

# Circular economy in the food industry. An analysis of Italian-listed companies' sustainability reports

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## Abstract

**Purpose:** The paper investigates the circular economy (CE) disclosure released by companies in response to the issuing of CE-related policies since the CE Action Plan 2015, using the institutional view of legitimacy theory.

**Design/methodology/approach:** The study adopts a multiple case study methodology by content-analyzing the CE disclosure released by all listed Italian agri-food companies in their sustainability reports in the period 2016-2021.

**Findings:** The findings show that Italian agri-food companies released low levels of CE disclosure. This result suggests a lack of strategic relevance attributed to the CE issue or the absence of CE-related standards to rely upon. The results could also reveal companies' scarce implementation of CE business models. The findings also show an increase in both the quantity and quality of CE disclosure released in response to the issuing of a public CE-related policy or framework, supporting the theoretical arguments of the institutional view of legitimacy theory.

**Originality/value:** In light of the worldwide increasing attention toward environmental issues and the CE paradigm, particularly in the food industry, this study is the first to investigate the CE disclosure released by agri-food companies in response to the issuing of CE-related policies and voluntary frameworks.

**Practical implications:** The findings show that institutional pressure through the issuing of new CE-related policies and voluntary frameworks promotes increased

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CE disclosure by companies, suggesting that implementing both Directive 2022/2464/EU and the EFRAG standards would further encourage the release of CE disclosure.

**Keywords:** SDG, environmental disclosure, CE Action Plan, Directive 2014/95/EU, agri-food companies, legitimacy theory

**JEL:** Q01, Q18, M41, L66, O13

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## 1. Introduction

The circular economy (CE) is an industrial system useful to reduce waste and regenerate resources (Ellen MacArthur Foundation [EMF], 2013). More specifically, CE is a model that replaces the concept of end of life with the *cradle-to-cradle* concept (McDonough & Braungart, 2002) by “reducing, re-using, recycling and recovering materials in the production/distribution and consumption processes” (Kirchherr et al., 2017, p. 224). Currently, scholars (Jestratijevic et al., 2022; Vermeulen et al., 2014; Xing et al., 2017) have identified seven dimensions of CE, better known as the seven Rs: Reduce, Reuse, Recycle, Recover, Rethink, Rot, and Repurpose.

During the last several years, the CE concept has received greater attention from researchers, policymakers, companies, and society as a whole for its capacity to boost the achievement of Sustainable Development Goals (SDGs) (Ghisellini et al., 2016; Rashid et al., 2013; Schroeder et al., 2019), in particular the environmental ones (Geissdoerfer et al., 2017; Kristensen & Mosgaard, 2020). From an academic point of view, most scholars have investigated how CE allows companies to achieve sustainability by implementing the recycling processes to modify the products (i.e., Batista et al., 2021; Ross et al., 2012; Sharma et al., 2019). From a regulatory point of view, different rules have been developed to encourage the implementation of CE, such as the CE Action Plan issued by the European Commission in 2015 (EC, 2015) to reduce waste and use resources more efficiently. For their part, companies have implemented sustainable business models (Bagnoli et al., 2022), in particular CE business models (Bocken et al., 2014; Urbinati et al., 2017), to reduce the waste of resources (Bocken et al., 2016). Finally, public opinion has increased the level of attention to sustainability issues, requiring companies to release information on the actions they have implemented to achieve sustainable development (Lepore et al., 2023).

Therefore, in addition to adopting a CE business model, it is important for companies to provide information to external stakeholders on the activities carried out, the results, and the outcomes achieved to gain and maintain their legitimacy (de Colle et al., 2014; Lock & Seele, 2016; Stewart & Niero, 2018). In line with these considerations, the European Commission (EC) issued Non-Financial Reporting Directive 2014/95/EU (NFRD) requiring companies with more than 500 employees – and whose individual or consolidated accounts satisfy at least one of the following criteria: (a) total assets on the balance sheet exceeding €20,000,000; (b) total net sales and service revenues exceeding €40,000,000 – to disclose environmental information since fiscal year 2017. However, there are no detailed suggestions in the Directive on the CE information to release. In addition, there are no reporting guidelines or standards specifically dedicated to CE, revealing an information gap on this topic (GRI, 2019). This situation should change from fiscal year 2024. Recently, the EC issued the Corporate Sustainability Reporting Directive 2022/2464/EU (CSRD), which explicitly requires those companies previously required to prepare the mentioned environmental information to release CE information in their sustainability reports starting from fiscal year 2024 and to refer to the European Sustainability Reporting Standards (ESRSs) issued by the European Financial Reporting Advisory Group (EFRAG) in releasing this kind of information. Among these standards, there is the ESRS “E5 Resource Use and Circular Economy” specifically dedicated to CE.

Despite the increasing recognition of CE issues’ relevance, Opferkuch et al. (2021) noted that few scholars had analyzed the CE business models adopted by companies and that most companies had released little CE information in their sustainability reports. Therefore, the authors suggested the importance of deepening the comprehension of companies’ CE disclosure. Using the institutional view of legitimacy theory, the current study answers the previous demand for research by exploring the CE information all listed Italian agri-food companies disclosed in their sustainability report since the EC (2015). The paper aims to understand which kind of CE information companies have released to maintain legitimacy in response to the issuing of CE-related policies and voluntary frameworks. To achieve this aim, we content-analyzed the sustainability reports drawn up by agri-food companies from 2016 to 2021.

