THE INTEGRATION OF CIRCULAR ECONOMY WITHIN CORPORATE SUSTAINABILITY REPORTING – TOWARDS A FRAMEWORK

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To my family – Anne, John and Charlie.

Statement of Integrity

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RESUMO

Apesar da adoção crescente de iniciativas de desenvolvimento sustentável, as economias baseadas no consumo e na extração de materiais e energia não conseguem abordar questões globais como o esgotamento de recursos, as alterações climáticas e a perda de biodiversidade. Como resultado, académicos e decisores políticos têm procurado vias alternativas para a criação de valor económico e social, e que ao mesmo tempo minimizem os impactes ambientais negativos. O modelo de economia circular (EC) de produção e consumo, que promete transformar os sistemas económicos lineares, tem vindo a ser rapidamente integrado nas iniciativas de sustentabilidade organizacional. As empresas estão cada vez mais sensibilizadas para a transição para a EC, encarando como uma oportunidade para implementar práticas inovadoras de responsabilidade social. Este compromisso crescente das empresas em melhorar a implementação de estratégias e práticas de EC exige o desenvolvimento de directrizes para assegurar uma comunicação externa consistente e eficaz. Os relatórios de sustentabilidade permitem às empresas mostrar não só ocompromisso com a sustentabilidade, mas também aumentar a transparência das actividades empresariais. À medida que os modelos de EC ganham presença no sector privado, os relatórios continuam a ser um canal de interação privilegiada com as partes interessadas, assegurarando que as empresas estão a ser responsabilizadas pela implementação dosobjectivos de sustentabilidade assumidos. Na ausência de directrizes “normalizadas” para avaliar e comunicar a internalização da circularidade na organização, não está a ser aproveitado todo o potencial da utilização de relatórios como instrumento de apoio à transição para a sustentabilidade organizacional. As evidências existentes sugerem uma baixa inclusão da EC nos relatórios de sustentabilidade, e reforçam a existência de lacunas de investigação significativas sobre a intersecção da EC com os relatórios de sustentabilidade.

Neste contexto, o presente trabalho de investigação visa explorar e apoiar a a integração da EC nas práticas e abordagens associadas a relatórios de sustentabilidade nas empresas. Para atingir este objectivo principal, foram equacionados quatro objectivos

específicos de investigação: 1) investigar como é que a literatura existente e as abordagens metodológicas associadas à conceção e operacionalização de relatórios de sustentabilidade orientam as empresas na integração das questões de EC nos relatórios de sustentabilidade; 2) analisar o conteúdo relacionado com EC presente nos relatórios de sustentabilidade de empresas classificadas em *rankings* de sustentabilidade; 3) explorar as perspectivas e experiências das empresas que divulgam conteúdos de EC nos relatórios de sustentabilidade; 4) propor recomendações para melhorar o a comunicação dos conteúdos de EC pelas empresas. Este trabalho segue uma concepção interpretativa e indutiva da investigação, utilizando métodos qualitativos e quantitativos para a recolha e análise de dados. Mais especificamente, as estratégias de investigação incluiram uma revisão sistemática da literatura, análise de conteúdo, inquéritospor questionário, entrevistas semi-estruturadas e grupos focais. A investigação ao ter sido baseada em métodos mistos, incluindo a utilização de diferentes métodos de recolha de dados, permitiu reforçar as principais conclusões obtidas neste estudo.

Os principais resultados deste trabalho de investigação são consubstanciados em três artigos científicos, com o objectivo de contribuir para as discussões teóricas e práticas sobre EC em relatórios de sustentabilidade de organizações empresariais. Dos resultados do primeiro objectivo de investigação, verificou-se que a EC foi incluída apenas em cinco dos quinze modelos e abordagens de relatórios de sustentabilidade analisados, e na maioria das vezes incluídos como: i) um tema incluído voluntariamente e, apresentado como material suplementar; ou ii) discutidos dentro de um único tópico: gestão de recursos ou resíduos. Além disso, a EC é mais comummente descrita através da definição da Fundação Ellen MacArthur e a responsabilidade pela selecção dos dados da EC continua a ser da responsabilidade exclusiva da empresa, uma vez que não existem diretrizes ou normas para este efeito. As conclusões sugerem também que as empresas que procuram aconselhamento a partir destes modelos de apresentação de relatórios não irão muito provavelmente reportar as questões da EC ou descreverão apenas qualitativamente as actividades da EC sob uma perspectiva restrita, normalmente focada na gestão de resíduos. Os resultados do segundo objectivo revelaram que, embora a EC esteja a ser explicitamente mencionada em quase todos os relatórios de sustentabilidade analisados, o conteúdo de EC é muito limitado e não está presente nas diferentes componentes do relatório de sustentabilidade. Especificamente, CE é descrita na mensagem do presidente

executivo em apenas 20% das empresas, e em 28% das avaliações de materialidade da empresa. Além disso, observou-se que as empresas efetuam uma ligação superficial do conteúdo da EC com os Objetivos do Desenvolvimento Sustentável, e sem qualquer justificação quantitativa para a maioria dos casos. Relativamente a objectivos e indicadores de EC, menos de um terço das empresas revelaram objectivos que focam sobretudo iniciativas de circularidade de nível estratégico e indicadores que avaliam sobretudo práticas de circularidade de escala operacional. Globalmente, estas conclusões destacam duas visões de EC no âmbito das estratégias empresariais: 1) EC é um pilar importante; ou 2) EC é uma extensão (ou substituição) de temas associados às áreas de resíduos e/ou de gestão. No âmbito do terceiro objectivo, as empresas investigadas destacaram sete factores críticos para reportar EC, bem como identificaram vários desafios e benefícios associados à comunicação externa dos dados de EC. Em relação à relevância e exequibilidade do reporte de EC, as empresas evidenciaram que, em geral, o conteúdo de EC é relevante para todos os elementos-chave do conteúdo dos relatórios de sustentabilidade, contudo, consideraram os elementos de "Riscos e Oportunidades" e "Desempenho de Sustentabilidade" como os menos exequíveis para desenvolver e divulgar dados da EC. Os resultados do quarto objectivo de investigação traduziram-se por uma série de recomendações práticas, relevantes para os profissionais que trabalham com questões de EC, de relatórios de sustentabilidade e ainda aqueles envolvidos com a sustentabilidade organizacional em geral. Em particular, as empresas devem dar prioridade à identificação de riscos e oportunidades relacionadas com a EC, e reconhecer a hierarquia das estratégias da EC ao medir e divulgar os respetivos dados. Devem ainda reconhecer a EC como uma poderosa ferramenta de reporte no contexto da criação de valor empresarial e assegurar que as metas relacionadas com a EC são acompanhadas por indicadores relevantes para evitar potenciais alegações de ”*greenwashing*”.

No conjunto, os resultados desta investigação fornecem vários contributos para a concretização do objectivo central: explorar e apoiar a necessária integração da EC no âmbito das práticas e modelos de relatórios de sustentabilidade das empresas. Os principais resultados demonstram que a integração da EC não só é uma evidência, como está em rápida evolução no âmbito da elaboração de relatórios de sustentabilidade das empresas. Esta investigação conclui com reflexões teóricas sobre as percepções corporativas da EC e a sua relação com a sustentabilidade que emerge nos relatórios de

sustentabilidade. Além disso, os resultados revelam várias sinergias e limitações entre as percepções de valor dentro dos processos de EC e de criação de valor empresarial. Esta investigação apresenta um primeira contributo para apoiar a integração da EC nos processos de reporte da sustentabilidade das empresas, estabelecendo uma visão geral das actuais tendências e fraquezas dos relatórios, ao mesmo tempo que destaca numerosas oportunidades de trabalho futuro para facilitar e impulsionar a transparência na transição para uma EC.

Palavras chave: economia circular, relatório de sustentabilidade, avaliação da sustentabilidade, taxonomia da União Europeia, responsabilidade social das empresas

ABSTRACT

Despite the mainstreaming of sustainable development initiatives, overconsuming and extractive economies fail to address global issues such as resource depletion, climate change and biodiversity loss. As a result, academics and policymakers have been looking for alternative pathways to creating economic and societal value, whilst minimising adverse environmental impacts. The circular economy (CE) model of production and consumption, which promises to transform linear economic systems, is then rapidly being integrated within organisational sustainability initiatives. Companies are increasingly viewing the transition towards CE as an opportunity to implement innovative social responsibility practices. This increased commitment from companies to improving their CE implementation demands the development of guidelines to ensure meaningful and consistent external communication. Sustainability reports allow companies to display not only their commitment to sustainability but increase transparency of their business activities. As the CE model gains momentum in the private sector, reporting remains a viable pathway for stakeholders to ensure companies are being held accountable for achieving their sustainability objectives. With an absence of standardised guidelines for assessing and publishing progress towards circularity, the full potential of reporting as a tool to facilitate change towards improved corporate sustainability is not being realised. Early evidence suggests a low uptake of CE within sustainability reports and significant research gaps exist concerning the intersection of CE and sustainability reporting.

Within this context, this research aims to explore and support the emergence of CE within corporate sustainability reporting practices and approaches. To achieve this aim, four research objectives are offered: 1) investigate how existent sustainability reporting approaches and literature guide companies to include CE issues within their corporate sustainability reports, 2) explore CE-related content within the corporate sustainability reports of sustainably-ranked companies, 3) capture the perspectives and experiences of companies disclosing CE within their corporate sustainability report and 4) provide recommendations to improve the feasibility of companies disclosing CE content. This thesis follows an interpretivist and inductive research design, utilising both qualitative and

quantitative methods for data collection and analysis. More specifically, strategies include a systematic literature review, multiple content analyses, semi-quantitative surveys, semi-structured interviews and focus groups. By conducting a mixed methods study with multiple data collection methods, the overall conclusions have been strengthened.

The main results from this thesis constitute three appended research articles, aiming to contribute findings to both academic and industry discussions on CE. Within the outcomes of the first objective, CE was found to be included within only five of the fifteen sustainability reporting frameworks and approaches reviewed and most often included as: i) a voluntary issue within supplementary material; or ii) discussed within a single topic: resource or waste management. Furthermore, CE is most commonly described using the definition from the Ellen MacArthur Foundation and the responsibility for CE-data selection remains the responsibility of the company. The findings also suggest that companies seeking advice from these reporting frameworks will most likely not report CE issues at all or only qualitatively describe CE activities from a narrow waste management perspective. The outputs of the second objective determined that whilst CE is being explicitly mentioned within almost all of the sustainability reports analysed, very few integrated CE-content within each of the examined sustainability report elements. Specifically, CE was described in the CEO's message of only 20% of companies and in 28% of the company's materiality assessments. Moreover, companies were observed to be linking CE content superficially with the SDGs, with most instances being void of any quantitative justification. With respect to targets and indicators for CE, less than one third of companies were found to disclose them, with targets mostly measuring high-ranking circularity strategies and indicators mostly low-ranking circularity strategies. Overall, these findings signal two main representations of CE within corporate strategies: 1) CE is a major pillar; or 2) CE is an extension (or replacement) of existing waste and/or management issues. Within the third objective, investigated companies highlighted seven critical factors for CE disclosure, as well as several challenges to- and benefits of- externally communicating their CE data. With respect to relevance and feasibility, companies determined that generally, CE-content is relevant to all key content elements of sustainability reports, however, found the elements of 'Risks and Opportunities' and 'Sustainability Performance' to be the least feasible to develop and disclose CE data for. The outcomes of the fourth objective propose a number of practical recommendations relevant for practitioners of CE, sustainability reporting and those involved with general

corporate sustainability. In particular, companies should prioritise identifying CE-related risks and opportunities, acknowledge the hierarchy of CE strategies when measuring and disclosing CE data, recognise CE as a powerful storytelling tool within corporate value creation and ensure that CE-related targets are accompanied by relevant indicators to avoid potential claims of greenwashing.

Collectively, the chapters within this thesis provide numerous insights on achieving the central aim: to explore and support the emergence of CE within corporate sustainability reporting practices and approaches. In general, the findings of this research demonstrate that the integration of CE is not only evident but rapidly evolving within corporate sustainability reporting. This thesis concludes with theoretical reflections on the corporate perceptions of CE and its relationship with sustainability emerging within sustainability reports. Additionally, results reveal various synergies and limitations between perceptions of value within a CE and corporate value creation processes. This research presents a first attempt to support the integration of CE within corporate sustainability processes, establishing an overview of current reporting trends and shortcomings whilst also highlighting numerous opportunities for future work to facilitate and drive transparency within the transition towards a CE.

Keywords: circular economy, sustainability reporting, circularity indicators, disclosure framework, EU taxonomy regulation, corporate social responsibility

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List of Abbreviations and Acronyms

BSI	British Standards Organisation
CBI	Climate Bonds Initiative
CDP	Carbon Disclosure Project
CDSB	Climate Disclosure Standards Board
CE	Circular Economy
CEO	Chief Executive Officer
CSA	(SAM) Corporate Sustainability Assessment
CSR	Corporate Social Responsibility
CSRD	Corporate Sustainability Reporting Directive
CTI	Circularity Transition Indicators
DJSI	Dow Jones Sustainability Index
EC	European Commission
EEA	European Environment Agency
EFRAG	European Financial Reporting Advisory Group
EIB	European Investment Bank
EMAS	EU Eco-Management and Audit Scheme
EMF	Ellen MacArthur Foundation
ESG	Environmental, Social and Governance
EU	European Union
GICS	Global Industry Classification Scheme
GRI	Global Reporting Initiative
ICC	International Chamber of Commerce
ICMA	International Capital Market Association
ICT	Information and Communications Technology
IE	Industrial Ecology
IIRC	International Integrated Reporting Council

IFRS	International Financial Reporting Standards
ISO	International Organization for Standardization
KPI	Key Performance Indicator
LCA	Life Cycle Assessment
MFA	Material Flow Analysis
NGO	Non-Governmental Organisation
OECD	Organisation for Economic Co-operation and Development
POEF	Product and Organisational Environmental Footprint
SASB	Sustainability Accounting Standards Board
SD	Sustainable Development
SDG	Sustainable Development Goal
SDGD	Sustainable Development Goal Disclosures Recommendations
S-LCA	Social Life Cycle Assessment
SME	Small and Medium Enterprise
TBL	Triple Bottom Line
UN	United Nations
UNEP	United Nations Environmental Programme
UNEPFI	United Nations Environmental Programme Finance Initiative
UNGC	United Nations Global Compact
WCED	World Council for Economic Development
WCSD	World Council for Sustainable Development
WEF	World Economic Forum

1 Introduction

This introductory chapter presents the general context motivating the development of this thesis. First, the broad motivations and central aim of the research are presented (Section 1.1). Following this, the theoretical background will explore the main literature on key topics supporting this study (Section 1.2). Then, the research objectives will be presented (Section 1.3) followed by an explanation of the methodological approach employed to achieve them (Section 1.4). Finally, the structure of this thesis will be explained (Section 1.5) and a statement of the researcher's contribution will be provided (Section 1.6).

1.1 Motivations and aim

> *"TBL's stated goal from the outset was system change — pushing toward the transformation of capitalism. It was never supposed to be just an accounting system… Indeed, none of these sustainability frameworks will be enough, as long as they lack the suitable pace and scale — the necessary radical intent — needed to stop us all overshooting our planetary boundaries."*
>
> - John Elkington on "recalling" his 1987 'Triple Bottom Line' framework, 2022

Sustainable development is fast becoming the guiding principle for the 21st century. It's importance is unrefuted as scientists uncover the socio-ecological crises of the Anthropocene epoch, defined as: the most recent period of time where human activities have had a significant impact on the Earth's ecosystems and climate (Lewis & Maslin, 2015).

Along with the environment, sustainable development concerns the quest for developing and/or sustaining quality of life. This is most evident with the widely recognised definition of sustainability from the Brundtland report: *"development that meets the needs of the present without compromising the ability of future generations to meet their own needs"* (World Commission on Environment and Development (WCED), 1987). Hereafter, during the 1990s, economists and social scientists joined the discussion, advocating that sustainable development cannot be solely measured on ecological and/or environmental

criteria (de Vries & Petersen, 2009). Referring to the Brundtland definition of sustainable development, defining the term 'needs' and exactly *who's* needs should be prioritised, becomes a much more complicated endeavour. Therefore, sustainability evolved to be characterised by three dimensions: economic, social and the environment. These dimensions are encompassed by the Triple Bottom Line (TBL) framework, or as it is often known, "People, Planet, Profit" (Elkington, 1997). However, due to the subjective and difficult to quantify nature of the social dimension, social aspects are perceived as hard to operationalise and thus, often overlooked within frameworks for sustainable development (Boström, 2012). However, as Sauvé *et al.,* (2016) pointed out, the inherent transdisciplinary nature of sustainable development leads to challenges formulating a common and balanced understanding. Other authors maintain that the interpretive flexibility of sustainability is a strength, allowing it to be tailored to various institutions and contexts (Leach *et al.,* 2007). Nonetheless, society has moved towards a consensus on the conceptualisation of sustainability represented by the Sustainable Development Goals (SDG) framework, which consists of 17 overarching goals, 169 associated targets and 230 related indicators (UN, 2016).

Despite the mainstreaming of sustainable development, trends of unsustainable growth in resource use and human consumption continue to be observed. These trends prove society has ignored early warnings of a potential 'overshoot and collapse' from the pioneering *limits to growth* scenario originally modelled by Meadows *et al.,* in 1972. More recently, using historical data modelling, Turner (2008, 2014), determined these scenarios to be fairly accurate, indicating that society has so far continued on a 'business-as-usual' path of resource depletion, industrial output and population growth. From 1970 to 2010 annual global material extraction rates grew from 23.7 to 70.1 billion tonnes (Schandl *et al.,* 2016). Now, some reports are suggesting that the world consumes more than 100.6 billion tonnes of raw materials per year, with only 8.6% of those materials being recycled (de Wit *et al.*, 2020). The rapid acceleration of overconsuming and extractive economies has led to an exponential growth of both negative externalities and business opportunities.

Private sector companies cause a significant percentage of these negative externalities and thus, should be viewed as key agents in achieving sustainable and equitable transformations (Hrabanski, 2017; Sharma, 2017). However, a growing number of authors are questioning whether companies are in fact acting- and being held accountable-

as genuine partners in achieving sustainable development (Ordonez-Ponce *et al.,* 2021; Pimonenko *et al.,* 2020). Robinson & Cole (2015) suggest that the dominant sustainability discourse has so far focused on making things "less bad" with various frameworks and agreements working to reduce negative environmental and social impacts of business operations. In addition, Mazzucato (2019) argues that current economies reward companies who extract value rather than those who create value; allowing companies to justify their extractive resource use instead of producing anything new that is of value. Gray (2006) argues that society should be questioning the basic reasoning for a company to exist – is it simply to create wealth? With this narrow perception, a company's function of creating value for society and the environment is excluded. It is arguments like these that justify calls for improved accountability and due diligence, facilitated through organisational approaches that guarantee the transparent and consistent disclosure of a company's sustainability ambitions and performance (Boiral & Heras-Saizarbitoria, 2019). To answer these calls for increased transparency on their actions (and inaction), companies can produce voluntary and mandatory corporate sustainability reports (Lock & Seele, 2016). Although, there is a growing consensus that in its current form, corporate sustainability reporting has a limited efficacy of actually improving corporate legitimacy or facilitating organisational change towards sustainable development, as the reporting format is intended to do (Adams & McNicholas, 2007; Boiral, 2013; Cho *et al.,* 2015; Gray, 2006; Lozano *et al.,* 2016).

This level of scrutiny on the contents of sustainability reports extends to the overall corporate value creation processes (Adams, 2017) and has resulted in academics, policy makers and other actors searching for alternative pathways towards sustainable development. More specifically, pathways which can reduce overall resource extraction and consumption whilst supporting companies to create value on all three dimensions of sustainability (Bocken *et al.,* 2015). One such approach is the circular economy (CE). For businesses, the assumed promise of CE lies in halting the consumption of new raw materials and minimising negative sustainability impacts without jeopardising growth and prosperity (Ferasso *et al.,* 2020). Furthermore, CE encourages actors to view waste not as a problem, but as a resource and thus, a source of new value creation (European Environment Agency (EEA), 2014). To this end, companies engaging with CE strategies will need to rethink their value proposition and thus, reflect these changes in their corporate sustainability reporting processes. However, as CE gains popularity in both academia and sustainability policy

domains, exactly how the concept is being integrated within corporate sustainability reporting frameworks and approaches[1] as well as practices, constitutes a major research gap. Furthermore, it is unclear whether the narrative of CE present within these approaches has the ability to address underlying causes of sustainability challenges or, whether companies will merely continue to operate with limited accountability on the 'business-as-usual' scenario. For these reasons, the central aim of this thesis is to explore and support the integration of circular economy within corporate sustainability reporting approaches and practices.

1.2 Theoretical background

CE is a model of production and consumption that promises to: i) directly address resource-related problems and ii) indirectly decrease impacts on other sustainability aspects of the Anthropocene (Rask, 2022). CE offers an alternative to the current "take-make-dispose" linear economic model, one that is based on the assumption that natural resources are infinite, equally distributed and easy to dispose of (EEA, 2016). The term CE can been considered an "umbrella concept" (Hobson & Lynch, 2016), as it expands upon waste and resource management processes, combining various elements of its precursors, such as cleaner production and industrial ecology (Calisto Friant *et al.,* 2020). This allows CE to have a variety of interpretations and applications but nevertheless, has led to numerous scholars seeking: i) an individual and unrefuted conceptualisation of CE (e.g., Kirchherr *et al.,* 2017; Korhonen *et al.,* 2018b; Murray *et al.,* 2017) and ii) to define and question CE's relation with sustainability (e.g., Sauvé *et al.,* 2016a; Schroeder *et al.,* 2018; Webster, 2013). Despite these diversions, the European Commission (EC) interprets CE as where "*the value of products, materials and resources is maintained in the economy for as long as possible by returning them in to the product life cycle at the end of their use, while minimising the generation of waste*" (EC, 2015, p.2). CE is most commonly operationalised by the value retention hierarchy, consisting of "10 R-strategies" from Potting *et al.,* (2017). This hierarchy contains circularity strategies (e.g., reuse, recycle) developed to achieve less resource and

[1] Throughout this thesis the two terms 'disclosure frameworks' and 'reporting frameworks and approaches' are used interchangeably and can be defined as the initiatives, standards and frameworks designed to support companies with their sustainability reporting and accounting (EC, 2021).

material consumption in product chains, with strategies categorised from high circularity (low R-number) to low circularity (high R-number) (Reike *et al.,* 2018). Through the implementation of such strategies, there is a promise for companies that circular relationships among customers, markets and natural resources will have a distinctive capability to combine economic growth with sustainability (Ghisellini *et al.,* 2016). Therefore, as previously mentioned, CE has become influential across the private sector as it encourages companies to rethink the way they create and deliver value, through the use of innovative circular business models, products and services (Delgadillo *et al.*, 2021; Santa-Maria *et al.*, 2021). However, ensuring that the implementation of CE strategies will deliver value on all three dimensions of sustainability remains a complicated endeavour.

As many authors have discussed, well-intended CE strategies could lead to burden shifting or other unintended negative sustainability impacts (Blum *et al.,* 2020; Corona *et al.,* 2019). Indeed, the mainstream CE discourse is criticised in academic literature for focusing on: i) efficiency rather than sufficiency (Bocken & Short, 2020), ii) ignoring the social dimension of sustainability (Millar *et al.,* 2019; Walker, Opferkuch, Roos Lindgreen, Simboli, *et al.,* 2021) and more specifically, iii) neglecting issues of human development, equity and justice (Moreau *et al.,* 2017; Schröder *et al.,* 2020). For this reason, Schulz *et al.,* (2019, p.2) contend that CE strategies implemented as a technological fix *"denies the need to question current consumption patterns, global inequalities and persisting negative externalities"*. This notion demonstrates that CE activities do not always achieve their intended impacts of minimising both resource extraction and consumption, and therefore, presents challenges for companies trying to ascertain when a CE strategy actually has positive sustainability impacts.

A number of technical and non-technical barriers have been identified which prevent the diffusion of CE practices within corporate strategies (e.g., complexity of supply chains) (see: de Jesus & Mendonça, 2018; Kirchherr *et al.*, 2018; Ritzén & Sandström, 2017). Companies must acquire certain dynamic capabilities to overcome these barriers and ensure their CE adoption is in line with both their own corporate and broader societal sustainability objectives (Dagiliene *et al.*, 2020; Khan *et al.*, 2020; Köhler *et al.*, 2022). In particular, the capabilities required for- and approaches available to- assess CE practices has gained a lot of academic attention in recent years (e.g., Corona *et al.,* 2019; Kravchenko *et al.,* 2020; Roos Lindgreen *et al.,* 2020; Saidani *et al.,* 2018). Roos Lindgreen *et al.,* (2022)

surmise four general categories of available assessment approaches relevant for CE: 1) life cycle based methods; also considering material flow analysis (MFA)-based methods which demonstrate material and energy flows through the life cycle of a system (Brunner & Rechberger, 2016), 2) disclosure frameworks; such as the sustainability standards from the Global Reporting Initiative (GRI) (GRI, 2016), 3) single indicators; quantitative indicators which may signify circularity (or parts thereof) as a single value e.g., 'recycling rate' or '% total circularity' (Kristensen & Mosgaard, 2020) and 4) tailor-made tools and indicators suited to the company's specific context. Despite these advancements, there is still not a benchmarked and uniform approach to CE assessment (Lindgreen *et al.,* 2020; Pauliuk, 2018) and the risk of companies pursuing 'CE for the sake of CE' still exists (Harris *et al.,* 2021). Whilst the aforementioned articles propose and review a variety of company-level assessment approaches which can be applied to CE, they are mostly applicable for internal use only (Roos Lindgreen *et al.*, 2022). This presents a significant research gap as the external communication aspect of CE-assessment has been mostly ignored within academic literature.

Despite the contestations about the concepts potential to holistically address sustainability issues, CE has been cemented as an important topic within various international environmental policies and/or working groups. For example, the United Nations Environment Programme's (UNEP) Circularity Platform (UNEP, 2021) and the Organisation for Economic Cooperation and Development (OECD)'s RE-CIRCLE project (OECD Environment Directorate, 2018). Within the European context, the CE Action Plan (EC, 2015b, 2020) plays a major role in modernising and decarbonising the EU economy, as outlined in the European Green Deal – an integral part of the EC's strategy to achieve the SDGs (EC, 2019). However, to achieve these policy visions, the EC acknowledges the significant investment and long-term financing needs required to fund this 'green transition' (EC, 2019). Therefore, in 2020 a package was proposed for Sustainable Finance, which is defined as: *"the process of considering environmental, social and governance (ESG) considerations into account when making investment decisions in the financial sector, leading to increased longer-term investments into sustainable economic activities and projects*" (p. 11, Boffo & Patalano, 2020). This package comprises of regulatory and non-regulatory efforts to increase accountability and ensure that reliable, comparable and verifiable information is being disclosed to enable buyers and investors to make more

sustainable decisions and minimise the risk of 'greenwashing' (EC, 2019). To do this, two major policies have been created and/or revised: 1) The EU Taxonomy Regulation (European Parliament and the Council, 2020) and 2) the Corporate Sustainability Reporting Directive (CSRD) (EC, 2021) - which has been described as one of the *"cornerstones of both the European Green Deal and Sustainable Finance agenda"* (European Parliament, 2022).

Within both of these documents, CE has been formalised as one of six key environmental objectives, mirroring CE's rise in popularity as the preferred resource-related approach to sustainable development (Cecchin *et al.*, 2021). This also signals a shift in reporting requirements, from companies previously being *suggested* to measure and report data on their approach to "waste management" (as was suggested in the Non-Financial Reporting Directive (EC, 2014)) to soon being *required* to disclose data on their "resource use and circular economy" (EC, 2021) (illustrated in Figure 1.1).

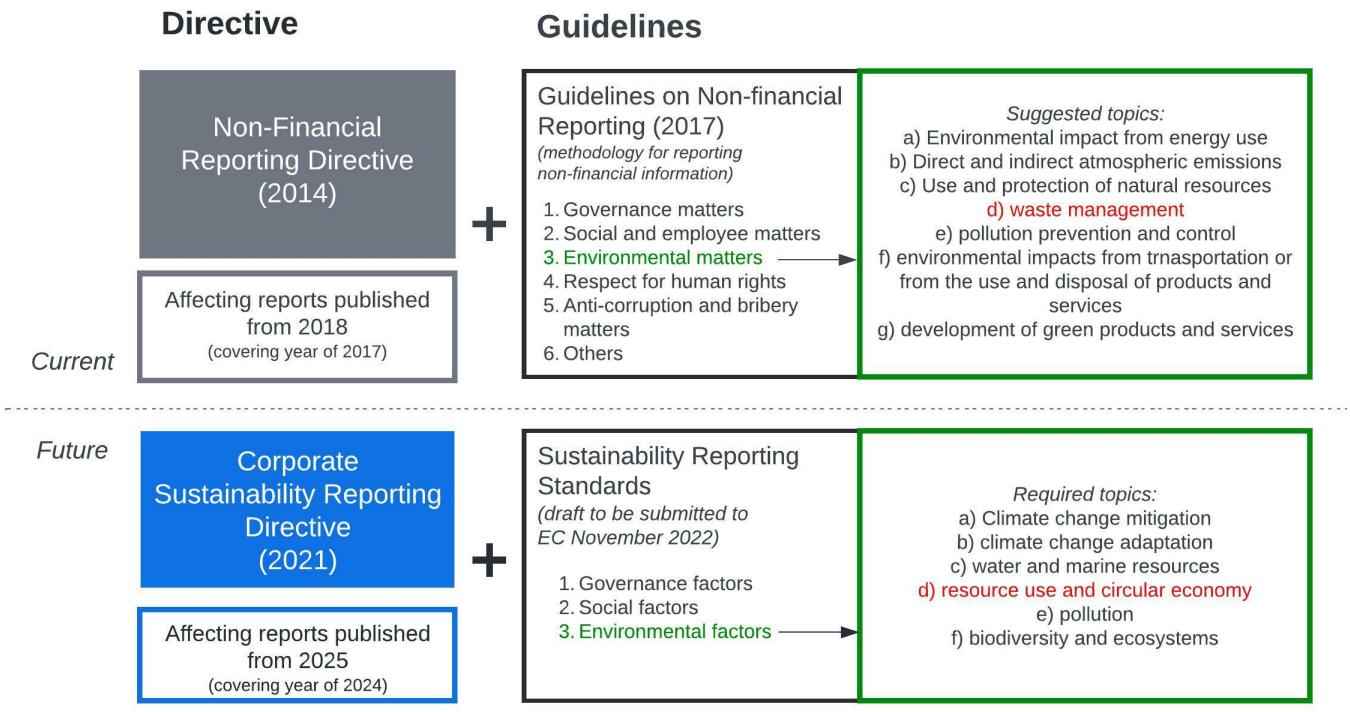

Figure: 1.1: Summary of current and future corporate sustainability reporting requirements for European companies, with specific focus on CE-related topics.

These developments will affect the reports of European companies published from the year 2025 onwards and clarifies the current categorisation of environmental topics in line with the six environmental objectives of the European Taxonomy Regulation (European Parliament and the Council, 2020) (detailed in Figure 1.1). Overall, it is clear there will be a significant increase in: i) the demand for CE-related data; ii) the amount of investments for CE-specific projects and CE-oriented companies; and iii) the level of scrutiny on the eligibility of sustainability information being included within corporate sustainability reports. However, despite the fast-changing landscape of CE disclosure and the overwhelming amount of academic literature focusing on CE (as seen in Figure 1.2), there remains a serious gap between academia and practice.

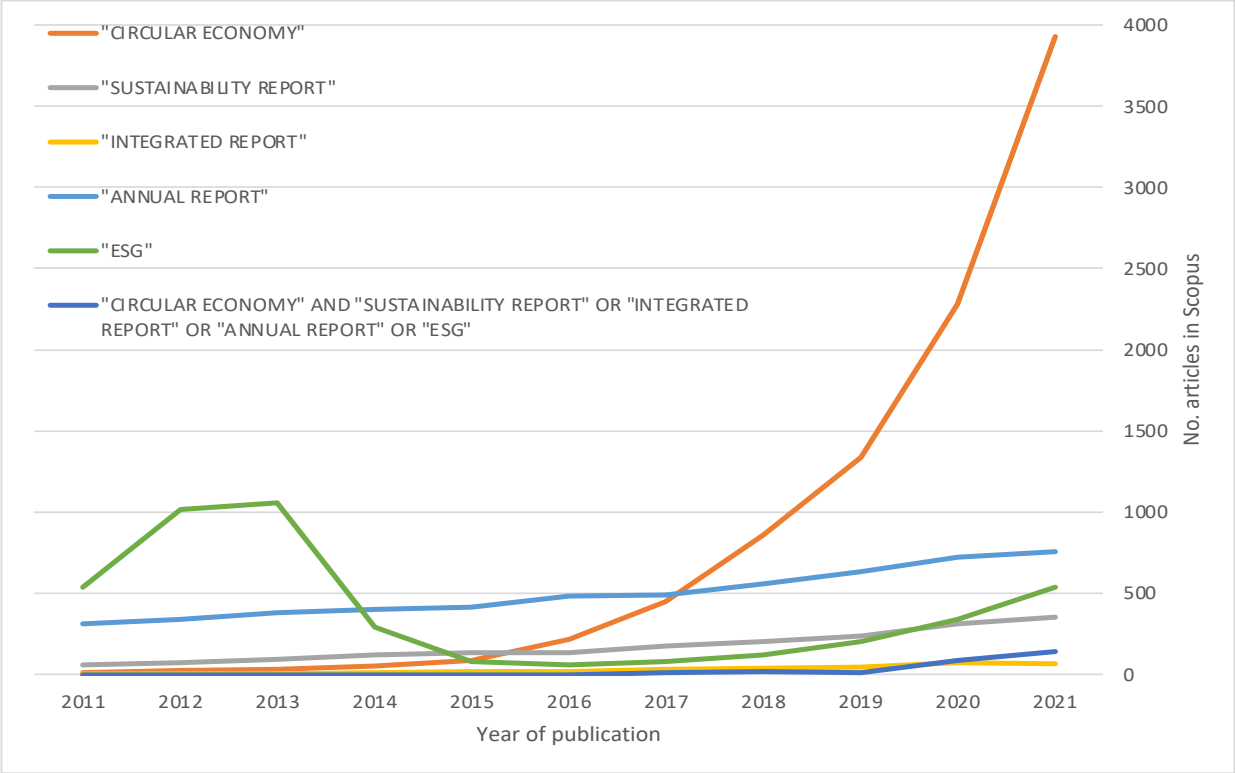

Figure: 1.2: Total academic articles found in Scopus that cite relevant terminology within title, abstract or keywords from 2011-2021. The last search string "circular economy" AND “sustainability report” OR etc. was multiplied by a factor of 10 to improve readability.

In fact, Figure 1.2 shows there is currently a significantly higher number of articles explicitly discussing CE than the total sum of articles focusing on the following topics: i) sustainability reports; ii) integrated reports; iii) annual reports; and iv) Environment, Social and Governance (ESG) matters. To date, there has been very limited research on the

intersection of CE with any of these four topics (as indicated by the dark blue line in Figure 1.1). In 2019, Kirchherr & van Santen critiqued the field of CE literature, declaring that: there is a lack of empirical work on CE, 95% of CE-specific articles with an industry focus target manufacturing industries and current scholarly work is failing to provide actionable advice for CE practitioners. The research contained within this thesis aims to answer Kirchherr & van Santen's (2019) call for cross-sectoral, empirical and practical contributions to advance the CE agenda.

The purpose of this thesis is to contribute research which bridges the gap between CE and corporate sustainability reporting. Whilst some stakeholders may view sustainability reports as simply a 'ritual public relations exercise' (Clatworthy and Jones, 2006), they are an output of the corporate value creation process and can be utilised as a formidable tool for driving sustainable transformations (Adams, 2017). Whilst the specific contents of important frameworks relevant for CE disclosure are still being developed (e.g., International Standardisation Organisation (ISO)'s TC 323 (ISO, 2018) and the Sustainability Reporting Standards which guide the implementation of the CSRD (EC, 2021), this thesis provides a snapshot of corporate CE disclosure before the requirements of the CSRD come into force. Additionally, this research captures the perspectives of companies who are already measuring and disclosing CE data, to ensure that their experiences can shed light on the actual understandings of- and capacities for- the implementation, assessment and disclosure of CE activities.

1.3 Research Objectives

As previously stated, this research aims to explore and support the integration of CE activities within corporate sustainability reporting approaches and practices, towards the development of a CE reporting framework. Therefore, several objectives were formulated to be able to achieve this aim. Specifically, four primary research objectives were designed to address the aforementioned research gaps:

I. Investigate how existent sustainability reporting approaches and literature guide companies to include CE issues within their corporate sustainability reports;
II. Explore CE-related content within the corporate sustainability reports of sustainably-ranked companies;

III. Capture the perspectives and experiences of companies disclosing CE within their corporate sustainability report;
IV. Provide recommendations to improve the feasibility of companies disclosing CE content.

As the research developed it became evident that academic CE literature was mostly theoretical in nature, lacking empirical evidence and that the scholarly work had not translated into business practice (Kirchherr & van Santen, 2019). To address this gap, complementary research was proposed and investigated through a collaborative approach where the author of this thesis was joint co-author of two research articles. In particular, as highlighted in Section 1.1, numerous authors questioned the various interpretations of- and relations between- CE and sustainability, however, these questions had not been explored from the perspectives of the companies actually implementing these two concepts. Therefore, as a first step, a study was designed to establish a foundational understanding of CE and sustainability within private sector companies (presented in Appendix I).

At the same time, there was also a clear trend within academic CE literature to propose and review a variety of indicators, metrics and approaches to CE assessment. However, again, early evidence suggested that actual implementation of these approaches was negligible (Stumpf *et al.,* 2019). Furthermore, an indication of company's capacities and understanding of these CE assessment approaches within the context of sustainability assessment was missing. Therefore, a study was designed to uncover how companies engaged with CE are actually assessing their CE and sustainability activities (presented in Appendix II).

The outcomes of the complementary research supported the achievement of the primary research objectives I to IV of this thesis. Specifically, the outcomes of the research article presented in Appendix I established definitions of key terms which were then contrasted with the definitions of the same terms found within the content analysis of sustainability reports (Chapter 3) and the discussions held in focus groups with companies engaged in CE (Chapter 4). Similarly, the outcomes of the research article presented in Appendix II, the list of assessment approaches companies are using to assess CE (presented in Appendix II), were searched for within the review of organisational approaches for sustainability reporting (Chapter 2) and the sustainability reports themselves (Chapter 3). Furthermore, the list of benefits and barriers to CE assessment compiled in Appendix II,

were investigated further in the focus groups and considered when developing recommendations to support CE disclosure (Chapter 4). In addition, this collaborative process allowed for a larger sample of companies to be targeted and several participants were utilised in the final research steps of this thesis (Chapter 4). To this end, although the articles presented in Appendices I and II do not directly achieve the primary research objectives, they have been included within this thesis to highlight the total academic contributions of this PhD project. An overview of the research objectives, methods employed and links to the relevant thesis chapters and appendices are summarised below in Figure 1.2.

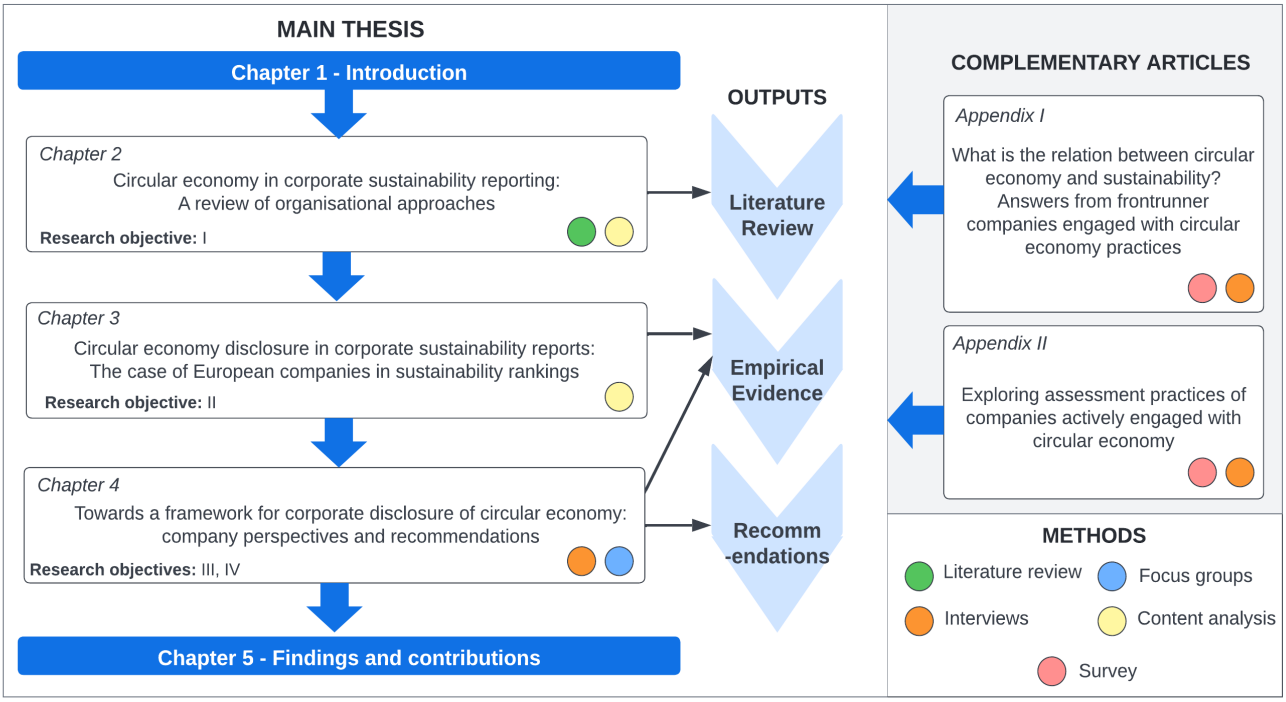

Figure: 1.3: Schematic overview of the contents of this article-based thesis.

1.4 Methodological approach

Throughout this thesis a variety of social research methods were utilised to achieve the research objectives. This sub-section will discuss the methodological decisions made based on the six layers of the Research Onion model from Saunders *et al.,* (2009). Following this, the reliability, replicability and validity of the research will be discussed as well as some of the limitations.

The overall thesis takes an interpretivist research philosophy (or epistemology), where the research is designed to acquire a deeper understanding of a phenomenon or process, whilst acknowledging the subjective interpretations of the observer (Saunders, Lewis & Thornhill, 2009). In the absence of extant research on the integration of CE and sustainability reporting, an interpretivist and inductive research approach has allowed the data to lead the research design (Grix, 2002). By utilising this type of approach, this research attempts to understand the relationship between different variables through primarily qualitative research, however, is supported by empirical evidence from quantitative research (Saunders, Lewis & Thornhill, 2009). In line with this philosophy, the thesis adopts an inductive research approach (Saunders *et al.*, 2009), one which allows for observations and measures of CE observed in previous studies, to be detected and analysed within sustainability reporting frameworks, practices and experiences. Generally, survey and archival research were the main research strategies employed at different stages of this research. These strategies were implemented using a number of data collection methods including: literature review, content analyses, interviews, semi-quantitative survey and focus groups (discussed in more detail in the next sub-sections). Employing multiple data collection methods within the same research project has allowed for triangulation of data. By doing this, the overall conclusions made in this research have been strengthened by additional independent sources of data. This research dealt with both quantitative and qualitative data techniques and analyses, therefore, a mixed-methods approach was used (Bryman *et al.,* 2021).

Due to the novel nature of the research topic, a cross-sectional research design was selected in order to provide a snapshot of the current situation of CE within corporate sustainability reporting. With this approach, a large amount of data, made up of numerous variables could be collected from various cases simultaneously. Furthermore, it allows for the body of data to be quantifiable as systematic approaches were developed to establish and then examine the variation between cases. This approach has allowed for this research to identify and discuss certain patterns of association between variables which had not yet been established in previous research (e.g., trends identified within the content analysis of sustainability reports (Chapter 3) or definitions of concepts from the perspective of companies engaged with CE (Appendix I)). The cross-sectional design was used in both quantitative (e.g., components of the content analysis) and qualitative (e.g., interviews)

aspects of this research. On a geographical scope, this research made efforts to consider the developments in both CE and sustainability reporting at a global scale. The article presented in Chapter 2 analyses relevant sustainability reporting frameworks and approaches applicable to companies regardless of their geographical location. Following this, the scope was narrowed and companies operating within the EU were selected as the research focus. The EU was selected because of its advanced progress in the two central topics to this research, 1) CE research, policies and innovation and 2) corporate sustainability reporting, e.g., revisions to the CSRD and EU Taxonomy. Therefore, empirical evidence was produced using secondary data from companies operating across the EU (Chapter 3) and primary data obtained from companies operating within Italy and the Netherlands (Chapters 4 and Appendices A and B).

It should also be noted that throughout the research, an interdisciplinary approach has been taken. Interdisciplinary research uses knowledge and skills from two or more disciplines to target a specific problem (Menken & Keestra, 2016). As previously mentioned, the very nature of sustainability problems demands an interdisciplinary response and this too extends to the proposed solutions, such as CE. CE is inherently interdisciplinary as it attempts to integrate economic activities and environmental wellbeing (Murray *et al.,* 2017). In the context of this research, CE within corporate sustainability reporting has been studied from the perspective of diverse research fields including literature discussing CE, broader sustainable development, corporate sustainability, sustainability accounting and associated management fields. The following sub-sections will discuss the five data collection and associated data analysis techniques utilised in this research in more detail.

1.4.1 Literature review

Literature reviews construct the initial part of all research projects. The aim of a literature is to establish what is already known about a specific topic, to provide justification and prove relevance for the ensuing investigation (Bryman *et al.,* 2021). There are numerous types of literature reviews and associated methodologies (Grant & Booth, 2009). Within this thesis, narrative reviews were included in the introductory sections of each chapter, acting as a starting point for each chapter of this research. A systematic literature review was used as the main methodological approach to achieve the first research objective, as outlined in Chapter 2.

Within Chapter 2, the systematic literature review was performed to collect a sample of academic articles from databases including Scopus and Google Scholar. The peer-reviewed literature was then analysed to find and discuss themes across the multiple studies. The results of the literature review were then combined with the results of a qualitative content analysis of relevant non-academic literature, specifically reporting frameworks, standards, guidelines and relevant international policy documents. This was carried out to not only identify relevant key words to the topics of CE and sustainability reporting within the text but also *where* and *how* these key words are being used, in order to interpret their contextual use (Hsieh & Shannon, 2005). Ultimately, the results of the systematic literature review published in Chapter 2 form the foundation and justification for the overall research project. Further details on the exact methodological steps taken are included within the methods section of Chapter 2.

1.4.2 Content analysis

Content analysis can be defined as the systematic, objective, quantitative analysis of message characteristics, with users opting for both human-coded analyses and increasingly, computer-assisted text analysis (Neuendorf, 2017). The general goal of a content analysis is to reduce large amounts of data, identify patterns and trends in a replicable way and eventually, deduce meaning (Bryman *et al.,* 2021).

Furthermore, content analysis techniques can be applied to several areas of inquiry, ranging from large scale analyses of various print media (e.g., news coverage in Qin, 2015), clinical applications (e.g., analysis of presidential addresses in Oleinik, 2015) and various forms of organisational communication, including corporate sustainability reports (Neuendorf, 2017). As the efficacy of corporate sustainability reporting is increasingly brought into question, the number of studies utilising content analysis methods to explore the contents of corporate sustainability reports is increasing. Given the general goal of content analysis techniques and it's known application to corporate sustainability reports, both qualitative and quantitative content analyses methods were deemed suitable to achieve research objectives I and II. Within Chapter 3 of this thesis, the content analysis approach was developed based on six components of content analysis as described by Krippendorff (2004); 1) sampling, 2) unitising, 3) recording, 4) reducing, 5) inferring; and 6) narrating. The

full explanation of the content analysis techniques implemented within this research can be found in the Methods sections of Chapters 2 and 3.

1.4.3 Survey

In line with the cross-sectional research design, a semi-quantitative survey was developed in order to collect empirical evidence from a large number of cases. The survey designed and implemented within this thesis was drafter using Gideon's (2012) seven-step framework for social scientists. The survey was administered through the form of an online self-completion questionnaire. Using this survey design had numerous advantages including: affordability, convenience for respondents, reduced interviewer bias and ability to remind participants to complete the survey, thus, increasing the response rate. A pre-test of the survey was undertaken to ensure the survey's quality in terms of comprehensibility and clarity (Fowler, 2014), as well as to improve the overall relevance of the survey questions. The survey questions were generally closed-ended with an exploratory nature that aimed to gain insights on the participants' (companies): 1) conceptualisations of CE and sustainability, 2) the methods and approaches employed to assess the impacts of their CE and sustainability activities and 3) the benefits and challenges associated with reporting CE activities. Furthermore, the scope of the survey were companies operating in either Italy or the Netherlands and already engaged with CE. This sampling strategy involved targeting companies who are members of national or international CE networks, thus having the assumption that these companies have knowledge of and/or experience with implementing CE strategies. Once these insights were collected, semi-structured interviews were conducted in order to dive deeper into the findings (explained in 1.4.4).

Survey results were gathered and analysed by first conducting descriptive statistics and frequency analysis, using the IBM SPSS software (2020). Following this, cross-tabulations were employed to identify any variations in the answers correlated with the participant's characteristics (e.g., company size) and conducted contingency coefficient tests to understand whether these correlations had any significance (Bartiaux *et al.,* 2018). Further information on the use of survey methods within this research can be read within the articles presented in Appendices A and B.

1.4.4 Interviews

Interviews are a commonly used method to collect qualitative data, not only because of their flexibility but because they can provide greater detail and depth than most other methods (Adams, 2015). Interviews are supported by the use of interview guides which are designed to allow interviewees to provide rich and detailed answers (Bryman, 2021). The semi-structured survey design has many advantages, for example, allowing the interviewer to focus on specific issues and motivations observed through the survey as well as providing consistency for research utilising multiple interviewers (as was the case in this research).

Within this research, semi-structured interviews were conducted with a subset of the survey respondents (results presented in Chapter 4, Appendices I and II). All interviewees were asked to consent for their data to be collected after being informed of the purpose of the interview and that their responses would be anonymised (Flick, 2009). Interview results were analysed using NVivo R1 software (QSR Interational, 2020), through an inductive approach based on thematic analysis (Braun & Clarke, 2006). An inductive approach to data analysis was deemed relevant due to the inherent conceptual ambiguities between the concepts of CE and sustainability, as well as the lack of- and demand for- empirical evidence observing company-level engagement with CE and it's assessment (Kirchherr & van Santen, 2019). Additional details on the interview process and thematic analysis can be read within Chapter 4, and the articles in Appendices I and II within this thesis.

1.4.5 Focus groups

Focus groups involve facilitating a group discussion on a particular topic, specifically designed to produce interaction between participants (Bryman, 2021). A key element of focus groups is the facilitator, who host and provide a space for participants to feel comfortable and express their beliefs whilst skilfully guiding the discussion (Cyr, 2016). The focus groups used the digital whiteboard tool Miro (Miro Enterprise, 2022) to easily plan and guide participants to collect the qualitative data during each session. These whiteboards could then be compared and qualitatively analysed to determine patterns and similarities across the responses in each session. As described in the sections above, all focus group participants had partaken in the surveys and interviews, thus demonstrating a relationship with the researcher had been formed. This final step allowed for the participants to collectively reflect and share their experiences with similar companies who are facing

challenges associated with CE disclosure. Additional information on the specifics of the focus groups, as well as the general description of participants, can be found in the methods section of Chapter 4.

1.4.6 Reliability, replicability and validity

The research conducted within this thesis was designed to ensure that sufficient levels of i) reliability, ii) replicability and iii) validity could be guaranteed. The content analysis methods employed have been transparently described and communicated to allow for replicability of the study on different samples of companies and for different moments in time. Furthermore, all of the survey and interview questions plus focus group topics have been made available within the respective articles and/or in the appendices of the published work. For the empirical evidence collected within this thesis, various statistical methods were employed (e.g., cross-tabulations, contingency co-efficient tests) to determine the significance of the correlations found. The research presented in Chapter 4 and the articles in Appendices I and II, as well as the overall thesis, utilised a mixed-methods approach thereby allowing for the triangulation of results to increase the internal validity (Bryman *et al.,* 2021). Finally, the work contained within this thesis has gone through peer-reviewed processes which have strengthened the quality of the research, in order to be published within international scientific journals.

1.4.7 Limitations

Despite best efforts, the results of this research are still subject to some limitations which must be acknowledged. Firstly, this overall research project was conducted over a time period of 3.5 years. During conceptualisation of the research problem and aims, academic literature on CE was at a low maturity, with articles mainly focusing on defining and contesting CE as a concept (e.g., Kirchherr *et al.,* 2017; Korhonen *et al.,* 2018a). However, as this research progressed, so did the field of CE-specific research, shifting from semantic discussions to articles exploring specific case studies of CE implementation and assessment. Furthermore, the formalisation and prioritisation of CE as a key environmental objective within European policies relevant to corporate sustainability reporting was formally announced in 2021 (EC, 2021). This explains the lack of studies exploring CE within corporate sustainability reporting prior to 2021, making it difficult to contextualise results

obtained within this thesis. It is hoped that the literature review conducted within this research (Chapter 2) can reduce this limitation for future studies in this field.

Because of the time limitations, data collection for longitudinal research was not able to be conducted. This could have provided more in depth observations and evidence of causality to the evolving field of CE disclosure. However, it can be noted that some elements of longitudinal research were observed by the continued participation of certain companies within multiple stages of the research (e.g., in the survey, interviews and focus groups). However, it was never this research's aim to analyse any potential changes in the individual or collective perspectives or behaviours of participants over time. Finally, other relevant methodological limitations are discussed within each individual article presented in this thesis.

1.5 Structure of the thesis

This thesis is arranged in five main chapters (1 – 5). In addition, two supplementary articles are provided which present the results of collaborative research performed in parallel to the primary research tasks (Appendices I and II). As outlined in Figure 1.2, the chapters are cumulative, however, they can still be read as stand-alone articles. The articles presented in Chapters 2, 3, and Appendices I and II, have been published in international peer-reviewed journals, whilst Chapter 4 has recently been submitted.

This first chapter introduces the main concepts which constitute the building blocks which motivate this research. More specifically, the research aim, objectives and methodological approach are clarified.

Chapter 2 presents the first article of this thesis, where literature discussing the three central topics informing this thesis: CE, sustainability reporting and disclosure frameworks are summarised. Following this, the article presents a review of: i) academic literature investigating the intersection of CE and sustainability reporting and ii) CE content within a list of fifteen reporting frameworks and approaches. This chapter was published as an open access review article in the *Business, Strategy and the Environment* journal in June 2021.

Chapter 3 details and discusses findings from the content analysis performed on the corporate sustainability reports of 94 European sustainably-ranked companies. This chapter was published as an open access article in the *Sustainable Production and Consumption* journal in May 2022.

Chapter 4 uses semi-structured interviews and focus groups to capture the perspectives and experiences of companies producing CE data for inclusion within their corporate sustainability reports. This chapter also proposes recommendations to improve the feasibility of CE-target and indicator selection as well as the identification and reporting of CE-specific risks and opportunities. As of September 2022, this chapter has been submitted to the journal *Corporate Social Responsibility and Environmental Management* and is awaiting review.

Chapter 5 concludes this thesis, providing a summary of the key findings and contributions of the research. Recommendations for practitioners (of sustainability reports and/or CE assessments) are provided as well as suggestions for future research.

The article presented in Appendix I utilises a semi-quantitative survey and semi-structured interviews to determine the relation between CE and sustainability from the company's perspective. This chapter was published as an open access article in the *Circular Economy and Sustainability* Journal in June 2021.

The article presented in Appendix II explores the assessment practices of companies who are actively engaged with CE through the use of results collected with the semi-quantitative survey and semi-structured interviews. This chapter was published as an open access article in the *Business, Strategy and the Environment* journal in January 2022.

1.6 Researchers contribution

Katelin Opferkuch conducted this research under the supervision of Sandra Caeiro as her main supervisor and Roberta Salomone and Tomás B. Ramos as her co-supervisors. For Chapters 2-4, Katelin was the leading author. She designed the research, collected data, performed data analysis and drafted the articles. For Chapter 4, Anna M. Walker and Erik Roos Lindgreen assisted with parts of the research design and data collection processes. Sandra Caeiro, Roberta Salomone and Tomás B. Ramos helped with the research design, reviewed previous draft versions of the manuscripts and provided ongoing assistance throughout the research for Chapters 2-4.

For the articles presented in appendices I and II, Katelin Opferkuch, Anna M. Walker and Erik Roos Lindgreen designed the research, collected data, performed data analysis and wrote the manuscripts, with Katelin leading all aspects related to international sustainability frameworks, external communication and reporting. Sandra Caeiro, Roberta

Salomone, Andrea Raggi, Alberto Simboli, Tatiana Reyes and Walter J. Vermeulen supported the research design and reviewed previous draft versions of the manuscripts. All submitted and published articles were read and agreed to by all authors.

2 Circular economy in corporate sustainability reporting: A review of organisational approaches [2]

2.1 Abstract

A growing commitment from companies to implement circular economy (CE) strategies demands the development of guidelines for consistent related external communication. The fields of non-financial reporting and sustainability are well established with numerous available international reporting frameworks and approaches; however, there is still an absence of standardised reporting principles and procedures for publishing progress on circularity. In this context, this article aims to explore how companies could include CE within their corporate sustainability reports, through an academic literature review and content analysis of existent reporting approaches. Results showed a clear disconnection between CE and sustain- ability reporting literature. Overall, only a few of the revised reporting approaches explicitly mention CE, and the guidance given to companies is very general, inconsistent and places the responsibility of selecting performance assessment approaches on the companies. The analysis contributes to identifying opportunities for transparent external communication of CE issues, as well as exploring the challenges and limitations.

Keywords: circular economy, content analysis, corporate social responsibility, literature review, reporting framework, sustainable development

[2] Opferkuch, K., Caeiro, S., Salomone, R., & Ramos, T.B. (2021). Circular economy in corporate sustainability reporting: A review of organisational approaches. *Business Strategy and the Environment*, *30*(8), 4015–4036. https://doi.org/10.1002/bse.2854

2.2 Introduction

Experts have long argued for the optimal strategy towards sustainable development (SD) and the Circular Economy (CE) model is gaining momentum as a promising pathway (Geissdoerfer, Savaget, Bocken, & Hultink, 2017a). With this trend comes a proliferation of CE definitions, terminology and performance assessment approaches being adopted by various stakeholders (Kirchherr, Reike, & Hekkert, 2017; Moraga *et al.,* 2019; Parchomenko, Nelen, Gillabel, & Rechberger, 2019; De Pascale, Arbolino, Szopik-Depczyńska, Limosani, & Ioppolo, 2020). Major principles of the CE model are becoming increasingly embraced and promoted by both companies and policy makers (Lacy *et al.,* 2014).

CE, as a designated policy approach, first became prevalent at a national policy level with the 'Circular Economy Promotion Law of the People's Republic of China' in 2008 (The Standing Committee of the National People's Congress, 2008). Within this document CE is described as "a generic term for reducing, reusing and recycling activities conducted in the process of production, circulation, and consumption" (The Standing Committee of the National People's Congress, 2008, p. 1), strongly echoing the 3R framework: reduce, reuse, recycle (Yang, Zhou, & Xu, 2014). Following this, several institutions, such as the European Commission (EC), developed publications promoting the implementation of CE including the EU Action Plan for Circular Economy (EC, 2015). Here CE is expanded and is defined as "A circular economy aims to maintain the value of products, materials and resources for as long as possible by returning them into the product cycle at the end of their use, while minimising the generation of waste" (EC, 2015, p. 2). CE has also become influential across business circles, where work done by organisations, such as the Ellen MacArthur Foundation (EMF) promote CE as an "economic model which seeks to ultimately decouple global economic development from finite resource consumption", often illustrated with the butterfly diagram distinguishing between technical and biological cycles (EMF, 2015, p. 2).

Despite the increasing promotion of CE from international institutions and private organisations, academic research has identified potential sustainability trade-offs and rebound effects from implementing CE principles (Korhonen, Nuur, Feldmann, & Birkie, 2018; Geissdoerfer et. al., 2017). This "rebound effect" can be defined as the reduction in expected benefits from new and more efficient technologies because of changes in consumer behaviour or the need for producers to maintain production of new products (Berkhout, Muskens, & W. Velthuijsen, 2000). This kind of effect could be also connected

with ‘greenwashing’: the corporate practice of claiming or exaggerating sustainability with the purpose of hiding a questionable environmental or socio-economic performance (Braga Junior *et al.,* 2019). In order to monitor and prevent rebound effects from the implementation of CE and subsequent greenwashing, it is imperative for companies to be transparent regarding the assessment and reporting of progress on circularity. This could be achieved through the use of quantitative metrics as well as qualitative evaluation approaches. When using these options, organisations can consider the impacts of their CE practices towards their organisational sustainability goals. Transparency to demonstrate how internal changes (e.g. CE implementation) are actually impacting a company’s sustainability performance, are often formally communicated through ‘corporate sustainability reporting’ (Lock & Seele, 2016; EC, 2021). Higgins & Coffey (2016) stated that sustainability reporting can contribute to a company establishing their own conceptualisation of sustainability, as well as their strategic integration of sustainability principles. To facilitate the reporting writing process, reporting frameworks and approaches were constructed to ensure comparable, measured and reliable disclosures from companies across sectors (Thomson, 2015a).

