. For intra-company dialogue	0%	0%	0%	0%	0%	0%	0%	0%	0%	50%	25%	100%	0%	25%
13. Company-based	11%	50%	28%	39%	39%	22%	22%	28%	44%	72%	6%	0%	100%	11%
14. Network-based	0%	42%	50%	25%	17%	25%	8%	0%	25%	75%	83%	8%	17%	100%

Source(s): Authors' own creation



Source(s): Authors' own creation

Figure 1.
Interactions between value network and non-business stakeholders

offered the "space" to expand the discussion from a value network to a business ecosystem in which the natural world gained a voice through the organisations and people involved.

The LCA also had two negative aspects. First, it was proposed and coordinated by Alfa, limiting dialogue to mainly Alfa and several non-business stakeholders (see Figure 1). Although this meant that other network companies did not directly meet with the non-profit organisations representing customers, municipalities and waste managers, Alfa demonstrated the strongest awareness of the need to engage in dialogue with non-business subjects to achieve real circular solutions and, more generally, an integrated sustainable circular bio-economy model. Indeed, Alfa supported other companies better understand that the system-wide perspective underpinning CE also includes non-business partners. Alfa used additional mechanisms (e.g. events and workshops) to engage in dialogue with these stakeholders, but many of these workshops targeted a single stakeholder category, thus missing the interplay between different views and perspectives.

Second, the impact assessment study did not evolve into Life Cycle Costing (LCC) and social LCA (S-LCA) or more broadly, Life Cycle Sustainability Assessment (LCSA). Following the ISO 1404/44 methodology, the LCA was performed using a dedicated commercial software, based on material flow accounting first, then emissions inventory, and finally impacts analysis on acidification, human toxicity and climate change. The manager of Alfa said that "*LCC and S-LCA require additional databases on financial and health aspects not available and difficult to monitor*". Therefore, building a comprehensive LCSA was deemed too demanding, similar to that outlined in the work of Bierer *et al.* (2015).

Finally, examination of the possible use of methodologies, metrics and tools for CE reveals that no specific circularity indicators or metrics were adopted. Some managers were aware of the Ellen MacArthur Foundation's Circulytics tools and the BS8001:2017 standard, but they were not capable of choosing the most appropriate instrument, instead preferring to wait for the forthcoming ISO standard for CE.

5. Discussion

5.1 The limits of managerial accounting

Consistent with Metting (2016), Ghisellini *et al.* (2016) and Elgie *et al.* (2021), our case study shows that managers seek more and better information when redesigning organisations around CE models and sustainability missions. However, they perceive current accounting systems – with their exclusive focus on financial aspects – to be unsuitable. Instead, managers see informal accounting and LCA as better equipped for stimulating value co-creation across multiple actors in a network and reducing environmental impacts across the life cycle.

One rationale for our findings is that managers deem environmental management tools more useful than "financial and profit maximization oriented" accounting tools in the specific transition stage toward SCBMs. In our case, managers needed to capture the environmental value of the new packaging solution not just the economic value. Accordingly, they jointly decided to focus on LCA rather than LCC despite the similarities of these tools (Rieckhof and Guenther, 2018). The absence of both LCC and S-LCA analysis indicates that economic and social performances were undervalued in the transition process. However, this condition risks an over-emphasis on environmental impact and an underestimate of the economic implications of the solution proposed from the medium to the long term (Piila *et al.*, 2022). It also overlooks the impacts in terms of jobs created, consumer awareness and local community wellbeing. It evidences that fostering value in the triple bottom line simultaneously is difficult, consistent with criticism levelled from the use of environmental management accounting tools (Burrit *et al.*, 2019; Burrit and Schaltegger, 2014; Unerman *et al.*, 2018).

An additional explanation for our results is that managers presume that accounting – as a language and methodology – is irreconcilable with the new mindset that circularity and sustainability dictate. This may be why managers turned to informal accounting (Heikkilä, 2023). It is notable that informal accounting also unfolded at the network level, revealing how SCMBs entail looking beyond company borders to consider ecological and economic system-wide impacts, as argued by some critical accounting scholars (Aranda-Usón *et al.*, 2022; Larrinaga and Garcia-Torea, 2022).

We find three key limitations for the use of mainstream accounting in CE-related decision-making. First, it solely focuses on financial value, while CE embraces the concept of multiple value creation and maximisation of both company efficiency and ecosystem health. Second, it assumes that the main goal of firms is to create value for shareholders and only residually for all other stakeholders, while CE incorporates system thinking and stakeholder engagement to preserve the value of materials in entire ecosystems. Relevant stakeholders have an important role to play in terms of defining new expectations or institutional demands (Selznick, 1957), which may take the form of new regulations, customer demands or public pressure – factors that often conflict with existing organisational perspectives or institutional logics (Thornton *et al.*, 2012). Finally, mainstream accounting restricts its reporting to the organisational boundaries, while CE requires a reconnection between the industrial metabolism and the earth's regeneration capacity.

For accounting scholars and practitioners to adapt their logic, routines and practices to CE principles (Kwarteng *et al.*, 2022), there is much work to do be if they are to play a bigger role in the transition to circular and sustainable solutions (Gibassier *et al.*, 2020). Researchers are well positioned to lead the change, with universities also facing a need to restructure their degree programs to include more training on sustainability and CE (Botes *et al.*, 2014; Boulianne *et al.*, 2018; Halari and Baric, 2023), so that research builds a bridge to practice.

We also identify a limitation in that LCA may not be the proper tool for supporting business model transformation towards SCBMs. Although LCA can stimulate life cycle thinking and reflections about system-related impacts (Jørgensen *et al.*, 2023) it does not

necessarily give a voice to all stakeholder categories. In fact, LCA is not built to fully integrate stakeholders' concerns and users' needs (Bocken *et al.*, 2019) and thus cannot wholly satisfy the requirements of CE to engage multiple actors in an ecosystem (Pieroni *et al.*, 2019; Ünal *et al.*, 2019).

5.2 Dialogic approach to spur new forms of accounting that stimulate the adoption of CE strategies

Dialogic accounting seems to be a promising approach for helping the accounting world embrace various discourses rather than continue to focus solely on measuring and maximising shareholder profit (Bebbington *et al.*, 2007; Brown, 2009; Brown and Dillard, 2019). Our case study data reveals the potential of dialogic theory. For example, LCA fostered the engagement and interaction of multiple subjects in an inter-organisational dialogue about finding a solution that could maximise value for the network actors (i.e. businesses), the environment and other stakeholders in the value network. However, it also has a key limitation: even if the dialogical nature of LCA unearthed the various conflicts that could arise from different stakeholders' priorities and viewpoints, the process of building the LCA was not democratic, as it was governed by a single actor. Thus, the logic used for implementing LCA lessened its utility as a dialogic tool (Aleksandrov *et al.*, 2018). Even if one company engaged with other actors via multiple workshops and events, as suggested by Brown and Dillard (2015), our case study underlines that these mechanisms are not merely dialogic nor democratic per se and do not encompass all relevant subjects (e.g. the farmers who provide the raw material for bio-based plastics).

Similarly, informal accounting helped managers to share informal accounts and so, reflect their individual epistemological viewpoints (Kilfoyle *et al.*, 2013). In this way, informal accounting is not only relevant at the organisational level (for individual managers' decisions), but may contribute to joint processes and productive debates at the network level, influencing broader debate at the ecosystem level too (Chenhall *et al.*, 2013; Goretzki *et al.*, 2018). However, the informal accounting observed in the case study did not embody all the principles of dialogic accounting (as theorised by Brown, 2009). As evidenced in our findings, the informal accounting that unfolded in the Open Lab encompassed business stakeholders of the value chain only, limiting its potential to be extended to the ecosystem; subjects with less power to influence company strategies were not involved.