The current study focused on the food industry for its potential to implement CE due to its significant influence on the environment (Raimo et al., 2021). During the last few years, the agri-food industry has given great attention to aspects such as food waste, food safety, production traceability, and product quality (Esposito et al., 2020; Zhang et al., 2022). More than a

third of the food produced in the world is wasted (Kummu et al., 2012); about 2.5 billion tons are thrown away each year (Santagata et al., 2021); food waste is responsible for 10% of global greenhouse gas emissions each year (United Nations Environment Programme, 2021). Therefore, agri-food companies have begun to adopt sustainable approaches to solve food waste (Hamam et al., 2021). In particular, the adoption of CE can boost the decrease of wasted material (Fiandrino et al., 2019).

The attention toward CE in the food industry has grown rapidly at both the policy and academic levels since 2015 (Esposito et al., 2020). Several scholars have conducted studies on CE in the food industry, investigating aspects such as food waste and the CE models implemented (Hamam et al., 2021). However, few studies have explored the CE disclosure released by agri-food companies. To the best of our knowledge, only Stewart and Niero (2018) investigated the CE disclosure released by agri-food companies within the wider sample of international fast-moving consumer goods companies. The authors, recognizing the limited number of studies analyzing CE adoption at the company level, content-analyzed the sustainability reports drawn up by 46 consumer goods companies exclusively in 2016 to explore the CE practices implemented and their relationship with sustainability.

This paper bridges the previous gap by investigating the CE information released by all listed Italian agri-food companies in response to the issue of a new policy or framework. More specifically, the paper investigates the CE disclosure provided since the EC (2015) by conducting a longitudinal study. The study focused on the Italian context, considering the legislature's increasing attention to the problem of decreasing waste, as indicated by the issuing of different rules such as Legislative Decree No. 116/2020. More recently, the Italian legislature adopted the National Recovery and Resilience Plan (PNRR), among others, to introduce the CE concept to achieve sustainable waste management. We extended the study of Stewart and Niero (2018) by investigating the determinants of CE disclosure, in particular, the role played by institutional factors in boosting the release of CE information. We started the analysis in 2016 after the implementation of EC (2015) and analyzed the CE disclosure provided by selected companies from 2016 to 2021 to understand how it changed after the issue of a new policy or framework. We also extended the study of Stewart and Niero (2018) by focusing on a different period, in particular, the years 2016-2021, and conducting a longitudinal study.

The findings show that Italian agri-food companies disclosed little CE information. While the attention toward CE issues appeared to heighten during the period analyzed, the companies investigated provided relatively little disclosure regarding CE problems when compared to information related to

environmental issues. This result suggests a lack of strategic relevance attributed to the CE issue or the absence of CE-related standards to rely upon. The results could also reveal the selected companies' scarce implementation of CE business models. When reported, the CE information mainly concerned the Reduce dimension, meaning that companies implemented CE business models aiming at redesigning and reducing resource use. The findings also show an increase in CE disclosure in response to the issuing of a CE-related policy or a new voluntary framework/guidance, supporting the theoretical arguments of the institutional view of legitimacy theory. The results show that the selected companies appeared to use CE disclosures in a manner consistent with an intent to legitimize their activities at a time when such issues had come under particular attention from regulators or standards setters. The CE disclosures released by the selected companies appeared to change as the regulators' or standard-setters' scrutiny of the CE problems changed. Therefore, the disclosures appear consistent with the perspective that the companies were using their disclosures for legitimation rather than to provide an objective account of the CE matters related to their activities.

The structure of the paper is as follows: Section 2 describes the institutional and regulatory background of CE. Section 3 illustrates the institutional view of legitimacy theory to explain the company's decision to disclose CE information and reviews previous studies on this topic, in particular in agri-food companies. Section 4 describes the methodology, and Section 5 highlights the findings and the discussion. The last section reports some concluding remarks, research limitations, and suggestions for future research.

## **2. The institutional and regulatory background on CE and related disclosures**

The CE concept was first introduced in the communication "Towards a Circular Economy: A Zero Waste Programme for Europe," issued by the European Commission in 2014 (EC, 2014) to reduce the use of resources and eliminate waste. In December 2015, the EC adopted the first Action Plan (EC, 2015) to make Europe more responsive to CE. The Action Plan established actions and measures useful to promote Europe's transition toward CE and encourage the achievement of SDGs. In the same year the United Nations adopted the SDGs, which have become a globally recognized framework for society to progress toward sustainable development (Rosati & Faria, 2019).

In March 2019, the EC issued the "Report on the implementation of the Circular Economy Action Plan" (EC, 2019a). The report contains the main

achievements and future challenges in orienting the economy towards a climate-neutral CE, minimizing the impact on natural and freshwater resources. After the issue of the European Green Deal in December 2019 (EC, 2019b), the EC developed “A New Circular Economy Action Plan for a Cleaner and More Competitive Europe” in March 2020 (EC, 2020), which established new actions and measures to be introduced by March 2022.

With specific respect to the food industry, the European Green Deal, considering CE as a key strategy for modernizing the EU economy (EC, 2019b), encourages agri-food companies to adopt CE practices in their business models. In line with this aim, in the new 2020 CE Action Plan, the EC identifies some actions and measures specifically focused on the food industry, such as the proposition of a target for food waste reduction or the revision of the directive on wastewater treatment. To introduce the CE paradigm for reducing food waste, the EC also issued Directive 2018/851/EU and Directive 2018/852/EU, which are part of the “Circular Economy Package”. These directives were transposed into the Italian context by Legislative Decree No. 116/2020. Recently, the Italian legislature issued the PNRR to both accelerate the achievement of the ambitious global and European goals of 2030 and 2050, which aim at a progressive and complete decarbonization of the system and to strengthen the adoption of CE solutions in line with the EC (2015)’s objectives.