Within this article, the term ‘reporting approaches’ includes reporting standards, guidelines, frameworks, models and other tools designed to facilitate the sustainability report writing process. Significant drivers of sustainability reporting are, not only the typical non-financial stakeholders’ demands (e.g. from consumers, local communities, NGOs), but also those from the investment communities (e.g. shareholders, banks) who are increasingly asking for transparency of business practices (Ditlev-Simonsen, Caroline, Midttun, 2010). Thus, the quantity and quality of information disclosed in sustainability reports can be used by stakeholders to measure an organisation’s legitimacy (Kuo, Yeh, & Yu, 2012). But with a growing landscape of competing reporting options available to companies, which are intended to reduce bias in self-assessment, the decision of which one to implement is not so straightforward, as highlighted by Thijssens, Bollen, & Hassink (2016). Furthermore, the capacity of reporting approaches to improve the quality and transparency of non-financial disclosures and in turn the sustainability performance of a company, remains heavily debated (Flower, 2015; Thomson, 2015b; Melloni, Caglio, & Perego, 2017; de Villiers & Sharma, 2017a; Cortesi & Vena, 2019). With respect to sustainability narratives, such as CE, the guidance included within reporting approaches will influence the terminology used, definitions of concepts promoted and the assessment approaches applied by companies

producing sustainability reports moving forward (Chen, Jermias, & Nazari, 2020). How these reporting approaches are suggesting companies should communicate CE within a sustainability report and the challenges surrounding CE reporting remains unclear and largely unexplored.

To shed light on this issue, a review of corporate sustainability reporting approaches and how they are integrating CE aspects is presented. Therefore, the main research aim is to explore how existent sustainability reporting approaches and literature guide companies to include CE issues. This guidance will be explored in terms of both the structure and content of the reporting approaches and will be extracted from academic literature, reporting approaches and related documents. To achieve these aims the remainder of this article is structured as follows. The next section provides a theoretical overview of the key concepts informing this research. In the third section, the methods utilised in this article are described. Following this, the academic articles are reviewed and the list of reporting approaches available to companies is selected and analysed using the coding framework. Finally, the article discusses critical reflections on the findings and concludes with suggestions for future research.

2.3 Theoretical Overview

This section presents the main concepts which constitute the building blocks motivating and supporting this research:

a) Sustainability reporting in the context of strategic management, in order to provide a definition, evolution, challenges and the benefits of sustainability reporting practices,
b) Importance and relevance of reporting approaches for sustainability disclosure, in order to introduce the goal of reporting approaches as well as an overview of the current reporting landscape,
c) The emergence of CE strategies, in order to improve sustainability performance,
d) Linking CE and sustainability reporting, a description of the research gap.

2.3.1 Sustainability reporting in the context of strategic management

The practice of sustainability reporting has evolved from the Corporate Social Responsibility (CSR) movement. In the 1970s, the first collection of organisations publishing information

regarding their environmental and social aspects was seen in both the United States and Western Europe (Kolk & Pinkse, 2010; Junior, Best, & Cotter, 2014). This practice gained serious prominence during the late 1990s and early 2000s partly due to the publication of the Triple Bottom Line (TBL) concept (Elkington, 1997). The TBL model, popularised as "people, planet, profit" (PPP) is an accounting framework responding to the Brundtland definition of SD in 1987 (World Commission on Environment and Development, 1987). Research from Davis-Walling & Batterman (1997) and Kolk (1999) contributed to the foundations of practices for evaluating the quality of sustainability reports. The evolution of sustainability reporting has been comprehensively summarised in numerous articles, such as Deegan & Blomquist, (2006), Buhr (2007), Gray & Milne (2008), Owen & O'Dwyer (2009), Dumay *et al.* (2016) and Rupley, Brown, & Marshall, (2017).

Sustainability reports should consist of objective information allowing stakeholders to make reliable evaluations of the organisation's non-financial performance, including (but not limited to) social and environmental aspects (Gray, 2006). By disclosing targets, benchmarks and commitments within a sustainability report, a company may help investors and other stakeholders to put its performance in context (EC, 2017). Reporting on sustainability performance could potentially provide numerous benefits for a company including: increased credibility, reduced legal risks, improved supplier relationships, increased access to capital and increased ethical behaviour along the supply chain (Paun, 2018). Regarding a company's individual approach to sustainability, sustainability reports are said to be their most direct expression (Comas Martí & Seifert, 2013). A corporate sustainability report can also be known as several other titles such as: *Sustainability Report*, *CSR Report*, *Integrated Report*, *Environment, Social & Governance (ESG) Disclosure* or *Environmental Report*. Some researchers argue however, that no organisation producing sustainability reports can give equal billing to each of the components of the TBL (Gray, Adams, & Owen, 2014) and that the expression 'sustainability reporting' is moving further away from the form of sustainability put forward with the Brundtland definition (Hahn & Kühnen, 2013). However, due to the recent publication of the draft proposal from the EC, 'Corporate Sustainability Reporting Directive' (EC, 2021), which proposes the terminology shift from 'non-financial report' (as defined in the European Non-Financial Reporting Directive in 2014 – see text below) to 'sustainability report', in this article the term 'sustainability reporting' will be used. Here, this term refers to the voluntary or mandatory

reporting activities of a company publishing a report composed of either exclusively or partially non-financial information, irrespective of the reports title or the reporting approach employed (EU, 2014).

Sustainability reports themselves are merely a product of sustainability accounting and strategic management processes, which includes: strategic goal development (Gagné, 2018), resource allocation (Bower, 1970; 2017), implementation and management of change (Hussey, 1998) and assessment, monitoring and communication (Gamerschlag *et al.,* 2011; Lozano & Huisingh, 2011). Research within corporate sustainability has demonstrated that in order to cope with emerging sustainability challenges, organisations require a specific set of capabilities to go beyond mere regulatory compliance (Teece *et al.,* 1997; Wu *et al.,* 2013). Furthermore, several studies have examined how accounting processes (and by extension reporting processes) influence both the development and management of a company's corporate strategy (Baumgartner & Rauter, 2017; Skærbæk & Tryggestad, 2010). Therefore, sustainability reporting can be utilised as a main driver facilitating change towards corporate sustainability within a company (Adams & McNicholas, 2007; Lozano *et al.,* 2016). Authors such as Vermeulen & Witjes (2016) stress that corporate sustainability is not only about sustainability issues (e.g. PPP) but must incorporate a time dimension: both taking a long-term perspective enabling radical transformative changes and a short-term perspective, starting with activities which can be implemented tomorrow. Burritt and Schaltegger (2010) suggest sustainability reports are a tool which help managers make sustainability decisions. Through a review of literature, these authors offer two managerial perspectives: (i) the "inside-out", meaning reports are developed by the company and their business strategy or (ii) the "outside-in", where reporting is driven by external communication requests made by stakeholders (Burritt & Schaltegger, 2010; Domingues *et al.,* 2017). Lozano *et al.* (2016) investigated these two perspectives in practice and concluded through a survey of 91 reporting companies, that sustainability reporting processes were mainly driven from internal motivations and their impact had facilitated changes for sustainability. Despite these examples of the potential benefits of sustainability reporting to a company's strategic management, it should also be noted that some authors claim companies are more likely taking an "outside-in" perspective, simply 'free-riding' on the backs of leading reporting companies whilst continuing in their pursuit of profit and growth (R. Gray & Milne, 2002).

2.3.2 Importance and relevance of reporting approaches for sustainability disclosure

Boiral & Heras-Saizarbitoria (2019) discuss that, despite advancements with social accounting practices, there has not been a direct increase in the quality of sustainability reports being published. Hopwood *et al.* (2005) voiced that companies are reporting more often on aims and intentions rather than on actual actions and performance. Even in 1998, researchers determined that managers often disclose information in a narrative format because such disclosures can be customised to manage public impressions (Neu *et al.,* 1998). This is not unlike the process of 'decoupling', as labelled by Meyer & Rowan (1977), which concerns a company's symbolic adoption of new structures or sustainability words whilst still operating with the same traditional policies and activities, resulting in a ritualistic compliance. As previously mentioned, to decrease these shortcomings, reporting frameworks, initiatives and approaches (henceforth reporting approaches) have been developed which assist organisations to report comparable, consistent and trusted non-financial information required by national and/or international guidelines (EC, 2017). Reporting approaches can be issued and published by different types of institutions, including the following: governments, financial market regulators, stock exchanges, industry bodies, investors, standard setters, consultancies, Non-Governmental Organisations (NGOs), intergovernmental organisations (Van der Lugt *et al.,* 2020). In addition, informal reporting approaches have also been proposed by academics as the result of a growing body of CSR research (e.g. Yongvanich & Guthrie, 2006; Sureeyatanapas, Yang & Bamford, 2015). Companies may use multiple reporting approaches to publish a report, however, this still results in a lack of comparability between data within sustainability reports (Eccles *et al.,* 2011). Generally, the discussion within academic literature focuses on the most commonly used horizontal reporting framework: 'GRI Standards' and increasingly, the 'International Integrated Reporting Framework' (Hahn & Kühnen, 2013; Peršić *et al.,* 2017). Which reporting approach a company selects is important; indeed, as Adams (2017) determined, the specific content related to value creation and sustainability issues can have a significant impact on the mindset of organisational leaders. The growth of reporting approaches available to companies within the last decade has resulted in a diverse landscape of reporting approaches all competing for dominance (Siew, 2015).

It is becoming increasingly obligatory for companies to formally report non-financial information. For example, the EU regulatory *Non-Financial Reporting Directive 2014/95/EU* (EC, 2014) impacts all sustainability reports published from 2018 by large public-interest companies. Following this, the EC published *Guidelines on Non-Financial Reporting (methodology for reporting non-financial information) (2017/C 215/01)* which acts as non-binding guidelines to assist companies in disclosing information in accordance with the Directive (EC, 2017). Although a European level policy, the Guidelines are based on information compiled from academic literature and various national and international reporting approaches. Furthermore, the Guidelines state that while its aim is to address companies which are required to produce a mandatory non-financial disclosure, they also represent best practice for companies who wish to voluntarily produce a report (EC, 2017). There are relatively few studies focussing on the process of developing corporate sustainability reports, primarily as most companies are utilising the report formats and procedures formally prescribed in reporting approaches (Roca & Searcy, 2012). Generally, a company's corporate sustainability report will include text describing their: (i) sustainability vision and objectives (e.g. Adams, 2017; R. Gray, 2006b) (ii) company policies, management systems and stakeholder relations (e.g. Daub, 2007; Lozano, 2020) and (iii) the company's performance in the context of sustainability, inclusive of relevant key performance indicators (KPIs) (e.g. GRI, 2016; Roca & Searcy, 2012). Building on this, the Guidelines formulated eight key content elements (e.g., business model, KPIs) which must be addressed within a corporate sustainability report (EC, 2017) (see Appendix III). As a result, these content elements are often utilised in academic studies as a basis to analyse the quality, format and style of sustainability disclosures (e.g., (Manes-Rossi *et al.,* 2018; Ştefănescu *et al.,* 2021).

Additionally, it should be highlighted that sustainability research continues to identify challenges for corporate sustainability reporting. In recent years, the UN's Sustainable Development Goals (SDGs) have become a globally recognised framework for society to progress towards SD (UN, 2015). Because of this, companies are aligning their sustainability initiatives and targets with the SDG agenda (Rosati & Faria, 2019a). In response, numerous reporting initiatives including the 'GRI Standards' and the 'Integrated Reporting Framework' have published supplementary material which support companies to integrate the SDGs within an organisation's internal goal setting process. The analysis of sustainability reports

to evaluate a company's commitment and operationalisation of the SDGs has become a rapidly growing area of research and highlights the potential of reporting initiatives to influence the development of a company's response to emerging sustainability challenges (e.g. Biermann, Kanie, & Kim, 2017; Izzo, Ciaburri, & Tiscini, 2020; Tsalis, Malamateniou, Koulouriotis, & Nikolaou, 2020).

2.3.3 The emergence of circular economy strategies

CE is not a novel concept and authors have discussed its origins and pre-cursors (see: Calisto Friant, Vermeulen, & Salomone, 2020). CE is most often presented as activities related to waste and resource management, aiming to establish a decoupling of economic development from finite resource consumption through introducing closed resource loops (Ghisellini *et al.,* 2016; Kirchherr *et al.,* 2017). Several authors argue these narrow conceptions of CE focussed on resource efficiency do not support a system thinking approach, which help companies consider the impacts of CE strategies from a broader sustainability perspective (Webster, 2013). For example, research from Schroeder *et al.* (2018) who suggest CE can be a tool having positive contributions on numerous SDGs, beyond only the environmental dimension. This notion is echoed by other authors who have discussed CE as one of many sustainability narratives positioned as having the potential to lead society towards positive transformative change (De Witt, 2018; D'Amato, 2021). These studies highlight the conceptual diversity of CE which is not only being discussed within academic literature but is also evident within international CE policies. Through an analysis of EU CE policies, Calisto Friant *et al.,* (2021) described the primary discourse of CE being promoted as both holistic and optimist. However, the targets and measures included within the EU policies reviewed are labelled as segmented and focus only on 'end of pipe' solutions (Calisto Friant *et al.,* 2021). The ability of CE to address the underlying causes of sustainability challenges is dependent on how the narrative of CE is understood and subsequently implemented (D'Amato, 2021).

The transition towards a CE presents a new business paradigm, one associated with critical challenges in terms of resource management, stakeholder management, financial and regulatory aspects, organizational barriers and consumer acceptance (Ritzén & Sandström, 2017; Stewart & Niero, 2018). This paradigm requires companies to rethink the way they create and deliver value, ensuring that CE promotes organisational sustainability

(Lozano, 2020). Companies implementing closed loop systems, are compelled to work with an ecosystem of actors, requiring a shift from firm-centric to network-centric operational logic and sustainability assessments (Blomsma *et al.*, 2019; Walker, Vermeulen, *et al.*, 2021). For these reasons, the research field concerning quantitative and qualitative approaches for CE assessment at both the company and product level is growing rapidly (Corona *et al.,* 2019; Kristensen & Mosgaard, 2020). To date, there is no uniform approach to the assessment of CE practices, with proposed approaches ranging across scales such as: (i) single indicators, e.g. the Circularity degree from Haas *et al.,* (2015), (ii) circularity indices, e.g. Material Circularity Indicator (MCI) from EMF (2015), and (iii) company-level assessment frameworks e.g. Circularity Measurement Toolkit from Garza-Reyes *et al.,* (2018). To contrast, some studies suggest that the evolution of assessment approaches for CE are losing sight of sustainability indicators (Kravchenko *et al.,* 2020) or are rarely based on scientific evidence and risk driving "circularity for circularity's sake" (Harris *et al.,* 2021). The conceptual limitations of CE and its assessment identified in literature could translate into practical limitations for companies adopting CE strategies (Calisto Friant *et al.,* 2020). Without strong theoretical foundations of the CE concept, a company claiming improvements in their sustainability performance due to the implementation of CE strategies could easily be accused of greenwashing, similar to discussions involving the 'green growth' discourse (Gregson *et al.,* 2015). Thus, companies' commitments towards CE may largely remain aspirational without formal guidance provided in reporting approaches (Jones & Comfort, 2017).

2.3.4 Linking circular economy and sustainability reporting processes

Research interest on the integration of CE strategies and business models within CSR processes is growing, however, investigation into the role of sustainability reporting remains in elementary stages. Furthermore, the potential of sustainability reporting processes to aid in the legitimisation and comparability of the sustainability contributions of CE strategies is yet to be explored. Currently, CE is being promoted as a key strategy within the 'European Green Deal', suggesting CE will "modernise the EU economy" (p.7, EU, 2019) and include measures which encourage businesses to adopt CE practices (EU, 2019). Within the same Communication, the Non-Financial Reporting Directive is being reviewed, with the aim of increasing disclosure on climate and environmental data as well as ensuring sustainable

investments (EC, 2019). A first draft of this revision suggests that indeed, the requirements for reporting a company's sustainability performance will involve more detail, also mentioning CE in relation with resource use as a material issue to disclose (EC, 2021). With these policy developments, not only will the amount and quality of data required to be reported by companies in the near future increase but also the number of companies required to publish sustainability data. This increasing public pressure emphasises the need for guiding principles to be included within reporting approaches, ensuring quality and comparable CE related information will be disclosed by companies moving forward. However, before these guiding principles and procedures can be proposed, research is needed to clarify the current challenges regarding reporting CE issues in accordance with the guidance of reporting approaches.

2.4 Methods

This section describes the literature review approach applied in this research. This approach is adapted and applied on two bodies of literature: academic and reporting approaches, namely reporting frameworks, standards, guidelines and policy documents. It utilises qualitative content analysis methods with the purpose of not only identifying key words within the text but also understanding and interpreting the contextual use of these key words (Hsieh & Shannon, 2005). The overall research approach is graphically presented below in Figure 2.1.

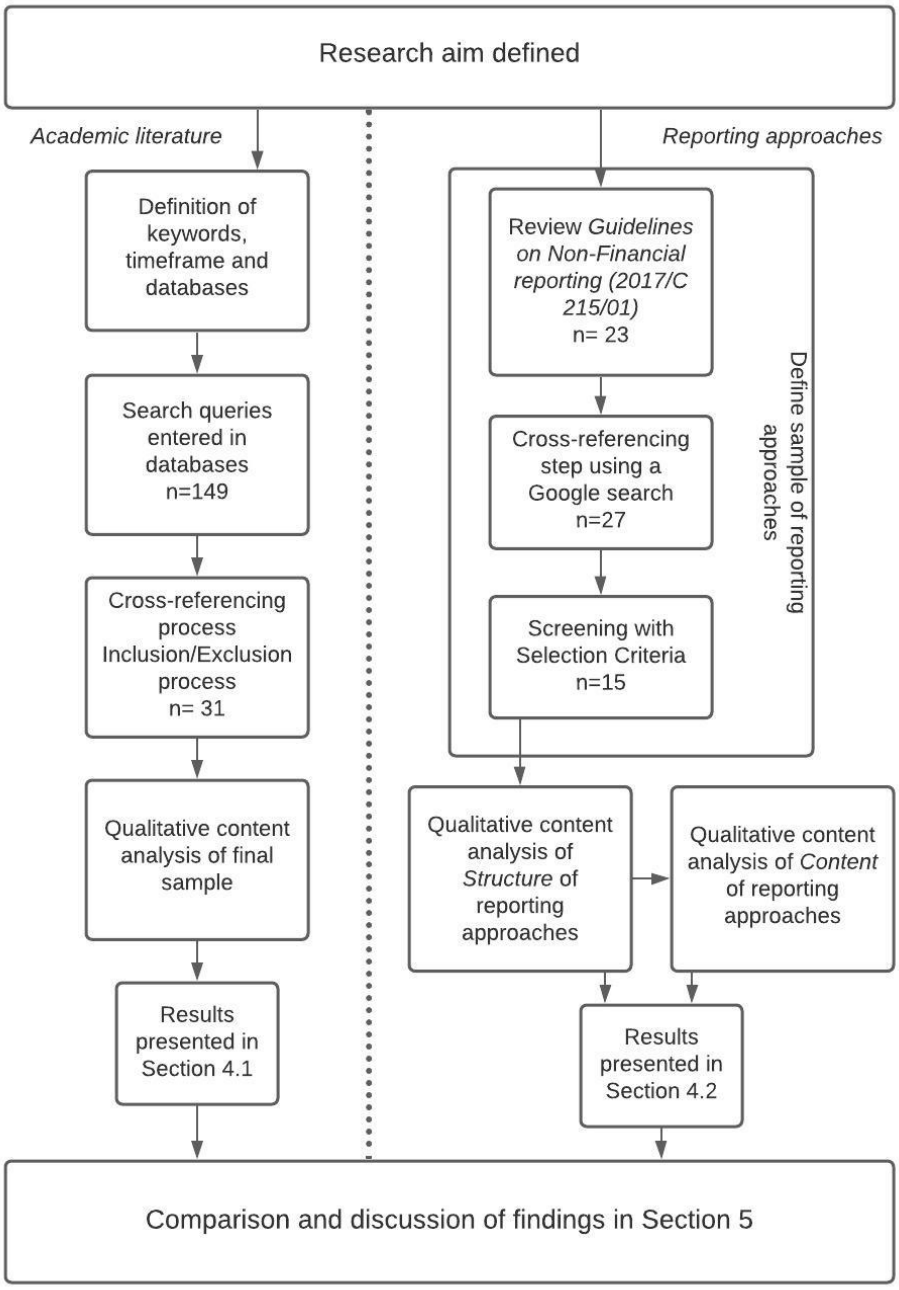

Figure: 2.1: Summary of research steps.

2.4.1 Search for circular economy within sustainability reporting literature

First, a systematic review was carried out to collect a sample of academic articles and then a qualitative content analysis was performed to assess them (Grant & Booth, 2009). The aim of the systematic review was to find and discuss themes across multiple studies. The final outcome presents a broad understanding of the connection between CE and

sustainability reporting (Butler *et al.,* 2016). A review protocol has been developed in line with the qualitative systematic review method to reduce bias and locate relevant sources.

The database search was conducted for scientific articles written in English and peer-reviewed found in the Scopus and Google Scholar databases. Articles were included if they were published between 2012 and July 2020. This timeframe ensured the literature being reviewed was published just prior to the noted increase in CE related literature in 2013-2014 (as identified in Geissdoerfer, Savaget, Bocken, & Hultink, 2017) and since the first report published by the EMF in 2012, and the consequent increase in public promotion of the CE concept (EMF, 2012). A search query was devised to search for the selected terms in the title, abstract and keywords of publications. Eight search strings were selected in combination with the term "circular*" - the asterisk is a truncation symbol to allow different endings of the search term (e.g. circularity) to be included in the results. According to the report *Reporting Matters* (WBCSD, 2019), for the year 2018 corporate reports were most commonly referred to as: sustainability report (42%), annual report (16%), integrated report (14%) or CSR report (4%) in declining order. Knowing this, each of these four report titles were included as separate search strings. Additionally, less frequently used terms related to reporting were added: "disclosure", "communication", "performance evaluation" and "Environment, Social & Governance" (ESG). By including all of these eight search terms with the operator "or" and the term "circular*", the possibility of excluding relevant literature due to incorrect terminology is reduced. After applying this initial step, a sample of 149 articles was established.

The second process was to review and refine this sample of articles. To do this, the cross-referencing methodology from Wohlin (2014) was applied. Each article's title and abstract were scanned to determine if the article was indeed relevant to the scope and topic of this research. The inclusion or exclusion process was dependent on whether the article was providing strategies, differences or connections between the two fields of CE and sustainability reporting. The geographical scope of the research did not influence the article's inclusion. If an article was determined to be irrelevant it was excluded from the sample. Articles which appeared more than once in the search, duplicate copies, were removed. On completion of this review protocol the final sample of academic articles to be qualitatively reviewed was obtained (n=31). Articles were then qualitatively assessed to abstract data that identifies reporting approaches which incorporate CE and research

discussing or proposing tools for external corporate communication of CE (other than sustainability reporting). The results of this section are presented in Section 2.5.1.

2.4.2 Search for circular economy issues within reporting approaches

2.4.2.1 Sample Definition

As the research developed, it became clear that a cohesive list of reporting approaches available to companies to guide sustainability disclosures does not exist. Thus, to identify relevant documents, firstly the *Guidelines on Non-Financial Reporting (methodology for reporting non-financial information) (2017/C 215/01)* was analysed (EC, 2017). This revealed two lists of widely accepted reporting approaches mentioned within the document, which were then combined to create the initial sample (n=23) (as seen in Appendix III).

To ensure this list was still valid in the current reporting landscape, an additional cross-referencing step using a Google search was made. This step aimed to identify any other documents which are not exclusively intended as a reporting framework but include content relevant to reporting of CE issues. Similar to the methodology used for academic literature, a search query was developed to combine three search strings with the term “circular economy”. The search strings include: “reporting framework”, “reporting guidelines” and “organisational framework”. Four additional documents were identified: two which act as reporting frameworks and two which focus on the organisational implementation of CE. These additional documents were then added to the sample (n=27).

With this sample of documents, a criterion sampling technique was employed to ensure the final sample of reporting approaches are relevant to the research aims (Palinkas *et al.,* 2015). Four selection criteria labelled SC1 to SC4 (as seen in Table 2.1) were designed to ensure that the final sample of reporting approaches were the most relevant for companies engaged with CE and wanting to produce a sustainability report across sectors and regions. The sample of 27 reporting approaches was then reviewed and the ones which did not satisfy all four selection criteria were excluded (the remaining and reasons for exclusion are presented in Appendix III). The final sample contained 15 documents relevant for organisational CE reporting (n=15).

Table: 2.1: Selection criteria of the reporting approaches to be analysed.

Selection Criteria (SC)	Description
SC1	The reporting approach must be international in scope, excluding national or regional reporting requirements
SC2	The reporting approach must be intended to be used by organisations (private, public or state owned)
SC3	The reporting approach must be horizontal (cover a broad variety of sectors and topics), excluding any reporting approaches made specific to one sector or topic
SC4	The reporting approach must contain advice for organisations on the content and format of their non-financial report, excluding those designed purely for internal communication or internal decision making only

2.4.2.2 Content Analysis

Using the sample list, each reporting approach was analysed for CE on two dimensions: 1) structure of the reporting approaches and 2) the content of the guidance on CE issues. To do this a content analysis approach, consisting of the collection and coding of 'meaning units', was developed to facilitate a transparent and consistent analysis of the qualitative documentation (Bryman, 2012). 'Meaning units' are defined as "*the constellation of sentences or paragraphs containing aspects related to each other, answering the question set out in the aim"* (Catanzaro, 1988; Bengtsson, 2016). All fifteen reporting approaches were read and any explicit text mentioning "circular economy", or also more broadly other terminology including "circular*", were collected and recorded as meaning units. The extracted text will provide evidence of how companies producing a sustainability report are being advised by reporting approaches to integrate CE within their corporate sustainability strategy and ultimately be included in their sustainability reports.

For the dimension of structure, (*if* and) *where* the reporting approach mentions CE was noted in order to obtain insights into which key content elements of a report companies are being suggested to include CE within their reports. The coding framework was developed by examining each reporting approach and noting the (a) format, that is whether CE is included as a central topic within principle or within a supplementary material and (b) content

elements, that is where CE was mentioned across the three key content elements required for sustainability reports: (i) sustainability vision and objectives, (ii) company policies, management systems and stakeholder relations, and (iii) the company's performance in the context of sustainability. Using an inductive approach, the data gathered allowed classifying approaches into four categories as seen in Table 2.2. The location of each 'meaning unit' within the reporting approaches allowed each reporting approach to be categorised as one of the four. As little is known about how CE could be incorporated into reporting, a document was categorised as *Fully integrated* does not necessarily mean it will produce a better sustainability report discussing CE issues than a framework which is classified as *Partially integrated.* Instead, the aim is to observe *where* the authors of reporting approaches have chosen to include CE (or could choose in the future) and how frequent these categories are being applied in current reporting approaches. By observing this, insights into how much importance or weight each reporting approach gives to CE issues are obtained. The different structures of the reporting approaches will influence companies' interpretation of the CE concept and this will ultimately be reflected in the sustainability reports of the companies using them.

Table: 2.2: Categories used to identify if and where CE is integrated in the analysed reporting approaches.

Classification of the structure		**Description (if and where)**
Fully integrated		CE is integrated throughout numerous content elements within principal reporting guidelines of the document
Partially integrated	Multiple content elements, supplementary material	CE is included in a CE-specific supplementary material and integrated across more than one content element
	Single content element, main document	CE is integrated within one content element inside the principal reporting approach
Not mentioned		CE is not mentioned at all

For the second dimension of content, the sample was reviewed to determine *what guidance* specifically related to CE is integrated within each reporting approach mentioning

CE, as determined in the previous step. The coding framework was developed using three variables from literature which are considered critical to understanding a company's conceptualisation and implementation of CE: Definition (Ghisselini *et al.,* 2016; Kirchherr *et al.,* 2017), Terminology (Schoggl, Stumpf & Baumgartner, 2020; Walker *et al.,* 2021) and Assessment Approaches (Saidani *et al.,* 2019; Roos Lindgreen *et al.,* 2020). Specific to this study, a fourth variable was introduced titled 'Reporting Requirements' which observes whether CE issues are a voluntary or mandatory reporting issue according to the requirements of the reporting approach. Using an inductive approach, each 'meaning unit' was coded against the four categories seen in Table 2.3. For the content dimension, rather than classifying each approach (like what was done with the structure dimension), qualitative observations were noted on the four categories using the coding schedule and are presented in Section 2.5.2.

Table: 2.3: Categories used to identify what guidance related to CE is integrated in the analysed reporting approaches.

Classification of the content	**Description**
Definition	Presence of a definition of CE (own definition or reference to other source)
Terminology	Indication of key terms, phrases and concepts on circular economy and related topics (including sustainability)
Assessment approaches	CE-related indicators or other assessment approaches, including tailor made initiatives
Reporting requirements	CE is a voluntary or mandatory issue to be reported

2.5 Results

This section presents the results of the review of academic literature, followed by the results of the review of reporting approaches.

2.5.1 Findings from the review of academic literature

The articles reviewed revealed that within academic literature, to date, no informal reporting approaches have been developed to inform and guide companies wishing to include CE within their sustainability report. However, the following section will describe the common themes extracted from the academic articles reviewed resulting in the following challenges for CE reporting: application of existent reporting approaches to CE practices, challenges with corporate CE communication, transparency of CE impacts and insights into CE reporting trends.

Only a few authors have discussed existing sustainability reporting approaches with relation to their coverage of CE practices. Pesce *et al.* (2018) conducted research to gather opinions on the implementation of the international standard ISO 14001:2015 for environmental management systems in Chinese companies, linking with CE topics. One of the focus areas was to better "*understand the potential of the standard in relation to the rise of new approaches and corporate sustainability paradigms such as corporate social responsibility and circular economy*" (p. 8, Pesce *et al.,* 2018). From a workshop with 72 small and medium sized enterprises (SMEs) and multinational companies in the Guangdong province, the results suggest that the companies interviewed do not believe the ISO 14001:2015 standard fully integrates CE principles. The companies demanded changes in sustainability tools and approaches which will allow users to integrate emerging sustainability paradigms, such as the CE. The work of Pauliuk (2018) presents a critical appraisal of the CE standard BS 8001:2017. The standard from the BSI attempts to provide guidance for organisations implementing and monitoring CE principles and strategies. Pauliuk (2018) argues that the guidance on monitoring CE strategy implementation within the standard is vague and does not facilitate organisations capturing a broad range of benefits from CE implementation. Furthermore, the standard places the responsibility for selecting CE performance indicators for both internal and external communication (such as within sustainability reports) on the organisations themselves. Left without uniform guidance for the monitoring and assessment of CE practices, Pauliuk (2018) concludes organisations will "*cherry pick results that fit their corporate message but not necessarily contribute to the wider CE and sustainability goals*" (pp. 90). These two studies show that in an organizational management context, the suitability of existing reporting approaches to the developing model of CE is limited and only now beginning to be discussed.

Several challenges to corporate communication of CE have been studied but, within the analysed literature, the opportunities for sustainability reporting practices to address these challenges have not been yet explored. Esken, Franco-García, & Fisscher (2018) point out that CSR, as a field of management gaining attention since the 1990s, consists of activities designed within the linear economic model. For long running embedded CSR employees, often in upper management, it is difficult to embrace an alternative more systematic and non-linear model of production. Esken *et al.* (2018) suggest that, to increase synergies between the fields of both CSR and CE, intra-corporate exchange of best practices is critical. In order to transition towards a CE, no single entity can do this alone and their commitment must be expressed both internally and externally. This collaborative process could be accelerated through comparable sustainability reporting, to identify collaboration opportunities between organizations along the supply chain.

Gusmerotti *et al.* (2019) provide a further exploration of a firm-centric approach to CE implementation, exploring the drivers and approaches of CE within 821 Italian manufacturing firms. Their findings suggest that companies who are successful in CE implementation have recognised the need for circularity to *"pervade the whole business and, therefore, encompass all business functions*" (pp. 324, Gusmerotti *et al.,* 2019). Companies which limit their focus to internal operations will reduce the potential economic and market opportunities related to CE. On the other hand, companies who focus too much on marketing actions and communication could be interpreted as greenwashing and hinder their success in the market (Gusmerotti *et al.,* 2019). Laurenti *et al.* (2018) add suggestions for corporate communication through their study on waste impacts for circular products. Through stakeholder consultation with Life Cycle Assessment (LCA) practitioners and consumers, the researchers identified the paradox of suggesting metrics which are simple enough for consumers to understand but complex enough so they can still convey the significance of different environmental impacts (Laurenti *et al.,* 2018). Birat (2015) proposed the combination of two tools: LCA and Material Flow Analysis (MFA) to evaluate and communicate CE performance. However, this proposal has not yet been accepted by the market as the dominant representation of CE performance. These studies highlight the risks associated with data selection for external communication and how reporting approaches could inform this communication, providing a comparable format and reducing the potential for greenwashing and oversimplification of CE data.

Several of the reviewed articles discuss forms of external communication, other than sustainability reporting and their applicability to communicating CE performance. For example, Bovea *et al.,* (2018) investigate the options of eco-labelling for circular products. More specifically, the researchers focus on icon design and propose five globally selected icons for five different CE strategies (upgrade, disassembly, lifetime extension, repairability, reuse). The authors recommend companies integrate these icons into the design process of their products to improve consumer awareness of CE. This study demonstrates that the lack of consumer awareness and understanding of CE results in limitations for corporate communication of CE issues. On a related angle, Muranko *et al.* (2019) explore the use of persuasive communication strategies to influence the perception of remanufactured products (an example of products produced using CE practices) as having a high and safe quality. They too, identify a lack of societal CE awareness and comment on how this not only restricts the potential of corporate communication, but it could also be seen as a risk for companies.

In a related context of communication and transparency, Peschel & Aschemann-Witzel (2020) explored the level of transparency in communication of the prices of goods produced using CE practices, in this case, upcycled plant-based food items. In some scenarios, the introduction of upcycled alternatives actually increased sales of competing alternative sustainable items. The authors conclude that in their study, communication revealing the upcycling of ingredients actually lowered the product's perceived monetary value (Peschel & Aschemann-Witzel, 2020). Without adaptions to current corporate communication strategies, it is possible that companies will decide not to discuss CE issues at all.

A final theme across the analysed articles involves the application of content analysis research methods on sustainability reports to analyse various aspects of CE implementation in different sectors and regions (as previously mentioned in Section 2.3). Recently, Stewart and Niero (2018) made first attempts at revealing how CE is being included within companies sustainability agenda using systematic content analysis of corporate sustainability reports. Among the conclusions, the researchers emphasize that within the Fast Moving Consumer Goods (FMCG) sector, the integration of CE in sustainability reports has started and is mostly often associated with recycling and reusing (Stewart & Niero, 2018). The results also showed that sustainability reports which had more elaboration on

CE were lacking references to sustainability performance indicators or assessment methodologies (Stewart & Niero, 2018). This could indicate that companies are unsure of how to comprehensively communicate the integration of the assessment of CE practices within sustainability reports. Fortunati, Martiniello & Morea (2020) analysed the integration of CSR and CE within multi-national companies in the cosmetics industry. The authors observed that in numerous cases, the circular approach was not clearly described or supported by quantified actions and objections (Fortunati *et al.,* 2020). Similarly, Dagiliene *et al.* (2020) determined, through content analysis of sustainability reports within the manufacturing sector, that companies are still not reporting much information about CE. Findings suggested that sustainability reports which do describe reuse, recycle and recover practices still do not contain sufficient data from the holistic perspective of CE. The authors also acknowledge the potential for reporting approaches and assurance standards to positively guide the development of the reporting of CE strategies, however, more work needs to be done to integrate CE within existing environmental management accounting tools (Dagiliene *et al.,* 2020).

2.5.2 Findings from the review of reporting approaches

The final list of 15 documents, (numbered 1-15), are presented in Table 2.4. As described by the four selection criteria in Table 2.1, this list can be utilised by organisations engaged with CE of all sizes, operating in different sectors and locations seeking guidance to assist them in preparing a voluntary or mandatory organisational sustainability report suitable for external communication.

Table: 2.4: Classification of the structure of reporting approaches to identify CE, according to the four categories defined in Table 2-3 (reporting approaches listed in alphabetical order).

No.	Abbreviation	Author(s)	Name of the reporting approach	Last revised in[3]	Classification on structure
1	*CDP*	CDP Global (formerly the Carbon Disclosure Project)	CDP	2019	**Not mentioned**
2	*CDSB*	Climate Disclosure Standards Board (CDSB)	CDSB Framework	2020	**Not mentioned**
3	*EMAS*	European Commission	Eco-Management and Audit Scheme (EMAS)	2017	**Supplementary material**
4	*GRI*	Global Reporting Initiative (GRI)	GRI Sustainability Standards	2020	**Content element**
5	*ISO*	International Organisation of Standardisation (ISO)	ISO 26000 Social Responsibility	2017	**Not mentioned**

[3] Either partial or full revision

6	*IIRC*	International Integrated Reporting Council (IIRC)	The International (IR) Framework	2021	**Not mentioned**
7	*OECD*	Organisation for Economic Co-operation & Development (OECD)	OECD Responsible Business Conduct: OECD Guidelines for Multinational Enterprises	2011	**Not mentioned**
8	*POEF*	European Commission	Product and Organisation Environmental Footprint Guides	2016	**Not mentioned**
9	*SASB*	Sustainability Accounting Standards Board	Sustainability Accounting Standards Board	2017	**Not mentioned**
10	*SDG*	United Nations	SDG Compass: The guide for business action on the SDGs	2015	**Not mentioned**
11	*SDGD*	ACCA[4], ICAS[5], CA ANZ[6], IIRC & World Benchmarking Alliance	Sustainable Development Goals Disclosure (SDGD) Recommendations	2020	**Not mentioned**
12	*UNGC*	United Nations	United Nations Global Compact: Guide to Corporate Sustainability: Shaping a Sustainable Future	2014	**Not mentioned**

[4] Association of Chartered Certified Accountants

[5] Institute of Chartered Accountants of Scotland

[6] Chartered Accountants Australia and New Zealand

13	*WEF*	World Economic Forum (WEF)	Measuring stakeholder capitalism: Toward common metrics and consistent reporting of sustainable value creation	2020	**Content element**
14	*BSI*	British Standards Institute	BSI 8001:2017 Framework for implementing the principles of the circular economy in organizations – Guide	2017	**Supplementary material**
15	*UL*	UL	UL 3600 Measuring and Reporting Circular Economy Aspects of Products, Sites and Organizations	2018	**Supplementary material**

Results indicate that the majority of the sustainability reporting approaches reviewed have no mention of the concept of CE. One reason for this could be due to the reporting approaches being published before the *EU Action Plan for Circular Economy* (EC, 2015), however, this is not the explanation for all approaches as only two were last revised before 2015.

No reporting approaches were classified as having fully integrated CE*,* indicating that, despite academic literature and policy documents positioning CE as a transformative model for the improvement of organisational sustainability performance, from the perspective of the authors of those documents, the implementation of CE is not a central topic within a sustainability report nor within the organisation.

Five reporting approaches were classified as having partially integrated CE. Two of them, *GRI* and *WEF,* were classified with *Content element*, indicating CE was mentioned inside a specific content element of the core reporting approach. In both cases, CE was only mentioned with relation to one content element: sustainability performance of the company. More specifically, both reporting approaches describe CE with relation to only the environmental performance, or "Planet" dimension of the company's activities. With *GRI*, CE is discussed in the recently revised 'GRI 306: Waste 2020', which is only effective for reports published on or after 1st January 2022 (GRI, 2020). Designed to outline the GRI's reporting requirements on the topic of waste, this revision is the foremost mention of CE throughout the entire 'GRI Standards' series. In the case of *WEF*, CE is discussed within one of four pillars – "Planet", specifically as an expanded metric for "resource availability". Other mentions of CE or circularity throughout the framework are aligned with the view of CE advancing resource management. Table 2.4 also shows that the remaining three reporting approaches classified as partially integrating CE, *EMAS, BSI* and *UL,* were further classified with *Supplementary Material*, having developed supplementary material promoting the inclusion of CE within organisations, as well as within reporting. The *EMAS* published a document titled "Moving towards a circular economy with EMAS: Best practices to implement circular economy strategies" (EC, 2017). All three are examples of reporting approaches considering CE as an important issue with respect to sustainability strategy development, however, companies themselves must voluntarily find and gain access to the additional CE-specific advice. In the case of *BSI*, the 'BSI 8001:2017' is different to other

standards from BSI, in the sense that it is merely a set of guidelines, void of any accreditation for its implementation.

When focussing on the five reporting approaches that contain any mention of CE (*EMAS, GRI, WEF, BSI, UL*) other findings within their content can be explored using each of the four categories earlier explained: *Definitions, Terminology*, *Assessment Approaches* and *Reporting Requirements* as seen in Table 2.5.

Table: 2.5: Analysis and classification of content for reporting approaches which mention CE according to the four categories defined in Table 2.3.

Reporting Approaches		Definition	Terminology	Assessment approaches	Reporting requirements
		Presence of a definition of CE (own definition or reference to other source)	**Indication of key terms, phrases and concepts on CE and related topics**	**CE-related indicators or other assessment approaches, including tailor made initiatives**	**CE is a voluntary or mandatory issue to be reported**
3	EMAS	Based on EMF definition – but does suggest companies adapt this to their own context	“circular economy”, “material circularity”, “circularity indicators”	EMF Circularity Indicators, LCA’s, MFA’s suggested	Voluntary
4	GRI	Undefined	“circularity measures”	Tailor made “circularity measures” indicator prescribed. Suggests companies qualitatively describe and report the circularity measures implemented or planned within the company	Mandatory
13	WEF	Based on EMF definition	“circular economy”, “resource circularity”, “circularity metrics”, “sustainability”	EMF Circularity Indicators, WBCSD Circularity Transition Indicators (CTI) or self-developed metrics for resource circularity	Voluntary
14	BSI	Based on EMF definition	“circular economy”, “sustainability”	For products: LCAs, MFAs and aggregation of several data sources (e.g. proportion of recycled content, product recyclability) are suggested For companies: states there is no metric or method which should determine a level of circularity but as a starting point: EMF Circularity Indicators or circularity maturity model proposed within BSI	Voluntary
15	UL	Undefined	“circular economy aspects of products, sites and organizations”, CE aspects: “material flows and the impact of those flows”	Tailor made quantitative metrics developed by UL: “product circularity”, “site circularity”, “corporate circularity”	Voluntary

Through the use of the category *Definition*, none of the five reporting approaches listed in Table 2.5 propose their own original definition for CE. *EMAS, WEF* and *BSI* include definitions of CE based on the definition proposed by EMF (EMF, 2012). Only *EMAS* and *BSI* suggest organisations adapt this definition to their own context and then communicate this within their sustainability reports. *GRI* does not use the term CE or describe it as a societal concept, rather describing circularity as a method to prevent waste generation and waste's associated impacts (GRI, 2020).

Focusing on *Terminology,* no consistency in CE related terminology was found between *EMAS, GRI, WEF, BSI or UL*. The most commonly used terminology within each reporting approach is summarised in Table 2.5. Surprisingly, only two mention the word "sustainability" in relation to CE – *WEF* and *BSI*. Within *BSI*, sustainability is referred to as the goal of SD, which is defined based on the Brundtland definition (WCED, 1987). The connection between CE and sustainability remains implicit, however, the benefits of CE implementation on all three dimensions of sustainability are discussed. Acknowledging structural differences of the reporting approaches, *GRI* clearly describes at the beginning of the 'GRI 306: Waste 2020' how this document is one part of the broader environmental series of standards which are accompanied by economic and social standards, completing the sustainability standards from the Global Reporting Initiative (GRI, 2020). From the perspective of a company adhering to the GRI framework, CE should only be mentioned within a sustainability report in relation to the environmental dimension of sustainability and more specifically, only through the perspective of waste. This is also the case within *EMAS* where the entire reporting approach relates solely to environmental management systems within organisations. Within *UL*, the terminology used infers CE aspects specifically relate to measurable material flows and the impacts of those flows which should be communicated in a 'Circularity Facts Report' (UL LLC, 2018).

Analysis of *Assessment Approaches* reveals that across the five reporting approaches reviewed, five different CE related assessment approaches are presented. The majority of reporting approaches make suggestions for assessment approaches which may be implemented by companies to evaluate their CE practices and subsequently include the results within their sustainability report. In these instances, the choice of which assessment approach and how many is entirely up to the company. According to *BSI*, "*the British standard is not prescriptive"* (p. 64, BSI, 2017) and advises organisations to be flexible in

their interpretation of the guidance provided. *GRI* and *UL* have developed CE-specific indicators, of a qualitative and quantitative nature respectively. *GRI* advises companies to qualitatively describe the circularity measures being implemented within the organisation under four categories: *"Input material choices and product design, collaboration in the value chain and business model innovation, end-of-life interventions*" (p. 8, GRI, 2020). The most frequently suggested assessment approaches within reporting approaches are "EMF Circularity Indicators" from the EMF (EMF, 2015a). Additional advice is provided within *EMAS* as companies are encouraged to develop a narrative for its CE strategy as well as identifying national or international CE objectives which they can reference within their report.

Finally, reviewing the *Reporting Requirements* category shows that only *GRI* includes CE as an essential reporting requirement, all other reporting approaches position CE as an optional issue which the organisation may choose to include in their report.

2.6 Discussion

This article investigated how companies are being advised to disclose CE within their sustainability reports, in accordance with literature. Figure 2.2 summaries the main findings of the article and contributes a guiding question for further research. The low number of academic articles found within the systematic literature review has shown a clear absence of CE related discussion within the literature. In addition, across the few reporting approaches which do mention CE, the guidance for companies is vague, inconsistent and places the responsibility for the selection of CE-specific assessment approaches on the companies. Nevertheless, several challenges influencing CE within corporate sustainability reporting approaches have been identified and will be critically discussed in this section.

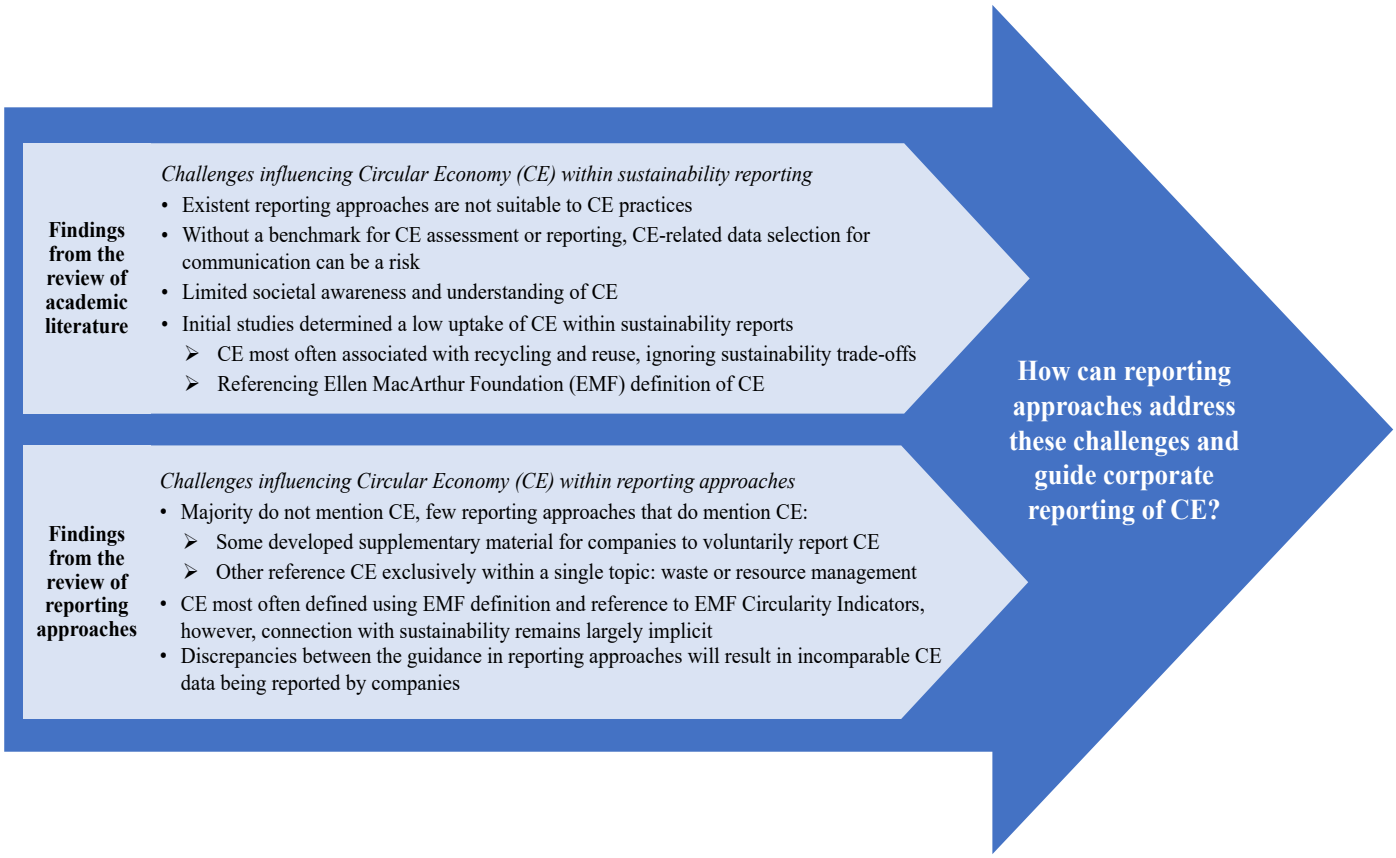

Figure: 2.2: Summary of the research findings from the review of academic literature, review of reporting approaches and a guiding question for further research.

As noted in previous research and seen in Figure 2.2, CE is most commonly presented in sustainability reports: 1) using the definition from EMF; 2) highlighting the connection with only the environmental dimension of sustainability; and 3) generally, without using consistent data selection or narratives (Stewart & Niero, 2018; Dagiliene *et al.,* 2020). These three CE reporting trends were also identified in the findings from the review of reporting approaches, as seen in Table 2.5, which encompasses the most common advice provided within reporting approaches for how companies should report CE. Although the study from Stewart & Niero (2018) focuses on one sector, it is an example of the level of influence reporting approaches can have on the perceptions of CE embraced by companies. As mentioned earlier, CE is frequently being explored and promoted as a way to bring planetary boundary thinking (Steffen *et al.,* 2015) or as a tool to achieve the SDGs (Schroeder *et al.,* 2018), which is a framework consisting of not only environmental, but social and economic societal goals. Particularly, more recent research is investigating the relevance of the social dimension of sustainability to CE practices (Kühnen & Hahn, 2017; Walker *et al.,* 2021). The

present study showed that the most frequent discourse adopted by the reviewed reporting approaches is that CE is only considered with the environmental dimension of CE, more specifically only with waste management operations or resource management at a practical level. This perception implies CE strategies will amount to *"incremental rather than radical transformations, a "weak" rather than a "strong" form of sustainability"* (Hobson & Lynch, 2016, p. 18). 'Hesitant company culture' has been identified as a pressing barrier for CE implementation, where CE-related discussions exist as a niche topic within the sustainability department and ignored in the more influential financial departments of companies (Kirchherr *et al.,* 2018). Results from this study suggest that reporting approaches in fact reinforce this barrier, with none of them being classified as *Fully integrated*. It is not likely that application of the reporting approaches reviewed in this study will facilitate CE-related conversations outside of a company's sustainability department nor for CE to be encompassed in all business functions, as suggested by authors such as Gusmerotti *et al.* (2019). Additionally, as determined, the contents of reporting frameworks can influence both the mindset of company leaders (Adams, 2017) as well as encourage long-term thinking (Vermeulen & Witjes, 2016). Therefore, the findings of the current research suggest that the lack of CE within the existent reporting approaches will not likely result in CE being further integrated in management level sustainability decisions, as Burritt and Schaltegger (2010) suggest sustainability reports can do.

Pauliuk (2018) criticised the "BSI 8001:2017" for being too vague and suggested that it's application will result in companies cherry-picking results, something attune to greenwashing practices. Results in this study highlighted that only one of the five reporting approaches that mention CE actually require companies to report on CE. The other four present CE as a voluntary material issue to report. This reflects the ongoing debate and uncertainty within literature about how best to define and measure the impact of CE strategies due to the absence of any benchmark or standard relating to CE implementation. Further to this, across the reviewed reporting approaches, different CE assessment approaches are suggested for companies to utilise and then include the results of this assessment within their sustainability report. This lack of consistency between reporting approaches with regards to the assessment of CE indicates that not only are there inconsistencies between the advice of different reporting approaches, but also within the approaches, as companies utilising the same reporting approach will apply different

assessment approaches and report different CE data. This implies that for the case of CE issues, the use of sustainability reporting approaches will not likely support consistent data selection, increase organisational transparency or produce comparable sustainability reports, as reporting approaches are intended to do (Lozano & Huisingh, 2011; Thomson, 2015). This challenge of inconsistent CE data collection may also inhibit increased supply chain collaborations, a characteristic imperative to the advancement of CE (Howard *et al.,* 2019).

Within both the *BSI* and *WEF* frameworks*,* it is acknowledged that there is currently no universally accepted or standardised approach to measuring organisational circularity (BSI, 2017; WEF, 2020). Results from this study show that the landscape of reporting approaches is also void of any universally accepted approach to disclosing CE issues (listed in Figure 2.2). Bouten *et al.* (2011) noted that without the requirement of uniform actions and performance indicators to report on, companies will report more on their aims and intentions rather than actual performance, as already stressed earlier. There has been a growing interest in developing new indicators, indices and company-level assessments for CE, as already highlighted by Saidani *et al.* (2018) and Roos Lindgreen *et al.* (2020). However, results from this review have shown that the majority of these indicators and other CE performance evaluation initiatives are not supported by reporting approaches, reducing the likelihood of them actually being implemented. Similarly, discussions on how best to define CE have been a major focus of CE literature (e.g. Ghisellini *et al.,* 2016; Geissdoerfer *et al.,* 2017b; Prieto-Sandoval, Jaca, & Ormazabal, 2018). Findings within this study suggest that despite this multitude of definitions, companies utilising reporting approaches will most likely be provided with the definition of EMF as their main reference, as efforts from EMF continues to drive the CE transition within the private sector. As stated earlier, the assessment and monitoring of strategies are an integral basis for the development of corporate communication strategies (Gamerschlag *et al.,* 2010), therefore, as cohesion within CE assessment approaches advances, it is likely that reporting approaches will be revised. In fact, the ISO have created a technical committee for CE, ISO/TC 323, which will work to standardise the implementation of CE, with the context of SD (ISO, 2018). However, until these standards are published, it seems the number of CE definitions and assessment approaches proposed within literature will continue to multiply and diverge, causing

acceptance of CE definitions and robust assessment approaches for varying contexts to be more difficult.

Reporting approaches are constantly competing for dominance as the authority for sustainability reporting (Siew, 2015). The development of uniform approaches to reporting of CE issues will assist in improving the legitimacy of CE and circular products much needed within society (Bovea *et al.,* 2018; Muranko *et al.,* 2019; Peschel & Aschemann-Witzel, 2020). This article determined that CE issues were primarily a voluntary issue to report, however, companies possessing an "inside-out" managerial perspective (Burritt & Schaltegger, 2010) or an 'ecologically-and eco-justice-informed approach' to reporting (Gray, 2006) can be more proactive and formulate a comprehensive strategy to reporting CE issues. If companies have an "outside-in" managerial approach and acknowledging that literature suggests the most commonly applied reporting instruments are *GRI* and the *IIRC*, then the results here show it is most likely companies engaged with CE will either: exclude any mention of CE within their report or they will qualitatively describe their circularity measures implemented with relation only to the environmental dimension of sustainability, more specifically regarding the prevention of waste generation.

So, as illustrated in Figure 2.2, how can reporting approaches guide corporate reporting of CE? Results from this study indicate that the application of reporting approaches is not likely to change the current state of CE reporting, where companies do not communicate much information about this topic (Stewart & Niero, 2018; Dagiliene *et al.,* 2020). Thus, what value CE reporting has for companies remains unclear. As previously mentioned, many initiatives and studies are now focussing on the integration of SDGs within sustainability reports (Izzo, Ciaburri, & Tiscini, 2020; Moldavska & Welo, 2019; Rosati & Faria, 2019; Tsalis, Malamateniou, Koulouriotis, & Nikolaou, 2020; Adams, Druckman, & Picot, 2020). These studies suggest that despite a high awareness of the SDG framework, there are still significant differences in the range of quantity and quality of data reported by companies for each SDG. As CE reporting moves forward on the agenda, lessons should be learnt from the progress of these aforementioned initiatives. Furthermore, research should progress the development or selection of sustainability evaluation tools incorporating CE which are both implementable by companies and desired by external stakeholders. This process should not only include the authors of reporting approaches and accounting firms but also sustainability practitioners and academics, among other relevant stakeholders. It

should be of particular interest for all stakeholders, as already mentioned, both sustainability reporting and CE centre around the idea of value creation: reporting is an output of the corporate value creation process (Adams, 2017) and CE is not only retaining value by shortening and closing resource loops, but also identify opportunities for new value creation, ultimately reframing how society values waste (EMF, 2017). With these developments', companies will be encouraged and supported to report on their CE performance, ultimately reducing claims of greenwashing. As Dagiliene *et al.* (2020) observed, the authors of reporting approaches may act as facilitators of translating CE strategies into companies' reports, however, results from this study suggest there is still a long way to go.

2.7 Conclusions

This article contributes an overview of the current status of CE disclosure within sustainability reporting approaches based on a literature review. As CE implementation increases in the private sector and the extent of its contribution to SD is debated, an increased scrutiny of CE data and communication will be observed. Companies utilising reporting approaches to facilitate the sustainability report writing process may embrace the definitions of CE, terminology and the CE assessment approaches promoted within their chosen reporting approaches. Therefore, the aims of this article were to investigate what reporting approaches are available for companies wanting to report on CE issues and based on their structure and content, observe how these documents are integrating CE issues. For this purpose, a systematic review of literature was conducted on academic literature and a coding framework was developed for the content analysis of reporting approaches.

Only few reporting approaches incorporate CE issues within their guidance. A list of fifteen reporting approaches relevant for companies engaged with CE has been compiled. Within those that do mention CE, companies are most commonly advised to define CE using the definition from EMF and consider CE practices with relation to only the environmental dimension of sustainability reports. Further to this, CE remains an optional issue to report with the only exception being the GRI framework which requires companies to report a qualitative indicator designed to describe circularity measures. In addition, "Circularity Indicators" proposed by the EMF are the most suggested CE assessment approach which companies may choose to include results of within their sustainability reports. The challenges for CE identified within this research highlight the vagueness and inconsistencies

between reporting approaches, likely resulting in companies either not reporting CE issues at all or only describing CE practices with relation to waste management. Furthermore, the literature review has pointed out challenges and opportunities for sustainability reporting to address challenges facing the advancement of CE including issues of legitimacy and transparency of with the sustainability impacts of CE practices, data selection for CE corporate communication and further integration of CE strategies within a company's strategic management processes. The current guidance provided from reporting approaches combined with the growing debates in academic literature on how best to define and assess CE, are not likely to improve the transparency or comparability of sustainability reports presenting CE data, as they were designed to.

The research methods chosen for this study have limitations which must be recognised. Firstly, as with any academic literature review the selection of databases, timeframe and keywords may have excluded relevant articles from being included for review. In particular with CE related literature, where a significant increase in the number of articles published in the last 5 years has resulted in a fast-changing landscape of CE research. In addition, only horizontal frameworks were included for review, meaning there may be some sector or product level reporting guidelines or indices available that advise on CE, however, this was not within the scope of this study. Furthermore, there are several factors which influence a company's decision to utilise particular reporting approaches (e.g., accessibility, data availability), but these factors were not covered within this research. The development of the content analysis coding framework was constructed and revised several times to reduce coder interpretation and subsequent bias in the results. However, it must be acknowledged as a limitation that some interpretation will remain. Additionally, the authors acknowledge that some reporting approaches are currently under consultation and review by their respective authors.

Further research is planned to work to bridge the gap between CE and sustainability reporting literature. Exploring the CE reporting practices of a wider variety of companies and identifying current CE reporting trends in light of the upcoming revisions to sustainability reporting regulations, will help support companies to the produce and communicate high quality CE data within their sustainability reports. A wide range of opportunities exist for research to develop corporate communication strategies which help legitimise the value of CE practices within society. Particularly, research should explore the popularisation of other

external communication channels (such as social media), as they continue to grow in importance and accessibility, especially for those companies where a corporate sustainability report is not mandatory to be produced. It is hoped that the challenges for corporate sustainability reporting approaches identified within this research can inform future revisions as well as the development of new CE-related assessment and communication strategies.

3 Circular economy disclosure in corporate sustainability reports: The case of European companies in sustainability rankings[7]

3.1 Abstract

Circular economy (CE) continues to become an increasingly important topic within disclosure frameworks and taxonomies for sustainable finance, however, early evidence points to CE not readily being included within corporate sustainability reports. Therefore, this research aims to explore how CE is emerging within the sustainability reports of companies listed in sustainability rankings. More specifically, the presence of CE within five corporate sustainability reporting elements has been investigated (when applicable): (i) the Chief Executive Officer's message, (ii) non-financial materiality assessments, (iii) references to the Sustainable Development Goal framework, (iv) targets, and (v) indicators. Qualitative and quantitative content analysis techniques were utilised to review 138 reports published in 2020 from 94 European companies, not restricted by sector. Results showed that nearly all companies are explicitly referencing CE, however, only 7% of them integrate CE within all five sustainability reporting elements. Less than one third of companies were found to include both targets and indicators for CE suggesting that overall, CE content within sustainability reports is largely superficial and inconsistent. This investigation contributes a descriptive overview of current CE reporting trends and shortcomings, as well as detailing implications relevant for academia and practitioners developing sustainability reports and/or CE assessments. The transition towards a CE requires transparency, therefore, further

[7] Opferkuch, K., Caeiro, S., Salomone, R., & Ramos, T.B. (2022). Circular economy disclosure in corporate sustainability reports: The case of European companies in sustainability rankings. *Sustainable Production and Consumption*, *32*, 436–456. https://doi.org/10.1016/j.spc.2022.05.003

research and engagement is needed to better define the value of CE within external corporate communication.