Interpreting our findings in light of Brown's (2009) key principles, we find that both informal accounting and sustainability accounting need renovations to internalise a democratic dialogue. We found the recognition of multiple ideological orientations and values of subjects (principle no. 1), which facilitate individual expression of different perspectives, but less powerful or distant subjects like farmers and end-users (no. 6) were not included. This means that LCA focuses on eco-efficiency but does not consider issues of eco-justice and how potential threats and costs cascade among all actors. Both informal accounting and LCA provide quantitative and qualitative data that avoid monetary reductionism (no. 2) and, especially informal accounting, offer information that allows different actors to understand diverse effects and make their own judgements (no. 4) about the extent to which will make trade-offs. However, actors were not fully open to the contestable nature of calculations (no. 3) because not all stakeholders were invited to participate in open and transparent discussions about the values and assumptions on which the LCA and accountings were based. Participatory processes (no. 5) were detected from the early stage of product development but they did not encompass any marginalised groups (Brown, 2009), therefore power relations were not considered. Lastly, we found the potential risk for new forms of monologism (no. 8), as the environmental aspects overrode the financial and social ones. In other words, we detected a risk of substituting accounting (a technical language

owned by finance professionals) with another complex language owned by scientists or environmental engineers. This type of substitution only entrenches a monologic culture, from which stakeholders are excluded.

6. Conclusions

This work investigates how the accounting field can support the decision-making process that leads a firm to adopt CE principles and goals and change organisational structure to embrace a SCBM. The reported case study examines the relevance of collaboration in a network of companies working together to launch a bio-based and compostable packaging for bakery products, and what role of management accounting systems and function played in the process that concurrently spurred a change in managerial and organisational practices. The findings confirm that CE involves a transformation of the BM, requires strong collaboration across the value chain (Bocken *et al.*, 2019; Ricciotti, 2020; Urbinati *et al.*, 2017), and implies stakeholder engagement among business and non-business stakeholders. Findings also indicate that informal accounting (Kilfoyle *et al.*, 2013) and LCA were the key enablers of life cycle thinking and system-wide orientations among all partners. Through these elements, and the interchange of listening, discussion and learning processes, the parties opened an elaborate dialogue that stimulated greater awareness about of stakeholders' value, need and desires. These characteristics are consistent with a dialogic approach (Bebbington *et al.*, 2007; Bellucci *et al.*, 2019; Landi *et al.*, 2021), but the lack of direct and inclusive access to other stakeholders view outside the value network and the ineffective participatory process (Brown, 2009) limited those tools' potential.

However, in our case, managers did not involve accounting functions and accountants in their decision process of adopting the new solution inspired by CE principles. Instead they relied on information accounting in their shift toward circular economy. CFOs' limited involvement can be explained by the fact that managers perceived the accounting function as having limited expertise to multi-value measurement due to their orientation to generally emphasise costs and financial aspects (Halari and Baric, 2023).

The preparers of accounting information (CFOs) risk being left out of future investment decisions if they do not expand their skills and knowledge about sustainable development and CE and do not open their mindset to inter-disciplinary collaboration inside and outside company borders. Accountants need to be trained on sustainability and circularity language and mindset in order to collaborate with technicians, sustainability managers but even more, non-business stakeholders. Similarly, accounting educators and professional bodies need to start preparing future leaders who can contribute to CE strategy discussion.

In line with Bracci *et al.* (2021, p. 1514), this study makes evidence of the need "to rethink accounting in light of wider values than the traditional focus on finances" in order for the field to remain relevant in the societal push for sustainable development (Burritt and Schaltegger, 2010; Vollmer, 2021). Implications for researchers is the need to reimagine accounting around a long-term, cross discipline, system-wide perspective and make CE relevant in accounting journals rather than just the management ones. As widely done by technical-oriented journals, and recently highlighted by Marrone *et al.* (2020) and Baker *et al.* (2023), more empirical and pragmatic based research is necessary to observe and detect current limitations and needs and stimulate academic advancement. In this regard, the dialogic theory may represent a promising angle to stone the role of accounting research in this area and address the current gap about the distinct categorisation of CE metrics in meso, micro and macro levels and so, the disconnection of resource efficiency metrics from planetary boundaries, as already emphasised by Dillard and Vinnari (2019) and Kingston *et al.* (2019) in their works.

Of course, this work features several limitations. First, our results derive from a single case study and results cannot be generalised. Second, we did not directly interview non-business

stakeholders. Relatedly, our analysis of the data does not reveal why the dialogic approach was only partially achieved. That is, were the companies unaware of how to structure the dialogue with non-business stakeholders? Or did they lack resources? Or seek to avoid damage to their legitimacy? These limitations open avenues for future studies that could, for example, adopt a longitudinal approach to understand the learning paths in management accounting for CE and the role of accountants in BMI. In addition, it might be interesting to understand whether various types of CE archetypes (Potting *et al.*, 2017) involve similar or different tools and practices from those that emerged in our case study which basically embrace the redesign strategy, located in the top of the 9R framework by Potting *et al.* (2017).

References

AFNOR (2018), *XP X30-901. Circular Economy – Circular Economy Project Management System – Requirements and Guidelines*, Association Française de Normalisation.

Alcouffe, S., Berland, N. and Levant, Y. (2008), "Actor-networks and the diffusion of management accounting innovations: a comparative study", *Management Accounting Research*, Vol. 19 No. 1, pp. 1-17, doi: 10.1016/j.mar.2007.04.001.

Aleksandrov, E., Bourmistrov, A. and Grossi, G. (2018), "Participatory budgeting as a form of dialogic accounting in Russia: actors' institutional work and reflexivity trap", *Accounting, Auditing and Accountability Journal*, Vol. 31 No. 4, pp. 1098-1123, doi: 10.1108/aaaj-02-2016-2435.

Amit, R. and Zott, C. (2012), "Creating value through business model innovation", *MIT Sloan Management Review*, Vol. 53 No. 3, pp. 36-44.

Antikainen, M. and Valkokari, K. (2016), "A framework for sustainable circular business model innovation", *Technology Innovation Management Review*, Vol. 6 No. 7, pp. 5-12, doi: 10.22215/timreview/1000.

Antonini, C., Beck, C. and Larrinaga, C. (2020), "Subpolitics and sustainability reporting boundaries. The case of working conditions in global supply chains", *Accounting, Auditing and Accountability Journal*, Vol. 33 No. 7, pp. 1535-1567, doi: 10.1108/aaaj-09-2019-4167.

Aranda-Usón, A., Moneva, J.M. and Scarpellini, S. (2022), "Circular sustainability accounting in businesses for a circular economy: a framework of analysis", *European Journal of Social Impact and Circular Economy*, Vol. 3 No. 3, pp. 1-10.

Arjaliès, D.-L., Rodrigue, M. and Romi, A. (2020), "Special issue of *accounting Forum*: 'accounting for the circular economy'", *Accounting Forum*, Vol. 44 No. 3, pp. 1-28, doi: 10.1080/01559982.2020.1801134.

Asgher, M., Qamar, S.A., Bilal, M. and Iqbal, H.M. (2020), "Bio-based active food packaging materials: sustainable alternative to conventional petrochemical-based packaging materials", *Food Research International*, Vol. 137, 109625, doi: 10.1016/j.foodres.2020.109625.

Baker, M., Gray, R. and Schaltegger, S. (2023), "Debating accounting and sustainability: from incompatibility to rapprochement in the pursuit of corporate sustainability", *Accounting, Auditing and Accountability Journal*, Vol. 36 No. 2, pp. 591-619, doi: 10.1108/aaaj-04-2022-5773.