The EC has also regulated the environmental disclosures that companies have to release to external stakeholders thanks to some specific requirements. Until the fiscal year 2023, companies have referred to NFRD (implemented in Italy by Legislative Decree No. 254/2016), which required larger companies, as defined before, to prepare a sustainability statement from the fiscal year 2017 including, i.a., environmental information. CSRD, whose provisions come into effect from the fiscal year 2024, has implied the enactment of the above-mentioned ESRs, including additional and more detailed requirements regarding CE.

Although the release of environmental information is nowadays mandatory for listed companies with more than 500 employees, whose total assets on the balance sheet exceed €20 million or whose total net sales and service revenues exceed €40 million, there are no detailed suggestions in NFRD on the CE information to release. In addition, there are no reporting guidelines or standards specifically dedicated to CE, revealing an information gap on this topic (GRI, 2019). According to Opferkuch et al. (2021), only five documents refer to disclosure on CE. These have been issued by the following organizations: Eco-Management and Audit Scheme (EMAS), Global Reporting Initiative (GRI), World Economic Forum (WEF), British Standards Institute (BSI), and Underwriters Laboratories (UL). Among these docu-

ments, only the GRI and WEF specifically provide suggestions on the CE information to release. The other three documents instead focus on the actions to adopt to implement CE principles within the company's processes and, only indirectly, provide suggestions on the CE information to report.

The EMAS is a tool composed of four Microsoft Excel files, developed to support companies in finding out their environmental aspects, as well as collecting and analyzing their environmental data and drawing up an environmental statement. The EMAS tool can support companies in releasing credible CE information by automatically computing five indicators (energy efficiency, material efficiency, water, waste, biodiversity and emissions) to include in the environmental statement (EC, 2017).

BS 8001, issued by the BSI in May 2017 (BSI, 2017), is a practical framework and guidance developed to support companies in implementing CE principles within their processes. Like the EMAS, this document does not specifically focus on the CE information companies should release.

UL 3600, "Measuring and reporting circular economy aspects of products, sites and organizations," issued by UL in September 2018 and lastly revised in February 2023 (UL, 2023), aims to support companies in measuring and assessing the circularity in their processes by releasing the 3600 certifications. The UL assesses the circularity progress made in the company's processes and discloses the results in a Circularity Facts™ Report. However, UL does not suggest how to release this information.

Most useful in identifying some of the CE information companies should release are the revised version of GRI 306 on waste and the WEF document. GRI 306 provides useful suggestions to companies on the information to release on waste management, specifically requiring the disclosure of circularity measures adopted both to prevent waste creation and to adequately manage the waste created. GRI 306 also requires releasing information on the recovery operations (i.e., reuse, recycling, or other recovery operations) implemented to manage the waste diverted from disposal. More usefully, it includes some examples of tables that companies could refer to in reporting CE information. The revised version of GRI 306 was issued in 2020 (GRI, 2020) and is effective for reports published on or after January 2022. However, the GRI encouraged its earlier adoption.

In a similar vein, the document "Measuring Stakeholder Capitalism: Towards Common Metrics and Consistent Reporting of Sustainable Value Creation," issued by the WEF in September 2020 (WEF, 2020), identifies a list of metrics and disclosure companies should release, grouping them into four pillars. These metrics and disclosure address important issues, such as resource circularity, that are not adequately represented in specific reporting

standards. With specific regard to CE, the metrics and disclosure concerning resource circularity are included in the Planet pillar. The WEF suggests companies disclose the most suitable resource circularity metrics, such as the Circular Transition Indicators first developed by the World Business Council for Sustainable Development (WBCSD) in 2020, the indicators developed by EMF, or other metrics developed by the company.

With specific regard to the indicators developed by EMF, it is important to cite the document “Circularity Indicators: An Approach to Measuring Circularity,” first issued in 2015 and revised in 2019. This document describes the methodology to follow to measure circularity indicators, such as the Material Circularity Indicator, which companies can use as a decision-making tool.

The analysis of previous documents highlights the absence of reporting guidelines or standards specifically dedicated to CE, so it is interesting to investigate the CE disclosure released by companies.

### **3. Theoretical background**

#### *3.1. Prior literature on CE disclosure*

Extant empirical evidence shows that companies communicate their sustainable activities and performance to external stakeholders to enhance their reputation (Montero-Navarro et al., 2021) and obtain legitimacy and consensus (Fornaciari & Pesci, 2018; Lock & Seele, 2016; Michelon, 2012; Stewart & Niero, 2018).

Companies mainly release environmental information, such as data on CE, in their sustainability reports. Since the creation of the EMF in 2010, the number of sustainability reports mentioning CE increased considerably after the issue of the EMF (2012) and the EC (2014) (Stewart & Niero, 2018).

Despite the relevance to companies of releasing data to external stakeholders, to date, few studies have investigated the CE information companies release (Opferkuch et al., 2021). Stewart and Niero (2018) investigated the CE disclosure released within sustainability reports by fast-moving consumer goods companies in 2016, finding that most companies related CE to environmental aspects, in particular to the recycling and reusing issues, mainly referring to the EMF. In addition, only a few companies reported key performance indicators (KPIs) to describe CE issues, revealing the difficulty of linking CE to sustainability performance. Tiscini et al. (2022) investigated the CE and environmental disclosure released by Italian cosmetic companies

after the issue of the EC (2015), using the Climate Disclosure Standard Board framework to develop a disclosure index. They found that, although companies reported little data on CE and insufficient CE KPIs, the use of CE terms increased over the years. Dagiliene et al. (2020) investigated the CE information released by European manufacturing companies and found that they mainly provided data on the Reduce dimension. Kuo et al. (2012) investigated the CSR disclosure released by Chinese companies in 2010 and found that environmentally sensitive companies paid greater attention to the development of CE.