Keywords: sustainability reporting, corporate social responsibility, circular economy strategies, greenwashing, circularity Indicator, sustainable finance

3.2 Introduction

In light of evolving global environmental health crises, there are concerns that the private sector may abandon or deprioritise commitments towards sustainable development (Amankwah-Amoah, 2020). Companies who are recognised as sustainability leaders have increased stakeholder pressure and public attention to respond to these concerns, often through the disclosure of sustainability information (Abeydeera *et al.,* 2016; Lozano *et al.,* 2016). To make sense of this information for investors, agencies who provide sustainability ratings and rankings comprise a growing industry (Abhayawansa & Tyagi, 2021; Adams & Abhayawansa, 2022). Indeed, companies who rank highly on these ratings seem less exposed to systematic risks, therefore attracting more investments and higher stock returns (Broadstock *et al.,* 2021; Ferriani & Natoli, 2021). For this reason, authors such as Pástor & Vorsatz (2020), argue that for investors, sustainability is now seen as a necessity, rather than a luxury good.

To support companies preparing sustainability disclosures, a variety of reporting frameworks, models, guidelines and other related initiatives (henceforth referred to as disclosure frameworks) have emerged (European Financial Reporting Advisory Group (EFRAG), 2021). Disclosure frameworks provide a format for organisations to report evaluated, comparable and reliable non-financial information required by national and/or international guidelines (European Commission (EC), 2017). Corporate sustainability reports are merely an output of sustainability accounting and strategic management processes (Lozano & Huisingh, 2011) and the guidance provided within disclosure frameworks can influence the development and management of a company's sustainability objectives and strategy (Baumgartner & Rauter, 2017). Therefore, it is imperative to better understand the influence of voluntary disclosure frameworks on companies' sustainability strategies, as these frameworks continue to compete for dominance in the fast-changing reporting landscape (Siew, 2015).

To progress this landscape and prioritise funding for sustainability oriented companies, several governments are publishing and revising regulations to outline sustainable finance. First, taxonomies are being developed, which are classification systems that assist investors to understand whether an economic activity is environmentally sustainable (EC, 2020). Examples include the 'Green Bond Endorsed Project Catalogue' in

China (People's Bank of China *et al.,* 2021), the 'National Green Finance Taxonomy' in South Africa (National Treasury of the Republic of South Africa, 2021), and the 'Taxonomy Regulation' in Europe (European Parliament, 2020), which is said to become the global standard (SustainAlytics, 2021). Second, several regulations concerning sustainability reporting are currently being revised, including the recent European adoption of the Corporate Sustainability Reporting Directive (CSRD) (EC, 2021), which is an update of the previous Non-Financial Reporting Directive first published in 2014 (EC, 2014). These revisions aim to prevent and reduce rising instances of 'green washing': the corporate practice of claiming or exaggerating sustainability with the purpose of hiding a questionable environmental or socio-economic performance (Braga Junior *et al.,* 2019; Uyar *et al.,* 2020). With more ambitious and detailed sustainability reporting requirements, companies will need to evolve and adapt their sustainability reporting practices, ensuring that they respond to emerging sustainability topics with a transparent approach (EC, 2021).

One such emerging sustainability topic, the transition to a circular economy (CE), has been explicitly included for the first time as one of six key environmental objectives for sustainable finance, appearing in both the European Taxonomy Regulation and the CSRD (EC, 2020; 2021). CE aims to redesign waste and resource management processes and can be defined as where *"the value of products, materials and resources is maintained in the economy for as long as possible, and the generation of waste is minimised"* (EC, 2015, pp. 2). This novel inclusion of CE perpetuates the mainstreaming of CE practices and terminology, indicating that investors will be encouraged to identify and support companies adopting CE objectives. Despite these developments, in the last five years there has been a growing number of academic articles discussing the contested nature of CE (Korhonen *et al.,* 2018a) and its growing role within society, more specifically: i) the various definitions of CE (e.g., Kirchherr *et al.,* 2017; Prieto-Sandoval *et al.,* 2018), ii) it's relation with sustainable development (e.g., Sauvé *et al.,* 2016; Walker *et al.,* 2021) and iii) the proposal of indicators, tools and other approaches for the assessment of CE activities (e.g., Kravchenko *et al.,* 2019; Lindgreen *et al.,* 2020; Saidani *et al.,* 2018).

What largely remains absent from these discussions on CE is the role of- and potential for- sustainability reporting to address certain issues, as previous research efforts have established (Opferkuch *et al.*, 2021a). Whilst a few studies have explored the presence of CE within sustainability reports, they primarily focus on the sustainability reports of companies from a single country, operating within a single sector and/or utilising data from

2018 or earlier (e.g., Stewart & Niero, 2018; Dagiliene *et al.,* 2020). Early evidence from these studies points to a limited, inconsistent and mostly unquantified inclusion of CE within corporate sustainability reports. In light of upcoming international regulatory and policy updates within sustainable finance, an updated investigation is needed to determine whether companies are already voluntarily reporting CE and if so, what this reporting looks like.

Therefore, to address these research gaps, this article aims to explore CE-related content in the sustainability reports of European companies who are recognised for their sustainability performance and reporting practices. This will be achieved by targeting companies who are i) listed on international sustainability rankings and ii) located in Europe, a region on the front line of evolving CE and sustainable finance regulations (EC, 2020; 2021). By analysing specific elements of sustainability reports, insights will indicate if companies already consider CE a main environmental objective: one which is driven by commitments from senior management, is clearly framed with sustainability and is consistently measured and reported with the use of relevant targets and indicators for CE. Ultimately, research findings can offer practical suggestions to inform future sustainability reporting guidelines, in order to support companies, across sectors and countries, who will be required to report progress on their CE objectives in the coming years. Furthermore, the results will shed light on how companies are currently interpreting and operationalising CE, ultimately contributing empirical evidence to the aforementioned ongoing theoretical discussions surrounding the contested nature of CE and its implementation.

This article is structured as follows. After the introduction, where the background and research aim are presented, Section 3.3 offers a literature review of previous relevant studies and concepts that are critical for this research. Section 3.4 describes the overall methodological approach, including the sampling strategy and content analysis framework. Section 3.5 presents the description of the sample of companies and the results of the content analysis, structured according to five elements of sustainability reports. Section 3.6 discusses main findings in the context of previous research as well as the implications of this study for theory and practice. Finally, Section 3.7 summarises the article with some concluding observations, presents some limitations of the study and proposes ideas for future work.

3.3 Theoretical overview

This section first provides a brief introduction to CE literature. Secondly, a review of previous academic studies which have explored evidence of CE within sustainability reports is presented. Then, a description of the five elements of sustainability reports chosen as the focus of this research is provided.

3.3.1 Introduction to circular economy literature

CE offers a restorative, regenerative and practical alternative to the current linear "take, make and dispose" production and consumption model (The Ellen MacArthur Foundation (EMF), 2012). As already mentioned, there has been a significant increase in academic articles discussing CE in recent years (Schöggl *et al.,* 2020). Private sector initiatives and corporate networks e.g., Ellen MacArthur Foundation (EMF, 2013) have equally played an active role within the promotion of CE throughout society. Despite CE gaining more prominence, several drawbacks of CE implementation are continuously being discussed within academic literature.

Numerous academics question the boundaries between the concepts of CE and sustainability, debating if and how CE activities positively contribute to broader societal sustainability objectives (Geissdoerfer *et al.,* 2017a; Walker *et al.,* 2021). Primarily, CE is most often described as aiming to decouple economic development from finite resource consumption through transforming both production and consumption processes from linear to circular (Ghisellini *et al.,* 2016). To this end, CE is most closely related to- and promoted in line with- Sustainable Development Goal (SDG) 12: Responsible Consumption and Production (UNEP, 2021). However, Schroeder *et al.* (2018) determined that CE activities are relevant to progressing society towards a number of SDGs, including those that influence the social dimension of sustainability, which is often overlooked in the discussion of CE and sustainability (Murray *et al.,* 2015). Additionally, an increasingly popular direction of CE literature relates to the inclusion of human development within the CE, with the goal of ensuring a socially just CE transition (Moreau *et al.,* 2017; Schröder *et al.,* 2020). Though these discussions remain largely theoretical, recent efforts from Walker *et al.,* (2021) determined that companies engaged with CE do consider the social dimension relevant to implementing CE and conducting CE assessments, however, were not actually conducting any type of social sustainability assessment and thus not reporting any results. Regardless

of these contestations, CE has been positioned as a solution to several sustainability challenges and offers companies a model of sustainable growth and the opportunity to rethink how they create value (Lozano, 2020).

Despite the rapid acceleration of CE implementation, CE literature continues to contribute research that is generally: sector-specific (e.g., van Straten *et al.,* 2021), focus only on the internal assessment of CE activities (Parchomenko *et al.,* 2019; Vinante *et al.,* 2021) or work to identify drivers and barriers for CE implementation in both the private and public sectors (de Jesus & Mendonça, 2018; Klein *et al.,* 2020). Indeed, Kirchherr & van Santen's (2019) critique on the field of CE research suggested that (among other things): i) there is a lack of empirical evidence, ii) most articles focus on manufacturing industries, and iii) the articles lack practical advice for practitioners.

3.3.2 Circular economy within sustainability reports

A search for studies conducting content analyses to investigate the inclusion of CE within corporate sustainability reports produced a list of thirteen articles which have been reviewed in this article (summarised in Appendix IV). Most, have been published within the last few years, highlighting the increasing academic attention towards, and relevance of, CE within sustainability reporting literature. However, this review has revealed numerous limitations making it difficult to ascertain any trends or generalisations of global CE reporting practices, nonetheless, a summary of the main findings and shortcomings of the literature is described below.

Firstly, discrepancies were found across the reviewed articles concerning how CE has been defined by the authors of the content analyses. CE as a concept, the associated terminology and it's role within society, has been continuously evolving over the past decade (Korhonen *et al.,* 2018b; Reike *et al.,* 2018). Therefore, it is rational that researchers have created coding schemes utilising *implicit* CE-related terminology (e.g., "reuse") to extract and interpret relevant text from sustainability reports and then make assumptions on the company's CE implementation. However, these lists of CE-related terminology are more often a reflection of the authors conceptualisation of CE, as opposed to the company's. For example, Yang *et al.* (2019) analysed CSR reports from 293 Chinese manufacturing firms to explore the synergistic effects of CE on CSR performance. The authors identify CE within the reports as exclusively referring to two activities: 1) *"reverse activities"*, activities conducted after the sale of a product to recapture it's value (de Brito & Dekker, 2004) and

2) “*eco-design”*, the integration of environmental aspects at all stages of the product development process, balancing economic and environmental requirements (UNEP, 2001). But this rationale ignores the possibility of companies reporting other CE-related activities, such as the development of new circular business models (Santa-Maria *et al.,* 2021) or circular products (Diaz *et al.,* 2021). It also ignores the presence and impact of individual “reverse activities”, such as those outlined and ranked in order of priority in the commonly utilised ‘10R framework’ from Potting *et al.* (2017). And yet, the article from Yang *et al.,* (2019) presents the research findings as evidence of holistic CE reporting limited to China. A more recent example, comes from Gunarathne *et al.*'s (2021) review of corporate disclosures of Sri Lankan companies. The authors analysed the sustainability reports for the presence of CE-related keywords grouped in four categories: 1) direct keywords, such as “circular economy”; 2) explicit keywords, such as “industrial ecology”; 3) implicit keywords, such as “solar” and 4) other keywords, such as “electric vehicle”. Although the identification of these terms serves to inform valid discussions of the companies sustainability objectives, suggesting a company who mentions the terms “solar” or “electric vehicle” in their sustainability report is also intentionally reporting CE strategies could be a stretch. Indeed, this approach to content analysis may foster the narrative that CE is replacing sustainability (as discussed in D’Amato, 2021) as opposed to the dominant CE discourse held by many academics, companies and policy-makers that CE is a tool implemented to achieve sustainability (Calisto *et al.,* 2021; EC, 2015; Walker *et al.,* 2021). As CE-related terminology becomes more mainstreamed and incorporated into international policies, in the coming years it can be assumed that companies who are explicitly reporting the term “CE” are referring to the same concept, albeit applied in their own context.

Across the articles reviewed, authors selected and accessed different databases of sustainability reports, in order to compile the sample of sustainability reports to be used within their analysis. Primarily, reports within private national-level databases have been used by authors examining CE reporting practices at a national level (e.g., Gunarathne *et al.,* 2021; Scarpellini *et al.,* 2020). Alternatively, some authors accessed reports from the GRI’s sustainability report database (e.g., Dagiliene *et al.,* 2020; Sihvonen & Partanen, 2017). However, this choice restricts the sample to companies who prepare their reports in a similar format, e.g., according to one of the two most commonly used disclosure frameworks: the Global Reporting Initiative (GRI) guidelines (GRI, 2016) and increasingly, the International Integrated Reporting Framework (Hahn & Kühnen, 2013; Peršić *et al.,*

2017). Throughout the articles summarised here, the presence and influence of specific disclosure frameworks on CE reporting has been largely ignored. Dagiliene *et al.* (2020) determined that companies referencing at least one disclosure framework were more likely to report environmental information and key-performance indicators (KPIs) from a CE perspective. The authors then go on to suggest that the developers of disclosure frameworks may act as "*facilitators of translating circular business practice into companies' reports"* (p. 9, Dagiliene *et al.,* 2020). However, few details are given about which disclosure frameworks and to what extent they may influence the presence of CE within sustainability reports. The authors of the present article in a previous study determined, through a review of major disclosure frameworks that the presence of CE is mainly absent (Opferkuch *et al.*, 2021a). Companies engaged with CE and preparing their sustainability report in accordance with common disclosure frameworks (e.g., GRI), most likely exclude any explicit direct mention of CE or *"qualitatively describe their circularity measures implemented with relation only to the environmental dimensions of sustainability, more specifically regarding the prevention of waste generation"* (p. 14, Opferkuch *et al.,* 2021). For these reasons, the influence and relationship between the guidance from disclosure frameworks and the CE content currently being reported needs to be further explored.

To date, research exploring CE within sustainability reports has primarily been limited to the reports of manufacturing companies operating within the Industrials, Materials or Consumer Discretionary sectors (e.g., D'Amato *et al.,* 2019; Sihvonen & Partanen, 2017; Stewart & Niero, 2018). This seems logical, as CE as a concept has evolved from precursor ideas and business models based on technological innovations for waste, including industrial ecology and cleaner production (Calisto Friant *et al.,* 2020). However, several studies have shown that companies are engaging with CE across a number of sectors and service-oriented value propositions (Gusmerotti *et al.,* 2019; Pereira & Vence, 2021). Additionally, most of the reviewed studies focus on the sustainability reports of companies operating within a single country, most frequently China (e.g., Wang *et al.,* 2014; Yang *et al.,* 2019), making it only possible to gain insights on the reporting practices of companies within that country. Four of the reviewed studies chose not to limit the reports by geographical location, but in turn all focussed on companies operating within one manufacturing industry e.g., cosmetics in the consumer discretionary sector (Fortunati *et al.,* 2020). This highlights the challenges associated with making generalisations of sustainability reporting when numerous requirements and limitations exist according to

national regulations (e.g., the German CSR Directive Implementation Act (2020)) or sectoral specific standards (e.g., GRI 11: Oil and Gas Sector (2020)). Moreover, the majority of reviewed studies, although published recently, have analysed sustainability reports issued in or before 2016, when CE was still an emerging topic within society (Kirchherr *et al.,* 2017).

Overall, the studies reviewed determined a generally low uptake of CE within sustainability reports. However, all conclude that a more consistent approach to CE reporting is needed, one that is supported by quantified objectives and actions (e.g., Fortunati *et al.,* 2020; Pauliuk, 2018). In fact, the linkage between CE and sustainability has been mostly ignored, except for Stewart & Niero (2018) who found the relationship between the concepts presented within sustainability reports of companies within the Fast Moving Consumer Goods sector to be mostly unclear. The authors also found a limited connection between CE and sustainability assessment, with very few CE-related indicators observed (Stewart & Niero, 2018). Indicators can act as instruments which are vital to disputing potential claims of greenwashing and, when disclosed in combination with sustainability targets, may dispute claims of "selective disclosure" (de Freitas Netto *et al.,* 2020; Marquis *et al.,* 2016). Finally, amongst all of the reviewed articles little attention was paid to where (or what elements) of the sustainability report CE-related content has been integrated, making it difficult to obtain insights into the company's internal integration of CE within corporate sustainability processes. As Dagiliene *et al.* (2020) noted, previous studies have merely concluded that companies must disclose more CE-related information, but practical or methodological recommendations for CE disclosure are missing.

3.3.3 Circular economy within core elements of sustainability reports

Content analyses conducted within the sustainability reporting field often consider the location of the qualitative data within the report as well as its meaning. By isolating specific elements of the reports, additional findings can reflect how certain concepts are perceived and integrated within internal corporate sustainability reporting processes (Beske, Haustein & Iorson, 2020; Van der Lugt, van der Wijs, Petrovics, 2020). The following section presents the core elements of sustainability reports identified as most relevant to the aim of this research: (i) CEO's message; (ii) non-financial materiality assessments (otherwise materiality matrix or analysis; iii) references to the SDG framework; (iv) targets; and (v) indicators for CE.

The CEO's message is a foreword, opening letter or interview of a sustainability report which outlines the company's sustainability performance, goals and vision for the coming year(s) (Armenic & Craig, 2006). Although it may be seen as merely a ritual public relations exercise (Clatworthy & Jones, 2006), a CEO's letter reveals to shareholders, investors and the general public the CEO's intentions concerning the company's future strategic objectives. For this reason, the CEO's message has been the topic of numerous content analysis studies which investigate corporate culture and strategic drivers of companies (e.g., Macellari *et al.,* 2021; Na *et al.,* 2020). Several authors suggest that CEO and senior management engagement with CE is a major enabler for improved CE implementation and performance (Stumpf *et al.,* 2021; Ünal *et al.,* 2019), however, to date, no empirical evidence of the inclusion of CE within CEO's message's in sustainability reports exists.

A non-financial materiality assessment is said to be the most significant framework guiding the creation of sustainability strategies and reporting (Torelli *et al.,* 2020). It enables a company to identify, select and prioritise material issues (e.g., anti-corruption or GHG reduction) which could affect the company's reputation and ability to create value in the short, medium and long term. This process is carried out with the interests of external and internal stakeholders (Boesso & Kumar, 2009; Charl de Villiers & Van Staden, 2010). More recently, the EC proposed the concept of 'double-materiality' (EC, 2019), which encourages companies to judge materiality from two perspectives: value creation for the organisation and for society (Adams *et al.,* 2020), facilitating a shift from focussing on value in the monetary sense, to value within sustainable development. Usually, through the distribution of a survey, a large list of material issues are provided and then ranked by both internal and external stakeholders according to their perceived importance moving forward. Generally, issues deemed to be significant require the development of KPIs to demonstrate to stakeholders that positive progress is being made (GRI, 2016). The practice of materiality assessments is a requirement of various disclosure frameworks (specifically within 'GRI 101: Foundation' (2016) and as a guiding principle of the 'Integrated Reporting Framework' (2021)). Within academic research, large-scale analyses of materiality assessments in sustainability reports have provided insights into both inter- and cross-sectoral responses to critical sustainability challenges (e.g., Boesso & Kumar, 2009; Calabrese *et al.,* 2019). Recently, the Global e-Sustainability Initiative (GeSI, 2018) has included CE as one of the 55 material topics companies within the Information and Communications Technology (ICT)

sector may utilise to develop their own materiality assessments, however, whether CE is actually being reported as an important material issue by companies remains unclear.

Acceptance of the SDGs as a major global sustainability framework (Biermann *et al.,* 2017) has led to mounting attention on companies to demonstrate how their business activities and objectives contribute towards the goals (Rosati & Faria, 2019b). Analysing sustainability reports to determine a company's operationalisation of the SDGs is an increasingly popular area of research (e.g., Izzo *et al.,* 2020; Tsalis *et al.,* 2020). However, the term "SDG-washing" has also emerged, describing the superficial engagement of companies with the SDGs, where often, symbols of individual SDGs are merely being inserted with existing CSR practices (Heras-Saizarbitoria *et al.,* 2021; OECD & UNDP, 2020). As previously mentioned, with respect to CE and the SDGs, researchers have identified that CE can have positive contributions to numerous SDGs, not just SDG 12: Sustainable Consumption and Production, but SDGs beyond those linked with only the environmental dimension of sustainability (Schroeder *et al.,* 2018). Nonetheless, the SDG framework has become a guiding aspect of corporate sustainability, and to date, little evidence exists on how companies may be operationalising CE within corporate reporting of the SDG framework.

In order to prove a company's progress (or shortcomings) towards the objectives outlined by their corporate sustainability strategy, as well as the SDGs, companies must report: (i) targets – defined as "*meaningful reference values that express a desired operational policy outcome in a synthetic (often numerical) manner*" (p. 657, Morseletto *et al.,* 2017); and (ii) indicators – defined here as "*quantitative or qualitative factors or variables that provide a simple and reliable means to measure achievement, to reflect changes connected to an intervention, or to help assess the performance of a development actor"* (p. 13, OECD, 2014). These are especially important in the context of CE, given the contested and complex nature of the relation between CE and sustainability (Geissdoerfer *et al.,* 2017b; Korhonen *et al.,* 2018b). Numerous articles have proposed and reviewed indicators for CE (e.g., Kristensen & Mosgaard, 2020; Saidani *et al.,* 2018). However, recent evidence suggests that their actual application within the private sector is negligible (Stumpf *et al.,* 2019; Roos Lindgreen *et al.,* 2022). Furthermore, deciding what assessment approaches or indicators to report progress for CE objectives remains the responsibility of the company (Opferkuch *et al.*, 2021a), therefore, as Pauliuk, (2018) argued, could facilitate greenwashing practices as companies select which CE-related indicators best suits their

corporate narrative. Regarding targets for CE, most studies have focussed on promoting the use of targets for limited aspects of CE such as recycling and recovery (e.g., Bjørn *et al.,* 2017; Repo *et al.,* 2018). More recently, Morseletto, (2020), utilising the '10 R-strategy' framework from Potting *et al.,* (2017) proposed a new set of targets encompassing a more holistic view of the CE. What remains unclear is whether these targets and indicators for CE, discussed within academic and grey literature, are actually suitable for use in external corporate sustainability reporting.

As already established in previous research (Opferkuch *et al.,* 2021), very few studies have examined the intersection of sustainability reporting and CE. The CE-specific reporting requirements within the European CSRD should be a step in the right direction to harmonising ongoing semantic discussions on CE and sustainability, such as those in Blum *et al.* (2020) or Cecchin *et al.* (2021). Eventually, directing efforts towards supporting companies to assess and communicate the sustainability impacts of their CE practices, as has already been recommended by several authors (e.g., Kalmykova *et al.,* 2018a; Roos Lindgreen *et al.,* 2022; Schulte *et al.,* 2021). However, until these regulatory developments are implemented, a cross-sectoral overview is needed to explore how companies are currently reporting CE, highlighting best practices and revealing any shortcomings. Once this has been determined, recommendations can be made to address these drawbacks and ensure that companies reporting their CE activities will do so in a consistent, comparable and transparent format.

3.4 Methods

In this research, the content analysis method has been used. This approach is commonly described using the definition from Holsti (1969, p.14), "*any technique for making inferences objectively and systematically identifying specified characteristics of messages".* Both quantitative and qualitative approaches to content analysis were utilised in this research in order to: 1) quantify content within textual information to observe patterns and trends in systematic and replicable way; 2) understand and interpret the contextual use of this content, through repeated examination and comparison (Bryman, 2012). This flexible approach allows researchers to reduce large amounts of data and deduce meaning, causing it to be suitable for achieving the aims of this research. The overall methodological approach was developed based on the six components of content analysis: (i) sampling; (ii) unitising;

(iii) recording; (iv) reducing; (v) inferring; and (vi) narrating, as described by Krippendorff, (2004) (illustrated in Figure 3.1).

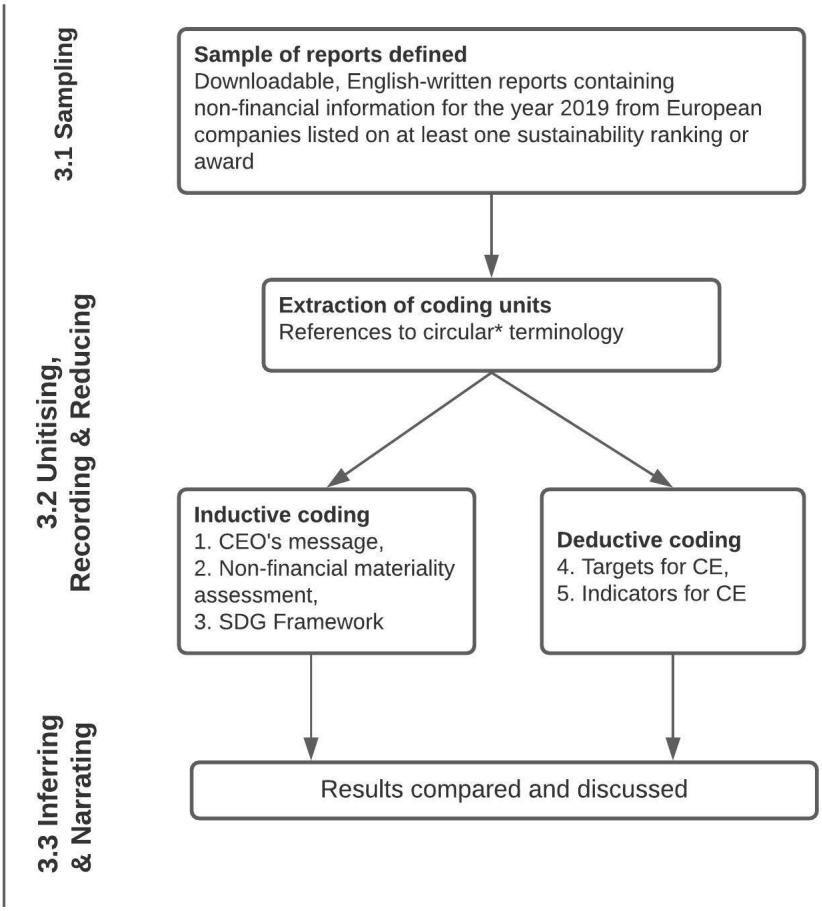

Figure: 3.1: Overview of research steps developed from content analysis framework from Krippendorff (2004).

3.4.1 Sampling

A purposive sampling strategy (Palinkas *et al.,* 2015) was used to produce a list of European reporting companies present on one or more global sustainability ranking lists published in 2020. As mentioned, Europe was selected as the geographical scope because of its advanced engagement with both CE and sustainability reporting. This is evident through the increasing number of policies, initiatives, and regulations for CE (e.g., the European Circular Economy Stakeholder Forum and the CE Action Plan, (EC, 2020), as well as for financial and non-financial reporting (e.g., the CSRD (EC, 2021), European Financial Reporting Advisory Group (EFRAG)). The year 2020 was chosen as these sustainability rankings are determined using the corporate non-financial performance data for the previous year 2019. Data was collected and analysed from February to July 2021, therefore, 2019 is the most

recent year of complete and publicly available corporate non-financial information. Furthermore, analysing sustainability reports which present a company's 2019 performance removes any potential influence of covid-19 pandemic related disruptions. If the company's reporting period follows the financial calendar, than reports from 2018-2019 were utilised. To select the companies, firstly, the Dow Jones Sustainability Index (DJSI) was consulted. The DJSI is a collection of indexes which track the stock performances of the world's most "socially responsible companies", in relation to their Environmental, Social and Governance (ESG) performance (Maas *et al.,* 2016). The decision to utilise this list ensures that companies are not limited by country, sector or disclosure framework implemented. The DJSI is frequently utilised in both academic and non-academic research to identify companies who are recognised as frontrunners for their sustainability performance (e.g., D'Amato *et al.,* 2019; Michelon *et al.,* 2015). Two separate lists from the DJSI were obtained (as seen in Table 3.1). Through an investigation of ESG ratings and rankings, Abhayawansa & Tyagi (2021) conclude that there can be significant divergences between rankings provided by different ESG rating agencies. Therefore, to increase the diversity of companies and remove ranking bias of individual rating agencies within the sample, an additional Google search, using the search string "list of sustainable companies 2020", was conducted to find other international lists of companies ranked by their sustainability performance for the year 2019. These lists must not have been restricted by location or sector and must be calculated using alternative assessment methodologies than the 'SAM Corporate Sustainability Assessment' (S&P Global, 2021), which compares companies across 61 industries via a questionnaire assessing cross-industry and industry specific questions. The result of this search added two sustainability ranking lists (#3 and #4 as seen in Table 3.1).

Table: 3.1: List of four global sustainability rankings based on non-financial performance of firms in 2019.

Ranking List (no.)	Name	Description	Companies included (no.)	Assessment methodology
#1	2019 DJSI Industry Leaders	*"Top performing company in each industry"*	61	SAM Corporate Sustainability Assessment (CSA)
#2	2019 DJSI ESG Score	*"Top 100 companies in terms of economic, environmental and social criteria with strong stock performance"*	100	SAM Corporate Sustainability Assessment (CSA)
#3	Corporate Knights Global 100 (2020)	*"World's 100 most sustainable corporations"*	100	Independent assessment – customised ESG KPIs
#4	SEAL Organisational Impact Awards (2020)	*"50 most sustainable companies globally"*	50	SAM Corporate Sustainability Assessment (CSA) and CDP Climate, Forest, Water scores

Combining the four global sustainability ranking lists and removing duplicates resulted in an initial sample of 98 European reporting companies. Additional selection criteria ensured that companies published at least one report including non-financial information (inclusive of all formats and titles) which was publicly available as a downloadable pdf and written in the English language. Application of these criteria resulted in four companies being removed (n=94).

Once the total sample was finalised, each company's website was visited and any reports containing non-financial information were downloaded and input into the MAXQDA software (MAXQDA, 2021). As this study was not limited to one report per company, the final sample constituted 138 reports from 94 companies. If companies produced a separate sustainability report – that is merely one section of their Annual Report – it was not added as an additional document. Additionally, for each report downloaded, relevant attributes

(e.g., company name, sector, country, report format) were specified. To distinguish sectors, the Global Industry Classification Standard (GICS) was utilised (MSCI, 2019).

3.4.2 Unitizing, recording and reducing

As a first step, the disclosure frameworks each sustainably ranked company is utilising was noted, to determine if there is any correlation between the type of materials and the extent of corporate CE reporting. To do this, a list of eighteen reference materials was compiled from three different sources: (i) international sustainability reporting frameworks: eleven reporting frameworks suggested for companies to use within the Guidelines on Non-Financial Reporting (methodology for reporting non-financial information) (2017/C 215/01) (EC, 2017); (ii) Sustainability rating agencies: three major sustainability rating agencies utilised in Europe, according to the results of report titled "Rate the Raters 2020: Investor Survey and Interview Results" (Sustainalytics, 2020); and (iii) CE-specific initiatives and material: the EMF and three specific guidelines established to assist companies evaluate and report CE strategies, as first compiled in Opferkuch *et al.,* 2021. The complete list and results can be seen in Appendix IV.

Following this, segments of text that are of interest to the research aims were defined. Through a unitizing process, 'coding units' were collected and can be defined as "*the constellation of sentences or paragraphs containing aspects related to each other, answering the question set out in the aim"* (Catanzaro, 1988; Bengtsson, 2016). A search query was developed consisting of the term: "circular*" to ensure all related terms e.g., "circularity" or "circular product" were identified. Each search result was reviewed to ensure its relevance to the research aim (and not, for example, extracting text which discusses a "business circular letter" – which is a format of business communication (Charles de Villiers & Maroun, 2017)). The authors acknowledge ongoing discussions on the precursors and other labels for CE activities (e.g., in Calisto-Friant *et al.,* 2020), however, the decision to use the term "circular economy" within this study follows the EC and the United Nations Environmental Programme (UNEP)'s explicit use of the term within multiple international environmental frameworks (e.g., in (EC, 2020; UNEP, 2017). This indicates that there is an international common understanding and acceptance of CE terminology and language to be used moving forward. All text segments containing the defined keywords were extracted and recorded as coding units. These coding units were then assigned to one of the five chosen elements of sustainability reporting based on which report section they occurred in. The specific coding protocol for each of the five elements are described and justified below:

1. *CEO's message:* To determine how (and if) CEO's or senior management are discussing CE issues, coding units found in the CEO's message of each sustainability report (if included) were analysed and inductively coded to identify common themes of how CE is presented;
2. *Non-financial materiality assessment:* To explore whether companies on sustainability rankings are rating CE as an important material issue, coding units found in the non-financial materiality assessments of sustainability reports were examined. First, the titles of the material issues were qualitatively analysed, and any similarities and trends were noted. When a company was found to be reporting CE as a material issue, observations were also made on where stakeholders had placed CE on the two dimensions (and axes) of the (double) materiality assessment, i) the significance of the company's ESG impacts on the material issue to society and ii) the relative significance of the material issue on the assessments and decisions of the company's stakeholders (GRI, 2016). Additionally, if the company classified material issues according to the three main dimensions of sustainability – environmental, social or economic –, it was noted how the CE-related material issue was classified;
3. *SDG framework:* All coding units (and the surrounding paragraphs) were analysed, and any direct references made to the SDG framework (be it to a single goal or the overall framework) were collected. The specific goals were noted as well as the total number of goals linked with CE-related content inside each report (e.g., a company stating their CE projects, collaborations and activities align with the goals of SDG 12);
4. *and 5. Targets and indicators for CE:* First, a list of targets and indicators containing circular* terminology were compiled from the extracted text. Then, the sustainability reports were individually reviewed to find any other targets or indicators which were being reported by the companies to demonstrate the performance of their CE objectives but were not using circular* terminology. For example, as part of the report section titled 'circular economy and waste management', Kesko (Consumer Staples sector) measure the number of eco take-back points intended for consumer recycling as a measure of progress towards their CE objectives. In this instance, the indicator 'number of eco take-back points' was deemed to be designed to measure progress towards their CE objectives in this company's context. Once the lists were

finalised, targets and indicators were deductively coded one-by-one using a thematic analysis coding framework seen in Table 3.2 created and employed for this study (Braun & Clarke, 2006).

Table: 3.2: Coding framework based on academic literature used to inductively code targets and indicators for CE extracted from sustainability reports (Based on the literature cited in the text: Potting *et al.,* 2017; Morseletto, 2020; Moraga *et al.,* 2019; WBCSD, 2018).

#	Category	CE strategy	Description
1	Smarter Product Use and Manufacture	Refuse	Make product redundant by abandoning its function or by offering the same function with a radically different product
		Rethink	Make product use more intensive through design
		Reduce	Increase efficiency in product use or manufacture by consuming fewer natural resources
2	Extend Lifespan of Products and its Parts	Reuse	Re-use by another consumer of discarded product which is still in good condition and fulfils its original function
		Repair	Repair and maintenance of defective product so it can be used with its original function
		Refurbish	Restore an old product and bring it up to date
		Remanufacture	Use parts of discarded product in a new product with the same function
		Repurpose	Use discarded products or its part in a new product with a different function
3	Useful Application of Materials	Recycle	Process materials to obtain the same (high grade) or lower (low grade) quality
		Recovery	Incineration of material with energy recovery
4	Reference to Linear Economy	Waste generation	Volume of waste generated as an indication of progress towards CE
		Waste to landfill	Volume of waste going to landfill as an indication of progress towards CE
5	Circular Value Creation	Develop new circular business models	Investments in or the quantity of new circular business models created by a company
		Revenue from circular	Revenue made from the sale of products or establishment of projects using CE strategies

		products/projects	
6	Other	Total circularity	Aiming for total circularity of products, the value chain or organisation, without detailing how this is achieved
	Other	Return of products	The volume of products returned to the company, without specifying end-of-life treatment
	Other	Internal CE strategy development (and employee training)	Number of employees that undertook training or education specifically for CE issues OR declaring objectives to improve organisational CE strategy

The coding framework presented in Table 3.2 builds on previous studies which have proposed CE strategies and then used them to categorise targets or indicators for CE; Categories 1 -3 proposed in Potting *et al.,* (2017) and Morseletto, (2020); Category 4 proposed in Moraga *et al.,* (2019) and Category 5 proposed in WBCSD, (2018). As the coding process developed, it became clear that for the context of sustainability reporting, companies were including targets and indicators for aspects of CE not captured within Categories 1-5. Therefore, through deductive coding, three more strategies for CE were added (seen in Table 3.2 as Category 6: *Other*). All targets and indicators for CE were coded individually and then critically analysed and discussed with three independent and experienced researchers working within the CE field in order to reduce both intra-coder variability and inter-coder variability (Bryman, 2012). In addition, during this process researchers noted any evidence of company's mentioning the use of either existing approaches (e.g., Life Cycle Assessment (LCA)) or tailormade tools for the assessment of their CE-related activities.

3.4.3 Inferring and narrating

The final stage of the content analysis was to convert the quantitative data and descriptive accounts of text to meaningful insights to answer the research aims. Due to the uneven distribution of 94 companies across 11 sectors and 14 countries, it was not possible to determine any significant correlation between the company's sector, country, number of reports published or materials referenced with the extent of CE reporting. However, descriptive statistics were determined using the IBM SPSS software (IBM, 2020). Finally, to

ensure the validity and reliability of results as much as possible, investigator and methods triangulation techniques were considered in the research design (Breitmayer *et al.,* 1993). With respect to performing the actual coding of sustainability reports, both software-assisted and manual coding was performed to ensure any errors were not overlooked. Additionally, critical cases were discussed amongst all authors to ensure consistency in interpretation of the data extracted. To further increase reliability, coding categories were grounded in academic literature (Kohlbacher, 2006), however, as with all content analyses, research findings should not considered to be accurately representative of a company's actual sustainability performance.

3.5 Results

This section first presents a descriptive overview of the sample of the 94 companies and their sustainability reports. This is then followed by the results of the content analysis, revealing evidence of CE within each of the elements of sustainability reports analysed within this study: CEO messages, materiality assessments, references to the SDG's framework, targets and indicators for CE.

3.5.1 Sample description

Almost all companies (n=85 or 90%) were found to include references to CE within at least one of their sustainability reports. Using the sampling method described in Section 3.4.1, the geographical and sectoral distribution of companies can be viewed below in Figure 3.2 and Table 3.3 respectively. The companies operate across fourteen European companies, most frequently from France or Spain. All eleven sectors of the GICS are present within the sample, however, the Real Estate and Energy sectors are underrepresented. Companies in the Financials sector were least likely to not have explicitly mentioned CE within any of their reports (25% of all companies in financial sector).

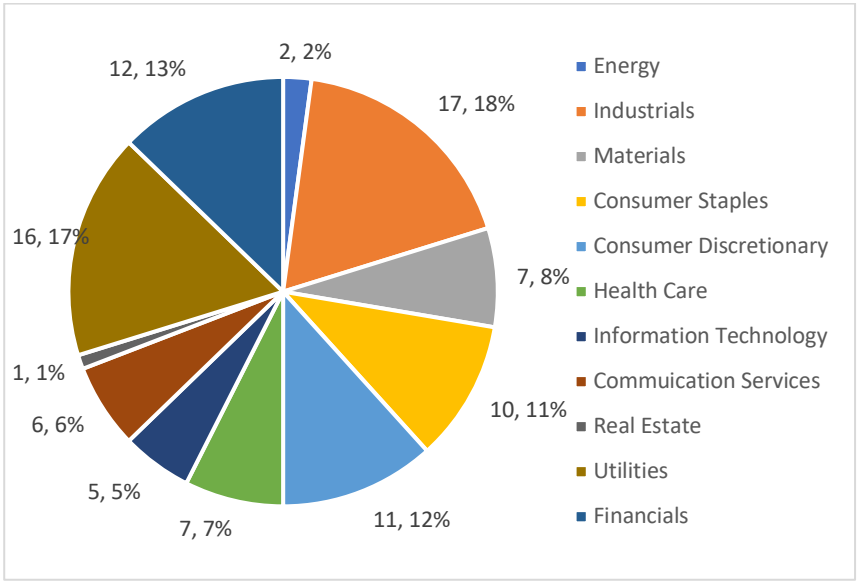

Figure: 3.2: Distribution of companies according to GICS sector classification (n=94).

Table: 3.3: Distribution of companies according to their country (n=94).

Country	Absolute Frequency (No.)
Austria	1
Denmark	5
Finland	6
France	14
Germany	10
Ireland	2
Italy	10
Norway	2
Portugal	2
Spain	11
Sweden	5
Switzerland	8
The Netherlands	8
United Kingdom	10
TOTAL	**94**

The majority of companies within the sample are present on only one of the global sustainability rankings, with the DJSI Top 100 and Corporate Knight Global 100 being the most common (for more details see Appendix IV). The most common report formats and their frequencies are presented in Table 3.4. More than half of the companies within the sample (N=52 or 55%) produced only one report containing non-financial information in 2020, whilst 40% (n=38) produced two and the remaining few companies (3% or n=3) produced three reports each. For companies only producing one report, the format is most likely to be an Annual Report (n=22 or 42% of companies producing one report) followed by an Integrated Report (n=12 or 9%). If producing two reports, companies are most likely to produce an Annual Report in combination with a Sustainability Report (n=29 companies or 31% of total sample) (for more information see Appendix IV).

Table: 3.4: Frequency of report formats as indicated by number of companies and individual reports.

Report format	Absolute Frequency (No.)	Relative Frequency (%)
Annual report	57	41.3
Sustainability report	35	25.4
Integrated report	18	13.0
[A] Other document	13	9.4
Integrated annual report	8	5.8
Non-financial statement	3	2.2
Corporate responsibility report	4	2.9
TOTAL	138	100[a]

Using the methods described in Section 3.4.2, reports were qualitatively analysed to identify references to common disclosure frameworks, ESG rating agencies and CE-specific materials (details shown in Appendix IV). All but one company make reference to the SDG's within their sustainability reports, reaffirming that it is indeed the most commonly utilised framework for operationalising sustainability. Overall, only 10 of the 18 reports labelled as Integrated Reports, explicitly make reference to the International Integrated Reporting Council's (IIRC) framework. A total of 30 reports reference both the GRI and IIRC, whilst 83% of reports labelled as Sustainability Reports (n=30) explicitly refer to the GRI Standards, reinforcing findings from previous studies that state GRI is the most commonly used disclosure framework, particularly within Europe (EFRAG, 2021; Hahn & Kühnen, 2013). It should also be noted that the vast majority of companies are a member of the UN Global Compact (85%) and the CDP (90%), strengthening the assumption that sustainably ranked companies are recognised for their commitment to advancing the international sustainability agenda. From a CE perspective, only 22% of companies have referenced material and/or are partners with the EMF.

[A] 'Other document' includes report formats present in the sample only once or twice, including 'ESG Report' or 'CSR Report'.

3.5.2 Circular economy within key elements of corporate sustainability reports

Contrasting previous research efforts, the results here showed that companies (operating within all sectors, not just manufacturing) consider CE a relevant topic for sustainability reporting. However, only seven companies (7%) were observed to have integrated CE within all five elements of sustainability reports (1-7 listed in Table 3.5), ultimately presenting CE as a key environmental objective for the company. Over 40% of the sustainably ranked companies do not include CE content within any of the five elements of sustainability reports analysed within this research. Results show that in general, companies based in the Netherlands were most likely to identify CE as a key objective, irrespective of their sector.

Table: 3.5: Companies found to have integrated CE within four or five elements of sustainability reports (columns), where X indicates that CE is present.

Company name	***Country***	***Sector***	***CEO's message***	***Materiality assessment***	***SDG Framework***	***Targets***	***Indicators***
KPN	The Netherlands	Communications	X	X	X	X	X
H&M	Sweden	Consumer Discretionary	X	X	X	X	X
Essity	Sweden	Consumer Staples	X	X	X	X	X
Philips	The Netherlands	Health Care	X	X	X	X	X
Signify	The Netherlands	Industrials	X	X	X	X	X
DSM	The Netherlands	Materials	X	X	X	X	X
Hera	Italy	Utilities	X	X	X	X	X
Naturgy Energy Group	Spain	Utilities	X		X	X	X
Acciona	Spain	Utilities	X	X		X	X
Akzo Nobel	The Netherlands	Materials		X	X	X	X
Schneider Electric	France	Industrials	X		X	X	X
CNH Industrial	United Kingdom	Industrials		X	X	X	X
Moncler	Italy	Consumer Discretionary	X	X	X	X	
Melia Hotels International	Spain	Consumer Discretionary		X	X	X	X
Inditex	Spain	Consumer Discretionary		X	X	X	X
Electrolux	Sweden	Consumer Discretionary	X	X		X	X

3.5.2.1 Circular economy within CEO messages

The majority of sustainability reports (91% of companies or n=86) did include a CEO's message, however, for companies producing more than one report, the text was not exactly

the same in each report. Therefore, 19 companies (20%) were observed to include circular* terminology within the CEO's message of 23 sustainability reports (17% of all reports). It should be acknowledged that 5 of these companies only mentioned CE within the CEO's message of their sustainability report, whereas in their Annual report CE content was excluded.

Table: 3.6: Six themes revealed through inductive coding of CEO's message, listed in order of frequency of the codes. Note that CEO messages could be coded more than once (n=23 reports from 19 companies).

	Description of CE-related theme	Frequency
1	CE is one major pillar of the company's overall strategy	12
2	Specific CE targets and/or commitments	12
3	CE related to collaborations and partnerships	9
4	CE is a dominant megatrend and presents opportunities for the company	7
5	Promotion of CE to society	5
6	Company aspires to become a global leader in CE development	3

Inductive coding of these 23 CEO's messages highlighted six common themes describing how senior leadership perceive and implement CE activities (as displayed in Table 3.6). Most often, the CEO's messages describe CE's importance to the company for internal reasons, either describing CE as one of the major pillars of the company's broader strategy or announcing targets and commitments for CE to be achieved the following year. Around one third of the CEO's messages discuss CE's importance for external reasons, describing collaborations and partnerships that the company has established to further the development of circular solutions, as well as identifying CE as a 'megatrend', presenting opportunities for the company moving forward. For example, *"We continue to advocate on (mal)nutrition, climate change and circularity and the role of business in society. These are issues that define our times and can be addressed by our competences"* (DSM, Materials sector). Finally, a small portion of CEO's messages described their company's role in promoting CE within society or their ambition to become a global leader in CE development. Despite almost all of the companies within the sample mentioning CE within their sustainability reports, the results show that there is an overall lack of engagement with CE from the CEO's of these companies, as only few have publicly identified CE as a key objective for the future.

3.5.2.2 Circular economy within non-financial materiality assessments

Most companies (85% or n=80) include a materiality assessment within at least one of their sustainability reports, however, less than one third (28% or n=23) reported a material issue with circular* terminology (listed in Table 3.7).

Table: 3.7: Material issues containing circular* terminology reported within materiality assessments and their frequencies (n=23).

Material issue title	**Absolute frequency of companies (no.)**
Circular economy	10
Circular economy and resources	3
Circular economy and products/business services/solutions	3
Transition to a circular economy	2
Circular economy and waste	2
Circular economy, resources and waste	2
Circular economy and consumption	1

Most often, companies frame CE as its own material issue (as can be seen in Table 3.7, in the first and fourth “Material issue title”). However, some companies merge the term “CE” with other terms associated with waste, resource- or product-related issues. To further explore whether companies perceive CE as its own issue or simply another name for waste and resource related issues, all other material issues reported within these 23 materiality assessments were collected and analysed (see Appendix IV). Eleven companies report other material issues which contain terminology related to waste and resource management (e.g., reporting ‘Transition to the circular economy’ as well as ‘Optimized water and waste management’ and ‘resource scarcity’ – *Suez group*, Utilities sector). Alternatively, the remaining twelve companies report only one material issue relevant to waste and resource use, with a title that includes the term CE as well as terms related to waste and resource use (e.g., ‘Waste and the Circular Economy’ – *Acciona*, Utilities sector). These two different approaches signal two pathways emerging for how company’s may be operationalising CE: (i) implementing CE as a major strategic issue of its own, separate to waste or resource

management; and (ii) CE is a part of (or replacement) of waste and resource related issues on an operational level. Two companies (*H&M*, Consumer Discretionary sector and *Signify,* Industrials sector) have in fact classified waste management as a subtopic under CE, symbolising the strategic importance of CE within their corporate strategies.

The majority of those companies (n=16 or 70%) that include a materiality assessment with CE-related topics categorise CE-related material issues as an environmental topic. A few companies classified CE under categories titled Innovation (n=2) and Products/Solutions (n=1), suggesting that for these companies CE is being implemented for reasons other than only environmental benefits. Following this, the materiality assessments were analysed to determine how the CE-related material issues are considered within double materiality, where stakeholders indicated a level of importance for value creation for: 1) the company (internal) or 2) for society (external) (Adams *et al.,* 2021; EFRAG, 2021). Figure 3.3 shows that CE is seen as an important issue by both internal and external stakeholders of the companies almost equally. This suggests that there are internal and external pressures to prioritise and promote CE implementation for these companies. The majority of companies reporting CE as a material issue were found to rate it as a priority issue for their company (that has been rated with either Critical or High priority within the company's materiality assessment) (Figure 3.4), demonstrating their likely future commitment towards CE integration. It should be noted that these results are only representative of the companies that have rated CE as a material issue which is ranked medium or higher. It is possible that other companies have determined CE to be an important material issue, however, have given it a low ranking and therefore, not required to include it within their sustainability report.

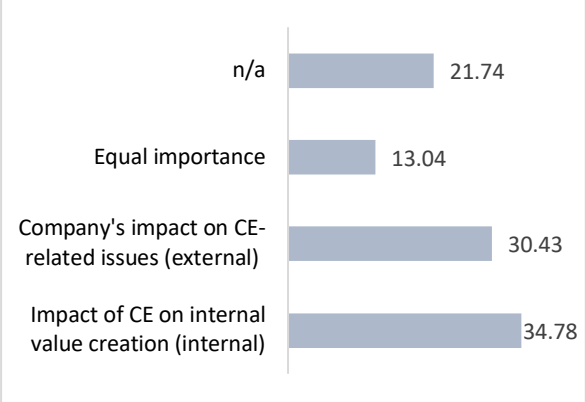

Figure: 3.3: Companies reporting CE as a material issue (%) and the level of priority attributed by stakeholders of the company, where Critical priority is the highest (n=23).

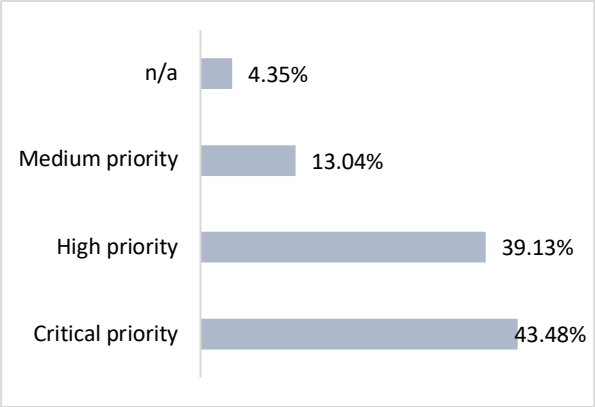

Figure: 3.4: Companies reporting CE as a material issue (%) and the level of importance indicated by stakeholders for internal and external value creation (n=23).
* N/a indicates that the company does not rate material issues in order of importance or level of priority.

It was also noted that around one quarter of companies (n=26 or 28% of companies) recognise CE as a topic presenting potential business risks and/or opportunities for the company in the coming years. Specifically, 18 companies (across all sectors) associated CE with potential regulatory risks, considering the implications of the introduction of the European Union's (EU) Green Deal (EC, 2020) and other upcoming regulations concerning packaging and waste management. Alternatively, 26 companies recognised CE as a business opportunity, specifically for the possibility to: enter new markets, reduce risks associated with price volatility of future materials and to develop new supply chain partnerships. These findings signal the inclusion of CE within strategic level discussions regarding compliance and long term value creation.

3.5.2.3 Integration of circular economy within the UN's SDG Framework

As mentioned in Section 3.5, almost all companies (n=93 or 99%) within the sample refer to the UN's SDG framework within at least one of their sustainability reports. Results of the content analysis showed that less than one third of companies (30% or n=28) directly link CE-content (using circular* terminology); such as objectives, targets, indicators, with references to the SDG framework.

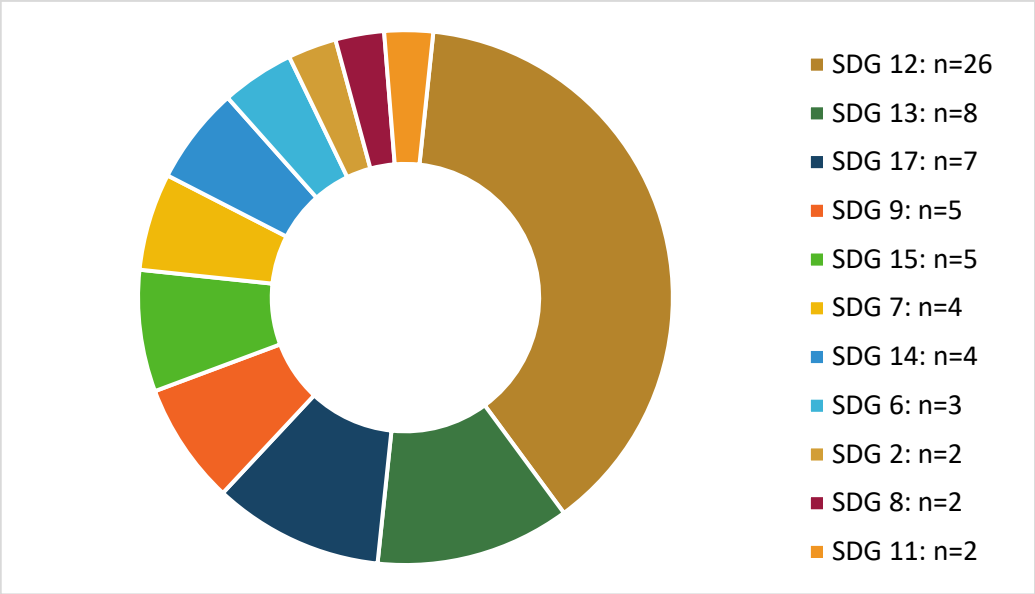

Figure: 3.5: Link between SDGs and CE (frequency of mentions of CE with each SDG within sustainability reports) (n= 28 companies).

Across these reports, CE was linked with eleven of the seventeen SDGs as displayed in Figure 3.5. Most often, CE was linked with SDG 12: Responsible Consumption and Production, followed by SDG 13: Climate Action and SDG 17: Partnership for the Goals. In fact, all but one of these companies explicitly linked CE with SDG 12, echoing the dominant discourse that CE is a progression from precursor topics such as cleaner production and industrial ecology (Calisto Friant *et al.,* 2020). Nearly half of the reports (43%) linking CE with the SDGs did so with only 1 SDG, however, few companies did explicitly connect CE-content with the objectives of as many as 8 or 9 SDGs. Concerning the format of the reports, only one company explicitly linked CE with the SDGs in every report they produced, the remaining companies only included this content within their separate sustainability report (or format other than Annual report).

3.5.2.4 Targets and indicators for circular economy

Less than one third of companies within the sample (29%) reported both targets and indicators that they attributed to measure progress towards their CE objectives. A total of 106 targets, reported by 39 companies (41%), and 96 indicators, reported by 36 companies (38%), were extracted from the sustainability reports and then deductively coded and classified against the coding framework presented in Section 3.2. The results of this analysis are presented below in Figure 3.6.

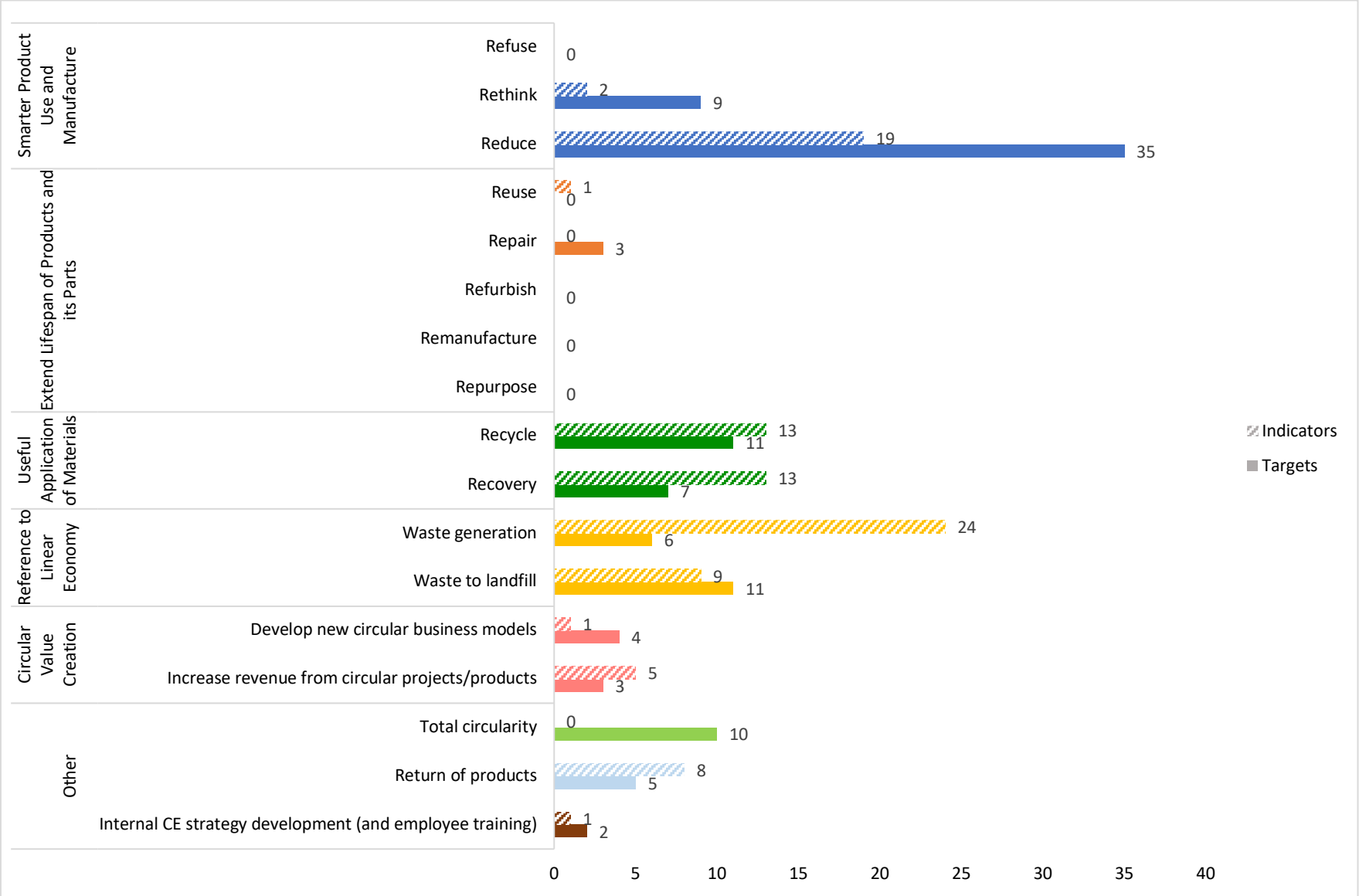

Figure: 3.6: Targets (n=106) and indicators (n=96) for CE extracted from the sustainability reports from sustainably ranked European companies.

From the analysis it is clear that companies are reporting targets for CE which involve higher-priority CE strategies (according to Potting *et al.,* 2017), as almost half of all targets (42%) were classified under Category 1: *Smarter Product Use and Manufacture*. Within this category, 35 targets relate to the CE strategy of 'Reduce'. Most often, the targets aim to eliminate and/or replace non-renewable resources within packaging e.g., '50% plastic packaging made from recycled or renewable materials' (*Orkla*, Consumer Staples sector). The remaining targets for 'Reduce' aim for either the elimination and replacement of non-renewable resources within the company's own products e.g., 'Replace virgin materials with recycled materials in our products' (*Electrolux*, Consumer Discretionary sector) or; the reduction of on-site plastic use e.g., 'Plastic-free catering at UK facilities' (*BT Group PLC*, Communication Services sector). Two thirds of the targets (67%) classified under 'Reduce' were from companies operating in either the Consumer Staples or Consumer Discretionary sectors, both involving the manufacture of goods. It was noted that under Category 6: *Other*, 8% of all targets describe achieving some form of 'Total Circularity', whether that be on a product, company or supply chain level. For example, 'close to 100% circular operations and services in 2025' (*KPN*, Communication Services sector) or 'close the loop on all large medical equipment by 2025' (*Philips*, Health Care sector). These targets were reported by six different companies, however, in all cases they were not accompanied by indicators that may demonstrate how and/or if the company is progressing towards this goal of total circularity.

In contrast, the indicators for CE which have been reported mainly concern lower-ranking CE strategies, with 34% of all indicators classified under Category 4: *Reference to the Linear Economy* and 27% under Category 3: *Useful Application of Materials*. Zooming in on the indicators within Category 4, they can be divided into two groups: 1) indicators that show the volume of waste being generated e.g., 'Total waste generated (t)', (*Melia*, Consumer Discretionary sector) and 2) indicators that demonstrate either the volume of waste going to landfill e.g., 'Volume of non-hazardous waste to landfill', (*Acciona*, Utilities sector) or measure progress on actions towards zero waste to landfill e.g., 'Number of sites labelled toward zero waste to landfill' (*Schneider Electric*, Industrials sector.) Often within the former group, these indicators are measured according to particular waste streams (e.g., hazardous and non-hazardous waste), in accordance with the requirements of the GRI Sustainability Standards (GRI, 2018). For the indicators classified under Category 3, similar

trends can be observed, with indicators either representing: 1) the volume of waste recycled e.g., '% Manufacturing waste recycled' (*Signify*, Industrial sector), or 2) the volume of waste incinerated with recovery of energy e.g., '% waste materials recovered', (*EDP*, Utilities sector).