Batista, L., Gong, Y., Pereira, S., Jia, F. and Bittar, A. (2018), "Circular supply chains in emerging economies – a comparative study of packaging recovery ecosystems in China and Brazil", *International Journal of Production Research*, Vol. 57 No. 23, pp. 7248-7268, doi: 10.1080/00207543.2018.1558295.

Bebbington, J. and Gray, R. (2001), "An account of sustainability: failure, success and a reconceptualization", *Critical Perspectives on Accounting*, Vol. 12 No. 5, pp. 557-587, doi: 10.1006/cpac.2000.0450.

Bebbington, J. and Larrinaga, C. (2014), "Accounting and sustainable development: an exploration", *Accounting, Organizations and Society*, Vol. 39 No. 6, pp. 395-413, doi: 10.1016/j.aos.2014.01.003.

Bebbington, J., Brown, J., Frame, B. and Thomson, I. (2007), "Theorizing engagement: the potential of a critical dialogic approach", *Accounting, Auditing and Accountability Journal*, Vol. 20 No. 3, pp. 356-381, doi: 10.1108/09513570710748544.

Bebbington, J., Österblom, H., Crona, B., Jouffray, J., Larrinaga, C., Russell, S. and Scholtens, B. (2019), "Accounting and accountability in the anthropocene", *Accounting, Auditing and Accountability Journal*, Vol. 33 No. 1, pp. 152-177, doi: 10.1108/aaaj-11-2018-3745.

Beekhuyzen, J., Nielsen, S., von Hellens, L. and Australia, B. (2010), "The Nvivo looking glass: seeing the data through the analysis", *5th Conference on Qualitative Research in IT*, Brisbane, Australia.

Bellucci, M., Simoni, L., Acuti, D. and Manetti, G. (2019), "Stakeholder engagement and dialogic accounting: empirical evidence in sustainability reporting", *Accounting, Auditing and Accountability Journal*, Vol. 32 No. 5, pp. 1467-1499, doi: 10.1108/aaaj-09-2017-3158.

Bierer, A., Götze, U., Meynerts, L. and Sygulla, R. (2015), "Integrating life cycle costing and life cycle assessment using extended material flow cost accounting", *Journal of Cleaner Production*, Vol. 108, pp. 1289-1301, doi: 10.1016/j.jclepro.2014.08.036.

Bjøornenak, T. and Olson, O. (1999), "Unbundling management accounting innovations", *Management Accounting Research*, Vol. 10 No. 4, pp. 325-338, doi: 10.1006/mare.1999.0110.

Bocken, N., Strupeit, L., Whalen, K. and Nußholz, J. (2019), "A review and evaluation of circular business model innovation tools", *Sustainability*, Vol. 11 No. 8, p. 2210, doi: 10.3390/su11082210.

Boons, F., Montalvo, C., Quist, J. and Wagner, M. (2013), "Sustainable innovation, business models and economic performance: an overview", *Journal of Cleaner Production*, Vol. 45, pp. 1-8, doi: 10.1016/j.jclepro.2012.08.013.

Botes, V.L., Low, M. and Chapman, J.D. (2014), "Is accounting education sufficiently sustainable", *Sustainability Accounting, Management and Policy Journal*, Vol. 5 No. 1, pp. 95-124, doi: 10.1108/sampj-11-2012-0041.

Boulianne, E., Keddie, L.S. and Postaire, M. (2018), "(Non) coverage of sustainability within the French professional accounting education program", *Sustainability Accounting, Management and Policy Journal*, Vol. 9 No. 3, pp. 313-335, doi: 10.1108/sampj-09-2017-0119.

Bracci, E., Saliterer, I., Sicilia, M. and Steccolini, I. (2021), "Accounting for (public) value(s): reconsidering publicness in accounting research and practice, Accounting", *Auditing and Accountability Journal*, Vol. 34 No. 7, pp. 1513-1526.

Braungart, M., McDonough, W. and Bollinger, A. (2007), "Cradle-to-cradle design: creating healthy emissions – a strategy for eco-effective product and system design", *Journal of Cleaner Production*, Vol. 15 Nos 13-14, pp. 1337-1348, doi: 10.1016/j.jclepro.2006.08.003.

Brown, J. (2009), "Democracy, sustainability and dialogic accounting technologies: taking pluralism seriously", *Critical Perspectives on Accounting*, Vol. 20 No. 3, pp. 313-342, doi: 10.1016/j.cpa.2008.08.002.

Brown, J. and Dillard, J. (2015), "Dialogic accountings for stakeholders: on opening up and closing down participatory governance", *Journal of Management Studies*, Vol. 52 No. 7, pp. 961-985, doi: 10.1111/joms.12153.

Brown, J. and Dillard, J. (2019), "Accounting education, democracy and sustainability: taking divergent perspectives seriously", *International Journal of Pluralism and Economics Education*, Vol. 10 No. 1, pp. 24-45, doi: 10.1504/ijpee.2019.10019563.

BSI (2017), *BS 8001: 2017. Framework for Implementing the Principles of the Circular Economy in Organizations – Guide*, The British Standards Institution, London.

Burlaud, A. and Colasse, B. (2011), "International accounting standardisation: is politics back?", *Accounting in Europe*, Vol. 8 No. 1, pp. 23-47, doi: 10.1080/17449480.2011.574412.

Burritt, R.L. and Schaltegger, S. (2010), "Sustainability accounting and reporting: fad or trend?", *Accounting, Auditing and Accountability Journal*, Vol. 23 No. 7, pp. 829-846, doi: 10.1108/09513571011080144.

Burritt, R. and Schaltegger, S. (2014), "Accounting towards sustainability in production and supply chains", *The British Accounting Review*, Vol. 46 No. 4, pp. 327-343, doi: 10.1016/j.bar.2014.10.001.

Burritt, R.L., Hahn, T. and Schaltegger, S. (2002), "Towards a comprehensive framework for environmental management accounting – links between business actors and environmental management accounting tools", *Australian Accounting Review*, Vol. 12 No. 27, pp. 39-50, doi: 10.1111/j.1835-2561.2002.tb00202.x.

Burritt, R.L., Herzig, C., Schaltegger, S. and Viere, T. (2019), "Diffusion of environmental management accounting for cleaner production: evidence from some case studies", *Journal of Cleaner Production*, Vol. 224, pp. 479-491, doi: 10.1016/j.jclepro.2019.03.227.

Cano-Rubio, M., Maglio, R. and Núñez-Cacho Utrilla, P. (2021), "Factors influencing circular economy implementation in Smes business models: the case of Spain", *Piccola Impresa/Small Business*. doi: 10.14596/pisb.2849.

Cardno, C. and Piggot-Irvine, E. (1996), "Incorporating action research in school senior management training", *International Journal of Educational Management*, Vol. 10 No. 5, pp. 19-24, doi: 10.1108/09513549610146105.

Carus, M. and Dammer, L. (2018), "The circular bioeconomy – concepts, opportunities, and limitations", *Industrial Biotechnology*, Vol. 14 No. 2, pp. 83-91, doi: 10.1089/ind.2018.29121.mca.

Chenhall, R.H., Hall, M. and Smith, D. (2013), "Performance measurement, modes of evaluation and the development of compromising accounts", *Accounting, Organizations and Society*, Vol. 38 No. 4, pp. 268-287, doi: 10.1016/j.aos.2013.06.002.

Circle Economy (2023), *The Circularity Gap Report 2023: Methods (V 1.0*, Circle Economy, Amsterdam, available at: https://www.circularity-gap.world/2023

Clancy, D.K. and Collins, F. (1979), "Informal accounting information systems: some tentative findings", *Accounting, Organizations and Society*, Vol. 4 Nos 1-2, pp. 21-30, doi: 10.1016/0361-3682(79)90004-7.