Rather than investigate the wider CE concept, most research, although limited, has specifically focused on waste management disclosure. These studies revealed that companies tended to release little and insufficient information on waste management (Adler et al., 2021; Stewart & Niero, 2018). Different reasons could justify the companies' decision not to disclose too much data, such as the costs of collecting and disclosing this information, the desire not to reveal negative performance (Clarkson et al., 2008), or the limited media attention to this topic (Pollach et al., 2009).

In conclusion, few studies investigated the CE disclosure released by companies, despite the growing worldwide attention toward CE, so it is interesting to deepen knowledge on this issue.

### *3.2. The legitimacy theory framework*

The paper refers to the institutional view of legitimacy theory. According to this theory, companies obtain legitimacy if they identify what society considers as socially acceptable behavior and comply with society's expectations (Dowling & Pfeffer, 1975; Suchman, 1995). More specifically, according to the legitimacy theory, there is a social contract between the company and society, which defines how the company should operate to gain legitimacy. If the company's activities do not satisfy society's expectations, a legitimacy gap will be created (Lindblom, 1993).

In this context, companies release disclosures to gain visibility and influence how external stakeholders view the company (Deegan, 2002). Therefore, companies that are more visible to society tend to release more information (Cormier et al., 2004) to communicate that their practices are in line with social values, thereby gaining legitimacy among stakeholders (De Villiers & Marques, 2016) and enhancing their reputation (Oliveira et al., 2010).

Previous considerations referred to a strategic view of legitimacy theory, which mainly analyzes the activities aiming at gaining or repairing legiti-

macy (Chelli et al., 2014). Literature has also developed an institutional view of legitimacy, used in this paper, that mainly focuses on the company's activities aiming at maintaining legitimacy. The institutional view of legitimacy theory deepens the company's capacity to maintain legitimacy in a setting of mandatory disclosure (Chelli et al., 2014; Tilling & Tilt, 2010; Yang et al., 2021). According to this view, rules and other institutional pressures represent society's expectations. Regulation seals the social contract between the company and its stakeholders (Mobus, 2005; O'Donovan, 2002; Suchman, 1995; Williamson & Lynch-Wood, 2008), and is considered an accurate representation of the society's values. To maintain legitimacy, companies should comply with both laws and the voluntary frameworks developed by other professional bodies (Ismail et al., 2021).

Most previous studies (e.g., Adler et al., 2021; Beske et al., 2020; Costa et al., 2019) referred to the legitimacy theory to investigate the content of environmental disclosure released by companies and determine whether the activities implemented were legitimate. Other researchers content-analyzed sustainability reports to verify whether they were readable and useful to generate value for stakeholders (e.g., du Toit, 2017) or to assess the quality of the information released after the issue of a new rule (Yang et al., 2021). To the best of our knowledge, no studies have used the legitimacy theory, in particular the institutional view of this theory, to investigate the CE information released by companies after the issue of a new policy or framework.

### *3.3. CE and related disclosure in the agri-food sector*

The food industry pays great attention to waste, recycling, and reuse because it is one of the most polluting sectors in countries with medium-high incomes (Muscio & Sisto, 2020). For agri-food companies, food waste is a business process that must be adequately managed (Adler et al., 2021) to increase process efficiency and performance (Alfiero et al., 2019). In this context, agri-food companies increasingly adopt CE business models to manage their resource flows effectively.

CE business models pursue the objective of finding innovative management solutions that allow the cyclical use of agricultural waste and by-products so new products can be developed based on natural resources (e.g., Mohan et al., 2016). CE is applied in the food industry to solve systemic problems like the conversion of waste into bio-products, new materials, and the higher costs caused by food waste disposal (Borrello et al., 2016). CE encourages the solution of these problems by decreasing the flow of resource

waste produced (Khan et al., 2020). CE application, in fact, permits the flows of resource waste to be turned into useful inputs for other production and increases efficient resource use (Kristensen & Mosgaard, 2020). For this reason, CE is often understood as a synonym for waste reduction in agri-food companies (Murray et al., 2017).

Considering its capacity to decrease waste by implementing recycling processes to modify products according to the green approach (Batista et al., 2021; Ross et al., 2012; Sharma et al., 2019), CE is considered a tool to implement the environmental SDGs (Fiandrino et al., 2019; Geissdoerfer et al., 2017; Kristensen & Mosgaard, 2020).

With specific regard to the CE disclosure released by companies in the food industry, most studies have investigated the wider CSR disclosure (e.g., Cuganesan et al., 2010; Iazzi et al., 2021; Raimo et al., 2021; Sommer et al., 2015). Raimo et al. (2021), for example, investigated the CSR disclosure released by 171 international listed companies operating in the food and beverage sector from 2010 to 2019. The authors collected data on CSR disclosure from the Bloomberg database and found that, on average, the sampled companies provided limited CSR information. To explore the content of the CSR information released, Iazzi et al. (2021) conducted a content analysis of the sustainability reports drawn up by worldwide food and beverage companies in 2018 and found that agri-food companies mainly released information on their employees' safety and rights and waste management, referring to the GRI indicators. With specific regard to the disclosure of waste management, the authors specified that the release of this kind of data by companies operating in the agri-food sector is both the consequence of the issuing of NFRD and an answer to the external requirements for more environmental sensitivity (Papargyropoulou et al., 2014). Food waste is considered a significant concern that affects citizens and their wider societies (Filho et al., 2021).