Several observations can be made on the design of both targets and indicators for CE reported. Firstly, several targets and indicators combine multiple CE strategies, for example, '% of waste that is recycled, reused or recovered' (*Sanofi SA*, Health Care sector). By doing this it is not clear whether the company is giving preference to higher-ranked CE strategies, in this case 'Reuse'. Furthermore, comparing changes in these reported values over time will not accurately demonstrate whether the company has actually improved from a CE perspective nor will it indicate the potential sustainability impacts of each CE strategy (e.g., higher level of circularity should equal fewer natural resources being consumed (Potting *et al.,* 2017)). Similarly, several targets and indicators were observed to focus solely on the return of products or materials to the company, without specifying what end-of-life treatment would then be applied (shown in Category 6: *Return of Products*). For example, '100% of stores with containers to collect used garments in 2020' (*Inditex*, Consumer Discretionary sector) or 'Return of products' (*Philips*, Health Care sector). However, again, from a CE perspective is not clear from the design of these targets and indicators if the returned products and materials are then for example, remanufactured or sent to landfill, both being different end-of-life strategies with potentially significantly different sustainability impacts. Finally, very few of the analysed targets and indicators measured the CE strategy 'Refuse' or strategies classified under Category 2: *Expand Lifespan of Products and its Parts*.

Despite the uneven distribution of companies across the eleven sectors and fourteen countries, some trends in the reporting of targets and indicators for CE can be observed (as seen in Appendix IV). Companies from the Financials and Information Technology sectors were the least likely to report both targets and indicators for their CE objectives. Whilst 70% of all companies from the Materials and Consumer Staples sector reported targets for CE and 50% reported indicators for CE. Additionally, indicators for CE classified under Categories 3 and 4 were most likely reported from companies operating within resource-intensive sectors; specifically from the Industrials, Materials and Utilities sectors. Furthermore, companies from the Consumer Discretionary sector had the highest average

number of targets (3.89) and indicators (4) for CE included within their reports. From a geographical perspective, 75% of all companies from the Netherlands (n=6) reported both targets and indicators for CE whilst 75% of companies from Switzerland (n=6) reported neither targets or indicators for CE (as seen in Appendix IV).

During the analysis, it was observed that numerous companies (23) are designing sections of their sustainability reports which combine CE-content and terminology with climate change. For example, declaring an overall objective for the company to become "circular and climate neutral" (*Electrolux*, Consumer Discretionary sector) or using such terminology: transition to a "decarbonised circular economy" (*Naturgy Energy Group*, Utilities sector) and "circular and low-carbon economy" (*Neste*, Energy sector). These examples may reenforce the significance of climate change related issues for companies and particularly, the scrutiny they increasingly face regarding accounting for their carbon emissions (e.g., UN Climate Change Conference COP26). At the same time, this trend may further exacerbate the confusion surrounding: i) the conceptual and assessment boundaries which exist between sustainability themes (such as CE and climate change); ii) efforts made by the developers of disclosure frameworks to 'harmonise' the sustainability reporting language (Adams & Abhayawansa, 2021).

Another finding relates to the inclusion of CE-content across the different report formats. Through the content analysis, attention was also paid to which report format companies chose to include the CE-related targets and indicators (further details in Appendix IV). Of the companies reporting targets or indicators for CE and producing more than one sustainability report (n=16 and 15 respectively), most often they were only included within their sustainability reports, not included within the Annual report. Furthermore, few companies (n=5) were observed to include different CE-related indicators across each of the reports the company produces. Finally, only a few companies mentioned the use of either tailormade (n=4) or corporate assessment approaches (n=13) as part of the sustainability assessment of their CE strategies (listed in Table 3.8). Most often, companies connect Life Cycle Assessment (LCA) with the evaluation of CE activities (n=8).

Table: 3.8: Assessment approaches used for CE reported within sustainability reports.

	Tailormade approaches	Companies		Corporate approaches for CE assessment	Companies
1	Tailormade environmental management system	Inditex	**1**	Life Cycle Assessment (LCA)	Ericsson, H&M, Moncler, Siemens, BillerudKorsnas, Acciona, Enel, Terna Rete Elettrica Nazionale
2	Kering Materials Circularity Index	Kering	**2**	Carbon Footprint	Electrolux
3	CirculAbility Model	Enel	**3**	Sustainable Apparel Coalition's Material Sustainability Index	H&M
4	Global Circularity Indicator for goods and services *(in development)*	Suez	**4**	Material Circularity Indicator (EMF)	Siemens
			5	Circulytics (EMF) (pilot phase)	Hera
			6	Product and Environmental Footprint (PEF)	Terna Rete Elettrica Nazionale

3.6 Discussion

This study used the content analysis method to explore the integration of CE within the sustainability reports of 94 sustainably ranked European companies. The results are here discussed in line with six key topics: 1) CE and sustainability within corporate sustainability reports; 2) measuring and reporting progress towards CE objectives; 3) addressing CE claims of greenwashing; 4) the importance of CEO engagement with CE; 5) format of sustainability reports; and 6) the integration of sustainability reporting criteria within CE assessment approaches. Following this, the implications of the research findings for both theory and practice will be presented.

As mentioned earlier, the transition to a circular economy has been introduced as one of six key environmental objectives within EU-level policies, however, the boundaries separating it from the other environmental objectives (e.g., climate change adaptation) remain ambiguous. Within the context of sustainability reporting, companies are mostly reporting CE strategies having impacts on only the environmental dimension of sustainability. Schoggl *et al.* (2021) state that CE research from 2000 to 2019 has been dominated by waste management and recycling solutions, thus the influence of CE on other sustainability components, such as social impacts and consumption-based solutions remain unresolved. Results of this study showed that within materiality assessments, CE is sometimes being classified by companies as a material issue that is more than just waste management, whilst the other half considered it merely a replacement of waste and/or resource management issues. Furthermore, of those companies linking CE and the SDG framework, almost half only associated it with SDG 12, despite CE being known to have contributions on several more SDGs (Schroeder *et al.,* 2019). This is similar to findings from Stewart & Niero (2018) who reported an unclear linkage between CE and sustainability in their content analysis of corporate sustainability reports. Additionally, the results support the notion that the link between CE and the social dimension of sustainability is uncertain, as no companies explicitly linked their CE activities to progressing social-oriented SDGs, for example, SDG 3: Good Health and Well-being or SDG 10: Reduced Inequality. Nonetheless, despite some authors and companies stating that definitional nuances of CE are unimportant (Kirchherr & Van Santen, 2019; Walker *et al.,* 2021), the inconsistent reporting of CE strategies observed in this study show that there is an opportunity for future sustainability reporting guidelines to work to clarify the relation between CE and sustainability, by advising the implementation of CE strategies through a social-ecological systems thinking perspective (Berkes *et al.,* 1998; Webster, 2013; Ahlström *et al.,* 2020). Companies should avoid assessing and reporting corporate actions in isolation between: i) different systems e.g., the economic, natural and social; financial and non-financial reporting, or ii) on material issues within one system, e.g., CE strategies to prevent waste generation and energy use. By encouraging companies to acknowledge the existence of dynamic interactions within and across interconnected social and natural systems, they can realise their dependency on them for inputs as well as how their organisational actions can

impact these systems, through feedback loops (Whiteman *et al.,* 2013; Starik and Kanashiro, 2013).

With respect to measuring and reporting progress towards CE objectives, results here echo previous studies which observed minimal corporate adoption of corporate assessment approaches for CE (Stumpf *et al.,* 2021; Roos Lindgreen *et al.,* 2022). LCA studies are being increasingly recommended and used to evaluate the sustainability impacts of CE strategies (Birat, 2015; Niero & Rivera, 2018; Schulte *et al.,* 2021). However, this study found limited evidence of LCAs being mentioned within sustainability reports, let alone linked with the evaluation of CE strategies. This finding highlights the potential lack of suitability LCA results have within external communication, largely due to the results' complexity and use of multiple assumptions, as discussed in previous studies (Finnveden *et al.,* 2009; Roos Lindgreen *et al.,* 2021). Concerning the reporting of targets and indicators for CE, findings showed an imbalance between company's ambitions and what they are actually measuring and consequently reporting progress towards. Reike *et al.,* (2018) indicated that CE-related policies and measurements focus on capturing recycling rates, rather than higher-ranking CE strategies e.g., reuse rates. Building on this, through an analysis of EU-level CE policies, Calisto Friant *et al.* (2021) highlighted a dichotomy between 1) EU discourse (words), which portrays a holistic optimist understanding of CE and 2) EU policies (actions), which take a technocentric approach to CE, including targets and indicators focussing on resource efficiency. The impact of this dichotomy can be seen in the evidence of corporate sustainability reports, as companies are primarily reporting indicators for lower-ranking CE strategies (e.g., Recovery or Recycling) or even references to the linear economy (e.g., volume of waste to landfill). As mentioned, this research shows inconsistencies between targets and indicators according to the ranking of CE strategies, but the results also show inconsistencies between targets and indicators addressing the same CE strategy. For example, companies most often reported indicators for the CE strategy of 'Reduce', however, these indicators generally describe producer-oriented activities, e.g., dematerialisation, as opposed to any consumer-oriented 'Reduce' activities, where an overall decrease in consumption and use can be encouraged (Sihvonen & Ritola, 2015; Worrell & Reuter, 2014). It was also observed that companies are reporting targets and indicators aside from traditional resource-oriented CE indicators, measuring progress through business value creation e.g., 'revenue from circular projects (€)'. This shows that

companies are increasingly looking to communicate CE in a way investors will understand, adding to the discussion on which units should be used to calculate circularity and raising questions on the comparability of CE data disclosed within sustainability reports (Linder *et al.,* 2017; Saidani *et al.,* 2018).

It is suggested that in order to combat claims of greenwashing, and more recently "SDG washing", companies should develop appropriate targets and indicators to increase transparency of the company's actual sustainability impacts and intentions (de Freitas Netto *et al.,* 2020). The results of this study show that only a small group of companies who recognised CE as a significant material issue within materiality assessments are reporting both targets and indicators for CE, therefore, determining which and how many indicators for CE are sufficient to combat potential claims of "CE washing" remains unclear. It must be acknowledged that if this study was replicated using a sample of companies who are not recognised on sustainability rankings, it is likely that even less integration of CE within sustainability reporting would be observed. Therefore, as the reporting of CE activities becomes increasingly mandatory, it is expected companies will do so in a reactive manner or through an 'outside-in' managerial approach, which is driven by external communication requests from stakeholders. This, as Burritt & Schaltegger (2010) suggest, can lead corporate external communication to suffer from *"potential greenwashing or the suspicion of conspiracy to mislead"* (p.839, Burritt & Schaltegger, 2010). In an attempt to address this uncertainty, for the first time, 'circularity claims' has been included as a topic within the International Chamber of Commerce (ICC)'s Framework for Responsible Environmental Marketing Communications (ICC, 2021). Yet, the advice for companies is vague, merely suggesting that *"any claims of circularity should be based on appropriate assessment"* (p. 22, ICC, 2021). This once again leaves the responsibility of selecting indicators and assessment approaches for CE on the company, as is the case for most disclosure frameworks, as already determined in previous research (Pauliuk, 2018; Opferkuch *et al.,* 2021).

Companies found to have CE content within the CEO's letter were more likely to integrate CE within other sustainability reporting elements, outlining the significance of upper management commitment to embedding sustainability issues throughout organisations (Walls & Berrone, 2015).. Review of the materiality assessments showed that CE is considered significantly important from the perspective of both external and internal

stakeholders, symbolising the presence of internal (proactive) drivers for sustainability change as well as external (reactive) as stressed by Lozano (2013). Another internal driver for sustainability explored in literature is leadership (DeSimone & Popoff, 2000; Doppelt, 2003). For the integration of CE, previous studies found that 'Hesitant company culture' and 'No leadership commitment for CE assessment' to be two significant barriers for CE implementation in both private and public sector organisations (Droege *et al.,* 2020; Kirchherr *et al.,* 2018). This stresses the importance of CEO (and senior management) engagement with CE in order to advance the CE agenda within organisations and society.

This research also offers a reflection on the format and total number of reports being produced by companies each year. In many instances, companies were not reporting the same sustainability information across each of their reports. Often, targets and indicators for CE, as well as references to the SDG framework were either only partially included or completely excluded from the company's Annual report. Generally, the Annual report is designed to communicate the company's operations and performance of the preceding year to shareholders (R. Gray *et al.,* 2014). As sustainability data becomes increasingly important for all stakeholders and investors, it is imperative that they receive this data in order to make informed decisions which consider the company's impacts on all three dimensions of sustainability. Indeed, the EU has moved away from language such as 'non-financial' and 'financial' as it discourages integrated thinking on value creation (EU, 2021). In this study, six of the seven companies found to be extensively integrating CE produced only one report – an integrated report (or 'Integrated Annual Report'). In these instances, CE was not only perceived as an environmental objective, but as a key objective within the overall corporate strategy. Therefore, when compiling reports, companies must not only consider the quality of data being reported but also how (and what format) the data is being published (e.g., either as integrated reports or separated financial and sustainability reports) as this reflects the company's perception of sustainable value creation.

Recent studies within CE literature advocate for the assessment of CE strategies using a two-step process; first, mapping the organisations resource flows (e.g., through the application of MFA-based approaches). Then, establishing the related impacts in the three dimensions of sustainability by applying life-cycle impact assessment methods (Kalmykova *et al.,* 2018b; Roos Lindgreen *et al.,* 2022; Rufí-Salís *et al.,* 2021; Schulte *et al.,* 2021). However, what is not being considered within these discussions and recommendations is

the role of external corporate communication within the sustainability assessment process. Specifically, these studies do not demonstrate how companies can select relevant CE assessment results for use in external communication and then disclose them in the context of broader sustainability and corporate objectives. As other authors have stated, an abundance of assessment tools and indicators for CE already exists (De Pascale *et al.,* 2020; Kravchenko *et al.,* 2020), therefore, what is truly needed are frameworks to support the selection of CE indicators specifically for sustainability reporting. These frameworks should build on (and not replace) previous academic and industry efforts advancing the sustainability assessment of CE activities and ultimately, streamline this process with existing sustainability reporting processes. The often limited capabilities of companies for sustainability assessments and reporting should also be acknowledged (Khan, 2020), so as not to burden companies and potentially induce or amplify 'assessment fatigue' (Khalid *et al.,* 2020; Roos Lindgreen *et al.,* 2022). As Bae & Smardon (2011) suggested, the disclosure of indicators for sustainability can accelerate the integration of sustainable business practices within corporate strategic decision-making processes. Therefore, the integration of CE within corporate sustainability reports can be seen as a driver and tool for increasing the implementation rate of CE activities as well as embedding CE as a key objective within corporate strategies.

3.6.1 Implications for theory

This article contributes findings, from a sustainability reporting perspective, on the theoretical discussions on CE assessment as well as the relation between CE and sustainability. Firstly, the findings from this study demonstrate that despite a number of indicators for CE being proposed and revised in literature (e.g., Saidani *et al.,* 2018; Moraga *et al.,* 2019), their suitability for inclusion within corporate sustainability reports remains unclear for companies. Secondly, the results here show that the ambiguity between CE and sustainability found in academic literature is being reproduced within the contents of corporate sustainability reports. Therefore, as academic discussions continue to find a more harmonised approach to CE assessment and a holistic understanding of CE that is considerate of potential sustainability trade-offs (Millar *et al.,* 2019), researchers should continue to analyse the message of CE being presented by companies within their corporate sustainability reports. This will allow researchers to understand if companies are indeed

implementing, evaluating and communicating CE with an approach that is in line with current research trends.

Whilst previous studies most often focus on single sectors (e.g., manufacturing), the findings of this study show that CE content is emerging in the reports of companies active in a number of sectors, therefore requiring more cross-sectoral studies, as opposed to the ongoing trend in CE literature focusing on specific case studies (e.g., Pigosso & McAloone, 2021; van Straten *et al.,* 2021). Furthermore, as less one third of companies reported both targets and indicators for CE, it is clear that companies face difficulties in assessing and disclosing relevant CE data. To address this, findings from previous studies which aim to improve the communication of sustainability within corporate reports (e.g., Bovea *et al.,* 2021) should be utilised in order to reduce the complexity of communicating CE data. A number of opportunities exist for academia to direct efforts to support the capacity building of companies to meet the CE-specific reporting requirements set out by the CSRD in the future. Specifically, it is recommended that stakeholders involved with sustainable finance (e.g., financial institutions) and agencies developing sustainability rankings should be included within discussions on CE assessment. This will help to align academic research with efforts to develop CE-specific screening and eligibility criteria for financial incentives in line with the various national and international taxonomy regulations being developed (e.g., the EU Taxonomy (EC, 2021)).

3.6.2 Implications for practice

The findings of this research call for increased engagement with CE by senior management in order to influence corporate culture and reduce barriers to CE implementation. This engagement can be driven by internal and external stakeholders through the materiality assessment process, where CE is likely to become a critical material issue for companies to respond to moving forward. Furthermore, companies must go beyond simply connecting CE with the label of one or many SDGs. Managers can utilise sustainability reports as a communication tool and strategic driver describing the implementation of current and planned CE strategies whilst also using relevant targets and indicators for CE to measure progress, in line with the company's broader sustainability objectives. Additionally, managers should acknowledge the hierarchy of CE strategies (as illustrated by Potting *et al.,* 2017) and establish a roadmap that will allow their company to measure and report both

targets and indicators of increasing CE priority (when possible) in the future. This article has identified a lack of consistency concerning how CE is being evaluated and reported by companies across countries and sectors. It is recommended that existing CE assessment approaches incorporate criteria and/or steps to support the selection of results for corporate external communication. These findings can create a basis for the development of a framework to assist companies to uniformly report progress towards CE, one that is in line with the requirements of evolving international sustainable finance regulations as well as the current assessment and reporting capabilities of companies engaged with CE.

3.7 Conclusions

This article explored the presence of CE content in the corporate sustainability reports of European companies recognised for their sustainability performance and reporting practices. A set of 94 European companies were selected, not restricted by sector. A quantitative and qualitative content analysis approach was developed and employed to analyse the contents of these company's sustainability reports, integrated reports, annual reports and other relevant documents published for the year 2019. The results show that the majority of companies are aware of the CE concept and including explicit CE references within their sustainability reports. However, upon further analysis of this content, it became evident that less than one fifth of companies were going beyond merely mentioning CE, but also integrating the concept within key sustainability reporting elements. About 20% of CEO's messages made reference to CE, highlighting the opportunities CE provides for their company as well as declaring the importance of CE to the company's overall strategy, not only their sustainability strategy. CE is generally only associated with the environmental dimension of sustainability, although, in some instances CE was classified as an issue separate to waste and resource management issues within the reported materiality assessments. CE was most often linked with references to SDG 12:Sustainable Consumption and Production, although sometimes described to progress towards as many as seven or eight SDGs. If companies were reporting targets for CE, they most often addressed higher-ranking CE strategies, more specifically involving the reduction of virgin materials in packaging and products. Companies reporting indicators for CE were most likely measuring lower-ranking CE strategies, aiming to reduce the volume of waste generated and/or going to landfill. Given the current climate of increasing international attention on

sustainable finance and the inclusion of CE within associated regulations, the results contribute an overview of current CE reporting trends and shortcomings from European companies working across a variety of sectors.

As this research was carried out using manual and software-assisted content analysis techniques, certain decisions were made when designing the methodological approach to ensure meaningful insights could be obtained in a feasible and timely manner. This, however, resulted in some limitations which should be acknowledged before generalising the findings. The sample contained only large companies (≥ 500 employees) who have been recognised for their sustainability performance. Therefore, this study does not consider any potential insights from Small and Medium Enterprises (SME's) who are by law, not currently required to publish a sustainability report but may still communicate non-financial information using a different format. As 99% of all companies within the EU are in fact SME's (Eurostat, 2018), future research should consider exploring the capacities and needs of SME's with respect to external sustainability reporting and particularly, their critical role within promoting CE through engaging with local communities. Furthermore, this sample of companies demonstrate best practices of sustainability reporting, thus, it should be remembered that if this study was to have been repeated with companies not listed on sustainability rankings results would differ. Despite best efforts, the final spread of companies was not evenly distributed across sectors or countries. Therefore, the generalisations of findings with respect to sector and/or country could not often be made. Additionally, Europe was selected as the focus due to the context of the incoming CSRD, meaning insights from other regions where CE implementation may be advanced, particularly in China (as discussed in the literature review) were excluded.

Future studies should consider larger samples of companies evenly distributed across sectors in order to statistically account for sectoral differences. Additionally, the data analysed represents the perspectives/strategies of companies during the 2019-2020 period. Further sustainability reporting research could take a longitudinal approach, as has been suggested by other authors (Stewart & Niero, 2018), to identify changes to the CE reporting practices of companies after the CSRD takes effect, which could then be contrasted with results presented here. Moreover, evolving research on approaches for CE assessment must incorporate criteria and processes which make the results of such assessments applicable for external reporting and communication. It should also be repeated that the data

contained within sustainability reports is not always an accurate portrayal of a company's performance, therefore, the findings should only be linked to sustainability reporting practices and not the actual CE or sustainability performance of each company.

4 Towards a framework for corporate disclosure of circular economy: company perspectives and recommendations[8]

4.1 Abstract

Circular economy (CE) is becoming an increasingly mandatory material issue within corporate sustainability reporting, however, what remains unaddressed within literature are the perspectives and capacities of the companies which must soon adapt to meet the evolving reporting requirements. This research aims to capture insights from companies engaged with CE in order to develop recommendations that support the integration of CE within corporate sustainability reports. To do this, a series of semi-structured interviews and focus groups were conducted with companies operating in Italy or the Netherlands, not limited by sector. The results detail corporate perceptions on the feasibility and relevance of CE content within elements of sustainability reports. Additionally, a list of challenges experienced- and benefits gained- by companies whilst externally communicating CE is provided. Practical recommendations are offered for developing targets and indicators for CE as well as identifying and reporting CE-specific risks and opportunities.

Keywords: circular economy, corporate social responsibility, circularity indicator, EU taxonomy regulation, value creation, due diligence

[8] Opferkuch, K., Walker, A. M., Roos Lindgreen, E., Caeiro, S., Salomone, R., & Ramos, T. B. (*submitted*). Towards a framework for corporate disclosure of circular economy: company perspectives and recommendations. *Corporate Social Responsibility and Environmental Management.*

4.2 Introduction

Within recent years, academics and industry groups have criticised the practice and efficacy of corporate sustainability reports. This practice is intended to provide stakeholders with consistent and objective information so that they can evaluate the company's approach to value creation, including their non-financial ambitions and performance (R. Gray, 2006). Generally, companies follow the guidance provided within a growing number of disclosure frameworks, most commonly those from the Global Reporting Initiative (GRI) and the International Integrated Reporting Council (IIRC) (Peršić *et al.*, 2017). However, as observed by Boiral & Heras-Saizarbitoria (2019), despite various developments within the content and structure of such disclosure frameworks, there has not been a direct increase in the quality of sustainability reports being published. Furthermore, some authors argue that even the term 'sustainability reporting' is moving further away from the concept of sustainability proposed in the Brundtland definition (Hahn & Kühnen, 2013).

To address these issues, several stakeholders involved with the setting of sustainability reporting standards are now calling for the 'harmonisation' of disclosure frameworks e.g., World Economic Forum (2020) and the International Financial Reporting Standards Foundation (IFRS) Foundation (2021). These calls work to resolve the current lack of comparability of sustainability data and any confusion experienced by companies caused by the proliferation of disclosure frameworks and standards in recent years (Siew, 2015). However, some academics state that any attempts to 'harmonise' the guidelines of disclosure frameworks are actually advocating for changes which serve solely the interests of investors (Adams & Abhayawansa, 2022). These authors acknowledge that many companies are broadening their concept of value from being solely profit-related to now including value for the company and value for society. However, the constant changes to disclosure frameworks risk the discourse shifting yet again towards 'enterprise value creation', which focuses on the economic evaluation of the whole enterprise (as seen in Impact Management Project, 2020).

Because of those criticisms, new initiatives have emerged which seek to rethink how companies account and report their value creation and associated impacts. These initiatives, such as the value balancing alliance (VBA) (VBA, 2021) and impact-weighted accounts (Serafeim & Trinh, 2020), offer alternative pathways to integrating financial and non-financial value, through the measurement of- and responsibility for- impacts on the

environmental, social and economic dimensions. These approaches advocate for a more holistic, integrated and stakeholder-oriented approach to developing and communicating a company's value proposition (VBA, 2021), allowing companies to internally embed sustainability and, ultimately, become more resilient to evolving sustainability challenges.

One such approach to realising sustainable development, which encourages a rethinking of how value is perceived and created, is the circular economy (CE) model. Despite its many definitions (Cecchin *et al.*, 2021; Kirchherr *et al.*, 2017), CE expands waste and resource management processes and can be defined as a system where *"the value of products, materials and resources is maintained in the economy for as long as possible, and the generation of waste is minimised"* (European Commission (EC), 2015). CE has become a major centrepiece of broader sustainability policies and projects from international organisations, such as the United Nations Environmental Programme's (UNEP) Circularity Platform (UNEP, 2022) and the European Union's (EU) Green Deal (European Commission, 2019). To achieve the targets set out in these policies, CE has recently been prioritised as one of six key environmental objectives within European sustainable finance-related regulations. These include the EU Taxonomy Regulation (European Parliament and Council, 2020); which is a classification system designed to assist investors to determine whether an economic activity is environmentally sustainable, and the recently agreed upon proposal for the Corporate Sustainability Reporting Directive (CSRD); which includes revisions to increase the quantity and quality of sustainability data a company must disclose, in order to prevent instances of corporate greenwashing (European Commission, 2021; Uyar *et al.*, 2020). Sustainability reporting and investment professionals have evolved to embrace climate-related risks and are now moving towards defining and accepting CE-related risks concerning the use and availability of resources and materials (UNEP, 2020). The aforementioned regulatory developments will lead to an increase in the following aspects: 1) the number of companies required to disclose CE data within their corporate sustainability reports and 2) the amount of investments to companies engaging with- and reporting- CE data in the coming years.

To meet this increasing demand for CE data, several academic studies have started to develop assessment approaches for CE (e.g., Corona *et al.*, 2019; Sassanelli *et al.*, 2019). However, as determined by Stumpf *et al.* (2021), the actual implementation of these approaches within industry is trivial. Furthermore, the application of these CE assessment

approaches to select CE data for inclusion within external communication is also negligible (Opferkuch *et al.*, 2022). Recently, in the authors previous work, a review of disclosure frameworks suggested that guidance on how to disclose CE-related issues is mainly absent (Opferkuch et al., 2021b). Therefore, companies which are engaging with CE and preparing sustainability reports in line with the guidance of major disclosure frameworks most likely exclude CE or simply qualitatively describe the circularity measures they have in place, specifically related to waste management (Opferkuch et al., 2021b). Additionally, research exploring evidence of CE within corporate sustainability reports has suggested that the reporting of CE is most often inconsistent and largely unquantified (Stewart & Niero, 2018; Opferkuch *et al.*, 2022).

Despite these advancements in research on the intersection of CE and sustainability reporting, what remains unknown are the perspectives and experiences of companies which will need to adapt and implement processes in order to meet these evolving CE-reporting requirements. To address this gap, this research aims to capture insights from companies that have experience with integrating CE content within their sustainability reports in order to develop critical factors and recommendations for CE disclosure. Specifically, this research has three objectives: 1) to identify and highlight the current challenges companies face when externally communicating CE; 2) to determine what value disclosing CE activities has for companies; and 3) propose recommendations to improve the feasibility of companies moving towards the meaningful reporting of their CE activities. The findings of this research are relevant for companies of all sizes, across sectors and countries, wishing to produce either a voluntary or mandatory corporate sustainability report integrating CE aspects. The proposed recommendations can act as supporting material to assist companies develop a roadmap to progress their CE implementation. Furthermore, the findings presented in this article are beneficial for those involved with standard setting and development of disclosure frameworks, as it provides them with the specific reporting capabilities and expectations of companies engaging with CE.

The remainder of this article is structured as follows. First, a brief theoretical overview is presented, summarising what is known on the topics informing the research and highlighting the research gap (Section 4.3). Next, the qualitative methods employed (Section 4.4), and the results from interviews and focus groups with selected companies are provided (Sections 4.5.1 and 4.5.2). Then, practical recommendations are presented to support

companies preparing CE content within their corporate sustainability reports (Sections 4.5.3). Finally, the article makes critical reflections on the results of the study (Section 4.5.4) and closes with some concluding remarks, limitations and suggestions for future research (Section 4.6).

4.3 Theoretical overview

As mentioned previously, the implementation of CE strategies encourages companies to rethink how they perceive, create and measure value. This in turn, requires companies engaged with CE to re-evaluate how they communicate and report these changes to their value creation story. This section therefore presents a brief introduction to CE and value creation (Section 4.3.1), an exploration of CE's emergence within corporate sustainability reporting (Section 4.3.2) and sustainable finance (Section 4.3.3). This section concludes with a culminating statement that highlights the research gap motivating this research.

4.3.1 Defining value in a circular economy

CE is commonly described as re-designing the traditional 'take-make-dispose' linear pattern of production and consumption (Geng & Doberstein, 2008). A common classification of strategies to operationalise the CE concept are the value retention strategies or '10R framework' (Potting *et al.*, 2017; Reike *et al.*, 2018). This framework consists of 10 value retention strategies of decreasing priority in terms of circularity, from R0 (refuse) to R9 (recovery). The potential benefits of implementing CE activities are well documented - as pointed put by the Ellen MacArthur Foundation (EMF, 2015). However, an increasing number of studies highlight the ambiguity of the relationship between CE and sustainability (Schroeder *et al.*, 2018; Walker, Opferkuch, Roos Lindgreen, Raggi, *et al.*, 2021). For example, CE is primarily an environmental-economic model that rarely considered the implications of CE activities on the social dimension of sustainability (e.g., inequality or health and wellbeing) (Murray *et al.*, 2017; Walker, Opferkuch, Roos Lindgreen, Simboli, *et al.*, 2021). This ambiguity between CE and sustainability is exacerbated by the identification of sustainability trade-offs and rebound effects when making decisions on which CE activities to implement (Geissdoerfer et al., 2017a; Korhonen et al., 2018a). To ensure that these rebound effects are prevented, it is imperative that companies can adequately assess

and report their performance with respect to their CE objectives, as well as to demonstrate how these objectives align with their broader value creation story.

The transition towards a CE requires companies to not just create new value from waste (Romero-Hernández & Romero, 2018) but to enhance quality of life through the creation, delivery and capture of value by implementing circular strategies which extend the lifetime of resources within the system (Nußholz, 2017). To this end, an increasing number of articles are investigating what this *value* looks like. Building on research from Bocken *et al.* (2015), Haines-Gadd & Charnley (2019) propose a taxonomy of value for CE, which separates four aspects of tangible value: 1) resource value; 2) consumer value; 3) data/knowledge value; and 4) relationship value, and five aspects of intangible value: 1) stability and control; 2) symbiosis; 3) positive social impact; 4) altruism; and 5) behaviour change. These nine aspects of value for CE demonstrate the range of impacts companies can experience -and should monitor- when implementing CE activities and circular business models. However, how feasible and relevant it is for companies to assess, monitor and, ultimately, integrate the impacts of CE value creation within a company's corporate sustainability report remains unaddressed within literature.

4.3.2 Circular economy within corporate sustainability reporting

Despite the evolving academic discussions on the actual sustainability potential of CE, early evidence suggests that within both disclosure frameworks and current sustainability reporting trends, the representation of CE remains fairly limited. In a literature review conducted by Opferkuch *et al.* (2021), 15 reporting frameworks and approaches deemed relevant for companies looking for guidance on how to produce a sustainability report were analysed (e.g., GRI and the Integrated Reporting Framework). The findings showed that only a few approaches had incorporated CE issues (Opferkuch *et al.*, 2021). The representation of CE observed within these disclosure frameworks was most often: i) based on the definition from the EMF (often illustrated with the butterfly diagram (EMF, 2015); ii) linked to only the environmental dimension of sustainability; and iii) the choice of which assessment approach(es) to be used to produce CE-data relevant for reporting is the responsibility of the reporting company (Opferkuch *et al.*, 2021). This, as Pauliuk (2018) suggests, leaves room for companies to cherry-pick CE data to report which best suits their corporate narrative and therefore, potentially engage with greenwashing practices.

Furthermore, the effects of this vague and inconsistent guidance on CE disclosure is already being reflected in the CE content observed within corporate sustainability reports, as identified in Stewart & Niero (2018) and Dagiliene *et al.* (2020). In 2018, Stewart & Niero conducted a content analysis of the sustainability reports of 46 companies within the fast-moving consumer goods (FMCG) sector. Their analysis found that companies were most often still associating CE with only recycling or reuse strategies, primarily in the product and packaging domain and without connection to the social aspects of CE (Stewart & Niero, 2018). Similarly, through a content analysis of 226 sustainability reports from companies within the manufacturing sector, Dagiliene *et al.* (2020) found that companies were still not reporting much information about CE and if so, generally described reuse, recycle and recover strategies. In the authors most recent work, a content analysis was performed on 138 reports of 94 European sustainably-ranked companies (Opferkuch *et al.*, 2022). The analysis identified the presence of CE within five sustainability reporting elements: CEO's message, materiality assessments, references to the SDGs, targets and indicators for CE. The results showed that all but one company was found to be explicitly mentioning CE within their reports, however, only 7% of companies are integrating CE within all five reporting elements. Additionally, of the one third of companies reporting both targets and indicators for CE, targets generally focussed on higher-ranking CE strategies, most often aiming to eliminate and/or replace non-renewable resources within packaging (e.g., '50% plastic packaging made from recycled materials'). Indicators for CE, however, generally measure references to the linear economy (e.g., volume of waste going to landfill) or low-ranking CE strategies (e.g., % material recycled or recovered). The work of de Freitas Netto *et al.* (2020) suggests that in order for companies to refute claims of greenwashing, appropriate targets and indicators must be reported as to increase the transparency of the company's sustainability ambitions and performance. However, for the case of CE it remains unclear how many and which targets and indicators are appropriate to reject those claims (Opferkuch *et al.*, 2022).

4.3.3 Circular economy within sustainable finance

As mentioned earlier, existing policies and financial instruments have been designed to finance traditional linear processes (European Investment Bank - EIB, 2019). For example, credit pricing has been traditionally determined through the creditworthiness of an individual

company, with no consideration of their broader supply chain partners (EIB, 2019). However, in a CE, these supply chain partners are becoming increasingly important as their relations are built on continuous material exchanges (Walker *et al.*, 2021). Until recently, circular business models have been observed by financial institutions as high-risk with uncertain returns and thus, some innovative companies were the exception rather than the rule (*UNEPFI*, 2020). However, in light of the EC's integration of CE objectives within the EU Taxonomy Regulation (European Parliament and the Council, 2020), financial institutions have begun to incorporate CE-specific terminology and metrics within their operations to develop a more comprehensive understanding of risk management within a CE. As a result, there has been a steep increase in the number of financial instruments related to CE, e.g., private and public equity funds, venture capital, as well as CE-specific adaptations to current bank lending, insurance and project financing procedures (EMF, 2020). Key actors driving these changes are international financial regulators: e.g., the EIB, private investment management firms, e.g., Blackrock, and banks, including International Nederlanden Groep (ING) and Intesa Sanpaolo. Early research findings suggest that the more circular a company is, the lower its risk of defaulting on debt (Zara & Ramkumar, 2022), highlighting the appeal for the financial community to identify and support companies prioritising CE strategies.

Along this line of reasoning, financial institutions have developed screening and eligibility criteria to categorise companies as substantially contributing to CE. For example, the EIB utilises a list of 14 CE categories organised into four groups: 1) Circular design and production models; 2) Circular use models; 3) Circular value recovery models; and 4) Circular support (EIB, 2019). Another example is from the Italian bank Intesa Sanpaolo, which in collaboration with the EMF, developed a plafond of up to 5 billion euros available to companies that adopt circular business models. Administered through the *Intesa Sanpaolo Innovation Centre* (Intesa Sanpaolo, 2019), funds from the CE-eligible loans are provided to companies that have been evaluated against five eligibility criteria: 1) Product life extension; 2) Renewable resources; 3) Resource efficiency and effectiveness; 4) Recyclable products; and 5) Enabling technologies (Intesa Sanpaolo, 2021). These types of CE-specific screening and eligibility criteria make it imperative that companies are able to adequately describe their CE activities in line with their business models and then include it within their corporate sustainability reports.

In addition to a company's business model being categorised as contributing to the CE, there are other factors which influence the possibility of projects and/or companies being eligible for CE financing. Companies must openly communicate their intentions and goals to contribute to CE objectives and demonstrate how their own actions have positive impacts for broader society (ABN Amro *et al.*, 2018; EIB, 2019). This is mostly in line with the increasingly popular principles of impact investing, which are investments made with the intention to generate positive, measurable social and environmental impact alongside a financial return (Global Impact Investing Network, 2022; O'Donohoe *et al.*, 2010). Furthermore, companies must integrate CE within their due diligence processes, ensuring that potential CE-specific risks to -and opportunities for- long term value creation are acknowledged within the company and reported externally to all stakeholders. Using a combined literature review and survey approach, Dulia *et al.* (2021) analysed the importance of 36 risk factors for circular supply chains, grouped into ten risk categories; e.g., Governmental risks and technological risks, adapted from Tang (2006). The authors determined some of the highest ranked risk factors were: 'quality degradation of recycled products', 'lack of proper vision such as goals, objectives, targets and indicators for circular supply chains' and 'lack of sufficient law implementation' (Dulia *et al.*, 2021).

Ultimately, financial institutions and regulators play a significant role not only in financing the transition towards a CE, but in shaping what this transition looks like. Despite the evolving integration of CE within both corporate sustainability reporting practices and sustainable finance-related regulations, evidence suggests the uptake of CE within corporate sustainability reports has been slow (e.g., Opferkuch *et al.*, 2022; Scarpellini *et al.*, 2020). The reasons why there has been such a slow uptake and what challenges to CE disclosure currently exist for companies remains unknown.

Recent research, exploring the assessment practices of companies engaged with CE, identified what the main barriers to- and benefits of- conducting CE assessments were (Roos Lindgreen *et al.*, 2022). The most frequently mentioned benefits were related to external communication and collaboration, namely: i) marketing and improving company reputation; and ii) communicating and reporting to stakeholders (Roos Lindgreen *et al.*, 2022). Therefore, there seems to be challenges preventing motivated companies from taking their CE assessment results and integrating them within their corporate sustainability

reports. To clarify this gap, research is needed which provides insights on the feasibility and relevance of CE disclosure for companies in relation to their broader sustainability reporting practices.

4.4 Methodological approach

This study combines qualitative research approaches in three distinct phases in order to achieve the research aims (as seen in Figure 4.1). Phase 1 – Interviews (Section 4.4.2), consists of exploratory semi-structured interviews with companies actively engaged with CE activities, to ensure that all participants have knowledge of- and experience with- the implementation and communication of CE activities. In phase 2 – Focus groups (Section 4.4.3), a series of focus groups were held with a subset of the interviewed companies to discuss the topics of feasibility and relevance of CE aspects within corporate sustainability reporting. Furthermore, the focus groups allowed for the co-creation of critical factors of - and desired goals for- companies reporting their CE activities. Phase 3 – Synthesis (Section 4.4.4), combines research findings with those from literature in order to propose recommendations to support companies disclosing their CE activities.

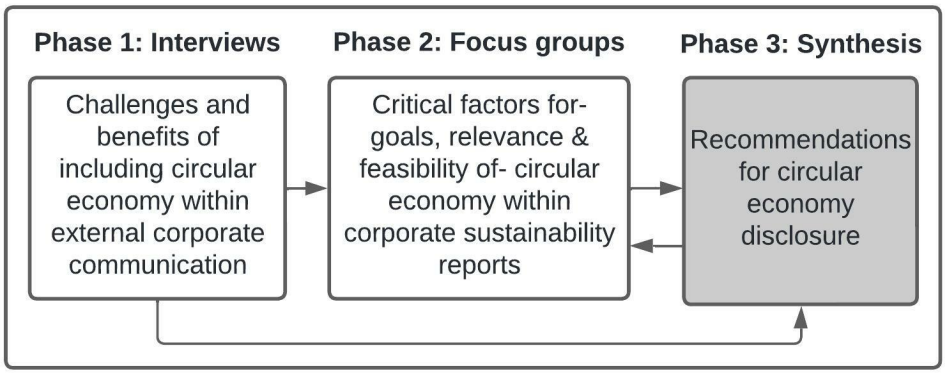

Figure: 4.1: Overview of three phases constituting the research approach.

4.4.1 Sample data description

During previous research, a semi-quantitative survey designed to explore the conceptualisation and assessment of CE within companies engaged with CE was completed by 155 respondents, as described in Walker *et al.* (2021). Upon completion of the survey, 43 companies self-selected to participate in a round of interviews which form the basis of

this article. Thus, the interviewees form a subset of the survey respondents. Purposive sampling was used to identify the original sample of surveyed companies (Hibberts *et al.*, 2012), by targeting companies which are members of national or international CE networks and thus, actively engaging with- and having knowledge of- CE. Companies operate in either Italy or the Netherlands, both countries which are considered frontrunners in terms of CE policies and innovations (Ghisellini & Ulgiati, 2020; Kristensen & Mosgaard, 2020). After the interviews, companies were invited to participate in focus groups if they met three criteria: 1) publish a sustainability report; 2) willing to communicate in English; and 3) had availability during the given time to participate in the study. Ultimately, eight companies were able to participate in the focus groups, therefore, forming another subset of the interview sample. The distribution of companies participating within the interviews and focus groups, and their characteristics, are summarised below in Table 4.1 (for more details see Appendix V).

Table: 4.1: Company sectors, size and location of interview and focus group participants.

Main characteristics	**Interview respondents (n = 43)**	**Focus group participants (n = 8)**
Company sector		
Accommodation and food service activities	9%	-
Construction	10%	-
Electricity, gas, steam and air conditioning supply	4%	12.5%
Information and communication	7%	-
Manufacturing	20%	37.5%
Other	12%	-
Other service activities	15%	12.5%
Professional, scientific and technical activities	14%	-
Water and waste management	9%	37.5%
Company size		
Micro companies (1 to 9 employees)	49%	0%
SMEs (10 to 249 employees)	26%	50%
Large companies (250+ employees)	25%	50%
Company location		
Italy	46.5%	12.5%
The Netherlands	53.5%	87.5%

Participant's position		
CEO or founder or owner	53%	25%
Sustainability and CSR department	30%	75%
Research and development	12%	-
Marketing and sales	5%	-

The allocation of interviewed companies between the two countries was almost even, with 23 companies operating in the Netherlands and 20 in Italy. With regards to sector, companies were most frequently offering consultancy services (29% from 'Other service activities' and 'Professional, scientific and technical activities') or active in the 'Manufacturing sector' (20%). Companies indicated their own sectoral classification according to the NACE classification system (Eurostat, 2018). Interviewed companies were most often micro companies (49% with less than 10 employees), whilst the remaining companies were either small and medium enterprises (SMEs) (26%) or large companies (25%). Lastly, interviewees generally held positions with decision-making power and/or had knowledge of sustainability as 53% were CEO's (or founders) and 30% were from the sustainability and/or Corporate Social Responsibility (CSR) department.

Zooming in on the focus group participants listed in Table 4.1, seven of the eight companies operate in the Netherlands and the remaining one in Italy. Concerning the companies' sector, companies were mostly from the 'Manufacturing' (n = 3) and 'Water and Waste Management' (n = 3) sectors. The distribution of company size was even with 50% of participants representing large companies and the other 50% representing SMEs (no micro companies were invited to participate due to the first selection criterion). Furthermore, most participants worked in the sustainability and/or CSR department (n = 6), whilst the remaining participants worked in general management positions (n = 2).

4.4.2 Phase 1: Interviews

The 43 semi-structured interviews were conducted by three interviewers via video-call between May and June 2020, lasting between 45 to 90 minutes each. The semi-structured format enabled each of the interviewers to ask the same questions, whilst having space for interviewees to clarify and contextualise relevant issues when necessary (Bryman, 2012). The interviews were conducted in the preferred language of the interviewee, either in Italian (n = 17), Dutch (n = 16) or English (n = 10), with one interviewer per language. All

interviewers followed the same interview guidelines and the interview questions discussed within this article are summarised in Table 4.2.

Table: 4.2: Interview questions concerning the external communication and reporting of CE activities.

Interview questions		**Results presented in**
1. Should circular economy content be included within corporate sustainability reports?		Section 4.5.1.1
Sub-questions	*If does produce a sustainability report:* Why or why not? What does this content look like, quantitative and/or qualitative?	
	If does not produce a sustainability report: Do you think circular economy content should be integrated into sustainability reporting or should it be separated? (only in other external communication formats e.g. website, individual report)	
2. What value does your company see in communicating circular economy externally?		Sections 4.5.1.2 and 4.5.1.3
Sub-questions	*If company does assess circular economy:* If you have already implemented assessment approaches for circularity (at either product or company level) what value does your company see in communicating (in any format) these results externally?	
	If company does not assess circular economy: does your company see value in communicating (in any format) circular economy goals/activities/progress in communicating circularity in a narrative/qualitative format?	

The exploratory nature of the research allowed for open questions to gather as much information as possible. As the interviewees consisted of a large number of micro companies, which did not necessarily have experience with producing corporate sustainability reports, interview questions focussed on the integration of CE within external communication in general (e.g., within sustainability reports, social media, newsletters). Sub-questions were designed to ensure that insights could be captured from all companies within the sample, regardless of whether they produce a sustainability report or conduct any

form of CE assessment. Interviewers followed the Systematic and Reflexive Interviewing and Reporting (SRIR) method from Loubere (2017). When utilising the SRIR method, interviewers are advised to both record and take notes during the interviews, then hold weekly meetings between themselves to discuss the evolving findings of the interviews. This process ensures a regular evaluation and consistent interpretation of the interview questions, thus, reducing interviewer variability (Bryman, 2012). Interview notes were translated into English, and then combined with company attributes before being imported into NVivo R1 (QSR Interational, 2020) software for thematic analysis using inductive coding (Braun & Clarke, 2006). To analyse the answers to the questions presented in Table 4.2, coding was conducted by one researcher, respondent by respondent, who then presented the coding to the other interviewers for review, in order to reduce the possibility of interviewer-related errors. After the coding was reviewed, responses for question 2 were aggregated into two themes: 1) challenges companies face when externally communicating CE issues (Section 4.5.1.2); and 2) benefits experienced by companies when externally communicating their CE activities (Section 4.5.1.3).

4.4.3 Phase 2: Focus groups

A focus group is delineated as a group discussion on a tightly defined topic, ran by a moderator (Merton *et al.*, 1956). Its design allows for interaction between the participants, generating data on multiple levels (individual, group and interaction) (Cyr, 2016). Three focus groups were conducted via video-call during March 2022, each lasting around 2 hours and hosting 2-3 companies (as seen in Appendix A). Once the focus group commenced, the moderator outlined the purpose of the research and assured participants the confidentiality of the meeting's discussion. Additionally, participants were guided to use an online collaboration platform: Miro digital whiteboard, which was created specifically for the focus groups. The purpose of this interactive tool is to facilitate discussion as well as readily capture responses and insights from group participants and has been used in several academic studies (Delgadillo *et al.*, 2021; Santa-Maria *et al.*, 2022). During the focus groups, data was collected by: 1) assigning post-it notes containing responses to questions onto the Miro digital whiteboard (within designated sections); and 2) additional note taking by the support moderator of the opinions shared verbally by participants. The contents and

structure of each focus group was organised into four main parts (summarised in Table: 4.3).

Table: 4.3: Guiding questions used during the focus group discussions.

Part	Guiding question(s)	Results presented in
1	What are critical factors that should be included within a company's CE disclosure?	Section 4.5.1.1
2	Feasibility: what are the most important aspects to enable your company to develop and publish a sustainability report? How does this differ when you report CE content?	Section 4.5.2
3	Evaluate the integration of CE within seven report elements for sustainability reports on two dimensions: 1) feasibility and 2) relevance. The seven report elements as stated in the Non-Financial Reporting Directive (EC, 2014) are: 1) Stakeholder inclusiveness, 2) Business model, 3) Risks and opportunities, 4) Strategy, 5) Materiality, 6) Sustainability outlook and performance and 7) Governance.	Section 4.5.2
4	Establishing desired goals for companies disclosing CE within their sustainability reports.	Section 4.5.2.1

The evaluation performed within Part 2 of the focus groups was done individually on a scale from "Not Feasible/Relevant at all" to "Extremely Feasible/Relevant". The scores of the eight participants were grouped for each individual report element and the median results are presented in Section 4.5.2. The report elements with the lowest scores for feasibility were identified and selected for inclusion within Phase 3: Synthesis, where recommendations are proposed. In Part 4 of the focus groups, companies were presented with a list of 6 goals companies should aim for when disclosing CE, based on previous findings from literature. They were then asked to individually rank these goals, offer any modifications or suggest new ones, ensuring all participants agreed on the final list of goals. Finally, each focus group ended with the possibility for companies to share general feedback or reflections on the progress of integrating CE within corporate sustainability reports. To examine the data collected from the focus groups, responses for each part were grouped and analysed to

identify the frequency of answers, common themes and contrasting differences, in line with qualitative thematic analysis (Braun & Clarke, 2006). Due to the limited number of interview respondents and focus group participants, no generalization of findings according to sector, company size or country could be made.

4.4.4 Phase 3: Synthesis and development of recommendations

The third phase of the methodological approach involved a qualitative synthesis, which is defined as *"the synthesis of individual qualitative research reports that relate to a specific topic or focus in order to arrive at new or enhanced understanding about the phenomenon under study"* (p. 1, Paterson, 2012). Within this article, primary data collected from the interviews and focus groups was supported with secondary findings from relevant academic literature. The latter entailed, in particular, the CE-specific eligibility criteria from financial institutions and CE-specific risk categorisation implemented in Dulia *et al.* (2021), discussed in Section 4.2.3. In line with the second and third research objectives, the aim of the synthesis was to: i) outline the *value* for companies integrating CE within their corporate sustainability reports; and ii) develop recommendations to improve the feasibility of companies collecting and selecting relevant data to report their CE activities (Section 4.5.3).

4.5 Results and Discussion

4.5.1 Company perspectives on the integration of CE within corporate sustainability reports

This section presents an overview of company perspectives on the inclusion of CE within sustainability reports, lining out a potential format and critical factors as well as the challenges and benefits of CE disclosure.

4.5.1.1 CE within corporate sustainability reports: ideal format and critical factors

The analysis of the 43 interview responses provided an overview of the sustainability reporting practices of the companies, as well as reflections on the ideal format for CE content within these reports. Just over half (53% or n = 23) of interviewed companies produce a sustainability report, even considering the high proportion of micro companies within the sample. Some reasons that companies did not voluntarily produce a sustainability report were either: a) the company is too small (n = 4), b), their website contains enough

information (n = 2), or c) they only report financial information (n = 1). However, most of these interviewees expressed a desire to produce a sustainability report in the future. A small group of companies (n = 5) stated that they do not see any value in producing a voluntary sustainability report, as their clients are not interested in one and/or sustainability is seen in everything that they do, therefore, they do not need to *"…formally prove they are sustainable in one document…"* (*Interviewee #7,* Manufacturing sector).

The majority of interview respondents (93% or n = 40) agreed that CE content is relevant within a sustainability report, whereas three companies suggested a separate circularity report should be produced. Several interviewees from micro companies and SMEs stressed the growing importance of continued engagement with their clients, consumers and the community, thus, highlighting the importance of communicating CE through the use of other external communication formats such as, social media, their website and newsletters. All interview respondents agreed that both quantitative and qualitative CE data is important within corporate external communication, however, the majority stated that they currently only publish CE-related data in a qualitative format. Some examples include the following topics: the CE-related projects they are involved in; the resulting new partnerships made; the CE assessment tools being used internally; and targets developed for their CE objectives. Overall, several companies mentioned that they are closely watching the development of guidelines for both CE assessment and reporting, with one interviewee stating "…*if there was a standard format for reporting CE this would be very valuable and integrated immediately…"* (*Interviewee #24*, Construction sector), further emphasising the need from companies for a more standardised approach to CE disclosure.

Within the focus groups, participants were asked to list and discuss critical factors they think should be included within a company's CE disclosure (main findings presented in Table 4.4 and full list in Appendix V). These seven factors were grouped under three categories: (i) content; (ii) quality; and (iii) structure (listed completely in Appendix B). Primarily, the focus group discussions centred on suggestions for the first category. All focus groups touched on the need for balance within sustainability reports, namely: tangible and intangible aspects of circularity; qualitative and quantitative data for CE; short-term and long-term ambitions; and consideration of internal (adopter) vs external (enabler) CE activities. Participants expressed that they observe some other companies that only report progress on their external CE activities, which enable other companies to improve their circularity

(e.g., % of recycling by-product recycled by suppliers), however, do not communicate progress on the circularity of their own internal CE activities (e.g., % waste generated during recycling processes). Furthermore, participants working within the sustainability or CSR departments of their companies were generally familiar with the '10 R-hierarchy', categorisation of CE strategies from Potting *et al.* (2017). These focus group participants described how companies should utilise this framework to communicate CE performance and ambitions on *each* of these 10 individual CE strategies (when possible). In terms of critical factors for the second category 'quality', companies frequently mentioned moving towards involving external assurers of CE data and including the intended time for companies to achieve their CE-specific targets. With respect to the structure of a company's CE disclosure, the participants generally agreed that there are issues with reporting significant material issues, such as CE, in isolation from one another. Therefore, companies should keep in mind when producing CE content that it should be clearly linked with other significant material issues, e.g., climate change, in order to present a holistic and complete picture of their organisation's sustainability ambitions and performance.

Table: 4.4: Critical factors to be included within a company's CE disclosure.

#	Critical factors
Content	
Balance between:	
1	Tangible vs intangible aspects of circularity
2	Qualitative vs quantitative data for CE
3	Short-term vs long-term ambitions
4	Consideration of internal (adopter) vs external (enabler) CE activities
5	CE activities described according to the '10R-hierarchy'
Quality	
6	Moving towards external assurance of CE data
Structure	
7	Clearly link CE to other significant material issues

4.5.1.2 Challenges of including CE within external corporate communication

Three main challenges were identified during the interviews which influence the quantity and quality of CE content being included within the companies' external communication.

1. *Lack of standardised assessment or reporting method for CE activities*

The majority of companies cited this as the reason why quantitative CE data (e.g., '% reuse rate') was excluded from external communication. Without a benchmark, companies declared to feel that there is a significant risk of opening themselves up to claims of greenwashing. Some companies highlight the context-specific nature of CE implementation, making the comparability of CE assessment results between sectors, locations and product groups extremely difficult. For example, *Interviewee #24* (Construction sector) is hesitant to report either: 1) 'circularity scores' of their buildings or 2) resource-oriented indicators for CE e.g., 'volume of renewable materials used', as each project has different goals, supply chains (based on location and materials used), design restrictions from both their clients and end-users, as well numerous regulatory regulations affecting their ability to use secondary materials (e.g., in government funded tenders). Ultimately, without providing transparent evidence of the methods behind these circularity scores and CE-related single indicators, their comparison becomes meaningless. Linked to this issue, a few (n = 3) large companies acknowledged the role of external assurers when determining what content is included within their sustainability report. Currently, the lack of assessment benchmark for CE combined with the rapidly evolving landscape of CE assessment and reporting, creates uncertainty for assurers to determine whether the methods chosen, and data collected is adequate for inclusion within sustainability reports at the time of their audit and/or review.

2. *Complexity of CE concept and data*

A group of companies (n = 8) stated that although they believe it is critically important to communicate quantitative data for CE, it can be seen as very complex and difficult to understand for their consumers as well as the readers of their sustainability reports. For example, *Interviewee #37,* (Manufacturing sector) described their decision to report Life Cycle Assessment (LCA) data, which they use to measure progress on their CE objectives. The company acknowledged that simply stating the results of the LCA is not enough for the reader to understand due to the complex nature of LCA's (as discussed in Finnveden *et al.*, 2009). Therefore, this communication requires additional explanation and resources to

ensure the LCA results are understood. It was suggested by interviewees that visualisations of CE-related data can be an effective tool in overcoming the complexity of CE (e.g., Sankey diagrams of resource flows).

3. *Low market awareness and consumer acceptance of circular products*

As already discussed in previous studies (e.g., Ritzén & Sandström, 2017), consumer awareness and overall acceptance of products designed with CE strategies remains low. *Interviewee #10* (Other services sector) described how providing too many details about the CE strategies their company employs to produce their products (e.g., increased share of recycled material within the product) may discourage consumers from buying the product, as they assume the product has a lower quality. From another angle, a company's position in the value chain can also impact their ability to influence overall market awareness of CE (e.g., a company with a 'business-to-business' model).

4.5.1.3 Benefits of including CE within external corporate communication

During the interviews, participants were asked what value externally communicating CE has for their company. Through the deductive coding, four benefits of externally communicating CE experienced by companies were frequently mentioned and will be explained further below.

1. *CE is a powerful story telling tool*

The majority of interviewed companies stated that CE is a core value and part of their overall strategy. Therefore, by communicating narrative descriptions of their CE ambitions, projects and progress, it helps to tell the overall story of their company. More specific examples include publishing stories which detail how implementing CE has enabled the company to engage more with the community, developing new innovations, and improving the sustainability of existing products, among others. These stories help to ignite a sense of pride amongst employees as well as attract the right kind of new talent/employees.

2. *CE is a tool to promote sustainability education*

Similarly, a constant theme arising from interviewees was that communicating CE-content enables their company to embrace their corporate responsibility to inform and educate the community. As *Interviewee #18* (Waste and Water management sector) noted, it is important that CE is defined by upper management and embedded within the company rather than only coming from those in the marketing department. Also, as quantitative CE-

data is not easily understood by the community, companies must ensure that a qualitative format is used to ensure the right emotions are evoked to facilitate the education of people and clients on their CE objectives as well as the CE concept in general.

3. *CE requires and drives transparency*

Several companies stated their commitments to transparency and how voluntarily publishing CE data can provide new opportunities for collaboration. As *Interviewee #19* (Manufacturing sector) explained, in order for CE strategies to work, "…*secondary resources must become more attractive for manufacturers and this can be done through sharing of knowledge regarding CE…"*. Transparency of information and traceability of materials must be offered from companies throughout the supply chain. This will not only make recycling processes more efficient but can work to identify new collaborations and foster trust between existing partnerships. In line with this need for transparency, some companies mentioned the use of material passports and platforms which have been developed to help facilitate this sharing of CE data e.g., Excess Materials Exchange (Excess Materials Exchange, n.d.) & Madaster (Madaster, n.d.).

4. *Improved reputation and eligibility for future incentives*

All companies suggested that by externally communicating their CE objectives they are positioning themselves as outwardly sustainability-oriented and ultimately, as frontrunners of CE implementation. This can then improve their reputation and attract new clients and employees. Several companies were not shy to declare that by publicising their commitments towards advancing CE, they are able to capitalise from the growing public attention on CE as a 'buzzword' topic. This then allows companies to apply for and receive CE-specific financial incentives awarded by numerous governmental and/or financial institutions (as discussed in Section 4.3.3).

4.5.2 Feasibility and relevance of CE within corporate sustainability reporting

The focus group participants discussed the most important aspects which make sustainability reporting feasible within their company. The most frequently mentioned aspects were: 1) use of clear guidelines or standards to ensure comparability and structure of sustainability report contents; 2) cooperation of all stakeholders, increasingly with suppliers and customers; 3) a clear vision, support and leadership from upper management; and 4) internal capacity – factors such as time, data availability, resources, ownership.

Participants were then asked if these aspects for the feasibility of sustainability reporting were different for CE aspects. Unanimously, all companies agreed that there is no difference. Participants from larger companies suggested that the materiality processes are key to increasing the internal capacity of companies to collect, assess and report data for CE. If, through the materiality process, a company and its stakeholders have identified CE as a significant material issue then it *must* allocate resources to collect data and adequately report on it.

In order to offer practical suggestions, focus group participants evaluated the feasibility and relevance of CE reporting/disclosure to seven key report elements of sustainability reports as defined in the CSRD (EC, 2021) (results shown in Table 4.5).

Table: 4.5: Median values of focus groups participants' ratings of each from 1 (not relevant/feasible) to 3 (very relevant/feasible). Values lower than 2.5 (highlighted in red) were determined to be the least relevant/feasible.

No.	Key content element	Feasibility to integrate CE	Relevance to CE
1	Stakeholder Inclusiveness	3	3
2	Business Model	3	3
3	Risks and Opportunities	2	2.5
4	Strategy	3	3
5	Materiality	3	3
6	Sustainability Outlook and Performance	2	3
7	Governance	3	2

As all participants represent companies which are actively engaged with CE, it is no surprise that overall, companies found CE to be relevant content and relatively feasible to integrate throughout their sustainability reports. With respect to the dimension of relevance, the key content element of 7) Governance was determined to be the least relevant as companies generally did not include many CE-specific roles or criteria within their governance structures. Zooming in on the results for the dimension of feasibility, it can be seen that 3) Risks and Opportunities and 6) Sustainability Outlook and Performance were deemed to be the least feasible report elements to integrate CE within. Companies discussed the difficulty with CE-specific target and indicator selection for their sustainability reports as well as how to communicate the various risks and opportunities for CE. To address this, these two report

elements were selected to discuss further and develop ideas on how best to support companies to improve the feasibility of integrating CE content.

4.5.2.1 Goals of integrating CE within corporate sustainability reports

Focus group participants discussed what goals they would like to achieve through producing a CE disclosure (summarised in Table 4.6). Answers were then organised in seven goals which outline the value of CE within corporate sustainability reporting, according to these companies' experience. Across all 3 focus groups, Goal #7 was raised as an increasingly critical outcome. Additionally, Goal #6 was gaining importance within most companies.

Table: 4.6: List of seven goals for companies to achieve when integrating CE aspects within corporate sustainability reports.