Cooper, H.M. (1988), "Organizing knowledge syntheses: a taxonomy of literature reviews", *Knowledge in Society*, Vol. 1 No. 1, pp. 104-126, doi: 10.1007/bf03177550.

Cooper, D.J. and Morgan, W. (2013), "Meeting the evolving corporate reporting needs of government and society: arguments for a deliberative approach to accounting rule making", *Accounting and Business Research*, Vol. 43 No. 4, pp. 418-441, doi: 10.1080/00014788.2013.794411.

Correa, C., Laine, M. and Larrinaga, C. (2023), "Taking the world seriously: autonomy, reflexivity and engagement research in social and environmental accounting", *Critical Perspectives on Accounting*, Vol. 97, 102554, doi: 10.1016/j.cpa.2023.102554.

Costa, E., Kratzer, A., Pesci, C. and Burgia, I. (2023), "Accounting for a forest-based circular economy in an Alpine collective ownership", *Accounting Forum*, pp. 1-31, doi: 10.1080/01559982.2023.2214703.

Crippa, M., De Wilde, B., Koopmans, R., Leyssens, J., Muncke, J., Ritschkoff, A.C., Van Doorsselamer, K., Velis, C. and Wagner, M.A. (2019), *Circular Economy for Plastics – Insights from Research and Innovation to Inform Policy and Funding Decisions*, European Commission, Brussels, Belgium.

D'Amato, D., Droste, N., Allen, B., Kettunen, M., Lähtinen, K., Korhonen, J., Toppinen, A. and Matthies, B. (2017), "Green, circular, bio economy: a comparative analysis of sustainability avenues", *Journal of Cleaner Production*, Vol. 168, pp. 716-734, doi: 10.1016/j.jclepro.2017.09.053.

De Pascale, A., Arbolino, R., Szopik-Depczyńska, K., Limosani, M. and Ioppolo, G. (2021), "A systematic review for measuring circular economy: the 61 indicators", *Journal of Cleaner Production*, Vol. 281, 124942, doi: 10.1016/j.jclepro.2020.124942.

Di Vaio, A., Hasan, S., Palladino, R. and Hassan, R. (2023), "The transition towards circular economy and waste within accounting and accountability models: a systematic literature review and conceptual framework", *Environment, Development and Sustainability*, Vol. 25 No. 1, pp. 734-810, doi: 10.1007/s10668-021-02078-5.

Dillard, J. and Vinnari, E. (2019), "Critical dialogical accountability: from accounting-based accountability to accountability-based accounting", *Critical Perspectives on Accounting*, Vol. 62, pp. 16-38, doi: 10.1016/j.cpa.2018.10.003.

Du Rietz, S. (2022), "Making up circular consumers: young adults' personal accounting and counter earmarking within a circular deposit-refund scheme", Accounting Forum. doi: 10.1080/01559982.2022.2149045.

Eisenhardt, K.M. and Graebner, M.E. (2007), "Theory building from cases: opportunities and challenges", *Academy of Management Journal*, Vol. 50 No. 1, pp. 25-32, doi: 10.5465/amj.2007.24160888.

Elgie, A.R., Singh, S.J. and Telesford, J.N. (2021), "You can't manage what you can't measure: the potential for circularity in Grenada's waste management system", *Resources, Conservation and Recycling*, Vol. 164, 105170, doi: 10.1016/j.resconrec.2020.105170.

Ellen MacArthur Foundation (EMF) (2013), "Towards the circular economy: opportunities for the consumer goods sector", available at: https://www.ellenmacarthurfoundation.org/publications

Ellen MacArthur Foundation (2018), "Circular economy overview", available at: https://www.ellenmacarthurfoundation.org/circular-economy/overview/concept

European Commission (2015), "An EU action plan for the circular economy", available at: https://eur-lex.europa.eu/legal-content/EN/TXT/?uri=CELEX:52015DC0614

European Commission (2018), "A European strategy for plastics in a circular economy", available at: https://eur-lex.europa.eu/legal-content/EN/TXT/?qid=1516265440535anduri=COM:2018:28:FIN

Fassin, Y. (2009), "The stakeholder model refined", *Journal of Business Ethics*, Vol. 84 No. 1, pp. 113-135, doi: 10.1007/s10551-008-9677-4.

Feeney, O. and Pierce, B. (2018), "Accounting and new product development: the importance of interactions within social and technical structures", *Qualitative Research in Accounting and Management*, Vol. 15 No. 2, pp. 251-279, doi: 10.1108/qram-05-2017-0045.

Finnveden, G., Ekvall, T., Arushanyan, Y., Bisaillon, M., Henriksson, G., Gunnarsson Östling, U., Guath, M., Sahlin, J., Stenmarck, Å., Sundberg, J., Sundqvist, J.O., Svenfelt, Å., Söderholm, P., Björklund, A., Eriksson, O. and Forsfält, T. (2013), "Policy instruments towards a sustainable waste management", *Sustainability*, Vol. 5 No. 3, pp. 841-881, doi: 10.3390/su5030841.

Foschi, E. and Bonoli, A. (2019), "The commitment of packaging industry in the framework of the European strategy for plastics in a circular economy", *Administrative Sciences*, Vol. 9 No. 1, p. 18, doi: 10.3390/admsci9010018.

Foss, N. and Saebi, T. (2017), "Fifteen years of research on BM innovation: how far have we come, and where should we go?", *Journal of Management*, Vol. 43 No. 1, pp. 200-227, doi: 10.1177/0149206316675927.

Frame, B. and Brown, J. (2008), "Developing post-normal technologies for sustainability", *Ecological Economics*, Vol. 65 No. 2, pp. 225-241, doi: 10.1016/j.ecolecon.2007.11.010.

Frame, B. and O'Connor, M. (2011), "Integrating valuation and deliberation: the purposes of sustainability assessment", *Environmental Science and Policy*, Vol. 14 No. 1, pp. 1-10, doi: 10.1016/j.envsci.2010.10.009.

Fraser, M. (2012), "Fleshing out an engagement with a social accounting technology", *Accounting, Auditing and Accountability Journal*, Vol. 25 No. 3, pp. 508-534, doi: 10.1108/09513571211209626.

Fregonara, E., Giordano, R., Ferrando, D.G. and Pattono, S. (2017), "Economic-environmental indicators to support investment decisions: a focus on the buildings' end-of-life stage", *Buildings*, Vol. 7 No. 4, p. 65, doi: 10.3390/buildings7030065.

Frosch, R.A. (1992), "Industrial ecology: a philosophical introduction", *Proceedings of the National Academy of Sciences*, Vol. 89 No. 3, pp. 800-803, doi: 10.1073/pnas.89.3.800.

Geissdoerfer, M., Vladimirova, D. and Evans, S. (2018), "Sustainable business model innovation: a review", *Journal of Cleaner Production*, Vol. 198, pp. 401-416, doi: 10.1016/j.jclepro.2018.06.240.

Geng, Y., Fu, J., Sarkis, J. and Xue, B. (2012), "Towards a national circular economy indicator system in China: an evaluation and critical analysis", *Journal of Cleaner Production*, Vol. 23 No. 1, pp. 216-224, doi: 10.1016/j.jclepro.2011.07.005.

George, S., Brown, J. and Dillard, J. (2021), "Social movement activists' conceptions of political action and counter-accounting through a critical dialogic accounting and accountability lens", *Critical Perspectives on Accounting*, Vol. 91, 102408, doi: 10.1016/j.cpa.2021.102408.