Little research has focused on environmental disclosure (e.g., Garzón-Jiménez & Zorio-Grima, 2021; Robkob & Ussahawanitchakit, 2009) or, more specifically, on waste management (Devin & Richards 2018). Garzón-Jiménez and Zorio-Grima (2021), for example, investigated the environmental disclosure released by 142 listed companies operating in both developed and developing countries from 2009 to 2019. The authors collected data on environmental disclosure from the Thomson Reuters Eikon Monitor database and found that, on average, the sampled companies obtained an environmental score of 28%. Robkob and Ussahawanitchakit (2009) focused on the environmental disclosure voluntarily released by agri-food companies operating in Thailand and found that releasing environmental information positively influenced both corporate image and customer acceptance. Devin and Rich-

ards (2018) specifically focused on food waste management in the Australian food supply chain by conducting different interviews with the key actors and analyzing the sustainability documents drawn up by the key supermarkets in 2014. The authors highlighted the necessity for a company to take responsibility for the effects of its actions on the whole supply chain.

With respect to the CE issues, few scholars have analyzed CE disclosure (Opferkuch et al., 2021), particularly by agri-food companies. To the best of our knowledge, only Stewart and Niero (2018) investigated the CE disclosure released by agri-food companies in 2016, within the wider sample of international fast-moving consumer goods companies. The authors, recognizing the limited number of studies analyzing CE adoption at the company level, investigated 46 sustainability reports and searched the term “CE” to explore the CE practices implemented and their relationship with sustainability. They found that companies did not provide a clear definition of CE in their report and that CE is generally associated with the concepts of recycling and reusing. This paper bridges the previous gap by investigating the determinants of CE disclosure, in particular the role played by institutional factors, i.e., the issue of a new policy or framework, in boosting the release of CE information by agri-food companies.

## 4. Research design

### 4.1. Empirical materials

The population comprises all listed Italian agri-food companies which, based on NFRD, have drawn up a “Non-Financial Statement.” The population is composed of all agri-food companies included in the FTSE Italia All-Share index and in the food, beverage, and tobacco sector of the Borsa Italiana. We excluded Centrale del Latte d’Italia from our analysis because, when accessing the sustainability section of its website, we were redirected to the Newlat Food website, revealing that the sustainability information of Centrale del Latte d’Italia is included in the Newlat Food sustainability report. Therefore, we excluded Centrale del Latte d’Italia from our analysis to avoid data duplication.

Table 1 shows some information for each agri-food company from fiscal year 2021. The table reports each company’s sales and its attention toward sustainability issues, revealing whether the company had a specific sustainability section on its website and whether it disclosed CE information.

Table 1 – The companies analyses

Company	Sales 2021 (mln)	Presence of a sustainability section on the website (2021)	Release of CE information within sus- tainability report (2021)
<b>B.F.</b>	283.4	Yes	Yes
<b>Bioera</b>	19.84	Yes	No
<b>Campari</b>	2,172.7	Yes	Yes
<b>Enervit</b>	64.73	Yes	No
<b>La Doria</b>	866.0	Yes	Yes
<b>Orsero</b>	1,069.7	Yes	Yes
<b>Newlat Food</b>	625.2	No	Yes
<b>Valsoia</b>	90.9	Yes	Yes

The company with the highest value of sales was Campari (€ 2,172.70 million), while the company with the lowest value of sales was Bioera (€ 19.84 million). The investigated agri-food companies paid great attention to sustainability issues and the SDGs, as demonstrated by the presence of a specific section dedicated to sustainability issues on most companies' websites.

The last column of Table 1 shows whether the company released CE information in its sustainability reports. Two companies (Bioera and Enervit) did not provide CE information within their “Non-Financial Statement.” Considering that we are interested in CE information, we excluded these two companies from our analysis. Therefore, we analyzed six companies.

To investigate the CE information released, we content-analyzed the sustainability reports drawn up for fiscal years 2016-2021. The year 2016 was the first year after the EC (2015); it was also the year before the implementation of NFRD, which has introduced mandatory environmental information.

## 4.2. Research method

To analyze the CE information released by the selected companies, we used content analysis (Krippendorff, 2013). Considering that there are no standards specifically suggesting the CE information to disclose, we decided not to identify *a priori* the items of information to search for within the sustainability reports. Following Steward and Niero (2018), we searched for the word “circular” within the documents. We also combined the word “circular” with the following terms: “economy,” “model,” “business,” or “development.” Following Dagilene et al. (2020), we also searched for the most commonly used four R framework words: (a) Reduce, (b) Reuse, (c) Recycle, and (d) Recover. We decided to investigate these four Rs because they are

the most studied dimensions in the food sector (Barros et al., 2020; Esposito et al., 2022; Esposito et al., 2024). We used the sentence as the recoding unit (Pisano et al., 2017), which is considered the most trustworthy unit of analysis (Milne & Adler, 1999), although it could be difficult for researchers to assign a sentence to just one category (Beattie & Thomson, 2007).

Once identified, we classified the sentences into the following four categories, developed using the four R dimensions (Kirchherr et al., 2017):

1. Reuse;
2. Reduce;
3. Recycle;
4. Recover.

Within the Reuse category, we included all the sentences referring to re-using waste, closing the loop, cycling, and refurbishing resources. We coded within the Reduce category all the sentences referring to redesigning, minimizing, and reducing resource use. Within the Recycle category, we included all the sentences referring to the recycling and cycling of food waste. Finally, we coded within the Recover category all the sentences referring to the incineration of materials with energy recovery.