No.	Description of goals
1	Increase awareness of- and promote- an understanding of circular economy to stakeholders and the wider community
2	Drive internal cultural change and employee engagement towards circular economy
3	Implement processes to identify relevant risks and opportunities for circular economy
4	Communicate their circular economy vision, through descriptions of their current and planned circular economy activities
5	Revaluate targets and indicators, in line with the company's established circular economy objectives as well as relevant international policies
6	Meet common screening criteria for circular economy incentives through achieving eligibility developed by financial and non- financial institutions
7	Attract and retain new talent who share the company's circular economy values and ambitions

4.5.3 Recommendations for the integration of CE within corporate sustainability reports

The following section presents the results of the synthesis phase and proposes recommendations to support companies: i) describing their CE activities (Section 4.5.3.1); ii) identifying and reporting risks for CE (Section 4.5.3.2); and iii) developing and disclosing CE-specific targets and indicators (Section 4.5.3.3). These proposed recommendations are

applicable with the reporting requirements of common disclosure frameworks, including those from the GRI and International Integrated Reporting Council.

4.5.3.1 Describing circular economy activities

To simplify dialogue on a company's value creation story and align with the suggested criteria proposed by financial institutions (as discussed in Section 4.3.3), it is recommended that companies consider how their CE activities result in long-term growth of the company's key objectives. To frame this description, companies may utilise the approach built from the findings of this research (shown in Figure 4.2). This approach encourages companies to consider three aspects when developing the description of their current and planned CE activities: 1) their position in the value chain (illustrated with seven stages adapted from Kalmykova *et al.* (2018)); 2) the attributes of the entity; either adopter (internal) or enabler (external) and 3) which of the strategies in the '10R framework' are being employed. For example, a company working in the waste management sector that collects and recycles waste from other companies may state 'Recycling waste products of other companies' (End of life x Enabler x Recycle). Alternatively, a company in the manufacturing sector may describe one of their CE activities as 'Designing products with improved modularity for easier repair' (Design x Adopter x Repair). Additionally, companies should consult the description of CE business models described by the EIB (2019), financial institutions, and other relevant stakeholders to confirm that descriptions of their CE implementation will ensure their eligibility for certain CE-specific financing opportunities.

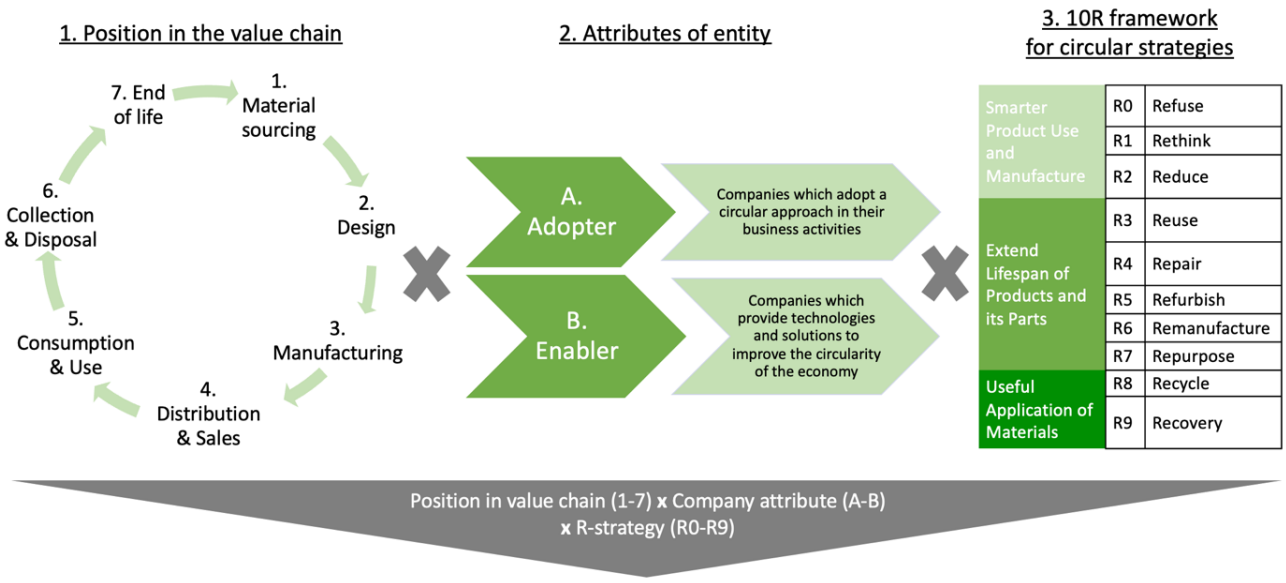

Figure: 4-2: Overview of an approach to support the identification and communication of CE activities and ways to frame their relevance to the company's business model.

4.5.3.2 Risks and opportunities for circular economy

Risks and opportunities are topics that may influence the long-term growth of a company's business model, acknowledging ongoing developments throughout society as well as the business environment (UNEP, 2021). Within a company's CE disclosure, it is recommended that they describe the key risks and opportunities that arise from their implementation of CE strategies and which may influence their long-term value creation strategy. Through the identification of CE-specific risks and opportunities, companies can ensure they stay ahead of any upcoming policies and market trends, before external issues force them to change their business models. However, as with all new innovations, uncertainty and thus risks, still remain for companies when implementing CE strategies. To support the identification of relevant CE-related risks, companies may utilise the approach to risk identification adapted from Dulia *et al.* (2021). The authors approach groups risks and opportunities into ten categories: 1) Technical; 2) Market; 3) Institutional; 4) Social/Cultural; 5) Economic; 6) Knowledge and skills; 7) Organisational; 8) CE framework; 9) Financial; and 10) Logistics. An example of how to use this approach for four of the categories in the context of CE are provided in Table 4.7. Once risks associated with the transition to a CE have been identified, companies should evaluate the likelihood of each risk occurring as well as determine their prioritisation to address within their specific business and sustainability context. Following this, companies can assess all potential risks and transform them into opportunities (as is

shown in Table 4.7). Alternatively, companies may approach the identification of risks and opportunities according to each stage of the product life cycle (as shown in Figure 4.2) which may also serve as a basis for indicator development and for use within decision making.

Table: 4.7: Approach to support the identification of CE-related risks and opportunities grouped into four categories (using the CE-risks and opportunities listed in Table 4.6 and categories adapted from Dulia *et al.*, 2021).

Risk categories	**Risks associated with:**		**Opportunities created with:**
	Relying on the linear economy	**Adopting CE strategies**	**The transition to a circular economy**
Technical	E.g., equipment used within linear production lines become outdated	E.g., quality degradation of recycled/reused products and materials	E.g., reduction in manufacturing costs through recycling waste and by-products
Market	E.g., higher resource prices and greater volatility due to resource depletion	E.g., inefficient accounting and valuation methods for secondary materials	E.g., improvement in supply chain resilience through becoming less dependent on non-renewable resources as primary inputs
Institutional	E.g., increasing GHG emission regulations for manufacturing and end-of-life incineration	E.g., anticipated developments to regulations with stricter requirements regarding packaging requirements, use of plastics	E.g., company's preparedness for future regulatory changes will allow company to becoming CE front runner
Social/ Cultural	E.g., damage to the company's reputation due to company's use of materials producing high environmental impacts	E.g., consumer rejection of remanufactured goods due to quality concerns	E.g., attracting talent who support CE and broader sustainability initiatives

4.5.3.3 Circular economy outlook and performance

As required by the CSRD, corporate sustainability reports should present the company's performance with respect to progress towards their established CE objectives, reported within the wider sustainability performance context. Until a formalised benchmark/standard for CE assessment and reporting containing mandatory indicators for CE is finalised, it is recommended companies focus on developing both targets and indicators for CE in line with

their own CE objectives, as outlined in their corporate strategy. In addition, companies shall review the relevant targets for sustainability published by regional, national, international and sectoral policy makers and regulators, for example the targets of the Sustainable Development Goals (United Nations, 2016). By linking the company's own targets with those set by international policies, companies can demonstrate more clearly how their business model and strategy are in line with society's sustainability objectives. However, if a company chooses to do this, they must ensure that they are reporting indicators to measure their progress towards these broader sustainability goals or they may open themselves up to claims of greenwashing, or more specifically "SDG-washing" (Heras-Saizarbitoria *et al.*, 2021). The process of developing targets and indicators should be completed after identifying the risks and opportunities associated with implementing CE strategies. The following subsections will demonstrate potential approaches companies may use to select and develop appropriate targets and indicators for CE which can then be included within their sustainability report.

4.5.3.3.1 Development of targets and indicators for circular economy

Targets for CE are guideposts for executing strategies to advance the company's CE vision and overall sustainability strategy (Moraga *et al.*, 2019). It is recommended that companies should first evaluate their CE objectives and how they integrate within their business model. From here, the company may take two approaches to develop relevant targets for CE (both quantitative and qualitative). The first approach is to base targets and indicators for CE on the specific CE strategies implemented within the company (outlined in Figure 4.2); e.g., a company that is implementing the strategy of 'R2 – Reduce' to eliminate non-renewable materials within the packaging used for their own products. An appropriate target may be "50% of all plastic packaging made from recycled or renewable sources by 2024" and a corresponding indicator would be "In 2023, 40% of total plastic packaging was made from recycled or renewable sources". With this approach, companies can warrant that they are disclosing targets and indicators for not only 'low-ranking' CE activities (e.g., recycle) but also 'high-ranking' CE activities (e.g., reduce). It is also important that companies do not combine multiple CE strategies within one target or indicator, e.g., "% of waste that is recycled, reused or recovered". By doing this, stakeholders are unable to determine if increases to this value are due to improved CE performance (e.g., more waste being reused)

or in fact, decreased CE performance (e.g., less waste being reused or recycled but more waste being recovered).

The second approach a company may use to develop targets and indicators is based on the CE-specific risks and opportunities identified. Examples of this approach are shown in Table 4.8.

Table: 4.8: An example of using the identification of risks and opportunities to develop relevant targets and indicators for CE disclosure.

	Risk of relying on the linear economy	***Opportunity***	***Target examples***	***Indicator examples***
Market	Losing customers because of increasing demand for sustainable products, materials and services	Enter new markets and attract new customers seeking sustainable products, materials and services	- 40% of products and services designed with circular economy strategies by 2025 - 25% of revenue generated from the sale of products and services designed with circular economy principles by 2025	- The percentage of products and services designed with circular economy principles - Share of revenue generated from the sale of products and services designed with circular economy principles

Finally, if the company chooses to report any single metrics - e.g., a circularity score - or the results of any industry-designed assessment approaches for CE - e.g., the Circulytics from EMF, (2019) -the results must be accompanied with an explanation of the methodology used to derive them, to demonstrate the company's commitment to transparency.

4.5.4 Discussion

This study engaged with companies operating in Italy and the Netherlands that are experienced with CE implementation and it captured their experiences with- and perspectives on- the fast-evolving landscape of CE disclosure. This section offers a reflection on the results in the context of two central themes: i) acknowledging CE-related

trade-offs within risk management; and ii) communicating CE value creation within corporate sustainability reporting.

As mentioned before, despite the increasing popularity of CE to address sustainability challenges, the benefits of implementing CE activities must not be assumed, as numerous potential sustainability trade-offs exist (Harris *et al.*, 2021). Industry and research efforts continue to develop relevant assessment approaches for CE - e.g., Circulytics from EMF (2019) or Circularity Transition Indicators (CTI) from WBCSD (2020), however, these approaches are generally designed to produce CE-specific targets and indicators for internal use only (Opferkuch *et al.*, 2022). For the context of sustainability reporting, the results of this research highlight synergies with recent CE-specific developments in sustainable finance, in particular the screening and eligibility criteria being proposed by relevant financial institutions (e.g., EIB, 2019). Scholars from these two fields of research can align efforts to further clarify what CE-specific content should be included within corporate sustainability reports and to continuously drive transparency of CE data. Furthermore, this research is in line with an evolving research area integrating risk management processes to identify and balance sustainability trade-offs (e.g., Hauschild *et al.*, 2022).

Additionally, previous studies have suggested that for the identification of CE-specific risks and opportunities, companies should acknowledge the risks of staying in the linear economy (Dulia *et al.*, 2021; European Investment Bank, 2019). However, what has been largely ignored are the new potential risks associated with implementing CE activities (outlined in Table 4.7). In line with the aforementioned research efforts to encourage companies to evaluate CE-related trade-offs, the results of this research encourage companies to identify and disclose risks associated with the following: i) remaining in the linear economy; but also ii) risks associated with implementing CE strategies. This will allow companies to demonstrate the true trade-offs associated with CE (and more broadly sustainability) to their external stakeholders and reduce potential claims of CE-related greenwashing for the company.

For some companies, the increasing number of changes within the sustainability reporting landscape which attempt to simplify issues across frameworks, can in fact exacerbate the discourse that sustainability reporting is a burden and a ‘tick the box’ exercise for companies (Aureli *et al.*, 2020; Michelon *et al.*, 2015). Nevertheless, researchers have previously demonstrated that sustainability reporting processes can act

as a driver facilitating change towards corporate sustainability within a company (Adams & McNicholas, 2007; Lozano *et al.*, 2016). The results of this study suggest that companies which are externally communicating their CE activities can experience a range of benefits and create both tangible and intangible value. These findings reflect the various types of tangible and intangible value associated with CE as categorised by Haines-Gadd & Charnley (2019). However, comparing these different types of value with the existing evidence of CE within corporate sustainability reports suggests that companies are not disclosing their CE activities to recognise these types of value being created (Opferkuch *et al.*, 2022). Therefore, it remains unknown, if CE can act as a transformative model to drive integrated thinking (as suggested by Barnabè & Nazir, 2022) and there is a risk companies will continue to adopt and communicate their CE activates through a limited set of resource-based indicators. However, the recommendations proposed within this article aim to avoid this and encourage companies to understand the full potential of the CE model within their value proposition.

4.6 Conclusions

This exploratory study aimed to capture the perspectives of companies actively integrating their CE-related activities into their external communication and sustainability reporting processes. Furthermore, this article contributes practical recommendations to improve the feasibility of companies reporting their CE activities. To achieve this, 43 semi-structured interviews and subsequent focus groups were conducted with companies operating in either Italy or the Netherlands, not limited by sector, but considered frontrunners in CE implementation. The results compiled a list of major challenges of- and benefits from-externally communicating their CE activities that companies experienced. Namely, three main challenges were identified: 1) lack of CE assessment and/or reporting benchmark; 2) complexity of CE data; and 3) the lack of consumer awareness and customer acceptance of circular products. Complementarily, the four benefits experienced by companies were: 1) CE is a powerful storytelling tool; 2) CE is a tool for sustainability education; 3) CE requires and drives transparency; and 4) CE allows for improved reputation and eligibility for future incentives. Additional findings highlight seven critical factors which should be considered by companies preparing CE content for their corporate sustainability report, including: a balance between qualitative and quantitative data, internal (adopter) and external (enabler) activities as well as describing CE activities as individual strategies utilising the 10R

framework originally proposed by Potting *et al.* (2017). Findings also demonstrate the relevance of- and feasibility to- integrate CE within specific report elements, revealing that companies find it least feasible (and therefore will require assistance) to include CE content within: i) risk and opportunity identification as well as ii) target and indicator selection within the sustainability performance report section. To address this, this article has proposed recommendations based on a synthesis of the study's findings and academic literature to improve the feasibility for companies incorporating CE aspects within their voluntary or mandatory corporate sustainability report.

As the authors have stated in previous studies, future work should help to build the capacity for companies to assess and report various sustainability issues in general, not only exclusively for CE. The findings of this study encourage researchers to explore the influence of increasing CE implementation on existing risk identification and management processes, potentially connecting sustainability trade-off research with due diligence processes. Additionally, the frameworks of financial institutions to evaluate and screen corporate reporting of CE should align with efforts from academic research on CE (e.g., considering the social impacts of implementing CE strategies), ensuring that the academic discussions on the various conceptualizations of CE and sustainability are not ignored by those institutions which are now evaluating CE implementation. Finally, in order to increase the demand for transparency and reduce instances of greenwashing of CE activities, translating academic CE research into meaningful educational resources should be prioritised, in order to increase both societal awareness and understanding of CE and ultimately, pro-sustainable production and consumption behaviour.

5 Conclusions and Recommendations

This research has uncovered foundational knowledge furthering the integration of CE within corporate sustainability reporting literature and practice. This final section presents the key findings and theoretical contributions towards the objectives defined at the beginning of this thesis. Furthermore, this chapter concludes with a list of recommendations based on the outcomes of this research for practitioners of CE and sustainability reporting as well as the author's suggested ideas for future research.

5.1 Key findings and contributions of the research

This research aimed to explore the emergence of CE within disclosure frameworks and corporate sustainability reports as well as to capture the perspectives and experiences of companies measuring and disclosing CE data. The quantitative and qualitative methods employed have collected results which contribute a literature review, empirical evidence and recommendations to both theoretical and practical discussions on CE disclosure. Consequently, the findings have successfully achieved the research objectives mentioned in Section 1.3 and are summarised below in Figure 5.1. The key findings presented within this section shall inform the future development of a framework to support companies integrating CE-content within their corporate sustainability reports.

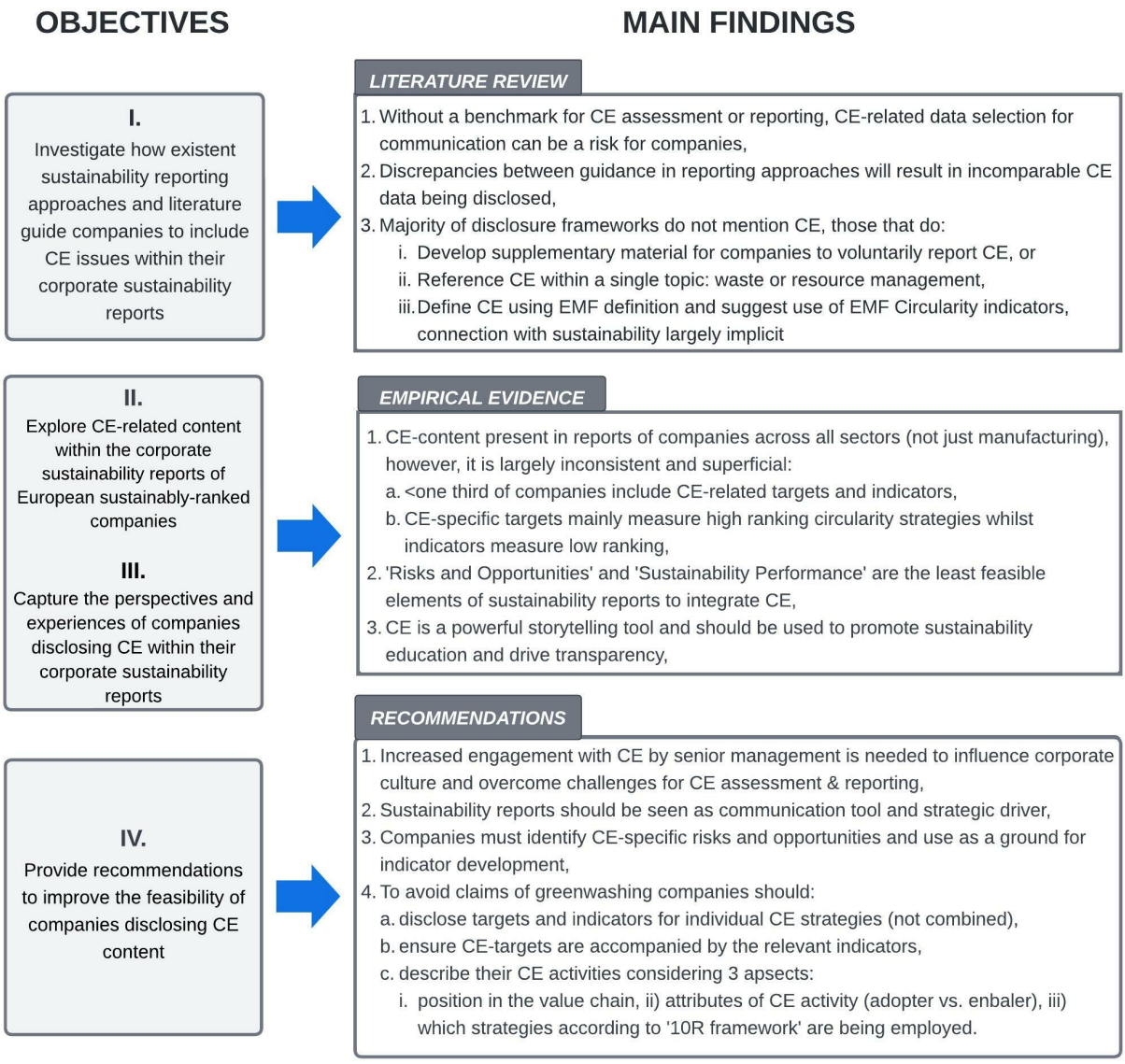

Figure: 5.1: Overview of the main research findings for each of the objectives achieved within this thesis.

To the authors knowledge, Chapter 2 presents a first literature review article linking two fields: CE and sustainability reporting. This review of academic literature yielded a low number of published articles, however, several challenges and research gaps were highlighted that recalibrated the direction of the subsequent research steps for this thesis. In particular, literature suggested the application of existent disclosure frameworks to advise on the reporting of CE practices was deemed inadequate (e.g., ISO 14001:2015 and BSI 8001:2017). This finding motivated the analysis of multiple reporting frameworks and approaches to investigate their inclusion of CE-related information. Additionally, several articles raise two main challenges affecting the type of CE-data companies will externally

communicate; these are: 1) a lack of consumer awareness and understanding of CE and 2) low market acceptance of CE and circular products. These challenges may restrict the potential of external corporate communication as a driver for CE implementation as the data selection processes for CE can be seen as too resource-intensive and ultimately, a risk for companies.

Furthermore, this research also conducted a first review of reporting frameworks and approaches, both in general as well as specifically for CE content, thus contributing new knowledge to the field (Chapter 2). The content analysis protocol designed for the scope of this chapter reviewed the documents on two dimensions: 1) content; what *guidance* specifically related to CE exists within each reporting approach and 2) structure; (*if* and) *where* the reporting approach mentions CE. Other researchers may adapt and utilise this content analysis protocol to reporting frameworks for other contexts and sustainability pathways, e.g., bioeconomy. In addition, a list of 15 international reporting frameworks and approaches deemed relevant for companies engaged with CE and wishing to produce a corporate sustainability report was compiled, which was not available before (Table 2.4).

The findings of Chapter 2 determined that in 2019, CE was only mentioned in five of the fifteen reporting frameworks and approaches reviewed. With respect to the dimension of structure, CE is either included within supplementary material or only referenced within a single topic: waste or resource management. Concerning the dimension of content, CE is most often described using the definition from EMF and choices for data selection remains the responsibility of the company. However, suggestions for companies to utilise the EMF Circularity Indicators were frequently observed and overall, CE remains a voluntary issue to report on. In general, numerous discrepancies exist between the guidance reviewed in the reporting approaches which is likely to result in companies either not reporting CE issues at all or only qualitatively describing CE activities from a waste management perspective.

Thereafter, evidence of CE content was collected within corporate sustainability reports to determine the influence of the guidance given within the reviewed reporting frameworks and approaches (Chapter 3). Whilst a limited amount of studies have analysed the presence of CE within corporate sustainability reports, the research carried out in this thesis was the first cross-sectoral and international content analysis of corporate sustainability reports for CE content. The findings highlighted the importance of more studies on the integration of CE inside companies with traditionally service-oriented business

models, e.g., within the Financials sector. The content analysis focused on companies who are publicly recognised for both their sustainability performance and sustainability reporting, thus, the findings contribute CE disclosure trends and shortcomings from companies who are most likely to be disclosing data on popular and emerging sustainability topics, including CE. Furthermore, the research in Chapter 3 took an innovative and pragmatic approach to content analysis by examining specific report elements of the sustainability reports, thus offering a methodological contribution which can be built upon by other researchers analysing the contents of sustainability reports.

In contrast to previous studies and the literature review results (Chapter 2), which identified a limited presence of CE within sustainability reports, the results demonstrated that the majority of companies were in fact explicitly mentioning the CE concept. However, deeper analysis of the CE content showed that very few were integrating CE within the key report elements reviewed. Specifically, this research determined that CE was described in the CEO's message by 20% of companies and in 28% of the company's materiality assessments. In these instances, two main representations of CE were signalled: 1) CE is a major pillar of the company's overall strategy or more simply, 2) CE is an extension (or replacement) of the company's existing waste and/or resource management issues. Additionally, this research also obtained evidence on the linking of CE content to the SDGs, where 30% of companies described CE in line with multiple SDGs but most often SDG 12: Sustainable Consumption and Production. These findings contribute to the ongoing theoretical discussions on how CE should be defined and the relationship between CE and sustainability, as they offer the perceptions of CE being disclosed by sustainably-ranked companies. Whilst the dominant discourse remains that CE is centred on activities within sustainable production and consumption, the findings suggest that this is evolving, as for some companies, CE is being implemented to address issues within climate action (SDG 13), partnerships for the goals (SDG 17), life on land (SDG 15) and industry, innovation and infrastructure (SDG 9).

Furthermore, the research in Chapter 3 contributed findings to the continuing academic and industry discussions on assessment approaches for CE, namely by identifying targets and indicators for CE in the reports of 29% of companies. This research was also the first study to identify targets and indicators for CE within corporate sustainability reports and then categorise them against value retention strategies or the '10-R framework'

proposed by Potting *et al.,* 2017. By doing this, the results determined that companies most often disclose targets for higher-ranking CE strategies, such as 'Reduce' (e.g., 50% plastic packaging made from recycled material). Conversely, indicators most often measure lower-ranking CE strategies, such as 'Recycle' (e.g., % of manufacturing waste recycled). These findings reiterate the importance for companies (and other actors) to not only state they are engaging with CE by disclosing performance on one low-ranking CE strategy but to demonstrate improvements in their circularity by implementing and disclosing data for higher-ranking CE strategies (when possible). Overall, these findings led to a novel and critical discussion on instances of greenwashing for CE activities and offered suggestions for how companies can potentially prevent these claims in the future (Chapter 3).

To further explore why companies practice these trends in CE disclosure, qualitative research was carried out in Chapter 4 which aimed to outline novel understandings of topics concerning sustainable finance, such as value creation and risk identification and management in the context of CE. To date, this is one of the few academic articles combining CE with such concepts. Generally, the interviewed companies considered the external communication of CE a critical part of their engagement with clients, however, the majority stated that they only publish qualitative CE-data due to the lack of any standardised CE assessment and/or disclosure frameworks, making CE-data incomparable and complex to interpret. This reiterates the importance of the need for additional guidance to support companies on how to measure, select and disclose CE data. The sample of companies identified critical factors they believe must be considered within a company's CE disclosure, including ensuring a balance between: 1) tangible vs. intangible aspects of circularity, 2) qualitative vs. quantitative data for CE, 3) short-term vs. long-term ambitions, 4) consideration of internal (adopter) vs. external (enabler) CE activities, 5) CE activities described using the '10R hierarchy'. Furthermore, these discussions raised the concern that external assurers of sustainability reports are not yet assuring CE-data, which again, creates barriers and risks for companies disclosing CE data. With respect to relevance and feasibility, companies determined that generally, CE-content is relevant to all key content elements of sustainability reports, however, found the elements of 'Risks and Opportunities' and 'Sustainability Performance' to be the least feasible to develop and disclose CE data for.

Chapter 4 highlights the significant influence that financial institutions have in shaping the transition towards a CE. As these institutions develop various screening and eligibility criteria to identify and categorise companies engaging with CE, it is no doubt that companies may reposition their value propositions (communicated through their sustainability reports) to align with the criteria in order to satisfy shareholders and receive additional investments. Also, within Chapter 4, a number of practical recommendations are made to support the integration of CE within corporate sustainability reports. These recommendations are based on a synthesis of all of the previous research findings and will be discussed in Section 5.2.

The research findings from articles presented in Appendices I and II contributes research findings that compliment and justify the main research findings discussed in this thesis. Firstly, research carried out in Appendix I contributes to evolving academic discussions on the conceptualisation of CE and its relation to sustainability. It was determined that for companies engaged with CE, the difference between the two concepts is not so important, however, the majority of companies recognised CE as an operational "toolbox" to progress towards sustainability. Secondly, the research presented in Appendix II determined that most of the academic and industry assessment approaches designed for CE are not being used by companies. Furthermore, the results uncovered the benefits of- and barriers to- CE assessment, where the benefits largely relate to the use of CE assessment results within external communication and marketing. To summarise, the methods applied in Appendices I and II have collected empirical evidence which constructs distinct corporate perspectives of: i) the concepts of CE and sustainability and ii) identifies practices related to their assessment. These corporate perceptions and practices were then able to be contrasted with the representations of CE and CE assessment approaches identified within the content analysis of corporate sustainability reports (Chapter 3).

Overall, the findings presented in this thesis add theoretical reflections to the dialogue on the efficacy of sustainability reporting to drive organisational change towards sustainability. Findings from Chapter 2 highlighted the extended length of time disclosure frameworks take to publish revised versions of their frameworks. This creates challenges in the effectiveness of disclosure frameworks to adequately respond to emerging sustainability topics, such as CE. Indeed, this research suggests that companies are more likely to be disclosing CE data despite the minimal guidance of the disclosure frameworks they prescribe to. Additionally, the results in Chapter 3 examined the format of sustainability

reports being produced by companies. The findings showed that companies publishing more than one annual report (e.g., a financial report plus a sustainability report), most often did not include CE-content within both reports or if CE-content was present in the financial report, it was at a reduced quantity and quality. This raises questions on whether the same sustainability information and value creation story is being communicated by companies to all relevant stakeholders. There is a growing push for more integrated and systems thinking on sustainability issues and thus, disclosing sustainability information through an integrated reporting approach. However, the findings within Chapter 3 indicate that the majority of companies are still separating financial and non-financial activities (even companies who are well recognised for their sustainability performance). The findings in Chapter 4 suggest that companies recognise a number of potential drivers for CE disclosure, with an increasing importance of using CE to attract new talent and encourage internal cultural change towards CE and more broadly sustainability. These findings reiterate the potential of sustainability reporting not only as a communication tool merely for compliance but as a process that facilitates the development and revision of an organisation's sustainability strategy, objectives, and assessment protocols.

It must also be acknowledged that although the specific scope of this research is on the topic of CE, as the aforementioned sustainable finance policies come into effect, challenges will arise for companies measuring and disclosing data for other evolving topics concerning environmental, social and governmental aspects e.g., global health threats, ecosystem services and human rights. This thesis discussed the difference in corporate perceptions of the ambiguous relation of CE and sustainability, and this ambiguity was observed in the sustainability reports analysed (Chapter 3). All of the findings within the chapters of this thesis reiterate the general lack of consumer awareness and understanding of CE, therefore, the findings encourage companies to disclose CE with the intention of educating and informing their employees, clients and stakeholders on CE issues.

To conclude, the interdisciplinary research carried out in this thesis has contributed a variety of empirical evidence concerning the emergence of CE within sustainability reporting literature and corporate accounting practices. This is particularly relevant for the ongoing work by EFRAG, who have to date, proposed the first draft European Sustainability Reporting Standards covering Environmental, Social and Governance material issues, with sectoral focused standards to follow. Furthermore, this thesis has contributed to major

theoretical discussions on the corporate perspectives of CE, the relation between CE and sustainability, the limitations of current sustainability reporting practices and the disclosure frameworks which guide them. The entirety of this research can be utilised in future investigations into practices of corporate greenwashing of CE activities (or "circular washing"). It is not yet clear if the implementation of CE strategies will truly reduce global resource extraction and consumption rates, thereby directing society away from the 'business-as-usual' sustainability path. However, the findings can at least ensure that corporate transparency within a CE and the potential for CE to drive sustainable value creation are topics that are gaining traction on the sustainability agenda. Furthermore, to quote Elkington (2018) again, "*together with its subsequent variants, the TBL concept has been captured and diluted by accountants and reporting consultants… where early adopters understood the concept as a balancing act, adopting a trade-off mentality".* This "trade-off mentality" is apparent throughout much of corporate sustainability research, as companies continue to assess and report activities in isolation between different systems, e.g., the economic, social and natural; which is also evident in traditional financial and non-financial reporting. Furthermore, decision-making frameworks for potential sustainability trade-offs associated with the implementation of CE strategies is becoming an increasingly urgent area of academia. Perhaps, as Elkington (2018) suggests, the mainstream disclosure frameworks which are engrained within corporate culture ignore the interconnected nature of natural and social systems. To this end, their integration of CE issues will only continue to encourage a trade-off approach to CE's implementation and disclosure. To overcome this, it is imperative that social-ecological systems thinking is utilised as a bridging concept to facilitate transdisciplinary action between different scientific disciplines and practitioners who are involved with regulating and financing sustainability transitions (Ahlström *et al.*, 2020).

Finally, this research has only begun to explore the synergies between the two fields of: CE and sustainable value creation. It is hoped that other researchers build on this thesis' findings and continue to investigate how CE can be integrated within corporate sustainability processes and frameworks to improve the efficacy of sustainability reporting. And in turn, advance the efforts made here to utilise sustainability reporting as a main driver facilitating change towards improved corporate sustainability within companies.

5.2 Recommendations for practitioners and future research

Given the novel nature of this research and the evolving landscape of CE disclosure, numerous opportunities have been uncovered for practitioners and future studies. This final section presents recommendations for practice (Section 5.2.1) and suggests ideas for future research directions (Section 5.2.2), as determined by the outcomes of the conducted research.

5.2.1 Recommendations for practitioners

The review of academic literature and analysis of disclosure frameworks presented in Chapter 2 can provide sustainability reporting practitioners with a summary of the available CE-specific guidance for disclosure. Furthermore, the review concludes with a number of challenges influencing the integration of CE within sustainability reporting. Practitioners can utilise these findings to determine which reporting framework or approach is most relevant for their company to develop and disclose CE-related material within their corporate sustainability report.

Findings presented within all chapters of this thesis have led to the development of practical recommendations for CE disclosure. These recommendations are relevant for managers, sustainability reporting practitioners and others who are involved with obtaining and reporting sustainability data. The following general recommendations are in addition to those detailed in Section 4.5.3:

1) Increased engagement with CE by senior management can lead to changes to internal corporate culture and reduce associated barriers for companies with CE implementation. It is recommended that companies initiate (double) materiality assessments to allow both internal and external stakeholders to identify significant material issues which may affect the company's ability to create value. Once CE has been identified through materiality assessments, the company must allocate resources to establish CE-specific objects and then measure and monitor progress towards these objectives;
2) Adding to this, with the prioritisation of CE as a key environmental objective within relevant sustainable finance policies, the number of companies required to disclose CE data will increase. Therefore, it is recommended that companies already start now to invest in improved CE-data collection processes and acquiring the necessary

CE-specific skills to ensure they can not only meet the future reporting requirements but become frontrunners of CE implementation and disclosure;

3) The descriptions of CE activities should not be superficially connected to the labels of SDGs or the company may be accused of “SDG-washing”. It is recommended that companies link their CE activities with the specific objectives of SDGs and to quantifiably demonstrate, through the use of targets and indicators, how their company’s business activities are contributing towards the achievement of individual SDGs;
4) Within corporate sustainability reports, targets for CE must be accompanied by relevant indicators measuring progress towards those targets (or indicate when progress will be made available);
5) The results of organisational approaches for CE assessment must be communicated with as much detail on the methodology used to derive them as possible. Reporting only single values or total circularity scores (e.g., 10% circular production processes) does not allow for comparison and is such, meaningless - unless the reader can determine how the result of such scores were produced;
6) Individual CE-specific targets and indicators should acknowledge the hierarchy of CE strategies and be designed to address only one CE strategy at a time. Combining multiple CE strategies within one indicator e.g., ‘volume of materials recycled, recovered and reused’, does not allow the reader to determine if the company has in fact made any improvements to their circularity (or sustainability) and will therefore expose the company to claims of greenwashing;
7) Practitioners should not forget that CE can be a powerful storytelling tool and such, should not neglect the qualitative information and data (e.g., stories of new supply chain collaborations for CE or employee training opportunities) included within their sustainability reports to increase awareness of CE and promote sustainability education within society;
8) When compiling reports, managers should reflect on not only the quality of sustainability data being reported but also how and where it is disclosed, both in and across their reports. It is imperative that all stakeholders receive the same relevant sustainability information to make informed evaluations and subsequent decisions related to the company’s overall performance - performance which is not solely based

on financial aspects or a limited version of their sustainability performance and outlook;

9) Practitioners should utilise the seven critical factors for CE disclosure presented in Chapter 4 as a framework to both develop and evaluate CE-content they intend to include within their corporate sustainability reports;
10) It is recommended that practitioners familiarise themselves with the seven goals of CE disclosure presented in Table 4.6. This list can be utilised as evidence of the potential benefits for companies and motivate managers to allocate sufficient resources to ensure their company's CE disclosure is of a quality that facilitates these goals to be met.

5.2.2 Recommendations for future research

The review of both academic and grey literature carried out in Chapter 2 discovered several opportunities for researchers to propose and validate communication strategies which can work to legitimise CE activities and their value to all members of society. In general, it is recommended that academics work to develop more educational resources which aim to increase societal awareness and understanding of CE. This will lead to: 1) an increase in consumer demand for circular products and CE-specific data and 2) an increase in the capacity of individuals and communities to not only understand this CE-specific data but to identify and criticise potential instances of corporate greenwashing of CE activities.

As mentioned in Chapter 2, this research observed limited evidence of CE content within fifteen major reporting approaches. It is very likely that within the next five years, these reporting approaches will be revised and updated in order to adapt their guidance to support their users (companies) to comply with the new reporting requirements set out in the CSRD (EC, 2021). Therefore, it is recommended that future studies are conducted to analyse the revisions for each framework, how the advice within each framework aligns and/or contrasts, and eventually, how they might influence the CE-specific content disclosed within corporate sustainability reports (this suggestion applies for other sustainability topics other than CE too).

In line with this recommendation, the findings from Chapter 3 encourage academics to take a longitudinal research approach to content analyses of corporate sustainability reports, in order to observe and analyse the changes in CE-specific report content after the

CSRD takes effect. These studies can consider a larger sample size and a more even distribution of companies across sectors, to account for potential sectoral differences (which was not able to be determined within this research). The results of this analysis can then provide an overview of trends and shortcomings of CE disclosure sector by sector and ultimately, help to inform sectoral-specific CE disclosure guidance.

Although the main focus of this research has been on the format of external sustainability reporting, it is recommended that researchers collect empirical evidence of CE-content within other external communication channels e.g., social media, speech transcripts and websites. This will become increasingly important for SMEs who are not (yet) required to produce a sustainability report but rely on informative and transparent communication to maintain engagement with their consumers and thus, may exhibit innovative approaches to CE disclosure or alternatively, instances of CE-related greenwashing.

The findings across all chapters within this thesis support the need for CE-specific capacity building within companies. Research can support them to develop the capabilities needed to independently assess and externally disclose the sustainability impacts of their CE activities. Furthermore, this research advocates that rather than “reinventing the wheel”, existing organisational approaches for sustainability assessment and reporting should be reviewed and CE-specific disclosure criteria integrated.

The results in both Chapters 3 and 4 demonstrate the increasing influence of various evolving sustainable finance policies on the structure and content of corporate sustainability reports. Furthermore, the integration of CE within key instruments and processes relevant to disclosure were identified such as: due diligence (risk and opportunity identification), materiality assessments, CEO’s messages, sustainability and corporate strategy development, as well as external assurance and audits. These findings allow for a number of new research directions, for example analysing and comparing the representation of- and metrics for- CE across these varying disclosure instruments, processes and within relevant sustainable finance policies. And, as already encouraged in Chapter 4, the ongoing efforts of academic researchers to identify and prevent sustainability rebound effects due to the implementation of CE activities must be aligned with the work of financial institutions who are developing the eligibility and screening criteria to finance CE-specific projects and companies.

Furthermore, it should be reiterated that due to the novel nature of this research field, the geographical scope has been mostly limited to companies operating in Europe, where companies are supported by ambitious CE research grants and transformative sustainable finance policies e.g., The EU Taxonomy Regulation (EC, 2020). The global influence of this EU Taxonomy Regulation can already be observed as other countries and regions are developing (or updating) their own sustainable finance taxonomies and policies. Therefore it is recommended that similar research on the emergence of CE within sustainable finance taxonomies, reporting regulations and the sustainability reports themselves, can (and should) be conducted in other geographical regions. As a starting point, Appendix VI lists a number of other official sustainable finance taxonomies which represent countries and regions around the world where the inclusion of resource-specific criteria will see an increase in global CE disclosure and CE-specific investments.

6 Conclusões e Recomendações (PT)

Esta investigação revelou conhecimentos que promovem a integração da economia circular (EC) na literatura e prática profissional de relatórios de sustentabilidade das empresas. Esta secção final apresenta as principais conclusões e contribuições teóricas para os objectivos definidos no início da presente tese. Este capítulo conclui também com uma lista de recomendações, baseadas nos resultados desta investigação, para profissionais de EC e relatórios de sustentabilidade, bem como com a sugestão de ideias para trabalhos futuros.

6.1 Principais conclusões e contribuições da investigação

Esta investigação teve como objetivo explorar a emergência da EC no âmbito dos modelos conceptuais de elaboração de relatórios de sustentabilidade das empresas, bem como identificar as perspectivas e experiências de empresas que medem e reportam dados de EC. Os métodos quantitativos e qualitativos utilizados recolheram resultados que contribuem para uma revisão da literatura, evidências empíricas e recomendações para o debate teórico e prático sobre o reporte da EC. Assim, os resultados alcançaram com sucesso os objectivos de investigação mencionados na Secção 1.3, sendo resumidos abaixo na Figura 6.1. As principais conclusões apresentadas nesta secção irão permitir o desenvolvimento futuro de um quadro de apoio às empresas que integram o conteúdo da EC nos relatórios de sustentabilidade.

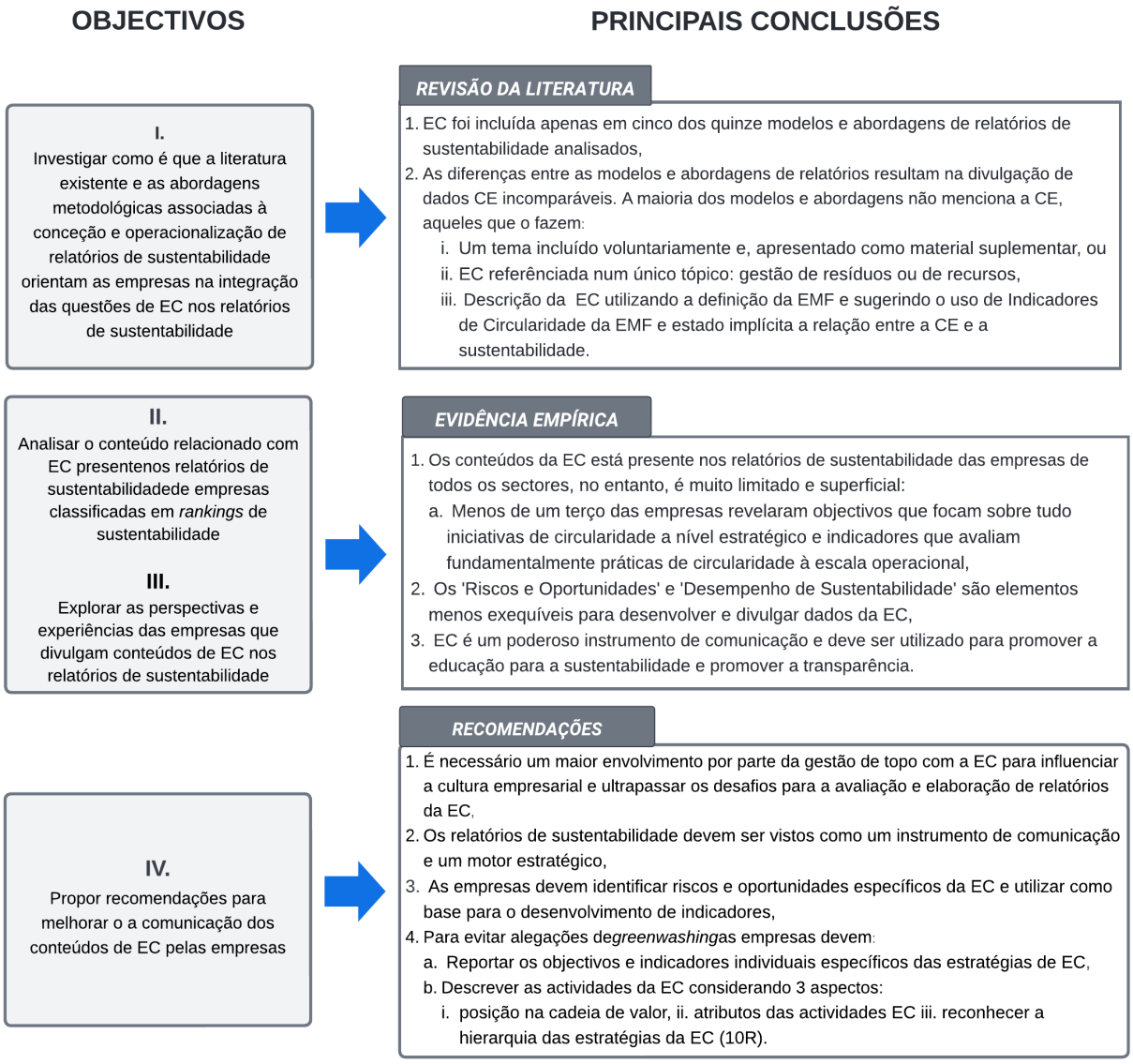

Figura: 6.1: Síntese dos principais conclusões da investigação para cada um dos objectivos realizados no âmbito desta tese.

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desenvolvimento futuro de um quadro de apoio às empresas que integram o conteúdo da EC nos relatórios de sustentabilidade.

O Capítulo 2 apresenta um primeiro artigo inovador de revisão bibliográfica que liga dois campos: EC e relatórios de sustentabilidade. Esta revisão da literatura académica encontrou um número reduzido de artigos publicados, no entanto, foram destacados vários desafios e lacunas de investigação que reorientaram as etapas de investigação subsequentes para esta tese. Em particular, a literatura sugeriu que a aplicação dos modelos de relatórios de apoio ao reporte de práticas de EC era inadequada (por exemplo, ISO 14001:2015 e BSI 8001:2017). Este resultado motivou a análise de várias estruturas e abordagens de relatórios para investigar a inclusão de informação relacionada com as EC. Adicionalmente, vários artigos da revisão de literatura levantam dois desafios principais que afectam o tipo de dados de EC que as empresas comunicam externamente, sendo estes: 1) a falta de consciencialização e compreensão dos consumidores em relação à EC e 2) a baixa aceitação no mercado da EC e de produtos dela resultantes. Estes desafios podem restringir o potencial da comunicação empresarial externa como motor da implementação da EC, uma vez que os processos de selecção de dados para a EC podem ser vistos como demasiado intensivos em termos de recursos e, em última análise, como um risco para as empresas.

Esta investigação também realizou uma primeira revisão dos modelos e abordagens de relatórios, tanto no geral como especificamente, para conteúdos sobre EC, contribuindo assim para novos conhecimentos nesta área (Capítulo 2). O método de análise de conteúdo, utilizado no âmbito desta tese, permitiu a revisão dos documentos em duas dimensões: 1) conteúdo: que orientação existe especificamente relacionada com a EC dentro de cada abordagem de reporte e 2) estrutura; *se* e onde a abordagem ou modelo de reporte menciona a EC. Esta análise de conteúdo pode ser adaptado e utilizado por outros investigadores em outros contextos, como, por exemplo, a bioeconomia. Foi igualmente compilada uma lista de 15 modelos de relatórios e abordagens internacionais considerados relevantes para empresas envolvidas com a EC e que desejem agora produzir um relatório de sustentabilidade (Tabela 2.4).

As conclusões do Capítulo 2 indicaram que, em 2019, a EC só foi mencionada em cinco dos quinze modelos e abordagens de relatórios analisadas. No que diz respeito à estrutura, a EC ou está incluída em material suplementar ou é apenas referenciada num

único tópico: a gestão de resíduos ou de recursos. No que diz respeito ao conteúdo, a EC é mais frequentemente descrita utilizando a definição da 'Ellen MacArthur Foundation' (EMF) e as escolhas para a selecção de dados continuam a ser da responsabilidade da empresa. No entanto, foram frequentemente observadas sugestões para que as empresas utilizassem os Indicadores de Circularidade da EMF e, de uma forma geral, a EC continua a ser uma questão de reporte voluntário. Em geral, existem diversas discrepâncias entre as orientações analisadas nos modelos e abordagens de reporte, o que provavelmente resultará em que as empresas ou não reportam as questões relacionadas com a EC ou apenas descrevem qualitativamente as actividades da EC sobre uma perspectiva de gestão de resíduos.

Posteriormente, foram analisados os conteúdo das EC nos relatórios de sustentabilidade das empresas para determinar a influência das orientações dadas no âmbito dos modelo se abordagens de relatórios em análise (Capítulo 3). Embora um número limitado de estudos tenha analisado a presença da EC nos relatórios de sustentabilidade das empresas, a investigação realizada nesta tese foi a primeira a efectuar uma análise de conteúdo, nos vários sectores de atividade e a nível internacional, dos relatórios de sustentabilidade em relação a conteúdos sobre EC. As conclusões salientaram a importância de mais estudos sobre a integração da EC nas empresas com modelos de negócio tradicionalmente orientados para os serviços, como por exemplo, no sector Financeiro. A análise de conteúdo centrou-se nas empresas que são publicamente reconhecidas tanto pelo seu desempenho de sustentabilidade como pelos relatórios de sustentabilidade, pelo que as conclusões contribuem para as atuais tendências do reporte da EC e as deficiências das empresas que mais provavelmente reportam dados sobre temas de sustentabilidade populares e emergentes, incluindo a EC. A investigação no Capítulo 3 adoptou também uma abordagem inovadora e pragmática à análise de conteúdos, examinando elementos específicos de relatório de sustentabilidade, oferecendo assim uma contribuição metodológica que pode ser desenvolvida por outros investigadores que analisam os conteúdos deste tipo de relatórios.

Em contraste com os estudos anteriores e os resultados da revisão de literatura (Capítulo 2), que tinham identificado uma presença limitada da EC nos relatórios de sustentabilidade, os resultados do Capítulo 3 demonstraram que a maioria das empresas estavam de facto a mencionar explicitamente o conceito de EC. Contudo, uma análise mais

profunda do conteúdo relacionados com a EC mostrou que muito poucas estavam de facto a integrar a EC nos elementos-chave de relatório analisados. Especificamente, esta investigação verificou que a EC foi descrita na mensagem do CEO por apenas 20% das empresas e em 28% das avaliações de materialidade da empresa. Nestes casos, foram assinaladas duas referências principais de EC: 1) a EC é um pilar importante da estratégia global da empresa ou, 2) a EC é uma extensão (ou substituição) das questões de gestão de resíduos e/ou recursos existentes na empresa. Adicionalmente, esta investigação também observou ligações do conteúdo da EC com os Objetivos de Desenvolvimento Sustentável (ODS), onde 30% das empresas descreveram a EC de acordo com vários ODS, em particular e na maioria das vezes, com o ODS 12: Produção e Consumo Sustentáveis. Estas conclusões contribuem para as atuais discussões teóricas sobre como a EC deve ser definidas e a relação entre EC e sustentabilidade, uma vez que oferecem as perspectivas e experiências das empresas classificadas em *rankings* de sustentabilidade que divulgam conteúdos de EC. Embora o discurso dominante continue a ser que a EC está centrada em actividades dentro da produção e consumo sustentáveis, as conclusões sugerem que as empresas também estão tendencialmente a implementar a EC para abordar questões relacionadas com a Ação Climática (ODS 13), Parcerias para a Implementação dos Objetivos (ODS 17), Proteção da Vida Terrestre (ODS 15) e Indústria, Inovação e Infraestruturas (ODS 9).

Além disso, a investigação do Capítulo 3 contribuiu para a continuação do debate académico e nas empresas sobre abordagens de avaliação da EC, nomeadamente através da identificação de objectivos e indicadores para a EC, como foi identificado nos relatórios de 29% das empresas analisadas. Esta investigação foi também o primeiro estudo a identificar objectivos e indicadores para a EC nos relatórios de sustentabilidade das empresas e depois a categorizá-los em função de estratégias do modelo dos 10-R proposto por Potting et al., 2017. Os resultados indicaram que as empresas revelam mais frequentemente objectivos para estratégias de EC de alto nível, tais como 'Reduzir' (por exemplo, 50% de embalagens de plástico feitas de material reciclado). Inversamente, os indicadores medem mais frequentemente estratégias de EC de nível inferior, tais como 'Reciclar' (por exemplo, % de resíduos industriais reciclados). Estes resultados reiteram a importância para as empresas (e outros atores) de não só afirmarem que se estão a envolver com a EC, reportando o desempenho de uma estratégia de EC de baixo nível,

mas também de demonstrarem melhorias na sua circularidade, implementando e reportando sempre que possível, dados para estratégias de EC de alto nível. Globalmente, estas conclusões conduziram a uma discussão nova e crítica sobre casos de *"greenwashing"* para actividades de EC e ofereceram sugestões sobre como as empresas podem potencialmente evitar estas alegações no futuro (Capítulo 3).

No sentido de melhor explorar as razões pelas quais as empresas praticam estas tendências no reporte da EC, a investigação qualitativa realizada no Capítulo 4 teve como objectivo delinear uma nova compreensão sobre temas relacionados com finanças sustentáveis, tais como a criação de valor empresarial e a identificação e gestão de riscos no contexto da EC. De uma forma geral, as empresas entrevistadas consideraram a comunicação externa da EC uma parte crítica do seu envolvimento com os clientes, contudo, a maioria declarou que apenas publicava dados qualitativos de EC devido à falta de qualquer quadro normalizado de avaliação e/ou reporte da EC, tornando os dados de EC incomparáveis e de difícil interpretação. Este facto reforça a importância da necessidade de orientações adicionais para apoiar as empresas sobre como medir, seleccionar e reportar os dados de EC. A amostra de empresas analisadas identificou factores críticos que elas acreditam que devem ser considerados dentro do reporte da EC de uma empresa, incluindo a garantia de um equilíbrio entre: 1) aspectos tangíveis vs. intangíveis da circularidade, 2) dados qualitativos vs. quantitativos para a EC, 3) ambições de curto prazo vs. longo prazo, 4) consideração das actividades internas vs. externas da EC, 5) actividades da EC descritas utilizando a hierarquia dos "10R". Adicionalmente, essas discussões levantaram a preocupação de que os avaliadores externos de relatórios de sustentabilidade ainda não estão a garantir dados de EC, o que, novamente, cria barreiras e riscos para as empresas que reportam dados de EC. No que diz respeito à relevância e viabilidade, as empresas indicaram que, em geral, o conteúdo da EC é relevante para todos os elementos-chave do conteúdo dos relatórios de sustentabilidade, contudo, consideraram que os elementos de "Riscos e Oportunidades" e "Desempenho de Sustentabilidade" eram os menos viáveis para desenvolver e reportar os dados de EC.

O capítulo 4 destaca a influência significativa que as instituições financeiras têm nos processos detransição para uma EC. À medida que estas instituições desenvolvem vários critérios de selecção e elegibilidade para identificar e categorizar as empresas que se envolvem com a EC, não há dúvida que as empresas podem reposicionar as suas

propostas de valor (reportadas através dos seus relatórios de sustentabilidade) para se alinharem com os critérios de modo a satisfazerem os accionistas e receberem investimentos adicionais. No Capítulo 4, são igualmente efetuadas várias recomendações práticas para apoiar a integração da EC nos relatórios de sustentabilidade das empresas. Estas recomendações baseiam-se numa síntese de todos os resultados da investigação anterior e serão discutidas na Secção 6.2.

Os resultados da investigação dos artigos apresentados nos Apêndices I e II contribuem para complementam e enquadrar os principais resultados discutidos nesta tese. Em primeiro lugar, a investigação realizada no Apêndice I contribui para a evolução do debate académico sobre a conceptualização da EC e a sua relação com a sustentabilidade. Verificou-se que, para as empresas envolvidas com a EC, a diferença entre os dois conceitos não é tão importante, contudo, a maioria das empresas reconheceu a EC como um conjunto de ferramentas operacionais para progredir no sentido da sustentabilidade. Em segundo lugar, a investigação apresentada no Apêndice II constatou que a maioria das abordagens de avaliação para a EC efectuadas pelos académicos e a nível das empresas, na verdade não estão a ser utilizadas pelas próprias empresas. Complementarmente, os resultados revelaram os benefícios e barreiras à avaliação da EC, onde os benefícios estão em grande parte relacionados com a utilização dos resultados da avaliação da EC na comunicação externa e *marketing*. Em resumo, os métodos aplicados nos Apêndices I e II recolheram provas empíricas que constroem perspectivas empresariais distintas sobre: i) os conceitos de EC e sustentabilidade e ii) identificação de práticas relacionadas com a avaliação da EC. Estas percepções e práticas das empresas puderam então ser comparadas com as representações da EC e das abordagens de avaliação da EC identificadas no âmbito da análise do conteúdo dos relatórios de sustentabilidade das empresas (Capítulo 3).

Todas as conclusões apresentadas nesta tese contribuem igualmente para o diálogo sobre a eficácia dos relatórios de sustentabilidade para impulsionar a mudança das organizações no sentido da sustentabilidade. As conclusões do Capítulo 2 destacaram o longo período de tempo que os modelos e abordagens de reporte o levam a publicar versões revistas desses mesmos modelos. Isto cria desafios à eficácia dos modelos e abordagens de reporte para responder adequadamente aos tópicos de sustentabilidade emergentes, tais como a EC. De facto, esta investigação sugere que as empresas estão

mais propensas a reportar dados de EC apesar da poucas orientações dos modelos e abordagens que as definem. Além disso, os resultados do Capítulo 3 examinaram o formato dos relatórios de sustentabilidade que estão a ser produzidos pelas empresas. Os resultados mostraram que as empresas que publicam mais do que um relatório anual (por exemplo, um relatório financeiro e um relatório de sustentabilidade), na maioria das vezes não incluem o conteúdo de EC em ambos os relatórios ou incluem no relatório financeiro de forma superficial. Isto levanta questões sobre se a mesma informação de sustentabilidade e de criação de valor empresarial está a ser reportada pelas empresas a todas as partes interessadas relevantes. Há uma tendência crescente para uma maior integração e pensamento sistémico sobre questões de sustentabilidade e, portanto, para o reporte de informação sobre sustentabilidade através de uma abordagem integrada de relatórios. Contudo, as conclusões do Capítulo 3 indicam que a maioria das empresas ainda está a separar as atividades financeiras das não financeiras, mesmo no caso das empresas que são bem reconhecidas pelo seu desempenho em matéria de sustentabilidade. As conclusões do Capítulo 4 sugerem que as empresas reconhecem uma série de potenciais catalizadores do reporte da CE, com uma importância crescente da utilização da CE para atrair novos desafios e encorajar a mudança cultural interna para EC e, de uma forma mais ampla, para a sustentabilidade. Estas conclusões reiteram o potencial do reporte da sustentabilidade não só como um instrumento de comunicação de conformidades legais, mas também como um processo que facilita o desenvolvimento e revisão da estratégia, objetivos e avaliação de sustentabilidade de uma organização.

Deve também reconhecer-se que embora o âmbito específico desta investigação seja sobre o tema da EC, semelhantes desafios surgirão para as empresas que medem e reportem dados para outros campos emergentes relativos a aspectos ambientais, sociais e governamentais, como por exemplo, ameaças globais à saúde, serviços de ecossistemas e direitos humanos. Esta tese discutiu a diferença nas percepções das empresas sobre a relação ambígua da EC e da sustentabilidade, e esta ambiguidade foi também observada nos relatórios de sustentabilidade analisados (Capítulo 3). Todas as conclusões dos capítulos desta tese reiteram a falta generalizada de consciencialização e compreensão dos consumidores em relação à EC, pelo que as conclusões encorajam as empresas a divulgar a EC com a intenção de educar e informar os seus empregados, clientes e todas as partes interessadas sobre as questões da EC.

Para concluir, a investigação interdisciplinar levada a cabo nesta tese contribuiu com uma variedade de provas empíricas relativas à emergência da EC dentro da literatura de relatórios de sustentabilidade e práticas de responsabilidade das empresas. Esta tese contribuiu ainda para os grandes debates teóricos sobre as perspectivas empresariais da EC, a relação entre EC e sustentabilidade, as limitações das atuais práticas de relatórios de sustentabilidade e ao modelos e abordagens de reporte que as orientam. Esta investigação pode também ser utilizada em investigações futuras sobre práticas de *greenwashing* de actividades de EC ou de *circular washing*. Não é, ainda claro se a implementação de estratégias de EC reduzirá verdadeiramente as taxas globais de extracção e consumo de recursos, afastando assim a sociedade do caminho da sustentabilidade "business-as-usual". Contudo, as conclusões podem pelo menos assegurar que a transparência empresarial dentro de uma EC e o potencial da EC para impulsionar a criação de valor sustentável são tópicos que estão a ganhar força na agenda da sustentabilidade. Refira-se ainda para citar novamente Elkington (2018), *"together with its subsequent variants, the TBL concept has been captured and diluted by accountants and reporting consultants… where early adopters understood the concept as a balancing act, adopting a trade-off mentality".* Esta mentalidade de *trade-off* é evidente em grande parte da investigação de sustentabilidade das empresas, uma vez que as empresas continuam a avaliar e a relatar actividades isoladamente entre diferentes sistemas, por exemplo, o económico, social e natural; o que também é evidente nos relatórios tradicionais financeiros e não financeiros. Paralelamente, os processos de decisão para potenciais compromissos de sustentabilidade associados à implementação de estratégias de EC estão a tornar-se uma área cada vez mais urgente da academia. Talvez, como Elkington (2018) sugere, os principais modelos de reporte que estão enraizados na cultura corporativa ignorem a interligação dos sistemas naturais e sociais. Para este fim, a sua integração de questões da EC apenas continuará a incentivar uma abordagem de *trade-off* à implementação e reporte da EC. Para ultrapassar esta questão, é imperativo que o pensamento dos sistemas sócio-ecológicos seja utilizado como um conceito de ligação para facilitar a acção transdisciplinar entre diferentes disciplinas científicas e profissionais envolvidas na regulação e financiamento de transições de sustentabilidade (Ahlström et al., 2020).