Ghisellini, P., Cialani, C. and Ulgiati, S. (2016), "A review of CE: the expected transition to a balanced interplay of environmental and economic systems", *Journal of Cleaner Production*, Vol. 114, pp. 11-32, doi: 10.1016/j.jclepro.2015.09.007.

Ghisellini, P., Quinto, I., Passaro, R. and Ulgiati, S. (2023), "Circular economy innovation and COVID-19 strategies in start-ups for more sustainable, humane and resilient entrepreneurship", *Piccola Impresa/Small Business*, Vol. 1, pp. 48-75, doi: 10.14596/pisb.3385.

Gibassier, D., El Omari, S. and Naccache, P. (2020), "Institutional work in the birth of a carbon accounting profession", *Accounting, Auditing and Accountability Journal*, Vol. 33 No. 6, pp. 1447-1476, doi: 10.1108/aaaj-12-2014-1912.

Goretzki, L., Strauss, E. and Wiegmann, L. (2018), "Exploring the roles of vernacular accounting systems in the development of 'enabling' global accounting and control systems", *Contemporary Accounting Research*, Vol. 35 No. 4, pp. 1888-1916, doi: 10.1111/1911-3846.12357.

Gray, R. (2010), "Is accounting for sustainability actually accounting for sustainability . . . and how would we know? An exploration of narratives of organisations and the planet", *Accounting, Organizations and Society*, Vol. 35 No. 1, pp. 47-62, doi: 10.1016/j.aos.2009.04.006.

Guthrie, J., Petty, R., Yongvanich, K. and Ricceri, F. (2004), "Using content analysis as a research method to inquire into intellectual capital reporting", *Journal of Intellectual Capital*, Vol. 5 No. 2, pp. 282-293, doi: 10.1108/14691930410533704.

Halari, A. and Baric, M. (2023), "Exploring accountant's involvement in circular economy: experiences and perspectives of practitioners", *Qualitative Research in Accounting and Management*, Vol. 20 No. 4, pp. 421-446, doi: 10.1108/qram-03-2022-0048.

Hall, M. (2010), "Accounting information and managerial work", *Accounting, Organizations and Society*, Vol. 35 No. 3, pp. 301-315, doi: 10.1016/j.aos.2009.09.003.

Hannan, M.T. and Freeman, J. (1984), "Structural inertia and organizational change", *American Sociological Review*, Vol. 49 No. 2, pp. 149-164, doi: 10.2307/2095567.

Harding, K.G., Dennis, J.S., von Blottnitz, H. and Harrison, S.T.L. (2007), "Environmental analysis of plastic production processes: comparing petroleum-based polypropylene and polyethylene with biologically based poly-β-hydroxybutyric acid using life cycle analysis", *Journal of Biotechnology*, Vol. 130 No. 1, pp. 57-66, doi: 10.1016/j.jbiotec.2007.02.012.

Heikkilä, T. (2023), "The heart and soil of value-based business: emerging circular business network and vernacular accountings", *Accounting Forum*, pp. 1-32, doi: 10.1080/01559982.2023.2185851.

Holdaway, M. (2019), "Crossing disciplines: exploring the contribution of a critical futures approach to democratising community engagement with a focus on the gas industry", *Pacific Accounting Review*, Vol. 31 No. 1, pp. 159-180, doi: 10.1108/par-11-2017-0093.

Hong, J., Zhang, Y. and Ding, M. (2018), "Sustainable supply chain management practices, supply chain dynamic capabilities, and enterprise performance", *Journal of Cleaner Production*, Vol. 172, pp. 3508-3519, doi: 10.1016/j.jclepro.2017.06.093.

Hopkinson, P., De Angelis, R. and Zils, M. (2020), "Systemic building blocks for creating and capturing value from circular economy", *Resources, Conservation and Recycling*, Vol. 155, 104672, doi: 10.1016/j.resconrec.2019.104672.

Huberman, A.M. and Miles, M.B. (1994), "Data management and analysis methods", in *Handbook of Qualitative Research*, Sage Publications, Thousand Oaks, pp. 428-444.

ICAEW (2004), *Sustainability: the Role of Accountants in Sustainable Business*, Institute of Chartered Accountants in England and Wales, London, available at: https://www.icaew.com/-/media/

corporate/files/technical/sustainability/sustainability-the-role-of-accountants-2004.ashx?la=en

IFAC (2016), "Time to act: the accountancy profession's contribution to the sustainable development goals", available at: https://www.ifac.org/system/files/publications/files/The-2030-Agenda-for-Sustainable-Development-A-Snapshot-of-the-Accountancy-Professions-Contribution-2016_0.pdf

Janik, A. and Ryszko, A. (2019), "Circular economy in companies: an analysis of selected indicators from a managerial perspective", *Multidisciplinary Aspects of Production Engineering*, Vol. 2 No. 1, pp. 523-535, doi: 10.2478/mape-2019-0053.

Jesse, F.F., Antonini, C. and Luque-Vilchez, M. (2023), "A circularity accounting network: CO2 measurement along supply chains using machine learning", *Spanish Accounting Review*, Vol. 26, pp. 21-33, doi: 10.6018/rcsar.564901.

Johnson, M.W. (2010), *Seizing the White Space: Business Model Innovation for Growth and Renewal*, Harvard Business School Press, Boston.

Jørgensen, S., Pedersen, L.J.T. and Skard, S. (2023), "Resource accounting for a circular economy: evidence from a digitalised waste management system", *Accounting Forum*, pp. 1-30.

Kanda, W., Geissdoerfer, M. and Hjelm, O. (2021), "From circular business models to circular business ecosystems", *Business Strategy and the Environment*, Vol. 30 No. 6, pp. 2814-2829, doi: 10.1002/bse.2895.

Karlsson, M. and Wolf, A. (2008), "Using an optimization model to evaluate the economic benefits of industrial symbiosis in the forest industry", *Journal of Cleaner Production*, Vol. 16 No. 14, pp. 1536-1544, doi: 10.1016/j.jclepro.2007.08.017.

Kilfoyle, E., Richardson, A.J. and MacDonald, L.D. (2013), "Vernacular accountings: bridging the cognitive and the social in the analysis of employee-generated accounting systems", *Accounting, Organizations and Society*, Vol. 38 No. 5, pp. 382-396, doi: 10.1016/j.aos.2013.08.001.

King, M. and Atkins, J. (2016), *Chief Value Officer: Accountants Can Save the Planet*, Greenleaf Publishing, Sheffield.

Kingston, K.L., Furneaux, C., de Zwaan, L. and Alderman, L. (2019), "From monologic to dialogic: accountability of nonprofit organisations on beneficiaries' terms", *Accounting, Auditing and Accountability Journal*, Vol. 33 No. 2, pp. 447-471, doi: 10.1108/aaaj-01-2019-3847.

Kirchherr, J., Reike, D. and Hekkert, M. (2017), "Conceptualizing the CE: an analysis of 114 definitions", *Resources, Conservation and Recycling*, Vol. 127, pp. 221-232, doi: 10.1016/j.resconrec.2017.09.005.

Kjaer, L.L., Pigosso, D.C.A., Niero, M., Bech, N.M. and McAloone, T.C. (2019), "Product/service-systems for a circular economy: the route to decoupling economic growth from resource consumption?", *Journal of Industrial Ecology*, Vol. 23 No. 1, pp. 22-35, doi: 10.1111/jiec.12747.

Korhonen, J., Nuur, C., Feldmann, A. and Birkie, S.E. (2018), "Circular economy as an essentially contested concept", *Journal of Cleaner Production*, Vol. 175, pp. 544-552, doi: 10.1016/j.jclepro.2017.12.111.