We measured the quantity of CE information as the number of sentences referring to CE released across the categories identified, as follows:

$$CEDisc_j = \sum_{i=1}^4 Sentence_{ij}$$

The CE disclosure released by company  $j$  is equal to the sum of the sentences provided across the four categories identified.

In addition to the quantity of CE information released, we also considered the quality. We coded the sentences according to the following three attributes of disclosures: type (financial/non-financial), nature (qualitative/quantitative), and time orientation (forward-looking/present/historical). In this way, we obtained a complete picture of the quality of the information provided, not limited to the mere quantitative count. In fact, although most studies have assumed disclosure quantity as a proxy for disclosure quality (Pisano & Alvino, 2015), it does not permit us to assess all dimensions of disclosure quality because it is a unidimensional measure (Beattie et al., 2004). For this reason, most scholars have recognized the measurement of disclosure quality as a relevant question (Cole & Jones, 2005; Healy & Palepu, 2001) that needs to be developed by investigating the attributes of the information released (Core, 2001).

We represented the content analysis results by creating tables, figures, and spider plots useful to better interpret the findings and support the discussion.

## 5. Results and discussion

This section reports and discusses the results of the analysis conducted. The next subsection describes the quantity of CE disclosures released by agri-food companies in the period investigated. Subsection 5.2 deepens the CE information released for each of the four R dimensions. Subsection 5.3 focuses on the quality of CE information released from 2016 to 2021.

### 5.1. The CE disclosure released by agri-food companies

Table 2 shows the CE disclosure of the listed Italian agri-food companies investigated for the whole period 2016–2021. The first section reports, for each company, the quantity of CE disclosure released in the period investigated, measured as the total number and the mean of sentences provided. It also reports the total number and the mean of sentences released for each year by all the companies. In the second section, the table shows the total number and the percentage of sentences provided for each of the four R dimensions.

Table 2 – The CE disclosure released by agri-food Italian listed companies in the period 2016-2021

Section I – The CE disclosure released by each company, all categories								
Company	2016	2017	2018	2019	2020	2021	Tot sentences	Mean sentences
<b>B.F.</b>	Not reported	Not reported	22	34	41	23	<b>120</b>	<b>30</b>
<b>Campari</b>	Not reported	13	28	23	37	51	<b>152</b>	<b>30.4</b>
<b>La Doria</b>	62	84	57	59	103	50	<b>415</b>	<b>69.1</b>
<b>Orsero</b>	Not reported	Not reported	Not reported	18	21	11	<b>50</b>	<b>1.6</b>
<b>Newlat Food</b>	Not reported	Not reported	Not reported	Not reported	62	19	<b>81</b>	<b>40.5</b>
<b>Valsoia</b>	Not reported	Not reported	Not reported	Not reported	13	10	<b>23</b>	<b>11.5</b>
<b>Tot sentences</b>	<b>62</b>	<b>97</b>	<b>107</b>	<b>134</b>	<b>277</b>	<b>164</b>	<b>841</b>	
<b>Mean sentences</b>	<b>62</b>	<b>48.5</b>	<b>35.6</b>	<b>33.5</b>	<b>46.1</b>	<b>27.3</b>		

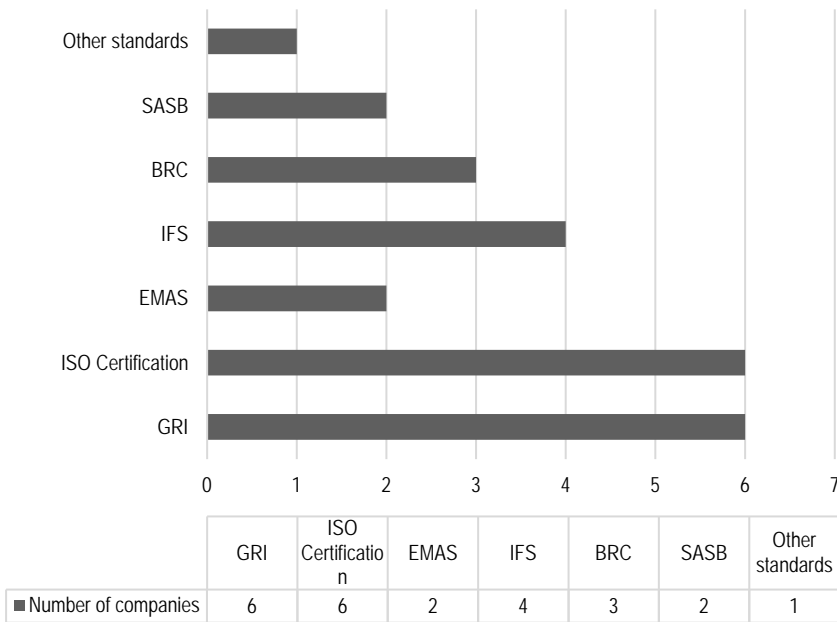
Section II – The CE disclosure released for each category, all companies								
Category	2016	2017	2018	2019	2020	2021	Tot sentences	% sentences
<i>Reuse</i>	2	10	9	14	21	14	70	8%
<i>Reduce</i>	50	71	69	82	204	83	559	66%
<i>Recycle</i>	2	6	9	15	10	28	70	8%
<i>Recover</i>	8	10	20	23	42	39	142	17%
<b>Total sentences</b>	<b>62</b>	<b>97</b>	<b>107</b>	<b>134</b>	<b>277</b>	<b>164</b>	<b>841</b>	<b>100%</b>

Over the years, the number of companies releasing CE disclosure gradually increased, passing from just one company (La Doria) in 2016 to all the sampled companies in 2020. This rise in the number of companies disclosing CE information could be the consequence of the issue of new CE-related rules and voluntary frameworks, supporting the theoretical arguments of the institutional view of legitimacy theory. In 2016, in fact, the Italian legislature implemented NFRD by issuing Legislative Decree No. 254/2016; in 2020, when all the sampled companies reported CE information, the EC (2020), GRI (2020), and WEF (2020) were issued.