Finalmente, esta investigação começou só a explorar as sinergias entre os dois campos: EC e a criação de valor sustentável. Espera-se que outros investigadores se

baseiem nas conclusões desta tese e continuem a investigar como é que a EC pode ser integrada nos processos e estruturas de sustentabilidade da empresa com o objetivo de melhorar a eficácia do reporte da sustentabilidade. É igualmente espectável permitir avanços para utilizar o reporte da sustentabilidade como um dos principais impulsionadores da mudança para a melhoria da sustentabilidade dentro das empresas.

6.2 Recomendações para profissionais e investigação no futuro

Dada a natureza inovadora desta investigação e o panorama evolutivo do reporte da EC, foram descobertas várias oportunidades para os profissionais e investigações futuras. Esta secção final apresenta recomendações para a prática profissional (Secção 6.2.1) e sugere ideias para futuras direções de investigação (Secção 6.2.2), conforme foi verificado pelos resultados da investigação realizada.

6.2.1 Recomendações para profissionais

A revisão da literatura académica e a análise dos modelos de reporte apresentados no Capítulo 2 podem fornecer aos profissionais que desenvolvam relatórios de sustentabilidade um resumo do que está disponível em termos de orientações específicas de reporte da EC. A revisão conclui também com uma série de desafios que influenciam a integração da EC nos relatórios de sustentabilidade. Os profissionais podem utilizar estas conclusões para determinar qual o modelo ou abordagem de elaboração de relatórios mais relevante para a empresa desenvolver e reportar material relacionado com a EC.

Os resultados apresentados em todos os capítulos desta tese conduziram ao desenvolvimento de recomendações práticas para o reporte da EC. Estas recomendações são relevantes para gestores, profissionais que desenvolvam relatórios de sustentabilidade e outros que estejam envolvidos na obtenção e reporte de dados de sustentabilidade. As recomendações gerais que se seguem juntam-se às que estão detalhadas na Secção 4.5.3:

1) Um maior envolvimento com a EC por parte dos quadros superiores pode levar a mudanças na cultura empresarial interna e reduzir as barreiras associadas para as empresas na implementação da EC. Recomenda-se que as empresas iniciem avaliações (duplas) de materialidade para permitir aos intervenientes internos e

externos identificar questões materiais significativas que possam afectar a capacidade de criação de valor da empresa. Uma vez identificada a EC através de avaliações de materialidade, a empresa deve atribuir recursos para estabelecer objectos específicos da EC e depois medir e monitorizar o progresso em direcção a estes objectivos;

2) Acrescentando a isto, com a prioritização da EC como um objectivo ambiental chave no âmbito das políticas financeiras sustentáveis relevantes, o número de empresas necessárias para reportar dados de EC aumentará. Por conseguinte, recomenda-se que as empresas comecem já a investir em melhores processos de recolha de dados de EC e a adquirir as competências específicas necessárias à EC para garantir que possam, não só cumprir os futuros requisitos de informação, mas também tornar-se pioneiras na implementação e reporte da EC;
3) As descrições das actividades da EC não devem estar superficialmente ligadas às rótulos dos ODS ou a empresa pode ser acusada de "lavagem dos ODS". Recomenda-se que as empresas associem as suas actividades da EC aos objectivos específicos dos ODS e que demonstrem de forma quantificável, através da utilização de metas e indicadores, como as actividades de negócio da empresa estão a contribuir para a realização de cada ODS;
4) Nos relatórios de sustentabilidade das empresas, as metas para a EC devem ser acompanhadas por indicadores relevantes que meçam o progresso no sentido de atingir essas metas (ou que indiquem quando é que o progresso será disponibilizado);
5) Os resultados das abordagens organizacionais para a avaliação da EC devem ser reportados com o maior detalhe possível sobre a metodologia utilizada para a sua obtenção. A comunicação de apenas valores únicos ou pontuações de circularidade total (por exemplo, 10% de processos de produção circular) não permite a comparação e não tem qualquer significado - a menos que o leitor possa determinar como o resultado de tais pontuações foi produzido;
6) Os objectivos e indicadores individuais específicos da EC devem reconhecer a hierarquia das estratégias da EC e ser concebidos para abordar apenas uma estratégia de EC de cada vez. A combinação de múltiplas estratégias de EC dentro de um indicador, por exemplo, "volume de materiais reciclados, recuperados e

reutilizados", não permite ao leitor aferir se a empresa fez, de facto, quaisquer melhorias à sua circularidade (ou sustentabilidade) e, portanto, pode expor a empresa a alegações de lavagem verde;

7) Os profissionais não devem esquecer que a EC pode ser uma poderosa ferramenta de reporte, como tal, não devem negligenciar as informações e dados qualitativos (por exemplo, novas colaborações na cadeia de fornecimento para a EC ou oportunidades de formação de empregados) incluídos nos relatórios de sustentabilidade para aumentar a consciencialização para a EC e promover a educação para a sustentabilidade na sociedade;
8) Ao compilar relatórios, os gestores devem reflectir não só sobre a qualidade dos dados de sustentabilidade a serem reportados, mas também sobre como e onde são divulgados, tanto dentro dos seus relatórios como entre eles. É imperativo que todas as partes interessadas recebam a mesma informação relevante sobre sustentabilidade para fazer avaliações informadas e decisões subsequentes relacionadas com o desempenho global da empresa - desempenho que não se baseia apenas em aspectos financeiros ou numa versão limitada do seu desempenho e perspectivas de sustentabilidade;
9) Os profissionais devem utilizar os sete factores críticos para o reporte da EC apresentados no Capítulo 4 como um modelo para desenvolver e avaliar o conteúdo da EC que pretendem incluir nos relatórios de sustentabilidade da empresa;
10) Recomenda-se que os profissionais se familiarizem com os sete objectivos do reporte da EC apresentados na Tabela 4.6. Esta lista pode ser utilizada como prova dos potenciais benefícios para as empresas e motivar os gestores a atribuir recursos suficientes para garantir que o reporte da EC das empresas seja de uma qualidade que facilite a realização destes objectivos.

6.2.2 Sugestões para futura investigação

A revisão da literatura académica e “cinzenta” realizada no Capítulo 2 identificou várias oportunidades para os investigadores proporem e validarem estratégias de reporte que possam trabalhar para legitimar as actividades da EC e o respectivo valor para todos os membros da sociedade. Em geral, recomenda-se que os académicos trabalhem no sentido de desenvolver mais recursos educativos que visem aumentar a consciência e

compreensão da EC por parte da sociedade. Isto conduzirá a: 1) um aumento da procura de produtos circulares e dados específicos de EC por parte dos consumidores e 2) um aumento da capacidade dos indivíduos e comunidades não só para compreender estes dados específicos de EC, mas também para identificar e criticar potenciais casos de *green washing* de actividades de EC por parte das empresas.

Tal como mencionado no Capítulo 2, esta investigação observou que o conteúdo de EC é muito limitado no âmbito dos grandes modelos e abordagens de relatórios analisados. É muito provável que dentro dos próximos cinco anos, estas abordagens de reporte sejam revistas e actualizadas a fim de adaptar as suas orientações para apoiar os seus utilizadores (empresas) no cumprimento dos novos requisitos de reporte estabelecidos na Diretiva de reporte de informações sobre a sustentabilidade das empresas (CSRD - *Corporate Sustainability Reporting Directive*) (CE, 2021). Por conseguinte, recomenda-se a realização de estudos futuros para analisar as revisões de cada modelo ou abordagem, a forma como as orientações dentro de cada modelo alinham e/ou contrastam e, eventualmente, como podem influenciar o conteúdo específico da EC reportados nos relatórios de sustentabilidade empresarial. Esta sugestão aplica-se também a outros tópicos de sustentabilidade para além da EC.

De acordo com esta recomendação, os resultados do Capítulo 3 encorajam os académicos a adoptar uma abordagem de investigação longitudinal para a análise de conteúdo dos relatórios de sustentabilidade das empresas, a fim de observar e analisar as alterações no conteúdo dos relatórios específicos de EC após a entrada em vigor da CSRD. Estes estudos podem considerar uma maior dimensão da amostra e uma distribuição mais equilibrada das empresas pelos sectores, para ter em conta potenciais diferenças sectoriais que não puderam ser verificadas no âmbito desta investigação. Os resultados desta análise podem então fornecer uma visão geral das tendências e fraquesas do reporte da EC, sector por sector e, em última análise, ajudar a fundamentar orientações sectoriais específicas em matéria de reporte da EC.

Embora o foco principal desta investigação tenha sido o formato de relatórios de sustentabilidade, recomenda-se que os investigadores recolham provas empíricas do conteúdo de EC dentro de outros canais de comunicação, por exemplo, meios de comunicação social, análise discursiva e *websites*. Isto tornar-se-á cada vez mais importante para as Pequenas e Médias Empresas que não são ainda obrigadas a produzir

um relatório de sustentabilidade, mas dependem de uma comunicação informativa e transparente para manter o envolvimento com os consumidores e, assim, podendo exibir abordagens inovadoras à divulgação da EC ou, em alternativa, de exemplos de "greenwashing" relacionados com a EC.

No geral, as conclusões de todos os capítulos desta tese apoiam de facto a necessidade de desenvolvimento de capacidades específicas de EC dentro das empresas. A investigação por um lado pode ajudar as empresas a desenvolver as capacidades necessárias para avaliar independentemente e reportar externamente os impactos de sustentabilidade das actividades de EC. Por outro lado, esta investigação defende que, em vez de "reinventar a roda", as abordagens organizacionais existentes para a avaliação e elaboração de relatórios de sustentabilidade devem ser revistas, devendo ser integrados os critérios de reporte específicos da EC.

Os resultados em ambos os Capítulos 3 e 4 demonstram a influência crescente de várias e atuais políticas financeiras sustentáveis na estrutura e conteúdo dos relatórios de sustentabilidade das empresas. Além disso, foi identificada a integração da EC nos principais instrumentos e processos relevantes para o reporte, tais como: identificação de riscos e oportunidades, avaliações de materialidade, mensagens do CEO, sustentabilidade e desenvolvimento de estratégias empresariais, bem como garantias externas e auditorias. Estas conclusões permitem uma série de novas orientações de investigação, por exemplo, analisando e comparando a representação e métricas para a EC através destes diferentes instrumentos de reporte, processos e no âmbito de relevantes políticas financeiras sustentáveis. E, tal como já realçado no Capítulo 4, os esforços em curso dos investigadores académicos para identificar e prevenir os efeitos de recuperação da sustentabilidade devido à implementação das atividades de EC devem ser alinhados com o trabalho das instituições financeiras que estão a desenvolver os critérios de elegibilidade e verificação para financiar projectos e empresas especificamente na área da EC.

Deve ser igualmente reiterado que, devido à natureza inovadora deste campo de investigação, o âmbito geográfico tem sido na sua maioria limitado às empresas que operam na Europa, onde as empresas são apoiadas por financiamentos de investigação relacionadas com a EC e políticas transformadoras de financiamento sustentável como por exemplo, o Regulamento da Taxonomia da UE (CE, 2020). A influência global deste Regulamento de Taxonomia da UE já pode ser observada à medida que outros países e

regiões estão a desenvolver, ou a actualizar, as suas próprias políticas e taxonomias financeiras sustentáveis. É assim recomendado é que investigação semelhante sobre a emergência da EC no âmbito das taxonomias de finanças sustentáveis, regulamentos de prestação de contas e os próprios relatórios de sustentabilidade, possa e deva ser conduzida noutras regiões geográficas. Como ponto de partida, o Apêndice V lista uma série de outras taxonomias oficiais de finanças sustentáveis que representam países e regiões em todo o mundo onde a inclusão de critérios específicos de recursos irá assistir a um aumento do reporte global da EC e investimentos específicos da EC.

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8 Appendices

8.1 Appendix I

Circular Economy and Sustainability
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FULL PAPER

What Is the Relation between Circular Economy and Sustainability? Answers from Frontrunner Companies Engaged with Circular Economy Practices

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Abstract
The circular economy (CE) concept has become a major interest for companies, promising new business opportunities and a decrease in environmental impacts. Though research on circular business models has recently increased, few scholars have investigated how companies engaged with CE view the connection between CE and sustainability. To address this gap, this paper uses a semi-quantitative survey and semi-structured interviews conducted with companies based in Italy and the Netherlands. Purposive sampling was employed to target firms associated with national and international CE networks, as these companies already engage with CE practices. The survey was distributed online to over 800 firms, of which 155 provided information on their understanding of the CE concept and its relationship with sustainability. The survey results are complemented through findings from 43 interviews with a subset of the survey respondents. The survey answers show that companies view CE as one of the tools to achieve sustainable development, particularly in the environmental domain, where the focus lies on environmentally friendly resource use. Yet, the respondents are less confident whether CE increases economic and social benefits of firms. Interviews show that a majority of respondents position sustainability as the overarching concept. However, most companies advocate that the private sector should strive for both sustainability and circularity, though the distinction between the two concepts in daily business operations seems synthetic and futile to some. These findings provide an important stepping stone for better understanding how firms could apply CE practices to move towards a more sustainable society.

Keywords Circular economy · Sustainability · Semi-quantitative survey · Semi-structured interviews · Mixed methods · Private sector

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Introduction

Companies are increasingly engaging with the concept of circular economy (CE) [1], further integrating CE practices within organisational sustainability strategies. As the definition and possibilities of CE evolve, so does its relation with sustainability, requiring a re-clarification of the two concepts. Sauvé et al. [2] pointed out that the transdisciplinary nature inherent to sustainable development (SD) results in difficulties formulating one single conceptualisation. This is because of the intermeshing of diverse disciplines, vocabularies and stakeholders. Some authors suggest the interpretive flexibility of sustainability is a strength, as it enables the concept to be adapted to a variety of contexts and institutions [3]. Others argue sustainability's vagueness hinders operationalisation [4]. Either way, efforts have been made to find a consensus on SD's conceptualisation [5] based on the globally accepted Sustainable Development Goals (SDG) framework [6]. In many ways, the ambiguity of SD can be extended to the concept of CE [7, 8]. This reality has encouraged numerous scholars to perform literature reviews in an attempt to improve the clarity of CE as a concept [9–12].

Similarly to SD, CE can also be considered an umbrella concept, drawing inspiration from a diverse set of resource management concepts and ideas from environmental sciences that were popularised in the 1960s [13]. While numerous CE strategies exist and discussions on the impact of such strategies are increasing [14], the core of CE can be described by its aim to retain value through the process of closing resource loops [15]. In some academic literature, this description has evolved, with numerous discourses suggesting CE can reduce harmful environmental impacts, stimulate economic growth and more recently, generate positive social impacts [16, 17]. Nonetheless, several authors have also shown that "circular" practices do not always result in sustainable impacts, potentially leading to sustainability trade-offs [11, 18, 19].

Given companies play a key role in the transition to a CE [20], their interpretation of the relation between CE and sustainability will provide insights into decision-making processes concerning the previously mentioned trade-offs and might reveal to what extent they consider their CE practices help to solve current sustainability issues. However, company perceptions of this relation have previously been overlooked in CE literature. Various articles study drivers for implementing CE solutions at the company level (e.g. [21]), but do not investigate the explicit question of how the concepts are connected. In addition, it has been noted that empirical research on larger numbers of cases is still uncommon in CE literature [22]. Furthermore, other studies have indiscriminately surveyed companies regardless of their engagement with CE [1, 21, 23], making it difficult to distinguish between the perspectives of companies that are engaged with CE practices and those which are not.

Therefore, this article aims to empirically explore how frontrunner companies engaged with CE practices understand the connection between CE and sustainability. In this research, frontrunner companies are considered as private sector organisations which are early adopters of CE practices and are involved in cross-sectoral networks to exchange experiences and further their knowledge on CE. For both reasons, it is assumed that they possess considerable insights on the topic [24]. To attain the research aim, four objectives were formulated to identify how companies engaged with CE: (a) describe CE, (b) describe sustainability, (c) describe the link between CE and sustainability, and (d) prioritise these two concepts.

An explorative mixed-methods approach consisting of a semi-quantitative survey and semi-structured interviews was implemented to enquire companies' perspectives on the connection of CE and sustainability. The companies selected within this study operate in either Italy or the

Netherlands. Both are leading European countries in publishing CE research and implementing CE practices [23, 25]. Moreover, both countries have established national and regional level CE networks, resulting in an ecosystem of companies involved with the development of CE [26]. With no restrictions on company size or industry sector, a diverse range of perspectives were uncovered to reflect the experiences of companies integrating CE practices, while progressing towards sustainability goals. The remainder of this article presents a literature review ("Academic Perspectives on the Relation between CE and Sustainability" section), the mixed methods approach employed ("Methods" section), results obtained for each research objective ("Results" section), their discussion and synthesis of the overall research aim ("Discussion" section) and concluding remarks ("Concluding Remarks" section).

Academic Perspectives on the Relation between CE and Sustainability

A vast array of conceptual interpretations of both CE and sustainability exists within CE-related literature [7, 8]. In fact, positioning CE in relation to the more established concept of SD has become a dominant topic of discussion [2, 10, 17, 18, 27, 28]. Sauvé et al. [2] contrast CE with environmental sciences and SD, noting that CE provides a relatively clear "angle of attack" to solve environmental problems. The multitude of relations is also addressed by Geissdoerfer et al. [10], uncovering three general groups of relationships: a conditional- (CE as a condition for SD), beneficial- (CE benefits SD) or a trade-off- (CE having both positive as well as negative sustainability impacts) relationship. In their literature analysis, Schöggl et al. [28] highlight that CE solutions can also carry negative sustainability outcomes, due to e.g. rebound effects (see also: [19]). They state that social topics remain underrepresented in CE and that higher-ranking value retention options, with potentially higher sustainability impacts, are less clearly addressed in CE literature. Next, Schroeder et al. [17] identify the extent to which CE practices are relevant for the implementation of the SDGs. The links between CE and the different SDGs range from weak/non-existent (e.g. SDG 3 on Good Health and Wellbeing and SDG 5 on Gender Equality) to strong/direct (e.g. SDG 8 on Decent Work and Economic Growth and SDG 12 on Responsible Consumption and Production). Lastly, using a critical literature review and timeline of CE conceptualisations, Calisto Friant et al. [13] develop a typology of circularity discourses. They present a conceptual differentiation between the *Circular Economy discourse*, which primarily offers a technical perspective of material efficiency, and the more SD-related *Circular Society discourse*, which also includes the redistribution of wealth, knowledge, technology and power throughout society.

While the academic debate on the relation between CE and sustainability is lively, the perspective of companies active in CE seems overlooked in CE literature. Yet, this perspective potentially carries insights about their envisioned contribution to solving current sustainability issues through the real-world impacts of firms' CE solutions. Several studies analyse drivers and barriers for implementing CE solutions at the company level (e.g. [21, 29]), but do not explicitly address how the concepts CE and sustainablity are related. Brown et al. [24] investigate why companies engage in CE collaboration and interestingly find that the actors' motivations are rooted in normative values for sustainability. However, the participants' interpretation of the connection between CE and sustainability is not assessed. Related thereto, Ritzén and Sandström [30] ask manufacturing companies about barriers to CE and find that the lack of integration of different domains, such as sustainability and CE, forms a barrier to the CE transition. In addition, the definition of the concepts might potentially be context-

dependent, as is the case for one of the underlying fields of study of CE, namely industrial ecology. Deutz et al. [31] have shown that the understanding and manifestation of industrial ecology approaches such as industrial symbiosis can vary considerably, both within and amongst countries. This context-dependency of the definition has not yet been analysed for companies with CE practices.

Furthermore, no consensus exists with respect to how two emerging aspects, bioeconomy and sufficiency, are relevant within these discussions about the relation between CE and sustainability. Bioeconomy has been considered a possible "sustainability avenue" [32], and its contribution to CE has been investigated [33]. The regenerative nature of biological materials, in which output materials can be returned to the cycle through processes such as composting, is in line with the circulation of resources in a CE [33]. Still, whether this concept is integral, complementary, or an alternative to implementing CE remains unclear [34]. For sufficiency, the possibility of realizing a CE in a world with growing consumption rates has been scrutinised by some [18, 35]. To address this, recent studies have proposed a further paradigm shift towards a sufficiency-based CE [36]. Introduced as a characterising feature of CE by Stahel [37], sufficiency is also described as a new paradigm within industrial sustainability. It takes a societal-wide focus on reducing consumption, evolving from lean manufacturing, cleaner production and CE [36]. Compared to the earlier understanding by Stahel [37] which was mainly based on the reduction of waste through value retention, Bocken and Short [36] also underline that sufficiency prevents rebound effects and thus entails an absolute decrease in consumption. Furthermore, consumers and policy makers have a larger role to play in sufficiency than within the previous paradigms, in which the market and technology were seen as the main levers. However, whether frontrunner companies engaged with CE practices are aware of both this paradigm shift and the role of bioeconomy in this transition remains unexplored.

Lastly, the promotion of CE as a tool to positively influence all three dimensions of sustainability of an organisation, as popularised by the Triple Bottom Line (TBL) concept [38], often ignores the dilemma of sustainability trade-offs [11]. It is important to note that such "CE trade-offs" would alter the interpretation of the relation between CE and SD and substantiate the necessity of accurately assessing the effects of CE solutions before their implementation. The blurry boundary between CE and sustainability and lack of insight into company-level interpretations of the two concepts, ultimately, constrains the efficacy of organisations implementing CE to contribute towards reaching the SDGs.

Methods

This section describes the mixed-methods approach [39] employed within this study. The authors opted for semi-quantitative and a qualitative research method, which are mainly applied to research of an explorative nature [40]. The first method was a semi-quantitative survey [39], which does not only focus on the frequency of respondents' characteristics within the sample but also analyses the variety of these characteristics. The second method employed were semi-structured interviews [41] to better understand why and how companies connect the concepts of CE and sustainability. The following paragraphs describe the individual steps of the method, starting with the sampling procedure ("Sampling Procedure " section). The obtained sample is then presented in the sample description ("Survey Development" section) and the types of questions asked are documented in the survey development ("Survey

Development" section). After collecting the survey answers, the interview process ("Interview Process" section) was developed and both data sources integrated into the iterative data analysis ("Data Analysis and Integration" section).

Sampling Procedure

A purposive sampling method [42] was applied to identify companies actively engaged with CE practices in Italy and the Netherlands. Though this sampling method reduces the potential target population for sampling, it increases the possibility that the whole sample has specific characteristics (i.e. possessing insights on CE) that are desirable to address the research question. Despite CE continuing to grow in popularity, the number of self-identified "circular firms" is limited [43]. Hence, the authors focused the sample on companies within existing national and international CE networks depicted in Table 1, as these firms were assumed to be frontrunners in conceptualising and engaging with CE practices [24]. CE experts, involving policy makers, university professors and CE network coordinators in the Netherlands and Italy, were consulted to ensure representative coverage of CE networks, thus avoiding a sampling bias, which could result in the exclusion of relevant CE networks [44]. Furthermore, to minimise the coverage error occurring if companies are missing within the sampling frame, the researchers consulted updated network member lists online or directly contacted the CE network coordinators.

At the end of the survey, respondents were asked to voluntarily opt-in for the subsequent interviews with the researchers; thus, the interview sample constitutes a subset of the survey respondents. The answers to both the survey and the interviews were anonymised to ensure the establishment of participants' trust and additional insights on participants' experiences.

Table 1 Sampling protocol and data collection overview

CE networks considered	• Atlante Italiano dell'Economia Circolare (IT) • Italian Circular Economy Stakeholder Platform (ICESP) (IT) • Circular Economy Network (IT) • Mercato Circolare (IT) • Circulair ondernemen (NL) • Ontertekenaars van Grondstoffakkoord (NL) • Circle Economy (NL) • Holland Circulair Hotspot (NL) • Circulaire Coalitie (NL) • Ellen MacArthur Foundation CE 100 (international) • Circular Economy Club (international)
Inclusion criteria for companies	• Part of a local or international CE network listed above • Primary business operations in either NL or IT, if member of international networks • Legal form is a private sector organisation according to national law • Online presence through an official website
Survey delivery and responding period	• Delivered online via Survey Monkey, with personalised email invitation and customised links • Three reminder emails sent out within intervals of 3 weeks • Three months total responding period: July–September 2019
Interviewing process	• Invited companies that indicated their availability for interview within the survey • Sent out interview guidelines at least 1 week prior to interview • Conducted semi-structured interviews through video calls • Interview period: May–June 2020

Sample Description

The survey was sent out online to a total of 809 companies and was completed by 171, of which 155 responses were valid. This represents a survey response rate of 19%, which is considerable for business surveys [45]. From these 155 respondents, 46% were based in Italy and 52% in the Netherlands. Two respondents were part of Italian or Dutch CE networks while being based outside of these countries: one from Luxemburg and one from Austria. Similarly, in the interviews, the distribution of firms (n = 43) was nearly the same, with 20 companies based in Italy and 23 in the Netherlands. This almost equal distribution in both the survey and interview sample reduces the risk of country bias in the results.

According to the Eurostat classification scheme for Small and Medium Enterprises (SMEs) [46], around 45% of the survey respondents were micro-companies, as depicted in Table 2. Concerning the interviewees, almost half of them were also micro-companies, while the rest was equally divided into SMEs and large companies. From Table 3, it becomes evident that the survey has reached both decision-makers who have management-level responsibilities, as well as employees that are closely involved with sustainability and Corporate Social Responsibility (CSR) activities. In a similar vein, most interviewees were from General Management, followed by the Sustainability and CSR department. However, the overall sample share of respondents from these two departments was larger, indicating a higher propensity of these professionals to be interviewed. The inclusion of respondents influencing companies on a strategic level supports the credibility of the provided information in both the survey and the interviews.

Using the statistical classification of economic activities in the European Community (NACE) [47], companies were asked to indicate in what sector they perform their primary business activities. Though the second largest group in Table 4 was the category "Other service activities", which is mainly designated for repair services [47], it became evident, after analysing the answers of individual responses, that some companies in this category were in fact consultancy firms. According to the NACE subcategories of industry sectors, consultancy activities should be classified under the sector "Professional, scientific and technical activities". This measurement error [44] was taken into account in the further analysis of the results by interpreting the answers as coming from consultancies. As in the survey, the largest group of the interviewees were active in the manufacturing sector, whereas consultancies ("Other

Table 2 Company size of survey and interview respondents

Company size	Number of employees	Survey		Interviews	
		Respondents *(n = 155)*	Company size *(subtotal)*	Respondents *(n = 43)*	Company size *(subtotal)*
Micro companies	1 to 9	45%	45%	49%	49%
SMEs	10 to 49	21%	33%	19%	26%
	50 to 249	12%		7%	
Large companies	250 to 500	4%	22%	5%	25%
	501 to 1000	4%		9%	
	1001 to 5000	8%		2%	
	5001 to 10'000	2%		2%	
	10'001+	4%		7%	

Table 3 Department of interview and survey respondents

Respondent department	Survey respondents (*n = 155)*	Interview respondents (*n = 43)*
General management	39%	53%
Sustainability and CSR	20%	30%
Marketing and sales	15%	5%
Research and development	12%	12%
Production	8%	-
Other	6%	-

service activities" and "Professional service activities") took the second spot. Overall, the results are thus representative for a large variety of sectors, with a focus on those sectors primarily associated with CE practices [29, 48].

A list of interviewees and the attributes of their companies (department, company size, country and sector) is provided in Table 5 of Appendix 1.

Survey Development

The survey was drafted according to the seven-step framework for social scientists by Gideon [49]. It contained 22 close-ended questions and one open-ended question to standardise the questioning process and took an average of 25 min to complete. Special care was attributed to the fact that it was an online self-completion questionnaire, sent out with a personal email invitation [50]. It was developed in a participatory way, involving seven researchers, two private partners of the research project specialised in sustainability and life cycle-based assessments and companies engaged with CE practices. Thereafter, the survey was translated from English to Italian and Dutch, tested in all three languages by four large multi-utility companies, a production firm, and two coordinators of CE networks and then sent out to 809 companies.

The survey questions covered in this paper mainly cover the companies' understanding of the CE concept and the link between CE and sustainability. To answer the two survey questions (available in Appendix 2), first, the respondents indicated the level of importance they attribute to seven CE characteristics, identified from [8, 11, 12, 16, 20, 43, 51]. It was also possible to add additional characteristics in an open text field as to extend the scope of potential answers. Second, they provided their level of agreement with six statements connecting CE and sustainability, the latter of which was expressed as the SDGs and the TBL concept. The answers to both questions were captured on a 5-point Likert scale [49].

Table 4 Company sectors of interview and survey respondents

Company sector	Survey respondents (*n = 155)*	Interview respondents (*n = 43)*
Manufacturing	27%	21%
Other service activities	24%	16%
Professional, scientific and technical activities	10%	14%
Water and waste management	10%	7%
Construction	7%	10%
Other	22%	16%
Accommodation and food service activities	Incl. in Other (<7%)	9%
Information and communication	Incl. in Other (<7%)	7%

This article sets out the first main topic of how companies are connecting CE and sustainability. Upcoming publications will discuss the remaining survey questions, including CE and sustainability assessment, and the goals of CE practices.

Interview Process

In order to better understand how frontrunner companies engaged with CE practice understand the differences and similarities between CE and sustainability, the authors conducted 43 semi-structured interviews administered via video calls, each with a duration between 45 and 90 min. The semi-structured format allowed the interviewers to ask each interviewee the same questions, while providing room to clarify and contextualise certain issues [41]. The interview guidelines were developed after analysing the survey results and broadly covered the main topics outlined in the previous section. This article analysed the answers to the set of questions (available in Appendix 3) regarding the link between CE and sustainability. Respondents were asked for their own definition of both CE and sustainability, and whether companies should strive for CE, sustainability or both. Moreover, since respondents had previously raised the concepts of bioeconomy and sufficiency within the open comment section of the survey, they were also asked whether they thought the bioeconomy and the idea of sufficiency were relevant to CE. Depending on the interviewees' preference, the interviews were held in Dutch, English or Italian, with one of the three interviewers. Each interviewer held the interviews in one language only. Therefore, the authors opted for Loubere's Systematic and Reflexive Interviewing and Reporting (SRIR) method [52], instead of writing full transcripts. This method requires scholars to hold frequent meetings to discuss the findings and impressions of the individual interviews. Hence the interviewers held weekly calls to talk about the main insights and to attune their interpretation of the interview guidelines, thus reducing interviewer variability [53]. Furthermore, the interviews were recorded and the interviewers took notes during the interview process. Thereafter, the interviewers listened to the recordings and complemented their notes, where necessary, to keep interviewer-related errors to a minimum.

Data Analysis and Integration

The qualitative data analysis employed in this study is based on thematic analysis [54]. Once the survey was closed, all survey data was exported from SurveyMonkey into the statistical analysis software IBM SPSS Statistics 26 [55]. Here, the qualitative information was coded into numerical variables. A univariate analysis approach was taken and frequency tables were created for each variable explored. Subsequently, the authors performed descriptive statistical analyses and cross-tabulations to the relevant dataset to investigate whether differences in the responses could be ascribed to the country of respondents. Given the almost equal distribution of Italian and Dutch companies in the sample, the selection bias could be expected to be minimal. Besides analysing the descriptive statistics results including the mean and standard deviation in more detail, Fisher's exact test, suitable for small sample sizes, was applied for the cross-tabulations, given that more than 20% of the answering options had frequencies < 5 [56]. Since the questions were based on a 5-point Likert scale with a midpoint, the values could not be aggregated to either the positive or negative side of the scale, which might have led to more significant results. Therefore, the authors used the interviews to further investigate and substantiate these tendencies.

Regarding the interviews, all data, including the respondent attributes such as company size, sector, country and position of interviewee, was imported into the qualitative data analysis software NVivo R1 [57] in the English language. Thereafter, the 43 responses were analysed question-by-question using a thematic analysis coding system according to Braun and Clarke [54]. This coding system was created and employed jointly by the three interviewers to reduce both intra-coder variability and inter-coder variability [53]. Using "open coding", participant responses for each interview question were assigned codes which were later grouped, compared and transformed into themes. It needs to be noted that participants' responses could be assigned to several different codes on the same topic, which is why the number of respondents per question is only roughly indicated in the result section. Finally, the results from the survey were compared and integrated with the results from the interviews, as seen in Figure 1, which illustrates the overall research design.

Results

The following subsections integrate answers from both the survey and interviews according to the four research objectives as illustrated in Fig. 1: describing frontrunner company perceptions of CE and sustainability, describing how they understand the link between CE and sustainability and describing how they prioritise these two concepts.

Describing Circular Economy

Figure 2 presents the first survey question with seven CE characteristics to which respondents were asked to attribute some degree of importance (full statements, standard deviation and statistical significance are available in Appendix 4). Overall, the high consistency between responses, indicated through a low standard deviation, points towards a consensus of the CE concept amongst frontrunner companies. Furthermore, there were only two cases of statistically significant (at $p<0.001$) differences between the answers of Dutch and Italian companies, substantiating the argument of similar perspectives across countries. The fourth statement

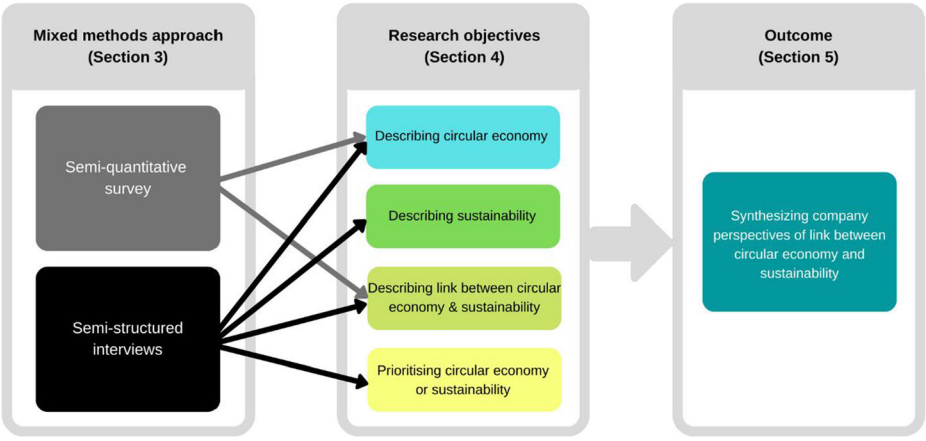

Fig. 1 Research design matching the mixed methods approach with the research objectives

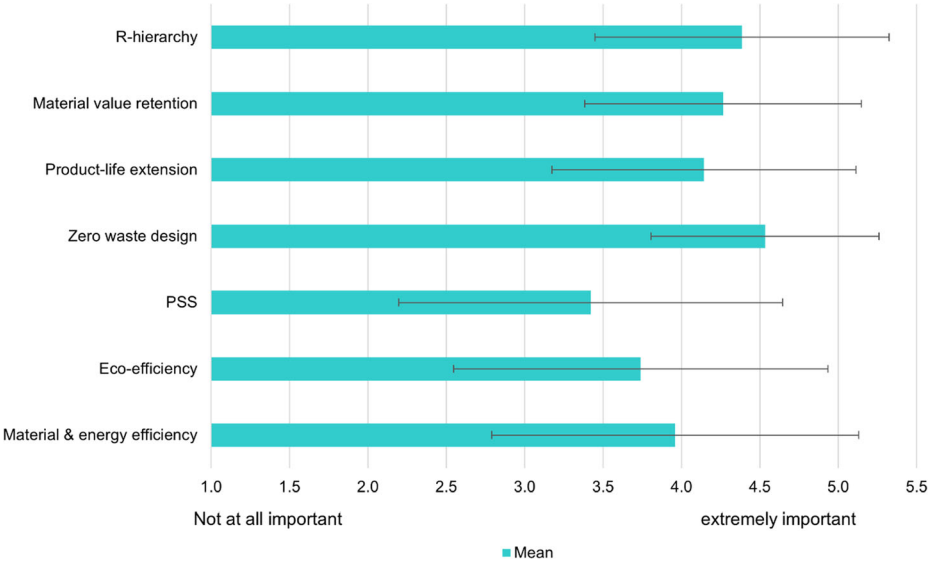

Fig. 2 Respondents' understanding of CE concept, assessing the importance of characteristics with scale from 1 (not at all important) to 5 (extremely important). Standard deviations are represented by error bars. "I don't know" responses were excluded from mean and standard deviation, $n=155$

"Products are designed in a way that eliminates waste" was identified as having the highest level of importance when characterising CE, though all seven characteristics are seen as rather important. It also appeared that the statement ranking second, underlining the importance of the "R-hierarchy", was perceived to be significantly more important in the Netherlands than in Italy. Interestingly, companies were least likely to characterise the concept of CE with the statement describing businesses shifting towards offering Product Service Systems (PSS). Also, eco-efficiency was perceived to be a slightly less important characteristic than material-efficiency when defining CE, though responses for both characteristics had a high standard deviation. Concerning eco-efficiency, there was another statistically significant difference between the two countries, with Italian companies assigning it more importance. Besides the seven characteristics mentioned, several survey respondents acknowledged the importance of the bioeconomy and the concept of sufficiency to the characterisation of CE within the additional comments field.

After finding the survey respondents generally agreed on the importance of the prescribed CE characteristics, interview respondents were asked how their company would describe CE in an open-ended question. Only few companies directly quoted well-known CE definitions (e.g. from EMF [58] or the EU Action Plan [15]); the majority of companies answered with self-adapted definitions of CE specific to their own context. Frequently, descriptions were supported with practical examples demonstrating their company's CE implementation.

The interviewed companies most often described CE as a set of activities focusing on resource management at an operational level. This was illustrated through the frequent mention of several related topics including "value retention", "closing the loop", "waste prevention" and "material use". Responses mentioning "value retention" often described CE using some of the 10 R-strategies [43] as a way to both valorise waste and facilitate value creation. Responses that referred to "closing the loop" often indicated that for their company, CE activities guaranteed that resources were available and part of multiple-use cycles. Some companies

noted that CE activities should not only avoid the use of non-renewable resources but also prevent waste generation: "CE only makes sense if it adds value, it should not be implemented if more energy is required or more materials are going to landfill" (interviewee #40). A smaller subset of companies that did not refer to resource loops still highlighted waste prevention activities and material use as critical elements of CE, mentioning the terms "zero waste" and "material-efficiency" specifically.

Almost half of the companies described CE as "integral to their business model so it's not really an option to exclude or sacrifice" (interviewee #32). Rather than only listing CE activities, companies explained how CE was becoming increasingly intertwined with CSR and their corporate strategy; as interviewee #26 said: "It is important to be part of the CE market […] we believe there is a real market opportunity." CE activities provide opportunities for innovation and these companies acknowledged the competitive advantage and enhanced corporate image of utilising CE as a strategic management tool.

One-quarter of companies illustrated how CE promotes societal change and, for them, a "mindshift" to a new way of conducting their business activities. Interestingly, a few companies, predominantly micro-companies, linked CE activities specifically to respect for nature and experiencing an increased sense of stewardship over natural resources.

Over a third of all companies reflected on the evolving discussions attempting to define CE, with many suggesting that the term CE was quickly becoming another "container concept". This allowed for the inclusion of many different terms under the umbrella of CE and eventually led to a multi-interpretable and therefore increasingly bland concept. Several companies considered that CE was context-dependent and within their companies, finding one definition was still and would always be a work-in-progress, due to the flexible nature of CE. Interviewee #8 explained: *"*If we are asked what the CE is, we always adapt our answer to the respective company, as the realisation of CE is different in every firm."

In order to explore the connection of CE with the bioeconomy and the concept of sufficiency raised within the survey results, interview participants were asked whether these are relevant concepts within the CE discussion. Regarding the concept of sufficiency, more than half of the interview participants agreed that sufficiency was an important part of CE. The main reasoning for this was CE's potential influence on reducing the quantity and improving the quality of societal consumption. In this respect, interviewee #1 argued: "Sufficiency is very important […] in our shop it is possible to buy exactly as much as you need and use only what you need, not determined by standard packaging sizes." However, the interviewees did not agree on whose responsibility it was to follow a sufficiency-based consumption approach. A few companies that considered sufficiency relevant for CE stated that it was not their responsibility to encourage this behaviour, but the responsibility of consumers, whose demands were prioritised. Others felt that they had little influence on the behaviour of consumers due to their business-to-business sales models, limiting their contact with consumers. On another note, the companies which stated sufficiency was not relevant for CE suggested that separate discussions on consumption should focus on encouraging more responsible consumption habits rather than simply telling consumers to purchase less. A similar trend emerged with interview responses concerning the concept of bioeconomy, with the majority of interviewees agreeing that bioeconomy is considered relevant to CE. Bioeconomy was most often described with reference to the biological cycle of CE, the regeneration of materials and the availability and selection of renewable resources. Similarly to responses regarding sufficiency, some companies declared that the concept of bioeconomy was not relevant or applicable within their scope of operations. Others raised the issue of bioeconomy circularity trade-offs, namely,

that some biobased solutions were not inherently circular, as stated by interviewee #5: "Bioeconomy is not necessarily the same as CE since there are biobased materials that are not biodegradable, while there are also synthetic, biodegradable plastics which are not biobased."

Describing Sustainability

The topic of sustainability was not included explicitly in the survey which focused on CE. After reviewing the survey results, the authors addressed the concept of sustainability in the interviews in order to get a better picture of the connection between CE and sustainability.

When companies were asked how they describe sustainability, distinct connections with existing sustainability theory were made by around one-third of all companies. Within this group, the three-pillar conceptualisation of (social, economic and environmental) sustainability was mentioned most frequently, sometimes alongside the notion of the TBL framework [38] or, as it is more commonly known, as "People, Planet, Profit" (PPP), coined by the same author. The well-known sustainability definition from *Our Common Future*, or the Brundtland Report [59] also emerged a few times in this context. Similar intergenerational aspects were heard in interview responses that considered sustainability to be closely associated with future generations, or with the future of the planet. These answers centered around topics such as continuity, durability, the capacity to continue certain production activities throughout time, and environmental stewardship. Some participants saw this as an essential aspect of being able to continue their activities, as elucidated by interviewee #37: "If we would now ignore negative environmental impacts, we could not do our work anymore in the future."

A prominent trend throughout the answers was found in the plethora of examples considering the social pillar of sustainability. These examples can be divided into several categories, with the following occurring most frequently: "community" (and territorial perspective), "well-being", "job creation", "employees", and "human behaviour". Notably, less examples were provided that could be attributed more directly to the environmental pillar of sustainability, such as a reduction of carbon emissions. This might have been caused by the order of the questions, causing companies to contrast or build upon responses to the previous question about their interpretation of CE. In a few cases, examples of material-efficiency related matters were provided as an illustration of what sustainability meant to the participants' organisations: value retention, end-of-life insights and regeneration of resources emerged in this category.

When describing sustainability, around one-third of the participants included wide-ranging sustainability practices from avoiding toxic materials, to installing solar panels. Interestingly, a smaller share highlighted that sustainability forms the (strategic) core of their activities. This is similar to the previous finding of companies indicating that CE was integral to their business. In some cases, sustainability was considered a prerequisite to handle the previously named future challenges, given "[sustainability] has been integrated for a long period of time and companies are now feeling comfortable with embedding it within their organisations to ensure longevity" (interviewee #10). In other cases, institutional conditions combined with idealistic motives were the reason for strongly embedding sustainability principles into the organisation, as described by interviewee #34: "When a company has a good approach in terms of sustainability (3 pillars), it is a company that can reduce their risk and can improve the value of the company to investors and stakeholders and take care of the community and employees."

General criticism of the term sustainability also emerged. Again similar to CE, a few participants considered sustainability to be a "container concept". These companies also

indicated that a single definition did not exist, and a small number of participants considered the term sustainability to be "overused": "Sustainability is often used as a concept or term, while it is not entirely clear whether the claims can actually be substantiated" (interviewee #11).

How Companies Connect Circular Economy and Sustainability

Within the survey, respondents were asked to indicate their level of agreement with six statements describing the effect of CE on sustainability represented as the SDGs and the TBL. The results in Figure 3 indicate that respondents agreed that the concept of CE had a positive relationship with all three sustainability pillars. More specifically, most survey respondents concurred that CE was *one of the tools* to help achieve the SDGs, while they did not necessarily agree that it was the *main tool* to achieve them. Answers further showed that the association of CE with the environmental pillar of sustainability was the strongest, followed by social benefits and economic profitability. Interestingly, it became apparent that respondents agreed less strongly that social equality was increased along a company's value chain when implementing CE practices. Concerning the statistically significant differences, it is further relevant to point out that Dutch companies were significantly (at $p<0.001$ and $p<0.05$) more likely to disagree with the fourth and fifth statements concerning the social dimension. Furthermore, visible from looking at the standard deviation, the second and fifth statements were the most contested (more detail in Appendix 4).

One open-ended interview question was designed to explore the motivations of respondents when considering implementing CE to improve their environmental performance and how this and the other two pillars influence the organisations' decision-making processes.

The most frequently mentioned motivation, indicated by more than half of the interviewees, showed that their choice for CE practices was indeed primarily motivated by CE's perceived positive impacts on the environmental pillar. Notably, only 5 of these interviewees were a part of large companies. Zooming in on this group of answers, more nuanced reasons for this

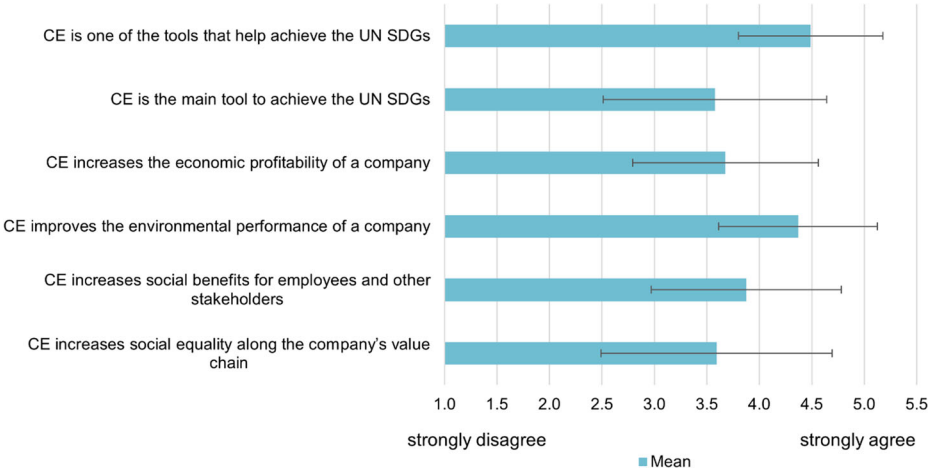

Fig. 3 Respondents' understanding of the link between CE and sustainability, indicating level of agreement with a scale from 1 (strongly disagree) to 5 (strongly agree). Standard deviations are represented by error bars. "I don't know" responses were excluded from mean and standard deviation, $n=155$

environmental focus emerged. According to some respondents, the legitimacy of measuring environmental impacts as compared to economic and/or social impacts played an important role, e.g. internationally recognised environmental targets as stipulated by the Paris Agreement. A few companies justified the implementation of their CE practices for environmental reasons by referring to the well-established nature of environmental sustainability. They stated that the presence of e.g. international agreements has positively influenced the general level of understanding of environmental sustainability and made it a priority for their clients. Another motivation was provided by a smaller group of interviewees who indicated that environmental benefits derived from CE implementation would, in the long run, also bring about social and economic benefits. The third most frequently mentioned motivation, by a quarter of the respondents, all of which were SMEs, considered this finding to reflect the idealistic motivation of frontrunner CE companies. In the words of interviewee #29: "They are visionaries and have a goal that is bigger than just finances." Interestingly, some interviewees showed doubts about the underlying reasons for companies implementing CE practices found in the survey. They highlighted organisations could potentially use CE for "greenwashing" because of its associated—but not necessarily proven—positive environmental impacts.

In contrast to the previous motivations, half of the interviewees underlined that the main drivers to engage with CE were still rooted in ensuring economic performance and efficiency. Again, views were diverse within this group. One-third indicated that a stronger economic performance would introduce environmental and social benefits, with companies stating that a profitable business model was considered a requirement for operation and a necessity to be able to achieve sustainability objectives. Additional reasons for pursuing CE with primarily financial motivations were provided by interviewees: to satisfy their clients' focus on costs and to make use of external incentives, such as governmental grants for funding new innovative CE solutions.

The economic and environmental pillars of sustainability were often considered to go "hand-in-hand", so the proposals for CE implementation were easier to communicate, illustrated by interviewee #27: "The high-value reuse of materials also leads to a higher price and therefore to better financial performance, these elements go hand in hand." The social dimension was, on the other hand, sometimes indicated to be somewhat out of focus to the organisation or considered less appealing in terms of storyline and communication towards stakeholders.

One-third of the responses raised the issue that they considered the three dimensions of sustainability inseparable and equally important in terms of decision-making. They were complemented by participants who indicated that the answer depended on who was asked within the organisation: employees associated with sustainability activities would generally pay more attention to the environmental dimensions, while upper-management and founders would rather base their decision-making process on financial parameters. Lastly, the dynamic nature of the decision-making process was highlighted by some who indicated that the mix of context (e.g. the current COVID-19 pandemic), timing, financial maturity and feasibility all influenced which sustainability dimensions would be considered most relevant. The use of "logical thinking" was underlined as well by interviewee #15: "Most decisions are taken based on common sense. A certain direction might seem surprising at first, but it will always be supported by valid arguments."

It is relevant to note that a quarter of all participants indicated that for them, the social dimension was either fundamental to their decision-making process, or they expected this dimension's importance to increase greatly in the coming years: "The social dimension will be

growing a lot in next 2-3 years; it will be even more important or demanded in the market" (interviewee #34). The companies that attributed high importance to the social dimension were mainly micro "social cooperatives"[1], of which some highlighted the importance of positively influencing education and citizen participation in the sustainability transition within their decision-making process, and referred to the relevance of "territory" and social innovation to CE practices.

Should Companies Prioritise Sustainability, Circularity or Both?

When interviewees were asked whether companies should strive for circularity or sustainability, the majority answered they should strive for both. The reasons for this were that while sustainability and CE were perceived as two different concepts in theory, they were closely connected and complementary. Though differences were described as fluid, sustainability was considered a broader concept than CE, as explained by interviewee #23: "Sustainability is larger in scope and I believe that circularity is part of sustainability." In particular, the social dimension of sustainability was frequently mentioned as a feature that distinguished CE from sustainability, with many interviewees claiming that the people dimension (also including governance and behavioural aspects) was absent from CE. In the words of interviewee #32: "CE would be extremely critical for achieving environmental and potentially economic goals, but CE would not be a direct driver for achieving social goals." Even so, it was also mentioned that CE covered mainly resource-related aspects, leaving out other environmental aspects such as carbon emissions related to energy and mobility. Yet, some interviewees also said that the difference between CE and sustainability was not yet marked out and that "time will tell. Both concepts are still under development" (interviewee #15). Especially the social dimension of CE still needed to be defined further.

At the same time, CE was perceived as an operational business approach with an economic focus, clear targets and applicable strategies, especially with regard to supply chain management. This was in line with companies' inevitable focus on cost reduction. Furthermore, CE was said to help maintain companies' "license to operate", given that consumption was often viewed negatively from a sustainability perspective. Congruently, the current discourse around this topic was mainly positive and related to entrepreneurship opportunities, while sustainability was sometimes associated with abstention, additional duties, or costs, exemplified by the following quote: "Sustainability has a connotation of 'it should be less'. This can be a bit negative. CE is much more about: what is possible? It is more positive, more entrepreneurial" (interviewee #16). Interviewee #11 further explained: "In a circular business model you most often solve several problems at the same time, therefore creating more value, making you more competitive and interesting." Related to the applicability to business, another reason was the more tangible nature of CE. While sustainability seemed too broad of a topic for companies at times, CE was perceived more concrete and "logical", implemented through Key Performance Indicators (KPIs) already known to companies, such as material and energy use, making its measurement more straightforward.

Moreover, almost one-third of all companies explicitly mentioned that sustainability needed to be the overall goal. Interviewee #38 explained: "CE is a driver for sustainability, a way

[1] Social cooperatives are a specific legal form of organisation in Italy and are, by law, founded with the intent to create social, health or educational benefits for their members and the wider society or to stimulate labour market inclusion of disadvantaged people.

towards it, so companies should strive for sustainability and use CE as a way to progress towards and also operationalise their sustainability goals." Whereas there were a few respondents of the opinion that CE would always lead to sustainability, there were also several which pointed out CE was not the only path to sustainability. Thus, for them, sustainability should remain the overall goal of company actions. If circularity were pursued, interviewee #30 mentioned that "a product may be more circular, but from this perspective alone some parts may be produced using child labour." It thus became clear that the "CE trend", as it was phrased by interviewee #6, would not replace sustainability, given its longer establishment and wider scope.

A quarter of all companies mentioned that it did not matter whether to strive for circularity or sustainability, because these concepts were in constant flux. These companies said the manifestation of either CE or sustainability practices in a company was highly context-dependent and thus attempting to pin down if a business practice was either sustainable or circular was unrewarding. Interviewee #15 asked: "Why should we talk about the difference at all? It is more important what is done." An interesting aspect was that firms with this perspective were mainly consultancy companies. As interviewee #16 stated: "It is important that the activities to 'make the world a better place' or 'do more good than harm' are in the core of the business. This is more important than whether this happens under the CE or sustainability umbrella." This was also supported by respondents who argued that CE and sustainability were "basically the same" and often "used interchangeably" in companies. Interviewee #39 further said: "CE is actually the new sustainability." For the few respondents who uttered this position, the concept of CE was merely a subsequent development stage of the sustainability concept, which had been introduced several years before CE. Notably, these interviewees indicated that for them, CE covered all three sustainability dimensions.

Discussion

The results have identified two non-mutually exclusive perspectives, as seen in Fig. 4, about the connection between CE and sustainability which were most frequently described by respondents. The first perspective seen in Fig. 4a is that CE is implemented to achieve sustainability, but sustainability is wider than CE. The concepts of CE and sustainability are depicted utilising the themes differentiating them, captured within the interviews. The second perspective, illustrated in Fig. 4b is that the difference between CE and sustainability is not important, as CE and sustainability are the same in practice. Furthermore, sufficiency and bioeconomy emerged as additional concepts associated with CE, through the input of some survey respondents. It was also found that the perspectives on CE and the connection to sustainability did not vary greatly between the two countries, except that for Dutch companies, the R-hierarchy seemed to be a more important concept with regard to CE, which could be linked to popular publications such as Potting et al. [60]. Meanwhile, Italian companies attributed higher importance to eco-efficiency. In the following subsections, the results are first discussed in connection with the two perspectives, after which reflections on the connection between CE and sustainability from a SD perspective are offered.

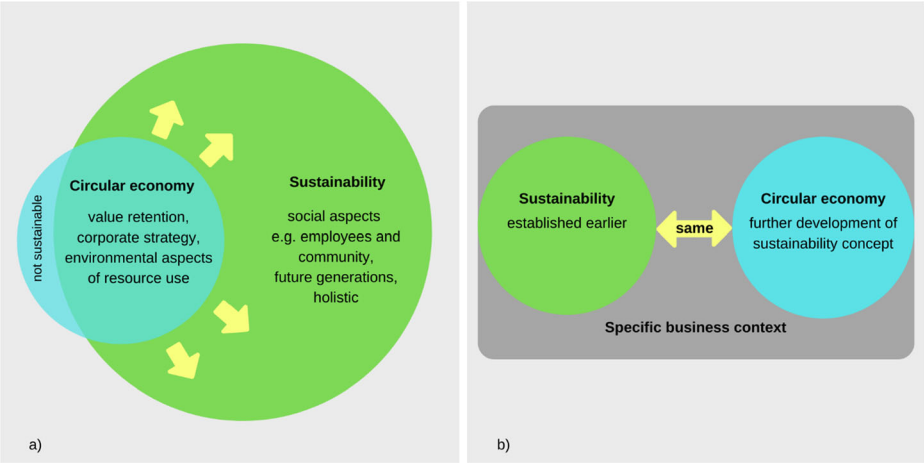

Fig. 4. Perspectives of respondents: **a** CE is implemented to achieve sustainability (left). **b** Difference between CE and sustainability is not important (right)

CE Is Implemented to Achieve Sustainability

The dominant perspective is that CE and sustainability are different concepts which are closely connected: CE is implemented as a pathway to achieve sustainability. Companies of all sizes and sectors indicated that CE can contribute positively to sustainability impacts. In particular, CE was seen by a majority of the survey and interview respondents as an important way to achieve the SDGs, but not the only one. While different views were encountered, generally, companies use CE to achieve sustainability, without having circularity as their end goal. This is in line with [17] who see CE as a "means to an end", or "toolbox", instead of an end in itself, indicated by the yellow arrows leading CE towards sustainability in Fig. 4a. The reason cited by interviewees was that sustainability was more comprehensive than CE, especially with respect to the social dimension. From the survey it also emerged that Dutch companies, in particular, did not expect CE practices to necessarily improve social aspects, in line with the findings of Boons et al. [61], documenting environmental and economic motivations for CE practices. Therefore, CE could not be the only tool to achieve sustainability, as it does not cover the three dimensions to the same degree. Instead, CE is described as more operational, practical and compatible with existing for-profit business strategies and a focus on resources. This is in line with previous findings from CE literature, such as in Schöggl et al. [28] who describe that CE and SD tend to form a subset relationship as depicted in Fig. 4a: while economic and environmental issues are addressed, social topics remain underrepresented, and few solutions on how to incorporate social and consumption-based issues are offered. Yet, several respondents indicated that the difference between CE and sustainability was still under development and that especially the position of the social dimension still needed to be better delineated. First attempts at this were made in e.g. Padilla-Rivera et al. [62] and Walker et al. [63]. It must also be noted that despite numerous authors presenting new definitions for CE [8, 64], companies did not necessarily refer to them. Instead, most interviewed companies described CE using self-adapted definitions specific to their own context, which overlap partially with the CE characteristics presented to the survey respondents. Interestingly, the PSS concept, which was seen as the least important CE characteristic in the survey, was also

hardly mentioned in the interviews. This shows a contrast with academic literature, where PSS is often described as a CE opportunity [65, 66].

Moreover, the results by Schroeder et al. [17], describing that the connections between CE and several SDGs range from weak to strong, were partially reflected in the findings of this research. While the survey results showed CE was not found to be a promising tool to decrease inequality in the supply chain, it was seen as a valid pathway for addressing environmental issues. Reasons mentioned in interviews were the readily available assessment tools and metrics for environmental sustainability, as well as its popularity in the market and amongst consumers. Reviews of assessment approaches to CE at the company or micro-level also found that the environmental and economic domains are included more frequently in CE metrics [25, 67]. In fact, the lack of a holistic approach to SD and, more precisely, the neglect of equality in CE, has been described as a long-standing shortcoming of CE research [8, 28]. Some researchers advocate for a more strongly politicised conceptualisation of CE, more distinctly focused on tackling the systemic socio-ecological challenges of the Anthropocene [13]. Related thereto, results further showed most companies did not pursue sustainability dimensions in isolation, but often saw them as interdependent factors. Therefore, decision-making was mainly characterised with a focus on the economic implications leading to impacts on the environmental and at times the social dimension, depending also on the degree of idealism present within the corporate culture.

Additionally, about a quarter of the interview participants noted that there could be trade-offs between CE and sustainability impacts. In Fig. 4a, the trade-offs are indicated by the area of CE labelled “not sustainable”, where CE practices with potentially non-sustainable outcomes are captured. Contextualising this result, the authors refer to Geissdoerfer et al. [10], who identified eight types of relationships between the two concepts discussed in academic literature. While several types of such relationships were discussed throughout the interviews, the trade-off relationship was the second-most mentioned after the beneficial relationship. Following this, it is important to note that the recognition of “CE trade-offs” would alter the perceived relation between CE and SD and therefore, substantiate the need to accurately assess the effects of CE solutions before their implementation. Since most CE practices do not specifically address the social dimension, it is especially important to not turn a blind eye on the potential CE effects on social issues, which was acknowledged by several interviewees.

Difference between CE and Sustainability Is Not Important

The second perspective that surfaced, shown in Fig. 4b, was that not all participating companies considered pinpointing the conceptual difference between CE and sustainability to be a priority, neither for themselves nor for academia. This mainly emerged from the interviews, in which many companies indicated both CE and sustainability could be considered either: “container concepts”, constantly undergoing change and serving as an umbrella for different practices, or “dynamic concepts” with different meanings in various business contexts. According to several respondents, consisting mainly of consultancy companies, addressing existing barriers to CE, or CE assessment, would benefit companies to a greater extent than discussing semantic differences. Interestingly, in academic literature, the discussion on the conceptual complexities of both concepts and their relation has received much attention (see e.g. [10, 18]), indicating that a considerable divergence might exist between practice (i.e. company needs) and science. Kirchherr and Van Santen [22] have also identified this gap in their critique on the CE research field, highlighting that “practitioners don’t care about the

definitional nuances of CE; they want empirical work that provides evidence on how to make CE work" (p. 1). About half of the companies with this perspective also stated that no difference between the concepts existed in practice, because they saw CE as an evolution of sustainability. These respondents also viewed CE as inherently sustainable and covering all three sustainability dimensions. Therefore, they were indifferent to the question whether to strive for CE or sustainability, as it depended on their respective business context.