Krippendorff, K. (2004), "Reliability in content analysis", *Human Communication Research*, Vol. 30 No. 3, pp. 411-433, doi: 10.1111/j.1468-2958.2004.tb00738.x.

Kwarteng, A., Agyenim-Boateng, C. and Simpson, S.N.Y. (2022), "The barriers to adapting accounting practices to circular economy implementation: evidence from Ghana", *Journal of Global Responsibility*, Vol. 14 No. 1, pp. 1-26, doi: 10.1108/jgr-12-2021-0102.

La Torre, M., Valentinetti, D., Dumay, J. and Rea, M.A. (2018), "Improving corporate disclosure through XBRL: an evidence-based taxonomy structure for integrated reporting", *Journal of Intellectual Capital*, Vol. 19 No. 2, pp. 338-366, doi: 10.1108/jic-03-2016-0030.

Lahti, T., Wincent, J. and Parida, V. (2018), "A definition and theoretical review of the circular economy, value creation, and sustainable business models: where are we now and where

should research move in the future?", *Sustainability*, Vol. 10 No. 8, p. 2799, doi: 10.3390/su10082799.

Lamberton, G. (2005), "Sustainability accounting – a brief history and conceptual framework", *Accounting Forum*, Vol. 29 No. 1, pp. 7-26, doi: 10.1016/j.accfor.2004.11.001.

Landi, S., Costantini, A., Fasan, M. and Bonazzi, M. (2021), "Public engagement and dialogic accounting through social media during COVID-19 crisis: a missed opportunity?", *Accounting, Auditing and Accountability Journal*, Vol. 35 No. 1, pp. 35-47, doi: 10.1108/aaaj-08-2020-4884.

Larrinaga, C. and Garcia-Torea, N. (2022), "An ecological critique of accounting: the circular economy and COVID-19", *Critical Perspectives on Accounting*, Vol. 82, 102320, doi: 10.1016/j.cpa.2021.102320.

Lee, C.H. and Wang, W.Y. (2020), "Strategy, accountants' activities and new product development performance", *Advances in Accounting*, Vol. 50, 100487, doi: 10.1016/j.adiac.2020.100487.

Lieder, M. and Rashid, A. (2016), "Towards CE implementation: a comprehensive review in context of manufacturing industry", *Journal of Cleaner Production*, Vol. 115, pp. 36-51, doi: 10.1016/j.jclepro.2015.12.042.

Liliani, T.B. and Cao, D. (2020), "Advancing bioplastic packaging products through co-innovation: a conceptual framework for supplier-customer collaboration", *Journal of Cleaner Production*, Vol. 252, 119861, doi: 10.1016/j.jclepro.2019.119861.

Lindgardt, Z., Reeves, M., Stalk, G. Jr and Deimler, M. (2012), "Business model innovation: when the game gets tough, change the game", *Own the future: 50 ways to win from The Boston Consulting Group*, pp. 291-298.

Manetti, G., Bellucci, M. and Oliva, S. (2021), "Unpacking dialogic accounting: a systematic literature review and research agenda", *Accounting, Auditing and Accountability Journal*, Vol. 34 No. 9, pp. 187-220, doi: 10.1108/aaaj-08-2020-4736.

Marco-Fondevila, M., Benito-Bentué, D. and Scarpellini, S. (2023), "'Old' financial instruments in 'new' circular models: applied environmental accounting in the banking sector for reporting in a circular economy", *Spanish Accounting Review*, Vol. 26, pp. 34-45, doi: 10.6018/rcsar.576251.

Marrone, M., Linnenluecke, M.K., Richardson, G. and Smith, T. (2020), "Trends in environmental accounting research within and outside of the accounting discipline", *Accounting, Auditing and Accountability Journal*, Vol. 33 No. 8, pp. 2167-2193, doi: 10.1108/aaaj-03-2020-4457.

Masanet-Llodra, M.J. (2006), "Environmental management accounting: a case study research on innovative strategy", *Journal of Business Ethics*, Vol. 68 No. 4, pp. 393-408, doi: 10.1007/s10551-006-9029-1.

Massa, L. and Tucci, C.L. (2013), "Business model innovation", *The Oxford Handbook of Innovation Management*, Vol. 20 No. 18, pp. 420-441.

Massaro, M., Dumay, J. and Guthrie, J. (2016), "On the shoulders of giants: undertaking a structured literature review in accounting", *Accounting, Auditing and Accountability Journal*, Vol. 29 No. 5, pp. 767-801, doi: 10.1108/aaaj-01-2015-1939.

Maykut, P. and Morehouse, R. (2002), *Beginning Qualitative Research: A Philosophical and Practical Guide*, Routledge, Abingdon.

McCormick, K. and Kautto, N. (2013), "The bioeconomy in Europe: an overview", *Sustainability*, Vol. 5 No. 6, pp. 2589-2608, doi: 10.3390/su5062589.

McDonough, W. and Braungart, M. (2002), *Cradle to Cradle: Remaking the Way We Make Things*, North Point Press, New York.

Mentik, B. (2014), *Circular Business Model Innovation: A Process Framework and a Tool for Business Model Innovation in a Circular Economy*, available at: http://resolver.tudelft.nl/uuid:c2554c91-8aaf-4fdd-91b7-4ca08e8ea621

Metting, T. (2016), "Reference lost – first Explorations on the Use of Macs in business model transformation, digital enterprise computing", in *Conference: Digital Enterprise Computing (DEC) 2016*, Böblingen, Germany.

Milne, M.J. and Adler, R.W. (1999), "Exploring the reliability of social and environmental disclosures content analysis", *Accounting, Auditing and Accountability Journal*, Vol. 12 No. 2, pp. 237-256, doi: 10.1108/09513579910270138.

Mitchell, R.K., Agle, B.R. and Wood, D.J. (1997), "Toward a theory of stakeholder identification and salience: defining the principle of who and what really counts", *Academy of Management Review*, Vol. 22 No. 4, pp. 853-886, doi: 10.2307/259247.

Moraga, G., Huysveld, S., Mathieux, F., Blengini, G.A., Alaerts, L., Van Acker, K., de Meester, S. and Dewulf, J. (2019), "Circular economy indicators: what do they measure?", *Resources, Conservation and Recycling*, Vol. 146, pp. 452-461, doi: 10.1016/j.resconrec.2019.03.045.

Morone, P., Tartiu, V.E. and Falcone, P. (2015), "Assessing the potential of biowaste for bioplastics production through social network analysis", *Journal of Cleaner Production*, Vol. 90, pp. 43-54, doi: 10.1016/j.jclepro.2014.11.069.

Morseletto, P. (2020), "Restorative and regenerative: exploring the concepts in the circular economy", *Journal of Industrial Ecology*, Vol. 24 No. 4, pp. 763-773, doi: 10.1111/jiec.12987.

Murray, A., Skene, K. and Haynes, K. (2017), "The circular economy: an interdisciplinary exploration of the concept and application in a global context", *Journal of Business Ethics*, Vol. 140 No. 3, pp. 369-380, doi: 10.1007/s10551-015-2693-2.

Nadeem, S.P., Garza-Reyes, J.A. and Glanville, D. (2018), *The Challenges of the Circular Economy*, Palgrave Macmillan, Cham.

Niza, S., Rosado, L. and Ferrao, P. (2009), "Urban metabolism: methodological advances in urban material flow accounting based on the Lisbon case study", *Journal of Industrial Ecology*, Vol. 13 No. 3, pp. 384-405, doi: 10.1111/j.1530-9290.2009.00130.x.

O'Dochartaigh, A. (2019), "No more fairytales: a quest for alternative narratives of sustainable business", *Accounting, Auditing and Accountability Journal*, Vol. 32 No. 5, pp. 1384-1413, doi: 10.1108/aaaj-11-2016-2796.