Companies released 841 sentences on CE, confirming Opferkuch et al.'s (2021) idea that CE is not a central issue disclosed in sustainability reports. Most sentences referred to the Reduce category (66%), followed by Recover (17%), Recycle (8%), and Reuse (8%). The findings are coherent with those of Dagiliene et al. (2020), who found that European manufacturing companies mainly released data on the Reduce dimension for fiscal year 2016. On the other hand, the results contrast with those achieved by Stewart and Niero (2018), who found that the greatest number of sentences released by their analyzed companies concerned the Recycle dimension, followed by the Reuse, Reduce, and Recover dimensions. This difference could be the consequence of the different countries and industries investigated, as well as the period analyzed.

Figure 1 shows the frameworks adopted by agri-food companies in releasing CE information.

Figure 1 – The voluntary frameworks used by sampled companies to release CE information



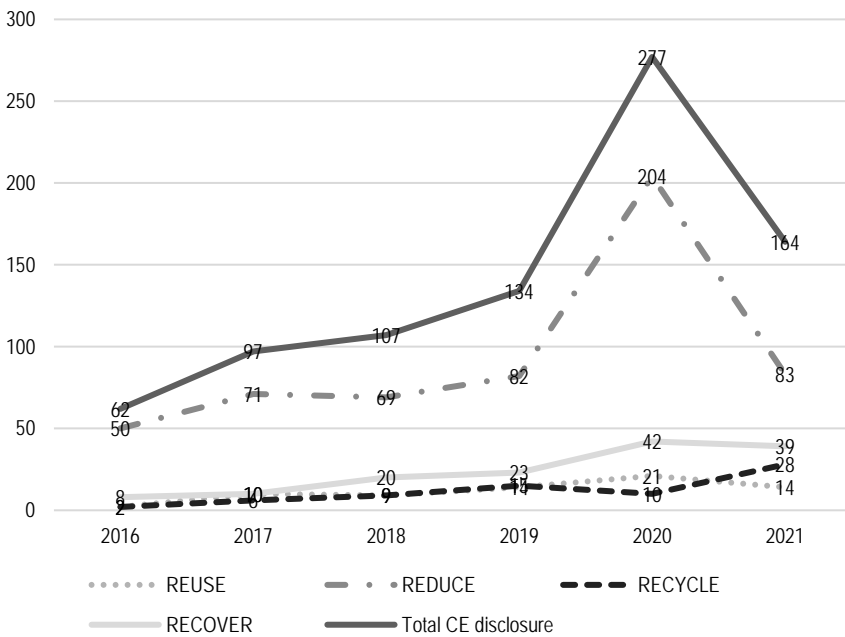
All companies referred to the GRI standards, confirming that these standards are today's most used sustainability standards worldwide (KPMG, 2020). However, they also relied upon one or more other technical frameworks in disclosing CE information. Specifically, all companies also referred to one or more ISO certifications, such as ISO22000 for safety management systems in the agrifood sector, ISO14001 for standardization of environmental management systems, and ISO50001 for establishing, initiating, maintaining, and improving an energy management system. Two companies (i.e., La Doria and Campari) also relied upon EMAS, providing data on life cycle assessment, a structured and internationally standardized method for quantifying the potential environmental and human health impacts associated with a good or service from its respective resource consumption and emissions. Almost all companies, except Campari and Newlat Food, also referred to the International Food Standard (IFS) approved by the Global Standard for Food Safety to ensure food quality and safety while respecting the environment. Three companies (i.e., La Doria, Campari, Orsero) also relied upon Brand Reputation through Compliance (BRC). Two companies (i.e., La Doria and

Valsoia) also referred to the Sustainability Accounting Standards Board (SASB).

Although the amount of CE information released was low, over the years, companies increased their release of CE disclosure, probably in response to the issue of new CE-related rules and voluntary frameworks.

Figure 2 shows the evolution of CE disclosure in the listed Italian agri-food companies investigated from 2016 to 2021. The figure reports the evolution of both the whole CE disclosure and the information released for each of the four R dimensions.

Figure 2 – The evolution of CE disclosure released by agri-food Italian listed companies in the period 2016-2021



As shown in Figure 2, although it was at the lowest level, in 2016 companies released CE information, probably in response to the EC (2015). The implementation of NFR brought an increase in the CE information released starting in 2017. Another relevant increase in CE information was reported in 2019 when the EU issued the EC (2019a, 2019b). The most significant rise in CE disclosure happened in 2020 when the EC (2020), GRI (2020), and WEF (2020) were published. Therefore, companies enhanced the CE in-

formation released after the issue of a new CE-related policy or voluntary framework.

The increase in CE disclosure after the issue of a CE-related policy or a new framework/guidance supports the theoretical arguments of the institutional view of legitimacy theory, revealing that companies release CE information to meet society's expectations. The results reveal that companies release CE information to comply with both the laws and the frameworks developed by other professional bodies (Ismail et al., 2021) to achieve the ultimate objective of maintaining legitimacy.

The upward trend shown in Figure 2 highlights that institutional interventions, such as the issue of a new CE-related rule or the development of a new voluntary framework, boosted the rise of the CE information released within the food industry.