Companies' View on Sufficiency and Bioeconomy

While sufficiency has been described as counterintuitive to the traditional way of doing business, most interviewed companies were aware that it is part of the CE discussion. After all, the first 10-R strategy defined by Reike et al. [51] is "R0 = refuse". This contradicts the finding that several companies saw CE as a commercial opportunity. Yet, many directed the attention to the agency of consumers, stating that they were the ones that should abstain from consumption. Only a few companies integrated a moderate sufficiency-based CE approach into their business, by ensuring that production or supply would not supersede demand or need, as anticipated by Bocken and Short [36]. With regard to bioeconomy, the majority of companies were quick to recognise the connection of the biological cycle within CE, detailed within the popular butterfly diagram [58]. However, though the bioeconomy is conceptually integrated into CE [33, 58] and supported by international policies [68], some participants were less likely to see the relevance to their business operations. Conversely, attention was awarded to the importance of renewable resources and the principle of cascading as part of CE; this integration and its potential contribution to the SDGs has been examined by Campbell-Johnston et al. [69] in detail.

Implications for Research and Practice

While previous studies appear to often focus on single sectors, such as manufacturing, the results here show that companies engaged with CE are found to be active in a number of sectors, requiring further cross-sectoral studies [29, 30]. To have a positive impact towards SD, CE practices are ideally implemented with the goal of being sustainable, rather than being circular in itself. However, this article shows that the motivations of companies to implement CE do not necessarily consider the impacts on all three sustainability dimensions. Depending on whether companies took the perspective of CE designed as an enviro-economic model—the *Circular Economy discourse*—or the perspective of CE being no different from sustainability—related to the *Circular Society discourse*—different implications for scientific research follow [13]. In the first case, it is recommended to include the social dimension in the corporate decision-making process; the social dimension can be addressed with existing CSR initiatives [62, 63], while in the second case, specific CE-related social issues are expected to find a place in decision-making frameworks [70]. Rather than providing lip service to the new "trend" of CE, one role of scientists would be to support companies in their pathway towards SD by not merely identifying barriers but also providing solutions to overcoming them. In this context, focusing on established sustainability assessment of CE practices can make CE-sustainability trade-offs visible [71] and allows for promoting CE only when it bears positive sustainability effects.

Acknowledging the respondents' concern that academics should not continue to focus on defining the differences between CE and sustainability, the authors find it crucial that

companies engaged with CE evaluate their underlying motives of implementing CE practices. It is recommended that CE strategies are formulated to positively impact all three sustainability dimensions in a systemic manner. Without this internal evaluation, companies run the risk of reducing opportunities to seize the transformative potential of CE, or of creating adverse sustainability impacts. After goal-setting and considering different CE strategies, assessment approaches can be applied to assess which CE solution is preferable, be it on a qualitative or quantitative level [72]. Given that the results indicated that micro-companies (regardless of their legal form) were more likely to implement CE to achieve broader sustainability goals, the development of holistic assessment should consider the capabilities of micro-companies. Companies engaged with CE can further explore sufficiency-driven business strategies, for which Khmara and Kronenberg [73] have proposed seven indicators for firms to self-assess their operations. The advancement of sustainability assessment approaches for CE practices enables companies to externally report the impacts of their CE practices in response to increasing demands for transparency from stakeholders and to demonstrate alignment with existing and developing governance frameworks e.g. the SDGs and the new Action Plan on CE under the European Green Deal [68]. While this degree of accountability for CE practices could be seen as cumbersome, diligent reporting will provide the foundation to receive CE-related funding and will offer new business opportunities with like-minded professionals.

Concluding Remarks

Using a mixed-methods approach, this article explored how companies engaged with CE practices view the connection between sustainability and CE. Two main perspectives were found: the first suggests that frontrunner companies generally view sustainability to be a wider, more holistic concept, including the social dimension, when compared with CE. At the same time, firms emphasise that CE offers (only) one possible operational pathway to a more sustainable society. The second perspective shows that companies do not consider the identification of conceptual differences between CE and sustainability to be a priority, as for them the two concepts are the same in practice. This shows that for companies engaged with CE, the concepts are closely connected, even though the motivations for implementing CE practices can be diverse. Ultimately, firms were aware that the goal of implementing CE ideally consists of striving for a more sustainable world. The findings presented in this article provide an overview of the relation between CE and sustainability, informed by experiences of companies engaged with these concepts. Eliciting these private sector perspectives makes an empirical contribution to a discussion which has, to date, largely remained in the theoretical realm.

The process of carrying out and analysing the survey and interviews comes with various limitations. These mostly relate to extrapolating the results to organisations outside of this sample, which is composed of highly diverse frontrunner companies engaged with CE across different sectors, sizes and CE activities. Moreover, the sample contains a large share of micro-companies, which have distinct ways of operating when compared to larger firms. However, as was observed in both the survey and interviews, company size did not have a significant impact on the perspective of companies on the CE and sustainability connection. Furthermore, the study exclusively covers firms operating in Italy and the Netherlands, which potentially allows for generalisations to Western Europe only. Finally, the interviews were conducted in

three languages which could have provided room for translation inaccuracies, although various methods were employed to minimise this.

Given this article focused only on companies already engaged with CE practices, further research to understand private sector interpretations of CE and sustainability could include firms which are new to CE. Future studies could also use the current findings to inform the development of corporate strategies for companies starting with their CE journey, while not letting sustainability out of sight. On the same note, research and practice are recommended to jointly develop impact assessment approaches to support these corporate strategies. Such co-created assessment approaches have the potential to enable firms engaged with CE to steer their transformative potential towards advancing the SDGs.

Appendix 1

Table 5 List of interviewees and their attributes

Code	Department	Company size	Country	Sector
Interviewee #1	General management	Micro	Italy	Accommodation and food service activities
Interviewee #2	General management	Micro	Italy	Construction
Interviewee #3	Sustainability and corporate social responsibility	Micro	Italy	Other
Interviewee #4	Marketing and sales	Micro	Italy	Accommodation and food service activities
Interviewee #5	Research and development	Micro	Italy	Professional service activities
Interviewee #6	General management	Micro	Italy	Other service activities
Interviewee #7	General management	Micro	Italy	Manufacturing
Interviewee #8	General management	Micro	Italy	Professional service activities
Interviewee #9	General management	Micro	Italy	Manufacturing
Interviewee #10	General management	Micro	Netherlands	Other service activities
Interviewee #11	General management	Micro	Netherlands	Other
Interviewee #12	Research and development	Micro	Netherlands	Construction
Interviewee #13	General management	Micro	Netherlands	Other
Interviewee #14	Sustainability and corporate social responsibility	Micro	Netherlands	Construction
Interviewee #15	General management	Micro	Netherlands	Professional service activities
Interviewee #16	General management	Micro	Netherlands	Other
Interviewee #17	Sustainability and corporate social responsibility	Micro	Netherlands	Other
Interviewee #18	General management	Micro	Netherlands	Other

Table 5 (continued)

Code	Department	Company size	Country	Sector
Interviewee #19	Sustainability and corporate social responsibility	Micro	Netherlands	Other service activities
Interviewee #20	General management	Micro	Netherlands	Professional service activities
Interviewee #21	General management	Micro	Netherlands	Other
Interviewee #22	Sustainability and corporate social responsibility	Small-Medium	Italy	Other service activities
Interviewee #23	General management	Small-Medium	Italy	Other
Interviewee #24	General management	Small-Medium	Italy	Accommodation and food service activities
Interviewee #25	Research and development	Small-Medium	Italy	Manufacturing
Interviewee #26	General management	Small-Medium	Italy	Manufacturing
Interviewee #27	General management	Small-Medium	Netherlands	Water and waste management
Interviewee #28	Sustainability and corporate social responsibility	Small-Medium	Netherlands	Other
Interviewee #29	General management	Small-Medium	Netherlands	Construction
Interviewee #30	General management	Small-Medium	Netherlands	Other service activities
Interviewee #31	General management	Small-Medium	Netherlands	Other service activities
Interviewee #32	General management	Small-Medium	Netherlands	Manufacturing
Interviewee #33	Research and development	Small-Medium	Netherlands	Other
Interviewee #34	Sustainability and corporate social responsibility	Large	Italy	Manufacturing
Interviewee #35	Sustainability and corporate social responsibility	Large	Italy	Accommodation and food service activities
Interviewee #36	Research and development	Large	Italy	Water and waste management
Interviewee #37	Sustainability and corporate social responsibility	Large	Italy	Water and waste management
Interviewee #38	Sustainability and corporate social responsibility	Large	Italy	Manufacturing
Interviewee #39	Sustainability and corporate social responsibility	Large	Netherlands	Construction
Interviewee #40	Marketing and sales	Large	Netherlands	Other
Interviewee #41	Sustainability and corporate social responsibility	Large	Netherlands	Manufacturing
Interviewee #42	Sustainability and corporate social responsibility	Large	Netherlands	Other
Interviewee #43	General management	Large	Netherlands	Other service activities

Appendix 2

Survey questions in English

1. The circular economy concept is a developing concept and thus not yet clearly defined. According to your understanding, which statements below characterise a circular economy?

   Please assign a level of importance to each potential characteristic of the circular economy.

   Characteristic not important at all, slightly important, moderately important, very important, extremely important

- During the life cycle of a product, materials are reduced, reused, recycled, or recovered
- Goods are produced in a way that enables the maintaining and recovery of value of materials such as gold and other scarce materials
- Goods are produced, or services are provided in a way that increases their durability, before they are disposed
- Products are designed in a way that eliminates waste, because after their end of life, they re-enter the value chain as material input
- Businesses offer a service to users, instead of selling their products to customers (e.g. renting a car, instead of selling it)
- More goods and services are produced while causing less negative impacts on the environment
- More goods and services are produced while using fewer material resources or energy
- Other, please specify:

2. Circular economy is often mentioned in connection with sustainability. In your opinion, what kind of effect does the circular economy have on the three sustainability pillars (environment, society and economy)?

   Please indicate your level of agreement with the following statements.

   Strongly disagree, disagree, neither agree nor disagree, agree, strongly agree

- The circular economy is one of the tools that will help achieve the UN sustainable development goals
- The circular economy is the main tool to achieve the UN sustainable development goals
- The circular economy increases the economic profitability of a company
- The circular economy improves the environmental performance of company
- The circular economy increases social benefits for employees and other stakeholders
- The circular economy increases social equality along the company's value chain

Appendix 3

Interview guidelines

1. How would your company describe circular economy?

a. Several companies have brought up the themes of sufficiency and bioeconomy as an integral part of Circular Economy. Are these concepts relevant to your company as well?

2. How would your company describe sustainability?

a. Do you think companies should strive for sustainability, circularity, or both? Why?
b. Results from our survey suggest that companies were most strongly motivated to implement Circular Economy practices in order to improve their environmental performance over improving their economic or social performance. Why do you think this is the case?
c. How do you integrate (or balance) the three dimensions of sustainability within the decisionmaking process in your company?

Appendix 4

Detailed survey results

Table 6 Respondents' understanding of CE concept with survey statements linked to CE characteristics

Statements in survey	CE characteristic	N.[a)]	Mean	Standard deviation	Significance Fisher's test
During the life cycle of a product (production, use, end-of-life) materials are reduced, reused, recycled, or recovered	R-hierarchy	153	4.4	0.94	0.001**
Goods are produced in a way that enables the maintaining and recovery of value of materials such as gold and other scarce materials	Material value retention	151	4.3	0.88	0.130
Goods are produced or services are provided in a way that increases the durability of products, before their disposal	Product-life extension	154	4.1	0.97	0.190
Products are designed in a way that eliminates waste, because after their end of life, they re-enter the value chain as material input	Zero waste design	150	4.5	0.73	0.474
Businesses offer a service to users, instead of selling their products to customers (e.g. renting a car, instead of selling it)	PSS	150	3.4	1.22	0.113
More goods and services are produced while causing less negative impact on the environment	Eco-efficiency	146	3.7	1.19	0.001**
More goods and services are produced while reducing material resource or energy use	Material & energy efficiency	146	4.0	1.17	0.363

[a)] excl. "I don't know" responses

*significant at 95% confidence interval

**significant at 99% confidence interval

Table 7 Respondents' understanding of the link between CE and sustainability

Statements	N. a)	Mean	Standard deviation	Significance Fisher's test
The circular economy is one of the tools that help achieve the UN sustainable development goals	153	4.5	0.69	0.410
The circular economy is the main tool to achieve the UN sustainable development goals	151	3.6	1.06	0.119
The circular economy increases the economic profitability of a company	152	3.7	0.89	0.949
The circular economy improves the environmental performance of a company	154	4.4	0.76	0.103
The circular economy increases social benefits for employees and other stakeholders	146	3.9	0.91	0.001**
The circular economy increases social equality along the company's value chain	142	3.6	1.10	0.040*

[a)] excl. "I don't know" responses

*significant at 95% confidence interval

**significant at 99% confidence interval

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Availability of Data and Material The data that support the findings of this study are available in aggregated form on request from the corresponding author. The data are not publicly available since they contain information that could compromise the privacy of research participants.

Author Contribution A.W., K.O. and E.R.L. designed the research, collected data, performed data analysis and wrote the article. A.R., A.S., W.J.V.V., S.C. and R.S. helped with research design, reviewed previous draft versions and provided ongoing assistance throughout the research. All authors read and approved the final manuscript.

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Declarations

Conflict of Interest The authors declare no competing interest.

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8.2 Appendix II

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RESEARCH ARTICLE

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Exploring assessment practices of companies actively engaged with circular economy

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Abstract

An emerging research area is dedicated to developing approaches for assessing the 'circularity' of companies and their products, within the context of sustainability goals. However, empirical evidence on the uptake of these assessment approaches remains scarce. Using a purposive sampling, we conducted a survey receiving 155 responses and held 43 semi-structured interviews with Dutch and Italian companies active in circular economy (CE), pursuing three research aims: to explore the use of CE and sustainability assessment approaches; to study the process of developing assessment approaches; and to uncover benefits of—and barriers to—CE assessment. While we find high variability of assessment approaches, most often, companies develop tailor-made sustainability indicators and apply life cycle assessments to CE strategies. Importantly, assessment development for CE practices requires and facilitates collaboration with external stakeholders. Finally, we reflect on the paradox of standardisation versus tailoring of assessment approaches within the CE reality and recommend establishing company needs and capabilities before designing assessment approaches.

KEYWORDS
circularity indicators, corporate sustainability, material flow analysis, mixed methods, stakeholder engagement, sustainability assessment

1 | INTRODUCTION

The circular economy (CE) is proposed as a potential solution to the imbalance of the current linear economic system between limited resource supply and increasing demand for goods (Marino & Pariso, 2020). It has been described as an umbrella concept, building on fields in sustainability science, such as industrial ecology (IE) and eco-efficiency, and aims at retaining value embedded in materials through a series of systemic feedback loops between different life cycle stages (Hobson & Lynch, 2016). Within EU-level policies on sustainable growth, the Circular Economy Action plan plays a key role in the European Green Deal (European Commission [EC], 2019). Simultaneously, CE is growing as a business paradigm (Murray et al., 2017). Indeed, private sector initiatives are an important driver of the CE transition in many countries, and the diversity of CE business models is increasing (EC, 2020; Henry et al., 2020; Santa-Maria et al., 2021). In literature, CE is dominated by a corporate and technocentric perspective, aligning CE with current business paradigms, such as

innovation and green growth (Calisto Friant et al., 2020; Schoeggl et al., 2020). Perceived benefits for companies implementing CE are related to lowering environmental impacts, realising social improvements and economic benefits, such as cost savings and developments of new markets—or growing existing ones (Laubscher & Marinelli, 2014). Therefore, the putative promise of CE practices lies in reducing negative sustainability impacts without jeopardising growth and prosperity (Ferasso et al., 2020).

While companies are becoming increasingly aware of the potential benefits associated with improving their resource efficiency, the uptake of CE practices is still lacking (Hartley et al., 2020). Translating the concept of CE into corporate strategies is obstructed by various technical and non-technical barriers, ranging from high start-up costs to the complexity of current supply chains (Jaeger & Upadhyay, 2020). Companies need to develop and apply dynamic capabilities to overcome such barriers and enable the implementation of CE practices (Khan et al., 2020). One of such capabilities, which has not yet received considerable attention in academic literature and is the focus of this article, is that of assessing CE practices and their sustainability impacts (Roos Lindgreen et al., 2020).

This assessment is essential because for many CE solutions and business models available to companies, it is unclear whether—or to what extent—they actually lead to more sustainable outcomes (Blum et al., 2020; Harris et al., 2021). Therefore, in order to contribute towards reaching the United Nations (UN) Sustainable Development Goals (SDGs) (UN, 2017), assessing the sustainability impact of CE practices before implementing them is key. Otherwise, well-intended CE strategies might actually lead to unintended sustainability impacts and burden shifting (Blum et al., 2020; Corona et al., 2019). Indeed, Roos Lindgreen et al. (2021) have found that applying resource-focused CE metrics in isolation can lead to contradicting results when compared to impacts calculated through life cycle assessments (LCAs). Different terms for managing units of information are used in academic literature on sustainability or CE assessment, such as metric, variable, indicator, methodology or index (Saidani et al., 2019; Sala et al., 2013; Veleva & Ellenbecker, 2001). Since we aim to capture a wide range of applied approaches from practice, we use the term 'assessment approaches' here. For a company, such an assessment approach includes obtaining data on the sustainability performance of any system (product or company level), allowing for its effective management (Beloff et al., 2004). The obtained information can be used for internal purposes, such as monitoring and evaluating company performance towards the SDGs, but also for external purposes, for example, communication to guarantee compliance with legislation or benchmarking between companies (Bae & Smardon, 2011). While discussing the value of both sustainability and circularity assessment,[1] it is important to remember that for most companies, especially small and medium enterprises (SMEs) which are not required to produce a mandatory sustainability report, these assessments are voluntary activities (EC, 2014). Thus, with limited incentives promoting the assessment of circularity or clarity regarding its integration with sustainability assessment, the motivations of companies to conduct additional assessments remain unknown.

While private sector engagement with CE and assessment approaches for CE from academic literature have been investigated (Kristensen & Mosgaard, 2020; Santa-Maria et al., 2021), empirical evidence on the assessment approaches applied by companies that actively participate in the CE transition is scarce (Hartley et al., 2020). Furthermore, research gaps exist with respect to the joint application of CE and sustainability assessment approaches, as well as the process of developing them, given the collaborative nature of most CE practices (Brown et al., 2019; Niero & Kalbar, 2019). Finally, the perceived benefits of—and barriers to—CE assessment have also yet to be studied (de Pascale et al., 2020; Rossi et al., 2020).

Therefore, we study CE and sustainability assessment practices of frontrunner companies already engaged with CE, which thus are inclined to assess their CE practices. Firstly, we study the practical application of CE and sustainability assessment approaches at company level. Secondly, the process of developing tailor-made CE assessment approaches and the involvement of stakeholders in this process are investigated. Our third aim is to reveal the benefits and barriers of implementing CE assessment. We use an explorative mixed-methods approach consisting of a semi-quantitative survey and semi-structured interviews with companies which are members of national or international CE networks and operating in Italy or the Netherlands. In both European countries, such networks play an active role in sharing knowledge, practices and connecting stakeholders, resulting in a thriving ecosystem of companies engaged with CE (Institut National de l'Économie Circulaire & Orée, 2020). Such networks were thus used within this study to identify a diverse range of companies engaged with CE, both in terms of sector and size.

In the remainder of this article, we present the theoretical background to the study, underlining the addressed research gaps and resulting research questions (Section 2), as well as the mixed-methods approach employed (Section 3), and the results of the survey and interview approach (Section 4). Then, the discussion section amalgamates these results in the context of existing—and future—research directions (Section 5), while the last section offers concluding remarks (Section 6).

2 | THEORETICAL BACKGROUND

This section highlights the research gaps identified in the three CE assessment-related areas investigated in this article: (i) practical application of CE and sustainability assessment approaches at company level; (ii) use of tailor-made CE assessment approaches; and (iii) benefits and barriers of implementing CE assessment. From the identified research gaps, three main research questions are formulated to guide the study.

2.1 | CE and sustainability assessment approaches for companies

A considerable number of review articles on CE assessment approaches for companies have been published in the past 3 years (e.g. Corona et al., 2019; de Oliveira et al., 2021; de Pascale et al., 2020; Kristensen & Mosgaard, 2020; Moraga et al., 2019; Roos

Lindgreen et al., 2020; Saidani et al., 2019; Sassanelli et al., 2019). These articles describe various assessment approaches and their characteristics, such as their connection to different sustainability dimensions and specific CE strategies. Generally, they focus on the environmental and economic domains, with social elements rarely being considered (de Oliveira et al., 2021). Indicators with an economic focus might be more attractive to business but carry the risk of detaching CE from environmental and social sustainability (Kristensen & Mosgaard, 2020). Furthermore, many indicators are centred around resource use or specific strategies from the 'R-hierarchy' (Potting et al., 2017), a framework commonly associated with CE by companies (Walker, Opferkuch, et al., 2021), making them unsuitable to assess the three-dimensional sustainability performance of circular systems (Corona et al., 2019).

From the wide range of available assessment approaches, we recognise four general categories relevant to companies. First, life cycle-based methods enable the quantification of impacts across all phases of a product's or system's life cycle, from the extraction of raw materials to its disposal (Finkbeiner et al., 2010). A precursor to such life cycle-based methods are material flow analysis (MFA)-based methods, which establish an overview of resource and energy flows across the life cycle of a system (Brunner & Rechberger, 2016). These MFA-based methods have provided the blueprint for more recent industry-developed CE metrics such as the Circular Transition Indicators (CTI) (WBCSD, 2020). Footprint tools, such as the carbon footprint approach, take on a similar approach and are therefore included in this category (WBCSD & WRI, 2004). Second, also relevant are the several available sustainability reporting frameworks, such as Global Reporting Initiative (GRI) Standards, which have the goal to create a common language and format for organisations to report on their sustainability impacts (Global Reporting Initiative, 2018). Next, various authors point out the presence of single indicators: quantitative indicators presenting circularity as a single number, which are mainly oriented around metrics such as recycling rate or resource use (Kristensen & Mosgaard, 2020). Lastly, and as discussed in the next section, the category of tailor-made indicators, which could be based on a life cycle approach or direct impact, allow for tailoring the CE or sustainability assessment more closely to a company's specific context (Kravchenko et al., 2020). As opposed to life cycle tailor-made approaches, direct impact here refers to 'Scope 1' impacts occurring from sources that are controlled or owned by an organisation (WBCSD & WRI, 2004).

Some authors (e.g. Geissdoerfer et al., 2017; Schroeder et al., 2018) have already stressed that the complex nature of the relation between CE and sustainability affects its assessment. However, a lack of consensus persists on the issue whether CE and sustainability assessment are different or the same and whether one forms part of the other (Vinante et al., 2020; Walzberg et al., 2021). Indeed, some authors consider it essential to complement resource-focused CE assessment with the assessment of the respective sustainability impacts, given that applying resource-focused assessment approaches only could lead to a risk of pursuing 'CE for the sake of CE' (Harris et al., 2021; Kristensen & Mosgaard, 2020). Furthermore, CE assessment approaches may potentially distract the decision-making process or even provide a vehicle for greenwashing when the results do not point towards sustainability, allowing companies to pick CE indicators which suit their corporate narrative (Pauliuk, 2018). Various other scholars nevertheless regard resource-focused CE metrics as valuable for decision-making and product comparisons (Parchomenko et al., 2019; Sassanelli et al., 2019). It has further been established that, to ensure the quantification of CE solutions' sustainability impacts, existing sustainability assessment methods could be used (Roos Lindgreen et al., 2020; Walzberg et al., 2021).

While available CE assessment approaches for companies are well documented, information on their practical application is scarce (Kristensen & Remmen, 2019; Stewart & Niero, 2018). One of these few practical studies showed that about three-quarters of the 39 involved companies applied a self-made CE assessment framework, instead of using existing frameworks developed by consultancy companies or academia (WBCSD, 2018). Similarly, Stumpf et al. (2019), analysing 131 case studies from the Circular Economy Industry Platform, found CE indicators from literature to play a negligible role in mainstream industrial assessment practices. Regarding sustainability assessment approaches, the capability of companies to carry out this assessment has been emphasised as a prerequisite for corporate sustainability (CS) (Maas et al., 2016). For SMEs, this capability increases when a company develops more sustainable (and holistic) business practices (Witjes et al., 2017). Since sustainability assessment is a field with a longer history, more information on its degree of implementation by companies is available. In fact, sustainability tools, initiatives and approaches, such as corporate social responsibility (CSR) and the GRI, are well known among companies (Lozano, 2020); however, their uptake of CE issues is lacking and less concrete (Opferkuch et al., 2021).

From the above, we highlight a lack of empirical evidence on the implementation of CE and related sustainability assessment approaches by companies, leading to the following research questions:

RQ1: How do frontrunner companies assess CE and sustainability?
RQ1A: Which assessment approaches are applied?
RQ1B: What are the differences between CE and sustainability assessment?

2.2 | Development process of tailor-made CE and sustainability assessment approaches

It is in the nature of CE practices to go beyond company boundaries and ideally encompass the whole life cycle of a product, thus requiring increased collaboration (Brown et al., 2019). Within the scope of this collaboration, companies are starting to assess the impacts of these CE practices. The development and implementation of tailor-made CE assessment frameworks indicates that companies are utilising the CE concept based on how it is most material to their core business (WBCSD, 2018). In literature, the selection of specific CE KPIs

suitable to a company's CE strategy is recommended (Kravchenko et al., 2019). This would also be in line with the long-standing finding in the field of sustainability assessment that indicators should reflect the business realities of a particular organisation; as such, they should not be limited to general methodologies or standards (Keeble et al., 2003). However, there are certain points of reference that could be considered universally applicable, such as the planetary boundaries (Rockström et al., 2009) or the Paris Agreement (UN, 2015). Furthermore, Niemeijer and de Groot (2008) have developed a framework for indicator selection based on causal networks which has found widespread uptake from scholars for discussion with the environmental domain. They point out the importance of looking at the integration of the indicator set rather than focusing on single indicators. Similarly, Addison et al. (2020) propose the creation of an assessment framework for evaluating the biodiversity impact of business practices, and mention the central role of involving stakeholders in the assessment, if the assessment scope goes beyond company boundaries. This is particularly relevant for CE practices, given that they mostly require collaboration of companies within their supply chain network (Brown et al., 2019). Moreover, the involvement of stakeholders in general is described as a methodological necessity for sound sustainability assessment by several scholars (Sala et al., 2013; Troullaki et al., 2021). It is by way of this transdisciplinary involvement that the assessment approaches can be adapted to contextual specificities of the sustainability impacts to be assessed, while also including some standardised indicators based on international consensus (Kühnen & Hahn, 2018).

However, evidence on *how* companies develop such context-specific CE assessment approaches is limited in literature (WBCSD, 2018). As in sustainability assessment, one key element in this process is the involvement of stakeholders, especially in connection to the flourishing field of CE consultancies and research agencies that offer CE assessment services (Pereira & Vence, 2021). For example, for public sector organisations, a co-developed CE assessment framework with the active involvement of internal stakeholders has been proposed; it emphasises including sector specifics in CE assessments of organisations (Droege et al., 2021a). With respect to the involvement of stakeholders, for micro-level CE assessment approaches from academic literature, only a low number have been designed in a participatory manner (Roos Lindgreen et al., 2020). Yet, to our knowledge, no research exists on how companies engaged with CE practices develop assessment practices either internally or with external consultation and how, if at all, the process differs from the development of sustainability assessments.

Following this, we address this lack of empirical data on the development of CE assessment approaches by companies and their stakeholders through inquiring specifically about their development process. To improve the development of future CE assessment approaches, company needs with respect to external expertise throughout the assessment process are extracted, revealing at what scale assessment tools are needed.

RQ2: What is the process of developing tailor-made CE and sustainability assessment approaches?

RQ2A: How are stakeholders involved in the creation of assessment approaches for CE practices?

RQ2B: What are the assessment needs and preferences of companies engaged with CE?

2.3 | Benefits of—and barriers to—CE assessment

Considerable research exists regarding the identification of drivers and barriers for embedding CS assessment processes within organisations (Lozano, 2020; Triste et al., 2014). The assessment process is a critical element of strategic management, facilitating and driving change towards CS within a company (Doppelt, 2003; Lozano et al., 2016). Bae and Smardon (2011) determined that the measurement and disclosure of sustainable business indicators allowed companies in manufacturing industries to integrate sustainable business practices into decision-making processes. This integration enabled companies to transform their practices from only environmental management towards broader sustainable business strategies (Bae & Smardon, 2011). Other, more general, benefits of assessing sustainable business practices are related to stakeholder communication, benchmarking between companies (Zimek & Baumgartner, 2019) and organisational learning (Sala et al., 2015). To complement this, several studies have identified barriers which can be both internal to the company (e.g. lack of awareness on sustainability issues, an absence of perceived benefits, lack of resources), as well as external (e.g. insufficient drivers, complexity of available tools) (Johnson & Schaltegger, 2016; Lozano, 2007). The identification of barriers enables the development of corresponding capabilities, allowing companies to not only overcome these barriers, but to go further than only compliance (Hart, 1995; Khan et al., 2020). In addition, the identification of barriers supports the revision of assessment approaches themselves to improve their applicability and relevance to companies. For instance, evidence points towards SMEs experiencing more significant barriers to sustainability assessment (Jaramillo et al., 2019; Johnson & Schaltegger, 2016), which has led to the development of new or modified assessment approaches for smaller companies (Garza-Reyes et al., 2018; Global Reporting Initiative, 2018). These advancements are essential as SMEs represent more than 99% of all companies in the EU (Eurostat, 2018). Companies implementing CE strategies are faced with critical challenges in terms of stakeholder management, financial and regulatory aspects, resource management and consumer acceptance (Ritzén & Sandström, 2017; Stewart & Niero, 2018). Several studies have focussed on such barriers to the implementation of CE business models and strategies (de Jesus & Mendonça, 2018; Mont et al., 2017; Ranta et al., 2018). However, the exploration of barriers exclusively for the assessment of CE practices has only been addressed by Droege et al. (2021b), focusing on Portuguese public sector organisations. To date, no study has identified the barriers related explicitly to the assessment of CE practices from private sector companies. Furthermore, no study has addressed the motivation and benefits of companies which voluntarily conduct a CE assessment.

From the above, the following research question emerges:

RQ3: Why do (or don't) companies conduct CE assessment?

3 | METHODS

Figure 1 illustrates the mixed methods approach (Creswell & Plano Clark, 2018) consisting of two complementary research methods to obtain insights from frontrunner companies engaged with CE: a semi-quantitative survey and semi-structured interviews (Adams, 2015). We chose the combination of these two methods to identify the approaches that were applied (through the survey), and how and why companies applied these approaches (through interviews). It should be highlighted that the survey and the interviews contained additional questions analysed in the context of a separate study (Walker, Opferkuch, et al., 2021).

3.1 | Sampling procedure

To identify companies actively engaged with CE practices in Italy and the Netherlands, we applied a purposive sampling method (Hibberts et al., 2012). Namely, we only included companies which are members of existing national and international CE networks since we assume they are frontrunners in CE and its assessment. A list of the included CE networks can be found in Appendix A. In order to be included in the survey, besides being part of a CE network, respondents needed to satisfy two other criteria: being a private sector organisation, according to national law; and having an official website. The survey was delivered through the online survey tool SurveyMonkey (2021), with personalised email invitations and was open from July until the end of September 2019. At the end of the survey, respondents had the option to opt in for successive interviews; thus, the interview sample consists of a subset of the survey respondents. These interviews were conducted between May and June 2020 through video

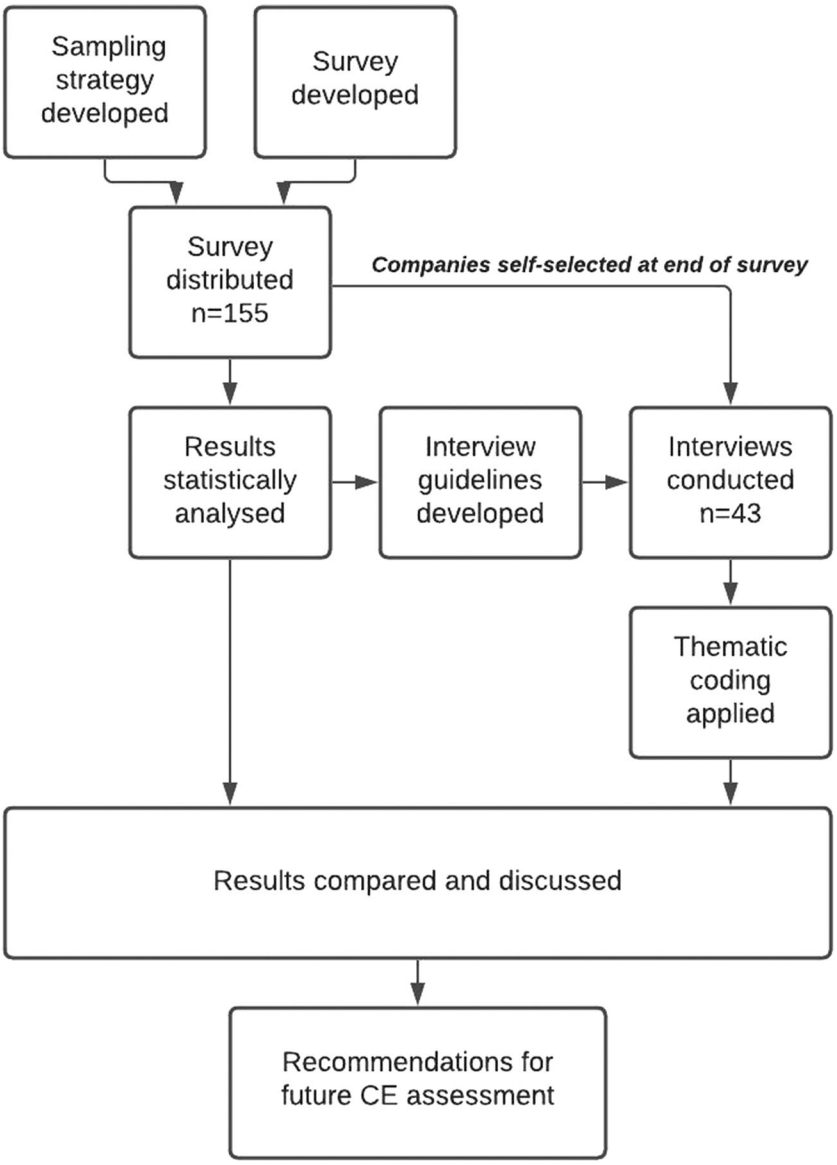

FIGURE 1 Illustration of overall research steps employed in this study

calls. Both the survey and interview participants were aware that the results of the study would be anonymised.

3.2 | Sample description

The survey was sent out online to a total of 809 companies and was fully completed by 155 (survey response rate: 19%). Of the responding companies, 46% were based in Italy and 52% in the Netherlands. Two respondents were part of Italian or Dutch CE networks while being based outside of these countries: one from Luxemburg and one from Austria. In the interviews, the distribution of companies ($n = 43$) was nearly the same, with 20 companies based in Italy and 23 in the Netherlands.

The companies were subdivided into the Eurostat classification scheme for SMEs. For the 155 survey companies, 45% consisted of micro companies (1–9 employees), 33% of SMEs (10–249 employees) and 22% of large companies (250+ employees). For the 43 interviewed companies, this was almost the same, with 49% micro companies, 26% SMEs and 25% large companies.

The respondents categorised their company sectors themselves according to the statistical classification of economic activities in the European Community (NACE) (Eurostat, 2008). Though both samples were diverse, Figures 2 and 3 show that the most frequently named sector in both cases was 'Manufacturing', followed by 'Other service activities' and 'Professional, scientific and technical activities', both of which represented consultancy companies. Whereas the former category would actually be assigned to repair services, the analysis of individual survey answers revealed that several companies in this category were in fact consultancy companies. As to be expected, 'Waste & water management' companies were also present in the sample, given the inherent circular qualities of their business models.

Finally, Figures 4 and 5 prove that the survey and the interviews collected information from decision-makers with generally high authority and knowledge on the topic of sustainability and CSR. Interestingly, in the interviews, the share of respondents from the 'General management' and 'Sustainability & CSR' was notably larger than in the survey, representing a higher willingness of these respondents to discuss sustainability and CE-related matters.

3.3 | Survey development

For a detailed description of the creation of the overall survey and its distribution to 809 companies, readers should refer to Walker, Opferkuch, et al. (2021). Regarding the survey questions addressed in this paper, we first asked companies whether they regarded a list of assessment approaches as either CE or sustainability assessment and whether they applied them on a company or product level. The identification of CE and sustainability assessment approaches was based on literature (Corona et al., 2019; Ness et al., 2007; Sala et al., 2013; Vinante et al., 2020), as well as input from a sustainability consultancy specialised in life cycle-based assessments. As identified in Section 2, the assessment approaches were categorised into life cycle-based/footprint, reporting frameworks, tailor-made indicators and single indicators, depicted in Table 1.

We also asked what system boundaries companies considered when doing assessments and whether they had developed their own assessment systems besides those postulated by the authors. In case companies had developed their own assessment frameworks, we further inquired whether this had happened in collaboration with external stakeholders or not, in order to get a better understanding of the development process of such assessment approaches. Finally, we posed the question in what assessment phase, of either sustainability or circularity assessment, companies would benefit most from external expertise. These assessment phases were composed of the steps of the LCA, the identification of suitable indicators (Kravchenko et al., 2020), the communication of the results to internal and external audiences and their inclusion into corporate decision-making (Bae & Smardon, 2011). This would help identify if company needs were different regarding CE or sustainability assessment and whether there were specific phases of assessment where support would be particularly useful. In all questions, it was possible to provide additional comments in open text fields.

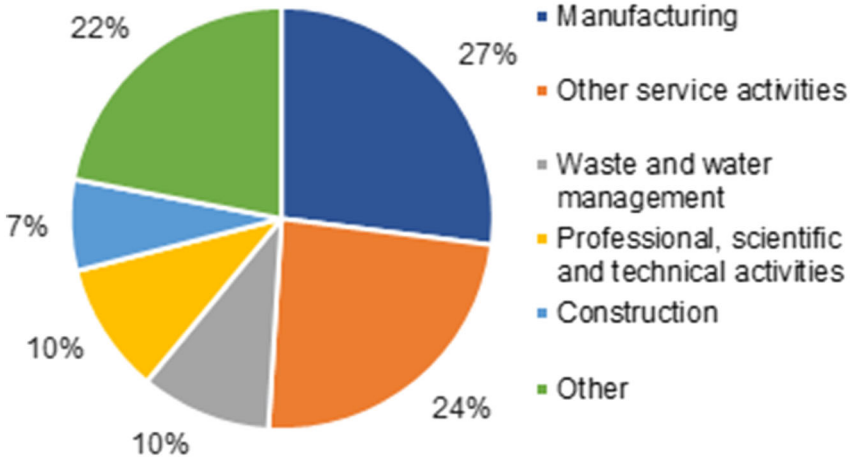

FIGURE 2 Industry sector of survey respondents ($n = 155$) [Colour figure can be viewed at wileyonlinelibrary.com]

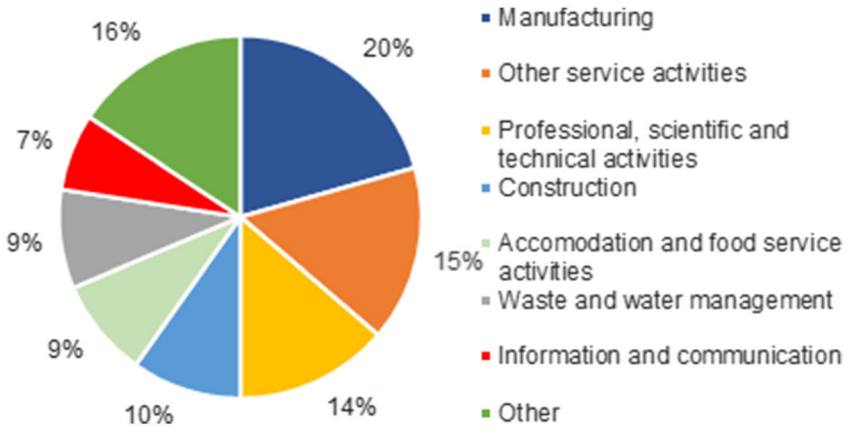

FIGURE 3 Industry sector of interview respondents ($n = 43$) [Colour figure can be viewed at wileyonlinelibrary.com]

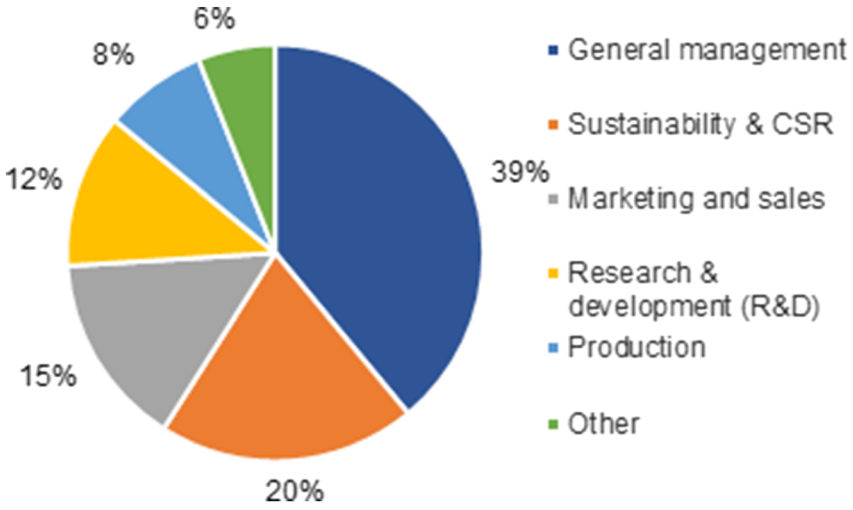

FIGURE 4 Department of survey respondents ($n = 155$) [Colour figure can be viewed at wileyonlinelibrary.com]

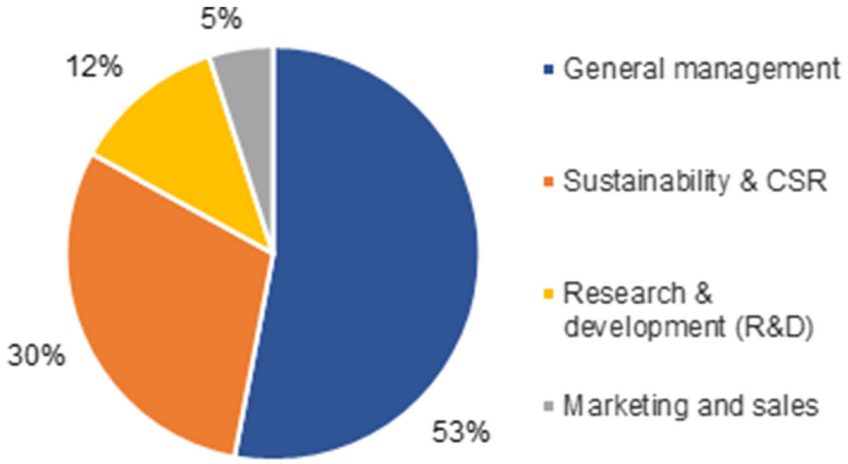

FIGURE 5 Department of interview respondents ($n = 43$) [Colour figure can be viewed at wileyonlinelibrary.com]

3.4 | Interview guideline development and process

To get a better picture of how frontrunner companies engaged with CE practices develop assessment approaches and why they do (or why they do not) implement these, we conducted interviews with 43 respondents which ranged between 45 and 90 mins. The interview questions focus on companies' understanding of CE and sustainability assessment, the assessment creation and application, and barriers and benefits of assessing CE (available in Appendix B). These questions emerged from the survey results and, in particular, from the open answer fields. Since the interviews were held in English, Dutch and Italian, we applied the Loubere's (2017) Systematic and Reflexive Interviewing and Reporting (SRIR) method. This method requires scholars to hold frequent meetings to discuss the findings and impressions of the individual interviews, instead of writing and analysing full transcripts.

TABLE 1 Assessment approaches and their abbreviations

Category	Assessment approach	Abbreviation	References
Life cycle based/footprint	Carbon footprint	CF	WBCSD & WRI, 2004
	Ecological footprint	EF	Wackernagel & Beyers, 2019
	Product environmental footprint	PEF	European Commission, 2013
	Environmental life cycle assessment	E-LCA	ISO, 2006a, 2006b
	Life cycle costing	LCC	Hunkeler et al., 2008
	Material flow analysis	MFA	Brunner & Rechberger, 2016
	Social life cycle assessment	S-LCA	UNEP, 2020
	Water footprint	WF	Hoekstra et al., 2011
Reporting framework	Environmental accounting	EA	Bebbington et al., 2021
	GRI standards	GRI	GRI, 2016
Tailor-made indicators	Tailor-made circularity indicators based on a life cycle approach	TCEI (life cycle)	N/A
	Tailor-made circularity indicators based on direct impact	TCEI (direct)	N/A
	Tailor-made sustainability indicators based on direct impact	TSI (direct)	N/A
	Tailor-made sustainability indicators based on a life cycle approach	TSI (life cycle)	N/A
Single indicators	Material Circularity Indicator (by Ellen MacArthur Foundation)	MCI	EMF and Grata, 2015
	Material durability	MD	Figge et al., 2018
	Recycled content	RC	Kristensen & Mosgaard, 2020
	Recycling rate	RR	Kristensen & Mosgaard, 2020
	Time for disassembly	TfD	Vanegas et al., 2018
	Volume of non-renewable resources not extracted	VNRRne	Kristensen & Mosgaard, 2020
	Volume of virgin material production prevented	VVMp	Kristensen & Mosgaard, 2020
	Volume of waste diverted from landfill	VWdL	Kristensen & Mosgaard, 2020

3.5 | Data analysis and integration

After the survey was closed, we exported the answers from SurveyMonkey into the statistical analysis software IBM SPSS Statistics 26 (IBM, 2020). Then, we took a univariate analysis approach and analysed the descriptive statistics. To identify whether variations in the answers correlated with the size (micro, small to medium and large) as well as the sectors (divided into production and service sector) of the respective companies, we employed cross-tabulations (Bartiaux et al., 2018) and conducted a contingency coefficient test to determine the significance of the correlations.

Regarding the interviews, we jointly analysed the interview notes in the qualitative data analysis software NVivo R1 (QSR International, 2020) with an inductive coding approach based on thematic analysis (Braun & Clarke, 2006). After assigning codes to the responses for each sub-question, we compiled them into major themes, as presented and discussed in the following sections. This inductive approach was chosen following the (1) novel nature of the research topic, and the inherent conceptual ambiguities between sustainability and CE, as described in chapter 2, and (2) the scarcity of empirical evidence on company engagement with CE assessment. Lastly, for a comprehensive analysis, the findings from the survey answers were confronted and complemented with the findings from the interview responses in an iterative manner.

4 | RESULTS

This section presents the results according to the three main research questions formulated in Section 2.

4.1 | Assessment of CE and sustainability by companies

4.1.1 | Application of assessment approaches

As seen in Figure 6, the application rate of the 22 approaches, previously introduced in Table 1, shows large variability, both overall and within each of the categories. Generally, 36% of companies have not applied any of the approaches on either a product or company level. On the product level, 53% of respondents do not apply any

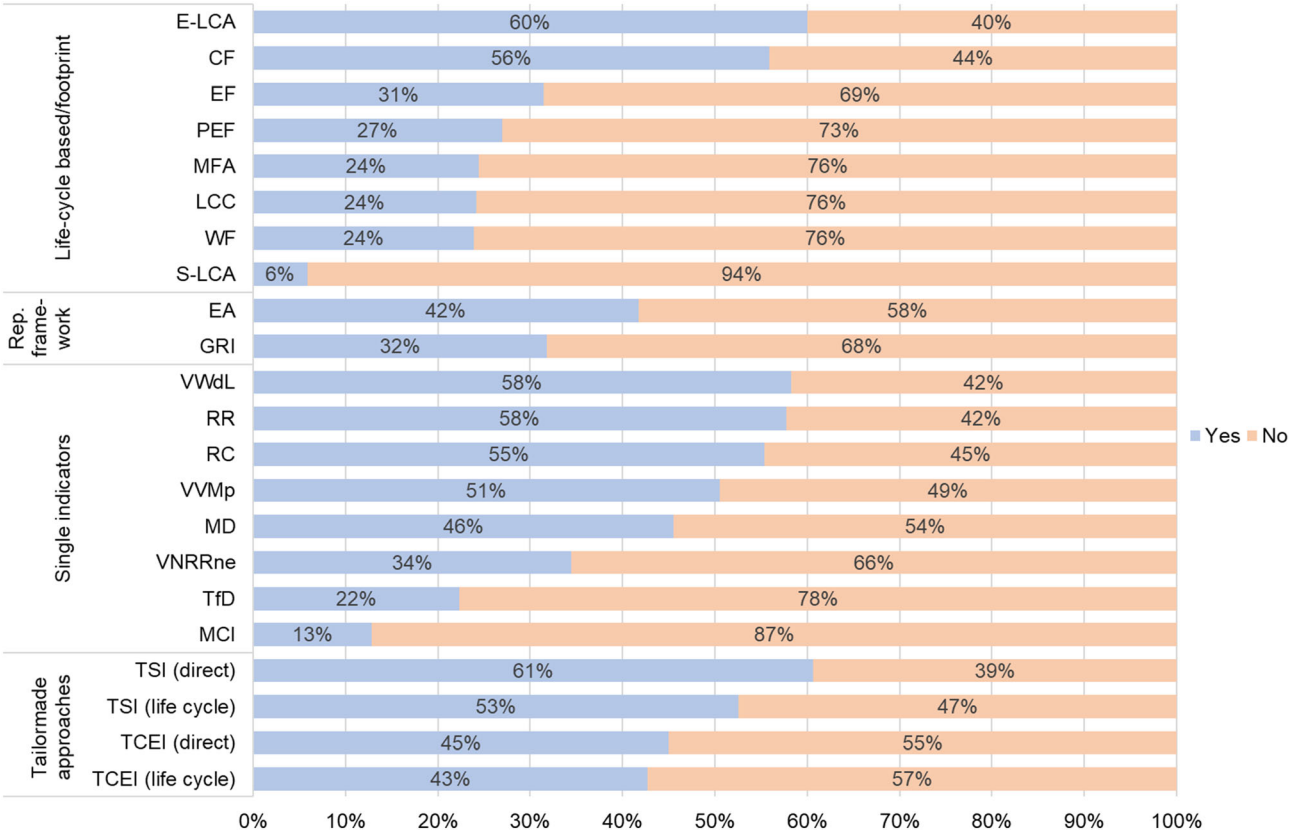

FIGURE 6 Application of CE- and sustainability assessment approaches ($n = 98$). CF, carbon footprint; EA, environmental accounting; EF, ecological footprint; E-LCA, environmental life cycle assessment; GRI, GRI standards; LCC, life cycle costing; MCI, Material Circularity Indicator (by Ellen MacArthur Foundation); MD, material durability; MFA, material flow analysis; PEF, product environmental footprint; RC, recycled content; RR, recycling rate; S-LCA, social life cycle assessment; TCEI (direct), tailor-made circularity indicators based on direct impact; TCEI (life cycle), tailor-made circularity indicators based on a life cycle approach; TfD, time for disassembly; TSI (direct), tailor-made sustainability indicators based on direct impact; TSI (life cycle), tailor-made sustainability indicators based on a life cycle approach; VNRRne, volume of non-renewable resources not extracted; VVMp, volume of virgin material production prevented; VWdL, volume of waste diverted from landfill; WF, water footprint [Colour figure can be viewed at wileyonlinelibrary.com]

approaches, 7% of respondents apply one approach, and the remaining 40% applied two or more approaches. Looking at the frequency of approaches applied at company level, 46% of respondents do not apply any approaches on a company level, 10% apply only one approach, and the remaining 44% apply two or more approaches.

Figure 6 shows that popular assessment approaches are tailor-made sustainability indicators (both with a life cycle and a direct impact approach), single indicators (for example, the volume of waste diverted from landfill), and E-LCA, especially on the product level. In the group of life cycle-based methods, MFA, PEF, LCC and S-LCA in particular are less frequently applied, the latter having the lowest application count. In contrast, CF is applied by more than half of the companies.

While the application of assessment approaches is in most cases not entirely attributable to either company or product level, there are some cases where differences were observed which may relate to the intended goal of these assessment approaches. The GRI standards, designed to help companies assess and report their impacts, are applied by >80% on company level. The same holds for EA (75%) and for tailor-made sustainability indicators with direct impact (75%). E-LCA is, on the other hand, applied by around 70% of companies at the product level, signalling a high application rate within the sample. Appendix C (Table C1) provides more insights on the level on which the other approaches are applied.

The companies were also able to leave comments with respect to their assessment of sustainability and CE. Several pointed out that company size and sector were important determinants when applying a certain approach or not. Therefore, the relation of both company size (micro, SME, large) and sector (production or service) with assessment application has been analysed. The complete results of this analysis are presented in Appendix C (Table C2). After performing Pearson chi-square tests, the correlation results between company size and CF, LCA and GRI showed statistical significance (Table 2): Large companies are more likely to implement these three approaches than SMEs or micro companies. For the remaining 19 assessment approaches, no statistically significant results were obtained that suggest company size influences the use of each of the assessment approaches. In the same vein (Table 3), production companies were

Assessment approach applied	Company size			Statistical significance	
	Micro	SME	Large	*p*-value	Contingency coefficient
CF	36%	60%	83%	0.001*	0.360
E-LCA	46%	56%	87%	0.004*	0.320
GRI	20%	17%	70%	0.000*	0.435

TABLE 2 Applied assessment approaches differing by company size ($n = 98$)

**Statistically significant at 99th confidence interval.

TABLE 3 Applied assessment approaches differing by company sector (n = 98)

Assessment approach applied	Sector		Statistical significance	
	Production	Service	*p*-value	Contingency coefficient
LCA	69.2%	48.8%	0.043*	0.203
Recycling rate	66.7%	46.5%	0.046*	0.199
Recycled content	67.3%	40.5%	0.009**	0.259
Volume of waste diverted from landfill	68.6%	45%	0.023*	0.231

*Statistically significant at 95th confidence interval.
**Statistically significant at 99th confidence interval.

more likely than service companies to apply LCA, and the single indicators RR, RC and VWdL, whereas for the other assessment approaches, the sector did not influence their application in a statistically significant manner (refer to Table C3 in Appendix C for complete results).

Almost two-thirds of the surveyed companies indicated that they take a product life cycle approach. Concerning the remaining third, 14% of the total assessed the company only from gate to gate, while the rest also included the most important up- and downstream supply chain partners.

Taking a look at the interview results, around three-quarters (30) of the respondents stated that their company conducts some form of circularity assessment. These respondents provided examples of various indicators, metrics, tools and strategies which they utilised for circularity assessment (Table 4). This list highlights the diverse range of assessment approaches used and how companies are applying and integrating existing assessment approaches within their circularity assessment. Particularly, various assessment approaches designed for broader sustainability assessment are applied to assess CE practices. Many companies have stressed that they would like to become more active in assessing CE in particular. Besides CE assessment approaches, companies also provided further insights into tailor-made indicators and assessment methods in the survey, which were not always clearly attributed to either CE or sustainability assessment. Yet, it emerged that CE indicators were mostly related to either waste (e.g. kg of food saved from waste or waste reduction), material use (e.g. trees saved by use of alternative material or material inputs and outputs) and the R-hierarchy (e.g. design for recycling, reassembly and reuse), while those considered sustainability indicators more often concerned energy-use (e.g. energy saved), CO_2 emissions (e.g. CO_2 emissions reduced) and social aspects (e.g. number of people benefitting from a product/service).

TABLE 4 Approaches applied to assess CE practices by interviewees ($n = 30$)

Assessment approach	Times mentioned
Material inventory and mass balance	7
External approach developed by consultancy	6
LCA	4
Waste production and/or waste prevention	4
EMF Circulytics tool	2
General business performance- increased business means increased circularity	2
Linking CO_2 impacts of circular economy strategies	2
World Business Council for Sustainable Development (WBCSD) Circular Transition Indicators (CTI)	2
Ladder Van Lansink ranking of materials	1
Volume of products developed with CE strategies sold	1

4.1.2 | Distinguishing between CE and sustainability assessment

Survey results (Appendix D) showed that most approaches were considered useful to both assess CE and sustainability. This general finding was most prominent for the single indicators included in the list, while life cycle-based/footprint approaches and reporting frameworks had a higher association with sustainability only. In particular, CE was highlighted as the approach associated most often with sustainability assessment. Indicators designed to strictly measure CE (SD CEI direct, SD CEI indirect, MCI) were naturally more frequently linked to CE

assessment. Meanwhile, MFA, GRI, S-LCA and MCI were the approaches that the respondents were least familiar with.

The survey results and explicit comments by survey respondents on the need for a clarification between CE and sustainability assessment motivated analysing the difference further within the interviews. Through inductive coding, we identified two groups of respondents: the first group (two-thirds of the respondents) considered CE and sustainability assessment to be different. Within this group, the most important differentiation was that the scope of sustainability assessment was characterised as wider, including more elements that would be listed under the social dimension of sustainability. In the same group, interviewees indicated that CE assessment would therefore form part of sustainability assessment. Furthermore, CE assessment was considered to be more straightforward, since it is more directly linked to material use, which is relatively simple to monitor. Moreover, it takes place in the context of industrial processes, which are generally more measurable. Other differences were that CE assessment is mainly linked to resource management, that it is less verifiable because of its novelty, and that it is focused on high-value reuse of resources.

The second group, composed of approximately one-third of the interviewees, highlighted that CE and sustainability assessment are the same. They, for example, considered CE to be a new version of sustainability, with the existing sustainability assessment tools applicable to CE as well. Social aspects were also considered a central part of CE by a few interviewees, while others mentioned that, to them, 'something cannot be circular if it is not sustainable. So in the measurement, there is no difference' (micro company, accommodation and food service activities sector). Finally, some respondents considered CE and sustainability to be integrated so densely that any differentiation in terms of assessment was not necessary.

4.2 | Development of CE and sustainability assessment approaches

4.2.1 | Stakeholder involvement

The companies answering the survey indicated that 39% of them did not create their own assessment framework, 24% have developed their framework internally, and 27% worked with external partners (Figure 7). Slightly less than half of those external stakeholders were consultancies (16), followed by universities (12) and other partners (11); also, several survey respondents involved more than one of these stakeholder groups. We further addressed the assessment development process and the inclusion of stakeholders in the interviews.

In a first step, interviewed companies mostly consulted internally with their employees. Frequently, they created cross-departmental focus groups to develop a sustainability or circularity assessment in line with their own corporate strategy pillars. This assessment was often based on existing industry standards, such as those from the GRI, as well as the sustainability reports of other companies. Several respondents mentioned that they did not develop specific tools for CE assessment but instead relabelled some of their existing environmental sustainability indicators as CE indicators. Upper management engagement was crucial to starting the assessment development process. However, in order to become more circular or sustainable, assessment development should be diffused through the whole company to create a better understanding of sustainability and CE amongst employees. After internal consultation, three-quarters of all interviewees also involved external stakeholders; those who did not involve external stakeholders refrained from doing so mostly in relation with the CE assessment, which was considered technical, and they perceived little benefit of stakeholder feedback. A few micro

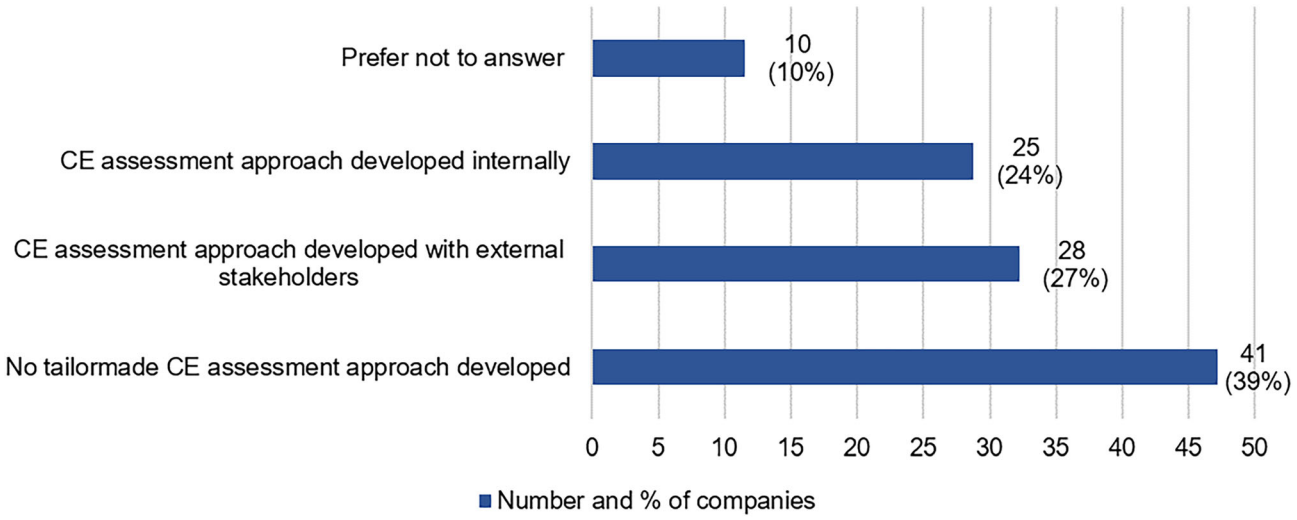

FIGURE 7 Involvement of external partners in development of tailor-made CE and sustainability assessment framework ($n = 104$) [Colour figure can be viewed at wileyonlinelibrary.com]

companies also simply did not have the resources to involve external partners.

Overall, external stakeholder engagement was seen as essential by a large majority of the interviewees. Non-technical stakeholders played a central role in determining companies' strategic sustainability priorities, supporting and approving corporate activities in their respective communities. The assessment was then adapted to these strategic goals through, for example, stakeholder workshops or a materiality assessment by means of a stakeholder survey. Such surveys were a frequently used tool, mostly by large companies, to collect feedback, with practitioners highlighting the need for common understanding of the issues at hand in order to correctly allocate priorities. Our findings demonstrate that for companies engaged with CE, these stakeholder surveys are being utilised within the context of CE assessment. For example, for large companies, shareholders and investors are putting CE on the strategic agenda, driving the inclusion of CE in the assessment process.