O'Dwyer, B. and Owen, D.L. (2005), "Assurance statement practice in environmental, social and sustainability reporting: a critical evaluation", *The British Accounting Review*, Vol. 37 No. 2, pp. 205-229, doi: 10.1016/j.bar.2005.01.005.

Oskam, I., Bossink, B. and de Man, A.P. (2021), "Valuing value in innovation ecosystems: how cross-sector actors overcome tensions in collaborative sustainable business model development", *Business and Society*, Vol. 60 No. 5, pp. 1059-1091, doi: 10.1177/0007650320907145.

Pagotto, M. and Halog, A. (2015), "Towards a circular economy in Australian agri-food industry: an application of input-output oriented approaches for analyzing resource efficiency and competitiveness potential", *Journal of Industrial Ecology*, Vol. 20 No. 5, pp. 1176e1186-1186, doi: 10.1111/jiec.12373.

Parida, V., Burström, T., Visnjic, I. and Wincent, J. (2019), "Orchestrating industrial ecosystem in circular economy: a two-stage transformation model for large manufacturing companies", *Journal of Business Research*, Vol. 101, pp. 715-725, doi: 10.1016/j.jbusres.2019.01.006.

Park, J., Sarkis, J. and Wu, Z. (2010), "Creating integrated business and environmental value within the context of China's CE and ecological modernization", *Journal of Cleaner Production*, Vol. 18 No. 15, pp. 1492-1499.

Pauliuk, S. (2018), "Critical appraisal of the circular economy standard BS 8001: 2017 and a dashboard of quantitative system indicators for its implementation in organizations", *Resources, Conservation and Recycling*, Vol. 129, pp. 81-92, doi: 10.1016/j.resconrec.2017.10.019.

Pearce, D.W. and Turner, R.K. (1989), *Economics of Natural Resources and the Environment*, Johns Hopkins University Press, Baltimore.

Peppard, C. and Rylander, A. (2006), "From value chain to value network: insights for mobile operators", *European Management Journal*, Vol. 24 Nos 2-3, pp. 128-141, doi: 10.1016/j.emj.2006.03.003.

Pieroni, M.P.P., McAloone, T.C. and Pigosso, D.C.A. (2019), "Business model innovation for circular economy and sustainability: a review of approaches", *Journal of Cleaner Production*, Vol. 215, pp. 198-216, doi: 10.1016/j.jclepro.2019.01.036.

Piila, N., Sarja, M., Onkila, T. and Mäkelä, M. (2022), "Organisational drivers and challenges in circular economy implementation: an issue life cycle approach", *Organization and Environment*, Vol. 35 No 4, doi: 10.1177/108602662210996.

Plastic Consult (2021), *La filiera dei polimeri compostabili*, Dati 2020 e prospettive, available at: http://assobioplastiche.org/assets/documenti/news/news2021/La_filiera_dei_polimeri_compostabili-Dati_2020-11_giu_2021.pdf

PlasticsEurope (2019), "Plastics – the facts 2019", available at: https://www.plasticseurope.org/application/files/9715/7129/9584/FINAL_web_version_Plastics_the_facts2019_14102019.pdf

Potting, J., Hekkert, M.P., Worrell, E. and Hanemaaijer, A. (2017), "Circular Economy: Measuring Innovation in the Product Chain", *Planbureau voor de Leefomgeving*, PBL Publishers, The Hague, p. 2544, available at: https://www.pbl.nl/sites/default/files/downloads/pbl-2016-circular-economy-measuring-innovation-in-product-chains-2544.pdf

Preston, F. (2012), "A global redesign? Shaping the circular economy", available at: http://www.chathamhouse.org/sites/default/files/public/Research/Energy%20Environment%20and%20Development/bp0312_preston.pdf

Qian, W., Burritt, R. and Monroe, G. (2011), "Environmental management accounting in local government: a case of waste management", *Accounting, Auditing and Accountability Journal*, Vol. 24 No. 1, pp. 93-128, doi: 10.1108/09513571111098072.

Rabionet, S.E. (2011), "How I learned to design and conduct semi-structured interviews: an ongoing and continuous journey", *Qualitative Report*, Vol. 16 No. 2, pp. 563-566.

Raworth, K. (2017), "A doughnut for the anthropocene: humanity's compass in the 21st century", *The Lancet Planetary Health*, Vol. 182 No. 2, pp. 48-49, doi: 10.1016/s2542-5196(17)30028-1.

Ricciotti, F. (2020), "From value chain to value network: a systematic literature review", *Management Review Quarterly*, Vol. 70 No. 2, pp. 191-212, doi: 10.1007/s11301-019-00164-7.

Rieckhof, R. and Guenther, E. (2018), "Integrating life cycle assessment and material flow cost accounting to account for resource productivity and economic-environmental performance", *International Journal of Life Cycle Assessment*, Vol. 23 No. 7, pp. 1491-1506, doi: 10.1007/s11367-018-1447-7.

Rodrigue, M. and Picard, C.F. (2022), "Non-accountants and accounting: on the emancipatory mobilization of accounting by sustainability managers", *European Accounting Review*, Vol. 32 No. 5, pp. 1-29, doi: 10.1080/09638180.2022.2052921.

Ruggieri, A., Braccini, A.M., Poponi, S. and Mosconi, E.M. (2016), "A meta-model of inter-organisational cooperation for the transition to a circular economy", *Sustainability*, Vol. 8 No. 11, p. 1153, doi: 10.3390/su8111153.

Saidani, M., Yannou, B., Leroy, Y., Cluzel, F. and Kendall, A. (2019), "A taxonomy of circular economy indicators", *Journal of Cleaner Production*, Vol. 207, pp. 542-559, doi: 10.1016/j.jclepro.2018.10.014.

Scarpellini, S. (2022), "Social impacts of a circular business model: an approach from a sustainability accounting and reporting perspective", *Corporate Social Responsibility and Environmental Management*, Vol. 29 No. 3, pp. 646-656, doi: 10.1002/csr.2226.

Scarpellini, S., Marín-Vinuesa, L.M., Aranda-Usón, A. and Portillo-Tarragona, P. (2020), "Dynamic capabilities and environmental accounting for the circular economy in businesses", *Sustainability Accounting, Management and Policy Journal*, Vol. 11 No. 7, pp. 1129-1158, doi: 10.1108/sampj-04-2019-0150.

Schaltegger, S., Bennett, M., Burritt, R.L. and Jasch, C.M. (2008), *Environmental Management Accounting for Cleaner Production*, Springer, Berlin.

Scheepens, A.E., Vogtlander, J.G. and Brezet, J.C. (2016), "Two life cycle assessment (LCA) € based methods to analyse and design complex (regional) CE systems. Case: making water tourism more sustainable", *Journal of Cleaner Production*, Vol. 114, 257e268, doi: 10.1016/j.jclepro.2015.05.075.

Selznick, P. (1957), *Leadership in Administration: A Sociological Interpretation*, Harper and Row, New York.

Seuring, S. (2004), "Industrial ecology, life cycles, supply chains: differences and interrelations", *Business Strategy and the Environment*, Vol. 13 No. 5, pp. 306-319, doi: 10.1002/bse.418.

Siggelkow, N. (2007), "Persuasion with case studies", *Academy of Management Journal*, Vol. 50 No. 11, pp. 20-24, doi: 10.5465/amj.2007.24160882.

Smith, M. and Taffler, R.J. (2000), "The chairman's statement – a content analysis of discretionary narrative disclosures", *Accounting, Auditing and Accountability Journal*, Vol. 13 No. 5, pp. 624-647, doi: 10.1108/09513570010353738.

Spicer, A.J. and Johnson, M.R. (2004), "Third-party demanufacturing as a solution for extended producer responsibility", *Journal of Cleaner Production*, Vol. 12 No. 1, pp. 37-45, doi: 10.1016/s0959-6526(02)00182-8.

Stål, H.I., Bengtsson, M. and Manzhynski, S. (2022), "Cross-sectoral collaboration in business model innovation for sustainable development: tensions and compromises", *Business Strategy and the Environment*, Vol. 31 No. 1, pp. 445-463, doi: 10.1002/bse.2903.

Steenkamp, N. and Northcott, D. (2007), "Content analysis in accounting research: the Practical challenges", *Australian Accounting Review*, Vol. 17 No. 43, pp. 12-25, doi: 10.1111/j.1835-2561.2007.tb00332.x.

Svensson, N. and Funck, E.K. (2019), "Management control in circular economy. Exploring and theorizing the adaptation of management control to circular business models", *Journal of Cleaner Production*, Vol. 233, pp. 390-398, doi: 10.1016/j.jclepro.2019.06.089.

Tanima, F.A., Brown, J. and Dillard, J.F. (2020), "Surfacing the political: women's empowerment, microfinance, critical dialogic accounting and accountability", *Accounting, Organizations and Society*, Vol. 85, 101141, doi: 10.1016/j.aos.2020.101141.

Tanima, F.A., Brown, J. and Hopper, T. (2023), "Doing critical dialogic accounting and accountability research: an analytical framework and case illustration", *Accounting, Auditing and Accountability Journal*, Vol. ahead of print, doi: 10.1108/aaaj-12-2020-5046.

Tencati, A., Pogutz, S., Moda, B., Brambilla, M. and Cacia, C. (2016), "Prevention policies addressing packaging and packaging waste: some emerging trends", *Waste Management*, Vol. 56, pp. 35-45, doi: 10.1016/j.wasman.2016.06.025.

Thornton, P.H., Ocasio, W. and Lounsbury, M. (2012), *The Institutional Logics Perspective: A New Approach to Culture, Structure, and Process*, OUP, Oxford.

Tukker, A. (2015), "Product services for a resource-efficient and circular economy – a review", *Journal of Cleaner Production*, Vol. 97, pp. 76-91, doi: 10.1016/j.jclepro.2013.11.049.

Ünal, E., Urbinati, A. and Chiaroni, D. (2019), "Managerial practices for designing circular economy business models", *Journal of Manufacturing Technology Management*, Vol. 30 No. 3, pp. 561-589, doi: 10.1108/jmtm-02-2018-0061.

UNEP (2015), "Sustainable consumption and production: a handbook for policymakers", available at: https://wedocs.unep.org/handle/20.500.11822/9660

Unerman, J., Bebbington, J. and O'Dwyer, B. (2018), "Corporate reporting and accounting for externalities", *Accounting and Business Research*, Vol. 48 No. 5, pp. 497-522, doi: 10.1080/00014788.2018.1470155.

Urbinati, A., Chiaroni, D. and Chiesa, V. (2017), "Towards a new taxonomy of circular economy and business models", *Journal of Cleaner Production*, Vol. 168, pp. 487-498, doi: 10.1016/j.jclepro.2017.09.047.

Veleva, V., Bodkin, G. and Todorova, S. (2017), "The need for better measurement and employee engagement to advance a circular economy: lessons from Biogen's 'zero waste' journey", *Journal of Cleaner Production*, Vol. 154, pp. 517-529, doi: 10.1016/j.jclepro.2017.03.177.

Villarrubia-Gómez, P., Cornell, S.E. and Fabres, J. (2018), "Marine plastic pollution as a planetary boundary threat – the drifting piece in the sustainability puzzle", *Marine Policy*, Vol. 96, pp. 213-220, doi: 10.1016/j.marpol.2017.11.035.

Vinnari, E. and Dillard, J. (2016), "(ANT)agonistics: pluralistic politicization of, and by, accounting and its technologies", *Critical Perspectives on Accounting*, Vol. 39, pp. 25-44, doi: 10.1016/j.cpa.2016.02.001.

Voegtlin, C., Scherer, A., Hawn, O., Siegel, D. and Stahl, G.K. (2022), "Grand societal challenges and responsible innovation", *Journal of Management Studies*, Vol. 59 No. 1, pp. 1-28, doi: 10.1111/joms.12785.

Vollmer, H. (2021), "Public value and the planet: accounting in ecological reconstitution", *Accounting, Auditing and Accountability Journal*, Vol. 34 No. 7, pp. 1527-1554, doi: 10.1108/AAAJ-11-2019-4283.

Voss, C., Tsikriktsis, N. and Frohlich, M. (2002), "Case research in operations management", *International Journal of Operations and Production Management*, Vol. 22 No. 2, pp. 195-219, doi: 10.1108/01443570210414329.

Wagner, M.E., Alves, H. and Raposo, M. (2012), "A model for stakeholder classification and stakeholder relationships", *Management Decision*, Vol. 50 No. 10, pp. 1861-1879, doi: 10.1108/00251741211279648.

Webster, K. (2015), *The Circular Economy: A Wealth of Flows*, Ellen MacArthur Foundation, Isle of Wight, available at: https://ellenmacarthurfoundation.org/the-circular-economy-a-wealth-of-flows-2nd-edition

Whetan, T. and Douglas, E. (2021), "How to talk to your CFO about sustainability: use this tool for measuring the financial return on ESG activities", *Harvard Business Review*, Vol. 99 No. 1, pp. 86-93.

Wong, A., George, S. and Tanima, F.A. (2021), "Operationalising dialogic accounting education through praxis and social and environmental accounting: exploring student perspectives", *Accounting Education*, Vol. 30 No. 5, pp. 525-550, doi: 10.1080/09639284.2021.1919531.

Xing, Y., Horner, R.M.W., El-Haram, M.A. and Bebbington, J. (2009), "A framework model for assessing sustainability impacts of urban development", *Accounting Forum*, Vol. 33 No. 3, pp. 209-224, doi: 10.1016/j.accfor.2008.09.003.

Yin, R.K. (1994), "Discovering the future of the case study method in evaluation research", *Evaluation Practice*, Vol. 15 No. 3, pp. 283-290, doi: 10.1016/0886-1633(94)90023-x.

Yin, R.K. (2017), *Case Study Research and Applications: Design and Methods*, Sage Publications, Thousand Oaks.

Yuan, Z.B.J. and Moriguichi, Y. (2008), "The circular economy: a new development strategy in China", *Journal of Industrial Ecology*, Vol. 10 Nos 1-2, pp. 4-8, doi: 10.1162/108819806775545321.

Zabihzadeh Khajavi, M., Ebrahimi, A., Yousefi, M., Ahmadi, S., Farhoodi, M., Mirza Alizadeh, A. and Taslikh, M. (2020), "Strategies for producing improved oxygen barrier materials appropriate for the food packaging sector", *Food Engineering Reviews*, Vol. 12 No. 3, pp. 346-363, doi: 10.1007/s12393-020-09235-y.

Zhou, Z., Zhao, W., Chen, X. and Zeng, H. (2017), "MFCA extension from a circular economy perspective: model modifications and case study", *Journal of Cleaner Production*, Vol. 149 No. 1, pp. 110-125, doi: 10.1016/j.jclepro.2017.02.049.

Zott, C., Amit, R. and Massa, L. (2011), "The BM: recent developments and future research", *Journal of Management*, Vol. 37 No. 4, pp. 1019-1042, doi: 10.1177/0149206311406265.

Corresponding author
Selena Aureli can be contacted at: selena.aureli@unibo.it