Frequently included stakeholder groups were suppliers with which companies had close relationships, clients and universities. Companies had different forms of collaboration with these groups. The initiative to create assessments usually came from larger companies in the supply chain. Their collaboration with the 'preferred suppliers' was sometimes based on joint method development, but more often on delivering data regarding the sustainability impacts of upstream production steps. Companies' clients were the second largest group that influenced corporate assessment practices by, for example, stipulating certain certifications or indicators to be reported in the tenders the respondents were bidding for, such as Environmental Product Declaration, SA8000 or ISO 14001. Companies also considered the clients' needs and knowledge of software tools when opting for a certain assessment procedure. Following this, for companies with a larger product portfolio, assessment was described as more complex. Conducting client workshops was a frequent approach to identify their needs with regard to the companies' impact assessment. Finally, universities were often involved to either jointly develop an assessment methodology or to verify the scientific rigour of the assessment process.

Consultants were at times hired to support the assessment process, both through tool development and assistance with its implementation. This collaboration allowed the consultants to continuously adapt and improve their assessment methods. Furthermore, consultants also provided expert knowledge regarding life cycle inventory data of secondary materials used as production inputs.

Finally, larger companies in particular were working on standardising assessment approaches within industry groups such as Factor10 of the WBCSD or the CE100 by the EMF. While they themselves did not develop the tools, they conducted pilots and provided feedback to the working groups. In contrast, smaller companies often did not assess their activities in a quantitative manner but had an open ear for feedback from their clients and employees, as to align their activities with their often-idealistic corporate values.

4.2.2 | Assessment needs and preferences

Overall, respondents indicated that expert input would be moderately beneficial throughout the assessment phases listed, except for 'Internal communication of results'. Even though the need for expertise was similar in both sustainability and circularity phases, Figure 8 shows it was considered slightly more beneficial for the

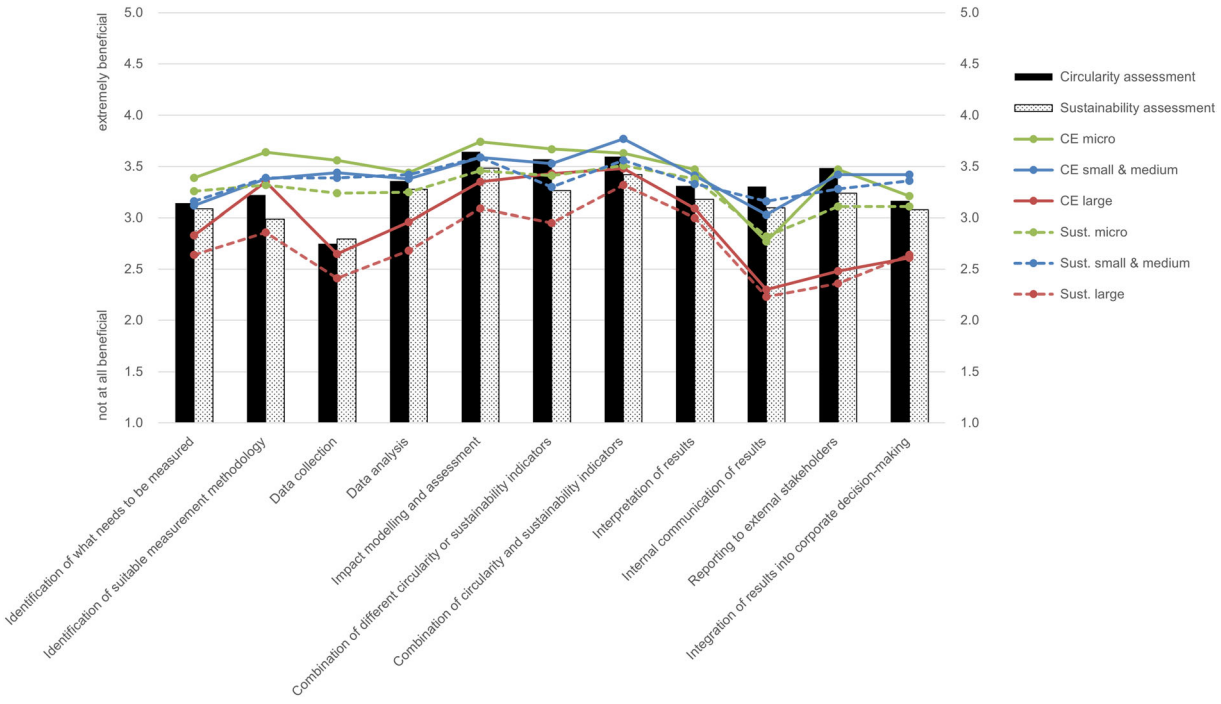

FIGURE 8 Benefit of expert support for sustainability and circularity assessment, by company size ($n = 101$) [Colour figure can be viewed at wileyonlinelibrary.com]

implementation of circularity assessment approaches than for sustainability assessment approaches.

We also found that large companies had a considerably lower need for expert involvement than SMEs and micro companies. It was further observable that the spread between benefitting from help between circularity (higher) and sustainability (lower) assessment was the highest within large companies, while SMEs and smaller companies seemed to potentially benefit more evenly from both circularity and sustainability assessment support.

When contrasted with the interview findings, it is interesting to observe that micro companies simultaneously form part of the group of companies which seem to potentially benefit the most from external assessment, while also considering assessment in general as superfluous.

With regard to the development of future CE assessment approaches, almost half of the respondents designated the supply chain to be the most suitable level for assessment, given the collaborative nature of CE practices. However, it was also acknowledged that this might be too complex, especially for large companies with an extensive portfolio of products and their respective supply chains. About a third of interviewees proposed that the level of assessment should be adapted to the context. A similar number of respondents advocated for employing an assessment on organisational level, especially if a company provided services or included internal supply chains. Yet, again, it was argued that companies were already using several assessment tools on an organisational level, so adding more might not always be favourable nor feasible, especially in the case of a diverging product range. The product level was suggested by about a quarter of companies, with the proposition that metrics should be clearly measurable and not subjective. According to them, it was easier to establish a product's rather than a company's degree of 'circularity', given there was no clear benchmark against which to compare company circularity. Other levels proposed included project level, mainly raised by construction companies, the regional, business group or portfolio level.

4.3 | Benefits of—and barriers to—circularity assessment

The 30 interviewed companies which stated that they implemented some form of CE assessment discussed the perceived benefits they obtain from this assessment. Respondents could mention more than one benefit, and through the inductive coding process, each benefit was grouped into one of two domains: (1) external communication and collaboration or (2) internal improvements and insights. The most frequently mentioned benefits are presented in Table 5.

Generally, the interview participants discussed how conducting some form of CE assessment has benefitted their marketing and external communication processes with stakeholders and clients in particular, as the results demonstrate the value of adopting CE strategies. Internally, responses highlight that for the companies, the entire CE assessment development process resulted in a positive learning experience, rather than from only receiving the final assessment result. Interestingly, investors were only mentioned once with relation to the benefits of CE assessment, suggesting that in its current form, CE assessment approaches are not necessarily integrated within management-level decision-making. In addition, several participants indicated that although through CE assessment they have been able to improve collaborations, the assessment process always needs an initial goal: 'Are we measuring CE to involve different members of the chain or are we measuring for the sake of measuring?' (micro company, other services sector).

TABLE 5 External and internal benefits of CE assessment ranked by number of times mentioned by interviewees ($n = 30$)

#	External communication and collaboration	Number of interviewees who mentioned the benefit
1	Marketing and improving reputation of company	6
2	Communicating and reporting to stakeholders	6
3	Communicating to clients	5
4	Providing evidence of activities to increase transparency	5
5	Identifying opportunities and evaluating collaboration	3
#	**Internal improvements and insights**	**Number of interviewees who mentioned the benefit**
1	Improving and internal optimising of CE strategies	7
2	Providing insights into broader sustainability performance	5
3	Enabling a learning process and cultural change (employees)	5
4	Developing company strategy and vision (future planning)	4
5	Allowing for comparability and identifying market opportunities	2

The 13 companies which stated that they did not conduct any type of CE assessment then elaborated on the 15 main barriers encountered when considering implementing a CE assessment approach, presented in Figure 9. Through the inductive coding approach, two key categories of barriers became apparent within the interviews: (1) internal and (2) external. Within this second category, codes were grouped to form a subcategory of methodological barriers. Generally, the nine external barriers relate to the fact that circularity assessment was perceived as too complex. Furthermore, several external barriers are influenced by the current absence of a benchmark or standard for CE assessment, causing difficulty for companies to contextualise their CE assessment results and integrate them within their broader sustainability and/or communication strategies. For the seven internal barriers to CE assessment identified,

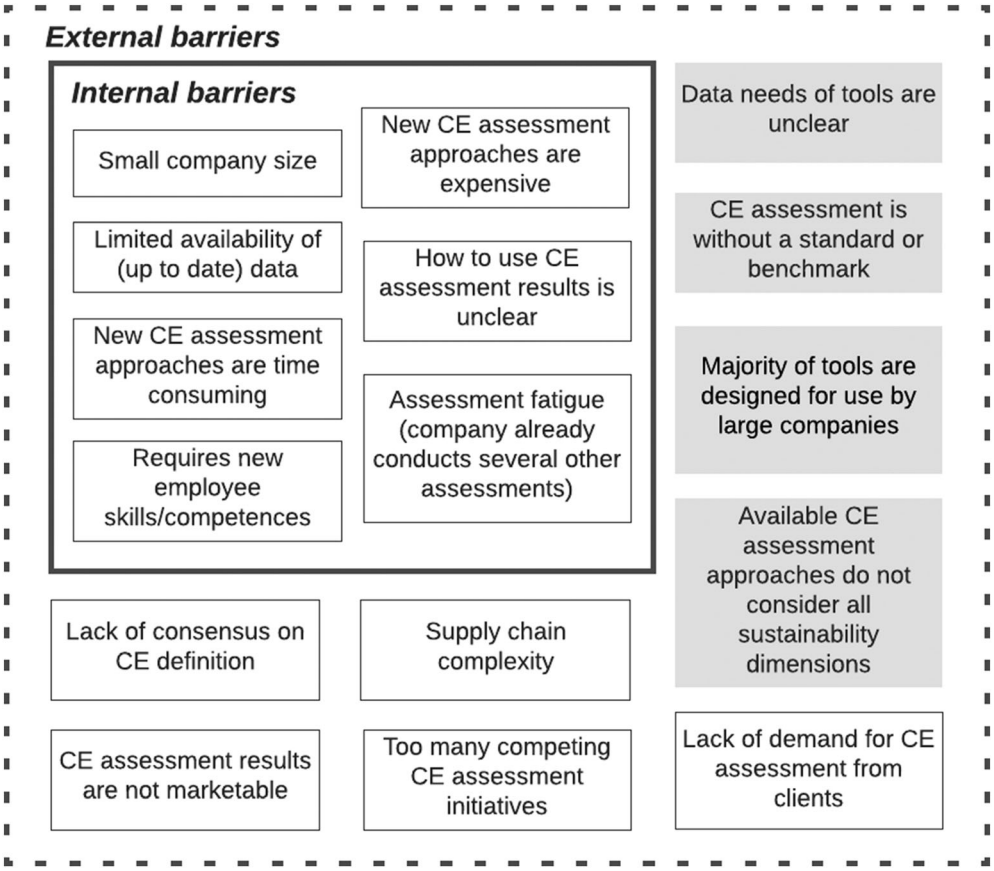

FIGURE 9 The seven internal and nine external barriers to CE assessment identified by companies not conducting any form of CE assessment. The four external barriers shaded in grey form the subcategory of methodological barriers ($n = 13$)

interviewees commented that the internal capacity of their companies to conduct yet another kind of assessment was limited. This was emphasised by the fact that it was unclear how the assessment results would be used, making it more difficult to justify allocating resources. Within these responses, no correlations were observed between company size, sector or country and their respected barriers and/or benefits.

5 | DISCUSSION

Overall, around a third of the companies in the survey sample do not conduct any CE or sustainability assessment. Also, as previously identified in literature, a low uptake of the CE assessment approaches proposed in academic literature (Stumpf et al., 2019; WBCSD, 2018) was found. Within this study, this is likely influenced by the composition of the sample, consisting mainly of micro companies (45%) and SMEs (33%). The survey results further show that a slight majority of companies engaged with CE assess their practices on a company, rather than a product level. When inquiring about their preferred level of assessment, the supply chain and organisational level are, despite their complexity, indicated as most valuable. Previous inventories of CE assessment approaches find product-level assessment approaches to be most commonly proposed (de Oliveira et al., 2021; Roos Lindgreen et al., 2020) and signal the need for methodological development of supply chain and organisational approaches (Harris et al., 2021; Walker, Vermeulen, et al., 2021). For company level assessment, respondents mainly rely on tailor-made indicators. On a product level, however, the most frequently used tool is LCA, a standardised methodology. This finding is in line with research and industry efforts to align LCA and CE assessment (Ávila-Gutiérrez et al., 2019; Niero et al., 2021). Recently, MFA has been promoted as an apt approach for circularity assessments (Kalmykova et al., 2018); however, within our sample, there was both a low application of and familiarity with MFAs from companies, irrespective of their size or sector. However, a significant correlation was observed between company size and the application of three out of 22 assessment approaches: GRI indicators, CF and LCA. This might point to both institutional conditions (e.g. the increasingly obligatory nature of sustainability reporting and rise in industry reporting initiatives) and resource availability as drivers for the uptake of assessment approaches by large companies (Di Maio & Rem, 2015). We also found that companies in the production sector were significantly more likely to implement LCA and three single indicators related to resource flows (RR, RC and VWdL) which could be explained by the higher importance of such flows in companies which are transforming materials into products. In contrast, companies in the service sector, which are more often working with intangible products, might apply different CE strategies, subsequently resulting in different impact assessment needs (Blomsma et al., 2019).

With respect to CE and sustainability assessment, findings here show that for companies, the distinction between the two is not clearly defined. This is in line with the persisting blurred perspectives

of the two paradigms from both companies and academic literature (Schoeggl et al., 2020; Walker, Opferkuch, et al., 2021). Most assessment approaches were considered by survey participants to be useful to assess CE as well as sustainability. Yet, from the interviews, two-thirds of respondents perceived CE assessment as a part of a wider sustainability assessment, where the latter encompasses the social dimension as well as certain environmental aspects which interviewees considered being not directly related to resource use (e.g. CO_2 emissions and energy use). Some companies with CE 'in their DNA' equated their general performance assessment with CE performance. However, as various authors have indicated, CE practices do not always lead to improved sustainability impacts (Blum et al., 2020; Corona et al., 2019). While our research demonstrates the confusion companies have regarding the differences and similarities between CE and sustainability assessment approaches, the majority of interviewees agreed that sustainability takes precedence over CE, as is promoted in other studies (Kristensen & Mosgaard, 2020). Regarding tailor-made approaches, a small majority of companies in our sample that developed assessment approaches have collaborated with external parties, primarily consultancies, but also universities or supply chain partners. In such collaborations, consultancies and universities often provide knowledge, in line with Pereira and Vence (2021). Consultancies often help companies to adapt existing assessment approaches to corporate realities and to generate information for decision-makers. Furthermore, the consultancies also use their assignments to improve their tailor-made methodologies. Meanwhile, supply chain partners are mainly involved for data collection. This draws attention to the ability of CE strategies to increase collaborations along the supply chain (Brown et al., 2019). At the same time, closer collaboration is needed to address the existing disconnect between research and practice with respect to assessing (the sustainability of) CE practices (Harris et al., 2021).

In the development process, larger companies often make use of available frameworks which support mandatory reporting, such as the GRI as well as tendering requirements made by their governments or clients. While using existing frameworks can be considered a top-down approach to developing assessment approaches, the involvement of stakeholders enables a bottom-up co-creation of assessment approaches, potentially resulting in enhanced assessment capabilities. This reflects two established findings from sustainability assessment literature: (1) Tailor-made assessment approaches better reflect companies' business realities, and (2) the involvement and participation of stakeholders is crucial for the development and application of assessment methodologies (Maas et al., 2016; Sala et al., 2013). Regarding the requirements for external assistance when developing CE and sustainability assessment approaches, we find that the company's expectations are similar for both CE and sustainability assessment. This indicates there is a similar level of understanding of the two concepts, although some tendencies stood out. Primarily, companies indicated they need the most external support when deciding how to combine circularity and sustainability indicators as well as to model the impacts of their CE practices. The latter is also one of the most challenging phases documented in literature, especially for SMEs not experienced with impact assessment methods of life cycle-based/footprint-based assessment approaches (Chevalier et al., 2011). Interestingly, external expertise was considered least beneficial for internal communication within the survey, whereas internal improvements and insights were established as major benefits of CE assessment in the interviews.

This study, to our knowledge, is the first to identify the benefits of and barriers to CE assessment within the private sector. Within the interview sample, three-quarters of companies declared that they conducted some form of CE assessment, while the remaining one-quarter did not. The latter group pointed to seven internal and nine external barriers to CE assessment, a categorisation of barriers that has previously been found in literature on sustainability assessment. Some of those barriers were categorised as methodological issues, related to the current absence of any standard or benchmark for CE assessment. Companies explained that this has resulted in a lack of demand or general awareness for CE assessment from clients, as similarly found by Droege et al. (2021b). Interestingly, for the companies that had implemented some form of CE assessment, the primary benefits concern the internal optimisation of CE strategies and the use of CE assessment results within marketing and external communication. This result highlights the value companies obtain from the overall learning process associated with developing and implementing CE assessment, as companies were able to further integrate CE within their CS and strategic management processes, as is expected by Skærbæk and Tryggestad (2010) and Lozano (2015). Additional benefits of CE assessment, such as increasing transparency and identifying opportunities for collaboration, were in line with the general benefits of sustainability assessment a company will experience, as described in Bae and Smardon (2011).

With respect to most of the internal barriers to CE assessment we identified (e.g. small company size), our findings suggest that they are consistent with general barriers to sustainability assessment approaches, as seen in Johnson and Schaltegger (2016) and Jaramillo et al. (2019). This suggests that ongoing efforts to develop a single standard for CE assessment, e.g. by the ISO/TC 323 (ISO, n.d.), will not remove all barriers to CE assessment. This highlights the continued importance of acknowledging existing barriers to assessment within sustainability research; future CE assessment approaches must consider them in order to increase the accessibility of sustainability assessment in general, as opposed to amplifying assessment fatigue (Khalid et al., 2020). Our study also reveals the limited assessment capacities of SMEs, as already established in previous studies (Johnson & Schaltegger, 2016), and stresses the benefits of CE assessment with the hopes that SMEs and micro companies can be informed and supported to allocate resources for this endeavour.

Finally, the results of this study call for a reflection on a long-discussed paradox associated with assessment: standardisation versus tailoring of assessment approaches. First, as already mentioned, our results showed a key barrier for companies to conduct CE assessments was a lack of relevant benchmarks or standards, prompting a call for some form of standardisation of CE assessment and reporting. However, we have found that companies obtained numerous benefits through the process of developing tailor-made CE assessment

approaches, benefits which would be potentially reduced, if standardisation was to occur in an overly prescriptive way. At the same time, it is important to acknowledge that companies selecting their own CE indicators opens the doors for incidences of greenwashing, as observed in recent studies on CE assessment and reporting guidelines (Opferkuch et al., 2021; Pauliuk, 2018). These studies indicated that companies are able to cherry-pick CE indicators, reporting more on aims and intentions, rather than actual performance. In response to this, we refer to the suggestions of previous studies including Kühnen and Hahn (2018), who discussed this paradox within the context of social sustainability assessment. The authors suggest that while a normative consensus is emerging on what kind of indicators are to be included, decision-makers have to accept that at least part of the assessment results will remain incomparable, but are adapted to the respective context (Kühnen & Hahn, 2018). Similarly, Veleva et al. (2001) noted that lists of environmental performance indicators provided by global sustainability frameworks (e.g. GRI) offer very little insights into how a company may annually select, revise and reselect indicators they deem to more accurately measure sustainability. To potentially overcome the standardisation vs. tailoring paradox, Veleva and Ellenbecker (2001) suggest the use of core and supplemental indicators, facilitating both comparability of performance and flexibility for context-specific aspects, a suggestion which could be utilised within the context of assessing CE practices.

5.1 | Recommendations for academia

While academia was swift to propose a ubiquity of assessment approaches designed to assess circularity, sometimes explicitly identifying their relation to sustainability, less robust knowledge has been developed on the topic of assessment benefits. How the assessment process and results are used for strategic decision-making should be further investigated to direct the development of assessment practices. Moreover, such assessments often require expert knowledge and data that might not be readily available in the private sector. Therefore, we recommend that scholars should attempt to create CE assessment approaches with benefits that are validated by their end users (companies), as to facilitate their uptake. For this, a clearer picture of company needs and capabilities is required to design assessment approaches that match business realities, as has been the case for sustainability assessment. For example, companies expressed they would appreciate, if CE assessment were to include the whole life cycle or product supply chain, which implies the involvement of a wider set of stakeholders. When designing CE assessment approaches, it is thus essential to include not only the immediate stakeholders of companies, but to ideally involve the actors involved throughout the entire life cycle of the companies' products. While this has also been advocated for in sustainability assessment (Sala et al., 2013), the life cycle perspective inherent in CE provides a comprehensible and accepted rationale for the co-creation of CE assessment approaches. It could be the role of scholars to facilitate the joint development of assessment approaches that help to identify and involve such stakeholders, promoting the integration of participatory processes, while ensuring that interests beyond the businesses' stakes are covered (Keeble et al., 2003). Future studies could also integrate such participatory processes for assessment development in fields not directly related to CE, such as innovation and strategic management studies.

Finally, we recommend that academia should be clear in disseminating the message that CE is best used as a means to achieve sustainability and that assessing circularity in itself would not serve this purpose. While circularity and sustainability indicators tend to overlap in some instances, assessment should be able to reveal whether a CE practice will make a company and its partners more sustainable or not. Nevertheless, we argue that CE assessment can still provide companies with insights valuable to managing their resources; it could be seen as a precursor of and not a substitute for sustainability assessment. After all, to assess the impact of resource flows on sustainability, these flows first need to be identified and quantified. For this, we recommend incorporating the use of existing assessment approaches such as MFA-based methodologies, instead of promoting the development of new assessment approaches from scratch (Birat, 2015; Kalmykova et al., 2018). Instead, more academic attention could be paid to understanding assessment capacities of companies and aligning their needs with the existing methods, thus reducing assessment fatigue. This should be done considering the requirements and developments of international environmental standards, tools and labels such as the proposed Corporate Sustainability Reporting Guidelines (EC, 2021).

5.2 | Recommendations for practitioners

Corporate ambitions that go beyond profit maximisation are commendable; however, assessment is needed to ensure whether these ambitions can also be transformed into practices that result in the desired impacts, preferably prior to implementing such practices. For impact assessment, stakeholder involvement is recommended for setting priorities, given the strong context dependency of the impacts which CE practices can have on CS. Whereas external experts can help during this process, corporate learning associated with the process of assessment will facilitate cultural change. This requires cross-sectional involvement of employees as well as close collaboration with suppliers and clients. The scope of the assessment should be determined by the life cycle of a product or a cumulation of different products, where in a first step, the resource flows are to be mapped—for example, through the application of MFA-based approaches. Then, in line with recent research, only in a second step the related impacts in the three sustainability dimensions can be established through application of life cycle impact assessment methods (see Kalmykova et al., 2018; Rufí-Salís et al., 2021; Schulte et al., 2021). It should be noted that traditional MFA-based methods do not, in contrast to tools such as the CTI, provide insights into the different recovery options

inherent in material or product flows (WBCSD, 2020). Transparency on the recovery options of resource flows can offer information on suitable CE strategies to take. It needs to be underlined that existing data on resource flows can be used for both assessment steps, thus streamlining the data collection efforts. Further guidance on design strategies, setting up assessment processes for manufacturing companies and balancing the trade-offs when making decisions based on assessment results are covered by Diaz et al. (2021) and Kravchenko et al. (2020).

6 | CONCLUSION

In this article, we collected empirical evidence on the development and application of assessment approaches by European frontrunner companies engaged with CE practices. The results show that despite ample assessment propositions from the academic realm, only few are implemented by companies. Instead, companies most often develop their own tailor-made assessment approaches to assess sustainability and CE, frequently in collaboration with consultancies and universities. The applied assessment approaches are either based on direct impact or life cycle-based methods, such as LCA. In addition, our results suggest that the majority of companies engaged with CE are aware of the importance of assessment and are applying assessment approaches that are life cycle based.

The distinction between sustainability and CE assessment is seldom explicit, but the results show that companies perceive sustainability assessment to have a wider scope, notably also including the social dimension. While CE assessment is often understood to fall under the environmental dimension and mainly concerns material use, it provides pertinent information on resource flows, the impacts of which can then be assessed from a sustainability perspective. The companies that conduct such a CE assessment use the results to support external communication and provide strategic insights into resource use. Yet, several of the interviewed companies have abstained from conducting a CE assessment, because of a lack of an assessment standard, limited client demand and having only moderate assessment capabilities and capacities.

We are aware that the results of this article are subject to some limitations: the majority of both the survey and interview respondents are micro companies, asking for the results to be generalised with caution. However, given that the majority of companies in the EU are either micro companies or SMEs, the population to which the findings are relevant could be considerable nevertheless. Furthermore, we received several comments in the survey that pointed out that the questionnaire seemed to be designed for large companies, with questions covering a rather extensive list of topics. Therefore, we paid special attention to inclusively addressing, for example, the distinction between CE and sustainability assessment and the benefits and barriers to CE assessment in the interviews. Additionally, we acknowledge the overlapping nature of various assessment approaches described within this study (e.g. MCI, MFA and single indicators) which may have distorted some of the results, potentially further complicated by companies' lack of familiarity with assessment approaches.

The empirical insights into the assessment practices of frontrunner companies engaged with CE, as identified in this article, can support the design of assessment approaches that are (1) adjusted to company needs, increasing their applicability, and (2) able to accurately assess sustainability impacts of CE practices. This sustainability assessment could in part be informed by the quantification of resource flows, making circularity assessment a precursor and not a substitute for assessing sustainability. Furthermore, future research could build on the presented findings by analysing the general usefulness and suitability of assessment processes and results in facilitating transformative sustainable change. As mentioned, we recommend both academia and practitioners to drive the involvement of various stakeholders to co-create assessment approaches, which, by improving company capabilities, may have the potential to accelerate private sector initiatives towards SD. Ultimately in the future, clients and other stakeholders will probably more frequently request companies to communicate the contribution of their CE practices to the SDGs in a transparent and systematic manner, for which assessment approaches are essential.

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ENDNOTE

[1] Within this article, *circularity assessment* and *CE assessment* are used interchangeably.

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APPENDIX A

LIST OF INCLUDED CE NETWORKS

TABLE A1 CE networks by country

Italy	Netherlands	International[a]
• Atlante Italiano dell'Economia Circolare • Italian Circular Economy Stakeholder Platform (ICESP) • Circular Economy Network • Mercato Circolare	• Circulair ondernemen • Ontertekenaars van Grondstoffakkoord • Circle Economy • Holland Circulair Hotspot • Circulaire Coalitie	• Ellen MacArthur Foundation CE 100 • Circular Economy Club

[a]Included companies needed to have primary business operations in Italy or the Netherlands.

APPENDIX B

INTERVIEW GUIDELINES

1. Why does your company assess circularity? If not applicable, why not?
    1. If does assess CE: What benefits does your company get from assessing circularity?
    2. If does not assess CE: Is the reason for this linked to the characteristics of assessment methodologies available for circular economy or linked with internal capacity (barriers)?
    3. If does OR does not assess CE: There are various CE assessment approaches available on various scales (i.e. material, product, organisational and supply chain). In your opinion, if we were to develop an assessment approach for circularity, what scale/level(s) should be the focus, and why?
2. How does your company approach sustainability assessment and circularity measurement?
    1. If company does assess: In your opinion, what is the difference between the two?

2. If your company does not do circularity assessment: Do you think there is a difference between sustainability assessment and circularity measurement?
3. If company does assess CE: Within your company, what was the process for creating the assessment approach for circularity?
4. If company does assess either: How have you included stakeholders in creating a circularity or sustainability assessment process? Does this internal process differ for circular economy and sustainability assessment?

APPENDIX C

APPLICATION OF ASSESSMENT APPROACHES

TABLE C1 Complete results of application of approaches on product and company level ($n = 98$)

Category	Abbreviation	Yes, on company level	Yes, on product level	Not yet, but planned	No
Life cycle based/footprint	CF	39%	17%	16%	28%
	E-LCA	18%	42%	13%	27%
	EF	16%	16%	15%	54%
	WF	14%	10%	11%	65%
	MFA	13%	11%	4%	72%
	PEF	11%	16%	15%	58%
	LCC	7%	17%	10%	66%
	S-LCA	5%	1%	16%	78%
Reporting framework	EA	32%	10%	13%	45%
	GRI	27%	5%	9%	59%
Single indicators	VWdL	38%	20%	8%	34%
	RR	36%	22%	5%	37%
	VVMp	29%	22%	12%	38%
	RC	23%	32%	4%	40%
	VNRRne	20%	14%	11%	54%
	MD	16%	30%	1%	53%
	TfD	9%	13%	5%	73%
	MCI	7%	6%	12%	76%
Tailor-made indicators	TSI (direct)	46%	14%	12%	27%
	TSI (life cycle)	27%	26%	10%	37%
	TCEI (life cycle)	24%	19%	8%	49%
	TCEI (direct)	21%	24%	7%	48%

Abbreviations: CF, carbon footprint; EA, environmental accounting; EF, ecological footprint; E-LCA, environmental life cycle assessment; GRI, GRI standards; LCC, life cycle costing; MCI, Material Circularity Indicator (by Ellen MacArthur Foundation); MD:, material durability; MFA, material flow analysis; PEF, product environmental footprint; RC, recycled content; RR, recycling rate; S-LCA, social life cycle assessment; TCEI (direct), tailor-made circularity indicators based on direct impact; TCEI (life cycle), tailor-made circularity indicators based on a life cycle approach; TfD, time for disassembly; TSI (direct), tailor-made sustainability indicators based on direct impact; TSI (life cycle), tailor-made sustainability indicators based on a life cycle approach; VNRRne, volume of non-renewable resources not extracted; VVMp, volume of virgin material production prevented; VWdL, volume of waste diverted from landfill; WF, water footprint.

TABLE C2 Complete results of application of approaches by company size ($n = 98$)

Category	Abbreviation	Yes (micro)	No (micro)	Yes (SME)	No (SME)	Yes (large)	No (large)	Stat. significance
Life cycle based/footprint	E-LCA	46%	54%	56%	44%	87%	13%	0.004*
	CF	36%	64%	60%	40%	83%	17%	0.001*
	EF	32%	68%	70%	30%	33%	67%	0.986
	PEF	26%	74%	21%	79%	35%	65%	0.561
	MFA	26%	74%	23%	77%	14%	76%	0.97
	LCC	23%	77%	19%	81%	33%	67%	0.499
	WF	21%	79%	27%	73%	26%	74%	0.806
	S-LCA	3%	97%	7%	93%	10%	90%	0.586
Reporting framework	EA	33%	67%	50%	50%	45%	55%	0.35
	GRI	20%	80%	17%	83%	70%	30%	0.000*
Single indicators	MD	50%	50%	43%	57%	41%	59%	0.758
	RC	49%	51%	61%	39%	68%	42%	0.543
	VWdL	49%	51%	61%	39%	70%	30%	0.255
	RR	49%	51%	62%	38%	67%	33%	0.315
	VVMp	45%	55%	56%	44%	52%	48%	0.621
	VNRRne	35%	65%	37%	63%	30%	70%	0.888
	TfD	21%	79%	34%	66%	9%	91%	0.093
	MCI	11%	89%	21%	79%	5%	95%	0.221
Tailor-made indicators	TSI (direct)	61%	39%	48%	52%	77%	23%	0.100
	TSI (life cycle)	52%	48%	52%	48%	54%	46%	0.982
	TCEI (life cycle)	44%	56%	45%	55%	46%	54%	0.994
	TCEI (direct)	37%	63%	43%	57%	52%	48%	0.502

Abbreviations: CF, carbon footprint; EA, environmental accounting; EF, ecological footprint; E-LCA, environmental life cycle assessment; GRI, GRI standards; LCC, life cycle costing; MCI, Material Circularity Indicator (by Ellen MacArthur Foundation); MD:, material durability; MFA, material flow analysis; PEF, product environmental footprint; RC, recycled content; RR, recycling rate; S-LCA, social life cycle assessment; TCEI (direct), tailor-made circularity indicators based on direct impact; TCEI (life cycle), tailor-made circularity indicators based on a life cycle approach; TfD, time for disassembly; TSI (direct), tailor-made sustainability indicators based on direct impact; TSI (life cycle), tailor-made sustainability indicators based on a life cycle approach; VNRRne, volume of non-renewable resources not extracted; VVMp, volume of virgin material production prevented; VWdL, volume of waste diverted from landfill; WF, water footprint.

*Statistically significant at 99th confidence interval.

TABLE C3 Complete results of application of approaches by company sector ($n = 98$)

Category	Abbreviation	Yes (production)	No (production)	Yes (service)	No (service)	Stat. significance
Life cycle based/footprint	E-LCA	69%	31%	49%	51%	0.043*
	CF	63%	37%	46%	54%	0.099
	EF	35%	65%	28%	72%	0.467
	PEF	24%	76%	30%	70%	0.560
	MFA	21%	79%	28%	72%	0.444
	LCC	23%	77%	26%	74%	0.768
	WF	24%	76%	24%	76%	0.923
	S-LCA	4%	96%	8%	92%	0.444
Reporting framework	EA	48%	52%	34%	66%	0.182
	GRI	35%	65%	27%	73%	0.427
Single indicators	MD	43%	57%	49%	51%	0.574
	RC	67%	33%	40%	60%	0.009**
	VWdL	69%	31%	45%	55%	0.023*
	RR	67%	33%	47%	53%	0.046*
	VVMp	58%	42%	40%	60%	0.077
	VNRRne	41%	59%	27%	73%	0.164
	TfD	28%	72%	16%	84%	0.192
	MCI	11%	89%	15%	85%	0.512
Tailor-made indicators	TSI (direct)	62%	38%	59%	41%	0.717
	TSI (life cycle)	57%	43%	48%	52%	0.383
	TCEI (life cycle)	47%	53%	43%	57%	0.675
	TCEI (direct)	44%	56%	41%	59%	0.828

*Statistically significant at 95th confidence interval.
**Statistically significant at 99th confidence interval.

APPENDIX D

ATTRIBUTION OF APPROACHES TO SUSTAINABILITY OR CE

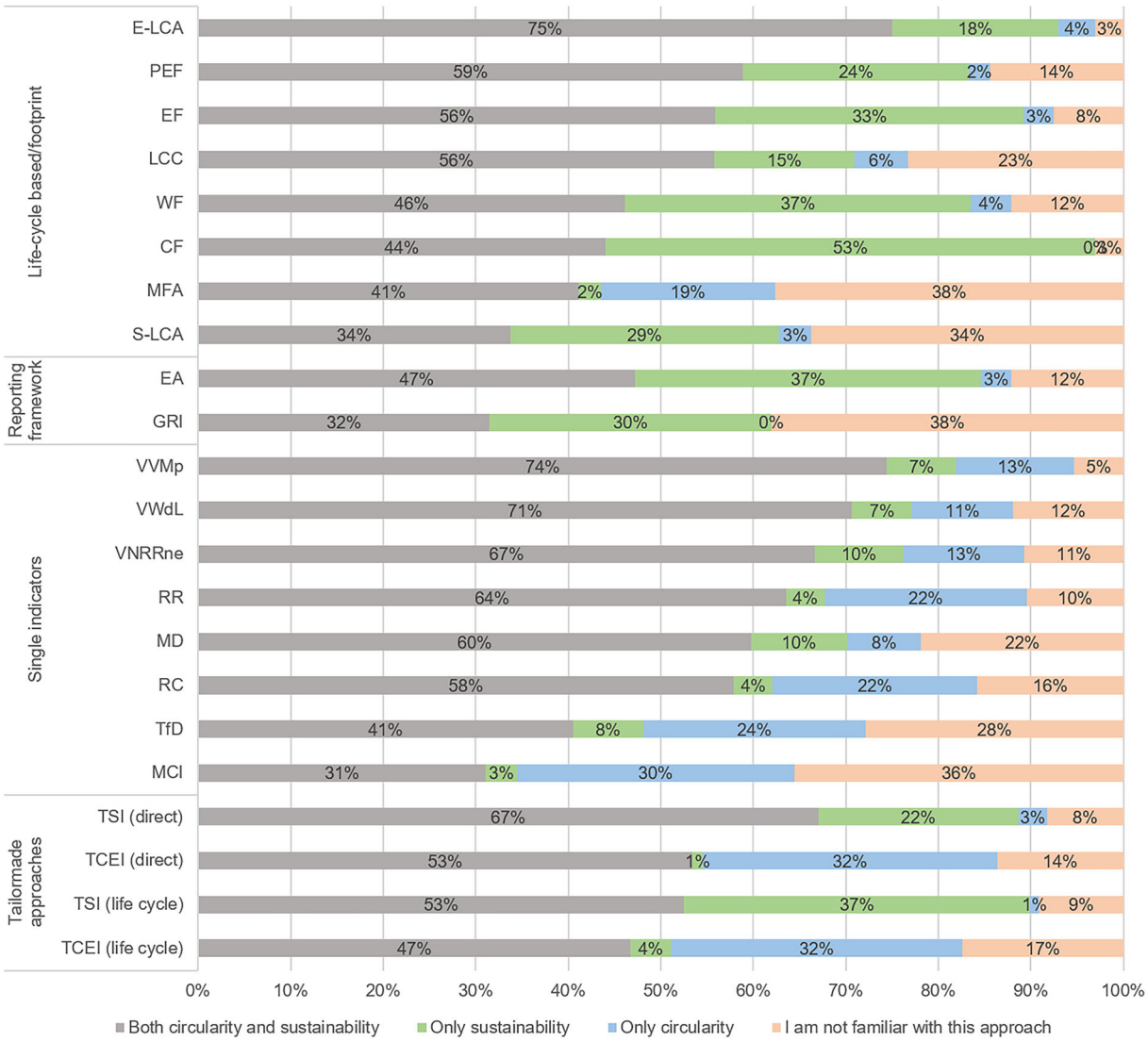

FIGURE D1 Attribution of approaches to CE- and/or sustainability assessment (n = 97). CF, carbon footprint; EA, environmental accounting; EF, ecological footprint; E-LCA, environmental life cycle assessment; GRI, GRI standards; LCC, life cycle costing; MCI, Material Circularity Indicator (by Ellen MacArthur Foundation); MD, material durability; MFA, material flow analysis; PEF, product environmental footprint; RC, recycled content; RR, recycling rate; S-LCA, social life cycle assessment; TCEI (direct), tailor-made circularity indicators based on direct impact; TCEI (life cycle), tailor-made circularity indicators based on a life-cycle approach; TfD, time for disassembly; TSI (direct), tailor-made sustainability indicators based on direct impact; TSI (life cycle), tailor-made sustainability indicators based on a life cycle approach; VNRRne, volume of non-renewable resources not extracted; VVMp, volume of virgin material production prevented; VWdL, volume of waste diverted from landfill; WF, water footprint [Colour figure can be viewed at wileyonlinelibrary.com]

8.3 Appendix III

Table: 8.1: Key elements of the structure and content of non-financial reports (adapted from EU, 2017).

	Key element	Description
1	Business Model	A brief description of the undertaking's business model
2	Policies and Due Diligence	A description of the policies pursued by the undertaking in relation to those matters, including due diligence processes implemented
3	Outcome	The outcome of those policies, presented from a useful, fair and balanced view of the undertaking's strengths and vulnerabilities
4	Principal Risks and Their Management	The principal risks related to those matters linked to the undertaking's operations including, where relevant and proportionate, its business relationships, products or services which are likely to cause adverse impacts in those areas, and how the undertaking manages those risks
5	Key Performance Indicators	Non-financial key performance indicators relevant to the particular business
6	Thematic aspects a) Environmental Matters b) Social and Employee Matters c) Respect for Human Rights d) Anti-Corruption and Bribery Matters e) Others	Information necessary for an understanding of the undertaking's development, performance, position and impact of its activity, relating to, as a minimum, environmental, social and employee matters, respect for human rights, anti-corruption and bribery matters. Others may include: supply chain issues and conflict minerals
7	Reporting Frameworks	A company relying on one or several frameworks should disclose which framework(s) it has used for its specific disclosures
8	Board Diversity Disclosure	A description of the diversity policy applied in relation to the undertaking's administrative, management and supervisory bodies with regard to aspects such as, for instance, age, gender, or educational and professional backgrounds, the objectives of that diversity policy, how it has been implemented and the results in the reporting period

Table: 8.2: Sample of available reporting approaches for companies before review. Reporting approaches 1-20 were utilised to guide the development of the EU Directive2014/95/EU (methodology for reporting non-financial information) (2017/C 215/01). Documents 21-24.

#	Reporting Approach (as listed in the EU Guidelines)
1	CDP (formerly the Carbon Disclosure Project)
2	the Climate Disclosure Standards Board
3	the Eco-Management and Audit Scheme (EMAS)
4	the European Federation of Financial Analysts Societies' KPIs for Environmental, Social, Governance (ESG), a Guideline for the Integration of ESG into Financial Analysis and Corporate Valuation
5	The Global Reporting Initiative
6	Guidelines for Multinational Enterprises of the Organisation for Economic Cooperation and Development (OECD)
7	the International Integrated Reporting Framework
8	ISO 26000 of the International Organisation for Standardisation
9	Model Guidance on reporting ESG information to investors of the UN Sustainable Stock Exchanges Initiative
10	the Natural Capital Protocol
11	Product and Organisation Environmental Footprint Guides
12	the Sustainability Accounting Standards Board
13	the United Nations (UN) Global Compact
14	UN Sustainable Development Goals, Resolution of 25 September 2015 transforming our world: the 2030 Agenda for Sustainable Development
15	the OECD Due Diligence Guidance for Responsible Supply Chains from Conflict-Affected and High-Risk areas, and the supplements to it

16	Guidance for Responsible Agricultural Supply Chains of FAO-OECD
17	Guidance on the Strategic Report of the UK Financial Reporting Council
18	UN Guiding Principles on Business and Human Rights implementing the UN “Protect, Respect and Remedy” Framework
19	the Sustainability Code of the German Council for Sustainable Development
20	the Tripartite Declaration of principles concerning multinational enterprises and social policy of the International Labour Organisation (ILO)
21	From the British Standards Institute: BSI 8001:2017. Framework for implementing the principles of the circular economy in organizations - Guide
22	From UL: UL 3600. Measuring and Reporting Circular Economy Aspects of Products, Sites and Organizations
23	From the World Economic Forum: Measuring stakeholder capitalism: Toward common metrics and consistent reporting of sustainable value creation
24	From the ACCA, ICAS, CA ANZ, IIRC & World Benchmarking Alliance: Sustainable Development Goals Disclosure (SDGD) Recommendations

Table: 8.3: Explanation of the excluded reporting approaches from initial sample.

#	Reporting approach title	Year last revised	Selection criteria not satisfied (SC1-SC4)	Remarks and link to reporting approach
1	the European Federation of Financial Analysts Societies' KPIs for Environmental, Social, Governance (ESG), a Guideline for the Integration of ESG into Financial Analysis and Corporate Valuation	2009	SC4	The document was last revised in 2009. Basically, all standard related information was published before 2010. https://effas.net/pdf/setter/DVFA%20criteria%20for%20non-financials.pdf
2	International Labour Organization's Tripartite Declaration of principles concerning multinational enterprises and social policy	2017	SC4	This framework is intended to inform the policies of rather than instruct how an organisation should develop a non-financial report. "The principles of this Declaration are intended to guide governments, employers' and workers' organizations of home and host countries and multinational enterprises in taking measures and actions and adopting social policies, including those based on the principles laid down in the Constitution and the relevant Conventions and Recommendations of the ILO, to further social progress and decent work." https://www.ilo.org/wcmsp5/groups/public/---ed_emp/---emp_ent/---multi/documents/publication/wcms_094386.pdf
3	Model Guidance on reporting ESG information to investors of the UN Sustainable Stock Exchanges Initiative	2015	SC2	Its primarily designed to inform stock exchanges to produce reports which can assist companies in providing relevant ESG information on them. But also in reverse it can be used to assist publicly traded companies (so not all companies) https://sseinitiative.org/wp-content/uploads/2015/09/SSE-Model-Guidance-on-Reporting-ESG.pdf
4	the Natural Capital Protocol	2016	SC4	https://naturalcapitalcoalition.org/wp-content/uploads/2016/07/NCC_Primer_WEB_2016-07-08.pdf The framework states it does not "provide a framework for external financial reporting, although decisions can be reported"

5	the OECD Due Diligence Guidance for Responsible Supply Chains from Conflict-Affected and High-Risk areas, and the supplements to it	2016	SC3, SC4	This framework is very sector specific, only “concerning companies who are operating in or sourcing minerals from conflict-affected and high-risk areas. The document providing guidance on principles and due diligence processes for responsible supply chains of minerals from conflict-affected and high-risk areas, consistent with applicable laws and relevant international standards.” Also the aim is not to assist companies in preparing a non-financial report. https://www.oecd.org/daf/inv/mne/OECD-Due-Diligence-Guidance-Minerals-Edition3.pdf
6	Guidance for Responsible Agricultural Supply Chains of FAO-OECD	2016	SC3, SC4	Sector-specific framework – only relevant for companies which are involved in agricultural supply chains therefore not a Horizontal framework.
7	Guidance on the Strategic Report of the UK Financial Reporting Council	2018	SC1	Developed by the UK Financial Reporting Council and scope is for organisations within the UK only – referring to numerous UK laws and regulations. https://www.frc.org.uk/getattachment/fb05dd7b-c76c-424e-9daf-4293c9fa2d6a/Guidance-on-the-Strategic-Report-31-7-18.pdf
8	the Sustainability Code of the German Council for Sustainable Development	2017	SC1	Technically it could be used by non-German organisations but it seems very German market oriented. Also, it mentions all of the other reporting approaches (e.g. GRI) which it suggests companies should use in conjunction with this document. Suggesting this is a supplementary material for the German market https://www.nachhaltigkeitsrat.de/wp-content/uploads/2018/03/The_SustainabilityCode_2017.pdf

8.4 Appendix IV

Table: 8.4: Previous studies utilising content analysis of sustainability reports to identify CE related data (in chronological order).

#	Study	Focus of article	CE defined/identified as	Number of analysed reports	Year of reports	Database of reports	Geographic scope	Sectoral or Industry scope
1	Kuo, Yeh & Yu (2012)	Examine environmental disclosure within CSR reports of Chinese firms; determine if environmentally sensitive industries or ownership patterns influence CSR reporting	CE is analysed under indicator: Paying attention to energy saving/carbon reduction and development of circular economy	529	2008-2009	www.csr-china.net	China	"All industries", divided into environmentally sensitive industries and ownership types
2	Wang, Che, Fan & Gu (2014)	Examine Chinese firm's social responsibility reports to determine correlation between corporate ownership governance structure, ownership concentration ratio, share loading ratio of institutional investors and report quality	CE is reviewed qualitatively, and each report graded in 4 categories: honours and performances of CE, investment and expenditure of CE, CE policies and implementation and resource reuse of CE	218	Unknown	Shanghai and Shenzhen stock exchange	China	Iron, steel, cement, chemical and petroleum industries
3	Sihvonen & Partanen (2017)	Examine how companies report quantitative environmental targets for products, what areas are in focus related to products' reuse and the relationships	CE represented through eco-design related terms including R9 strategies	43	2015	GRI database	No limit	ICT sector

		between published targets and environmental performance						
5	Stewart & Niero (2018)	Determine the level of uptake of CE in companies' corporate sustainability (CS) reports; examine how companies link CE and sustainability within CS reports; identify what CE practices are present within CS reports	Explicit mentions of CE extracted and data analysed using inductive approach	46	2016	Corporate Register Database + reports of EMF100 and CEC companies	No limit	Fast moving consumer goods (FMCG)
6	Yang Yang, Lujie Chen, Fu Jia & Zhiduan Xu (2019)	Examine the synergistic effects between circular economy, represented as eco-design strategies and reverse activities, on the CSR performance of a company	CE is represented as i) eco-design and ii) reverse activities	293	2013-2015	CNRDS database, Shanghai and Shenzhen stock exchange	China	Manufacturing
7	Fortunati, Martiniello & Morea (2020)	Examine the maturity of managerial and strategic approaches to CE within MNC's in the cosmetics industry	Bom et al model (design, sourcing, manufacturing etc) (i) Circular economy, (ii) recycling/reuse; (iii) zero waste/waste reduction; (iv) water/energy consumption; (v) gas emission; and (vi) soil use/biodiversity.	8	2018-2019	Company's website	No limit	Cosmetics

9	Scarpellini *et al.* (2020)	Define and measure the environmental capabilities applied when CE is introduced in businesses. Analyse different environmental competences that firms apply during this process.	Authors developed items classified as 'environmental activities related to the CE'	87	Unknown	SABI database	Spain	No limit
10	Sehnem, Pandolfi & Gomes (2019)	Examine the reporting practices of CE and sustainability overlap within one firm reports, Natura.	Using GRI G4 guidelines to code sustainability, ReSOLVE classification for CE (EMF)	16 (1 company)	2001-2016	Company's website	Brazil	Cosmetics
11	D'Amato, Korhonen & Toppinen (2019)	Examine the presence and framing of circular, green and bioeconomy concepts within sustainability reports of land-use intensive companies.	CE and concepts described using results of previous review from authors	123	Most recent from 2008-2016	DJSI	No limit	Land-use intensive sectors: Paper & Forest, Food, Beverages, Mining, Energy
12	Dagiliene, Frendzel, Sutiene & Wunk-Pel (2020)	Examine reporting framework = Deloitte etc	CE: 4R framework (expanded), quantitative env KPIs	226	2016	GRI database	EU	Manufacturing
13	Gunarathne *et al.* (2021)	Examine the presence of CE within sustainability and integrated reports of Sri Lankan companies.	CE: direct, explicit and implicit keywords derived from literature and EMF terminology, frequency of keywords	20	2018-2019	Institute of Certified Management Accountants of Sri Lanka	Sri Lanka	No limit

			is noted, but words like UNCG are used and the connection to CE is unjustified.			(CMA); Excellence in Integrated Reporting Awards scheme; Association of Certified Chartered Accountants (ACCA) Sri Lanka Awards for Sust. Reporting.		

Table: 8.5: The frequency of reporting frameworks and approaches referenced (at least once) within the sample, listed by number of companies and reports in order of most frequently mentioned.

#	ORGANISATIONS	REPORTING FRAMEWORKS AND APPROACHES REFERENCED	COMPANIES (N=94)		REPORTS (N=138)	
			N	%	N	%
	International sustainability reporting frameworks					
1	United Nations	SDGs	93	98.9	124	89.2
2	International Standard Organisation	ISO standards (assorted)	85	90.4	111	79.9
3	CDP (formerly Carbon Disclosure Project)	CDP	85	90.4	105	75.5
4	United Nations	United Nations Global Compact	80	85.1	103	74.1
5	GRI	GRI Sustainability Standards	77	81.9	105	75.5
6	Taskforce for Climate Disclosure (TCFD / TFCD)	Any materials	60	63.8	81	58.3
7	International Integrated Reporting Council	Integrated Reporting (IR) Framework	33	35.1	35	25.2
8	Sustainability Accounting Standards Board (SASB)	Sustainability Accounting Standards Board (SASB)	26	27.7	30	21.6
9	European Commission	EMAS	19	20.2	19	13.7
10	European Commission	Product or Organisational Environmental Footprint (PEF or OEF)	4	4.3	4	2.9
11	Climate Disclosure Standards Board (CDSB)	Climate Disclosure Standards Board (CDSB)	3	3.2	3	2.2
	Sustainability rating agencies					
12	Ecovadis	-	38	40.4	42	30.2
13	Sustainalytics	-	32	34.0	36	25.9
	CE-specific material					
14	Ellen MacArthur Foundation (EMF)	Any material	21	22.3	24	17.3
15	British Standards Institute (BSI)	Any material	9	9.6	9	6.5
15	GRI	GRI 306: Waste	33	35.1	34	24.5
16	UL	UL 3600: Measuring and Reporting Circular Economy Aspects of Products, Sites and Organizations	0	0	0	0

Table: 8.6: Companies and their presence on sustainability rankings (n=94).

NUMBER OF COMPANIES PRESENT ON	N	% OF ALL COMPANIES
DJSI INDUSTRY LEADER LIST	22	23.4
DJSI TOP 100	44	46.8
CORPORATE KNIGHTS GLOBAL 100	45	47.9
SEAL AWARD WINNERS LIST	30	31.9
1 RANKING	61	64.9
2 RANKINGS	22	23.4
3 RANKINGS	8	8.5
4 RANKINGS	3	3.2

Table: 8.7: Frequency of report formats for companies producing only one report containing non-financial information in 2019 (n=52 companies).

Report Format	Number of companies	%
Annual Report	22	42.31
Integrated Report	12	23.08
Other document	6	11.54
Sustainability report	5	9.62
Integrated Annual Report	5	9.62
Non-Financial Statement	1	1.92
Corporate Sustainability Report	1	1.92
Total	52	100

Table: 8.8: Frequency of report formats for companies producing two reports containing non-financial information (n=38 companies).

Report Formats	**N**	**%**
Sustainability Report + Annual Report	29	71.05
Annual Report + Other	1	2.63
Integrated Annual Report	1	2.63
Annual Report	0	0
Other Document	5	13.16
Non-Financial statement	2	5.26
Corporate Sustainability Report	2	5.26
Total	**38 companies**	**100**

Table: 8.9: Frequency of combinations of report formats for companies producing three reports containing non-financial information (n=3 companies).

Report Formats	**No. companies**
Sustainability Report + Integrated Report + Annual Report	2
Sustainability Report + Annual Report + Other Document	1
Total	**3**

Table: 8.10: List of companies which are reporting material issues labelled within circular* terminology and the labels of other related material issues contained within the same materiality assessment.

#	Company name	Explicit CE material issue	Other related material issues reported
1	Koninklijke KPN NV	Circular Operations	-
2	Telenet Group Holding	"contributes to the circular economy by developing circular supply chains, recovering and recycling materials, extending the product lifecycle through refurbishment of CPE and by offering products as a service"	-
3	Electrolux	Offer circular products and business solutions	Lead in energy and resource-efficient solutions
4	H & M Hennes & Mauritz	100% Circularity	-
5	Industria de Diseno Textil SA (inditex)	Circularity	Responsible sourcing, Sustainable products, Packaging
6	Melia Hotels International SA	Circular Economy and Responsible Consumption	-
7	Moncler SpA	Circular Economy	Responsible sourcing, Product quality and safety, Environmentally friendly packaging
8	British American Tobacco PLC	Circular Economy	Water and waste
9	Essity AB	Waste/circularity and plastics	-
10	Nestle SA	Resource efficiency, (food) waste and the circular economy	-
11	Koninklijke Philips NV	Circular Economy	Sustainable value creation, Waste management, Energy efficiency, Product responsibility and safety
12	CNH Industrial NV	Circular Product lifestyle	Water and waste efficiency, Value chain management, Emissions, Innovation to zero

13	Signify NV	Circular Economy	Responsible packaging, Energy efficiency, Water usage, Carbon footprint, Subtopics: Circular lighting, Weight and materials, Waste management
13	Akzo Nobel NV	Circular Economy	Resource productivity, Supplier sustainability
14	BillerudKorsnas AB	Circularity of products and solutions	Waste, Sustainability in innovation, Water and effluents
15	Koninklijke DSM	Resources and Circularity	-
16	Novozymes A/S	Circular economy and resource efficiency	-
17	Acciona SA	Waste and the circular economy	-
18	Galp Energia SGPS SA	Circular Economy	Operational eco-efficiency
19	Hera SpA	Transition to the circular economy	-
20	Iberdrola SA	Circular Economy	-
21	Red Electrica Corporacion S.A.	Circular Economy	-
22	Suez	Transition to the circular economy	Optimized water and waste management, Reducing energy consumption, Greenhouse gas emissions, Eco-design and processes and facilities, Resource scarcity, Fight against waste trafficking

Table: 8.11: Distribution of companies according to the presence of targets and indicators for CE within their sustainability reports according to their countries.

Country	**Total number of companies in sample**	**Both CE targets and indicators reported**	**% of all companies within country**	**Neither targets or indicators for CE reported**	**% of all companies within country**
Austria	1	0	0	1	100
Denmark	5	2	40	3	60
Finland	6	3	50	3	50
France	14	3	21.43	7	50
Germany	10	2	20	6	60
Ireland	2	0	0	2	100
Italy	10	1	10	5	50
Norway	2	0	0	1	50
Portugal	2	1	50	1	50
Spain	11	4	36.4	3	27
Sweden	5	3	60	1	20
Switzerland	8	1	12.5	6	75
The Netherlands	8	6	75	2	25
United Kingdom	10	2	20	6	60
TOTAL	**94**	**28**		**47**	

Table: 8.12: Share of companies reporting targets and indicators for CE according to how many reports they produce.

	CE-RELATED TARGETS		**CE-RELATED INDICATORS**	
	Companies (N)	Companies (%)	Companies (N)	Companies (%)
Company produces only one report	23	59.0	22	61.1
Company includes the same data in all reports published	2	5.1	3	8.3
Company includes CE data only in sustainability or non-annual reports	11	28.2	9	25
Company includes CE data within only the annual report	0	0	0	0
Company includes different CE data in each report	3	7.7	2	5.6
TOTAL	**39**	**100**	**36**	**100**

8.5 Appendix V

Table: 8.13: Overview of characteristics of interview respondents and focus group participants (n = 43).

Interviewee #	Country	Sector	Company size	Department	Focus group (1 – 3)
1	IT	Accommodation and food service activities	Micro	General management	
2	IT	Construction	Micro	General management	
3	IT	Other	Micro	Sustainability and corporate social responsibility	
4	IT	Accommodation and food service activities	Micro	Marketing and sales	
5	IT	Professional service activities	Micro	Research and development	
6	IT	Other	Micro	General management	
7	IT	Manufacturing	Micro	General management	
8	IT	Professional service activities	Micro	General management	
9	IT	Manufacturing	Micro	General management	
10	IT	Other service activities	SME	Sustainability and corporate social responsibility	
11	IT	Other	SME	General management	
12	IT	Accommodation and food service activities	SME	General management	
13	IT	Manufacturing	SME	Research and development	
14	IT	Manufacturing	SME	General management	
15	IT	Manufacturing	Large	Sustainability and corporate social responsibility	
16	IT	Accommodation and food service activities	Large	Sustainability and corporate social responsibility	
17	IT	Water and waste management	Large	Research and development	
18	IT	Water and waste management	Large	Sustainability and corporate social responsibility	1
19	IT	Manufacturing	Large	Sustainability and corporate social responsibility	
20	NL	Other service activities	Micro	General management	

21	NL	Other	Micro	General management	
22	NL	Construction	Micro	Research and development	
23	NL	Other	Micro	General management	
24	NL	Construction	Micro	Sustainability and corporate social responsibility	
25	NL	Professional service activities	Micro	General management	
26	NL	Other	Micro	General management	
27	NL	Other	Micro	Sustainability and corporate social responsibility	
28	NL	Other	Micro	General management	
29	NL	Other service activities	Micro	Sustainability and corporate social responsibility	
30	NL	Professional service activities	Micro	General management	
31	NL	Other	Micro	General management	
32	NL	Water and waste management	SME	General management	2
33	NL	Other	SME	Sustainability and corporate social responsibility	1
34	NL	Construction	SME	General management	
35	NL	Other service activities	SME	General management	2
36	NL	Other service activities	SME	General management	
37	NL	Manufacturing	SME	General management	2
38	NL	Other	SME	Research and development	
39	NL	Construction	Large	Sustainability and corporate social responsibility	3
40	NL	Other	Large	Marketing and sales	
41	NL	Manufacturing	Large	Sustainability and corporate social responsibility	3
42	NL	Other	Large	Sustainability and corporate social responsibility	1
43	NL	Other service activities	Large	General management	

Table: 8.14: List of critical factors to be included within CE disclosures most commonly suggested by focus group participants (n=8).

Content	Quality	Structure
- Performance on 10 R-strategies - Clearly stated definitions of equations used to determine CE targets and/or indicators - Balance of tangible and intangible aspects of circularity - Explanation of company's CE strategy/business model - Long term CE vision - Internal (adopter) vs external (enabler) CE activities - Clear link of CE activities to energy used and waste flows - Moving towards including social impacts of CE activities	- Consistent units of measurement for comparability - (moving towards) External verification of data - Targets with the intended time to achieve them - Quantifiable indicators	- Included within sustainability report, linked with other ESG material issues to paint full sustainability picture - More frequent updates of CE projects and progress done through social media and website

8.6 Appendix VI

Table: 8.15: Examples of other official sustainable finance taxonomies being developed and their relevant different geographical regions.

Title	Status	Country	Region	Reference
National Green Finance Taxonomy	Under development	South Africa	Africa	National Treasury of the Republic of South Africa, (2021)
Green Bond Endorsed Project Catalogue	Published	China	Asia	People's Bank of China *et al.,* (2021)
ASEAN Taxonomy	Published	Association of South East Asian Nations (ASEAN) countries	Asia	ASEAN Taxonomy Board (2021)
Korean Sustainable Finance Taxonomy (K-taxonomy)	Under development	South Korea	Asia	South Korean Ministry of Environment, 2021
Sustainable Finance Policy for Banks and Financial Institutions	Published	Bangladesh	Asia	Bangladesh Bank, 2020)
Transition Finance Taxonomy	Under development	Canada	North America	Canada Standards Association (CSA) Group, 2020)
Taxonomia Verde de Colomobia or 'Green Taxonomy'	Published	Colombia	South America	Gobierno de Colombia, 2021