These results align with those of Tiscini et al. (2022), who found that, although Italian cosmetic companies reported little data on CE, the use of CE terms increased from 2014 to 2019. Similarly, Papa et al. (2022) reported an increase in the wider environmental information disclosed by Italian environmentally sensitive companies after the NFRD implementation.

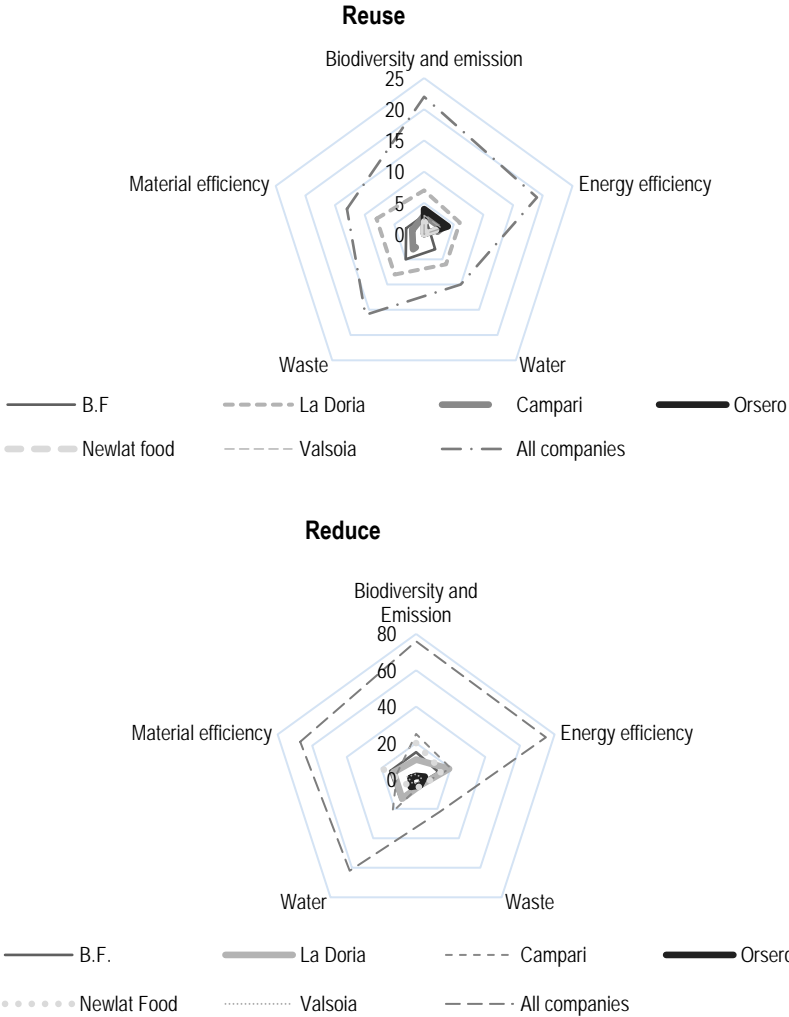
Another relevant detail highlighted in Figure 2 is the drastic drop recorded in CE disclosure released in 2021 because of the reduction of the Reduce dimension. This result should be interpreted considering the impact of COVID-19 on the food sector. In fact, because of the pandemic, the Italian legislature issued the PNRR, aiming to boost the adoption of CE solutions within the food industry, in particular solutions concerning reuse, recovery, and recycling. In response to the PNRR, agri-food companies mainly focused on the Reuse, Recovery, and Recycling dimensions, giving less attention to the Reduce dimension. In line with those arguments, Kirchherr et al. (2017) sustained that the lower percentage of sentences on recycling does not cause concern because a company that focuses only on recycling is not circular.

## *5.2. The CE information released for each of the four R dimensions*

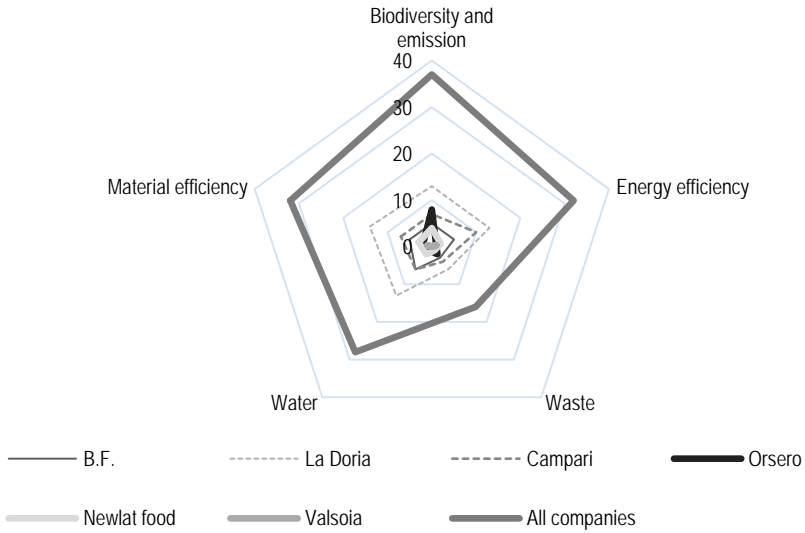
Figure 3 shows, for each of the four R dimensions, the sentences disclosed by sampled companies for all five environmental items identified by EMAS (i.e., energy efficiency, material efficiency, water, waste, and biodiversity and emissions). The decision to link the four R dimensions of CE to the five EMAS environmental items arose from the consideration that companies implementing the EMAS tool are also taking an important step toward reaching

CE. In fact, by assessing the level of resource use and environmental impact of their processes according to all five EMAS dimensions, companies can also identify and report the actions implemented to optimize their resource use in line with the CE principles (EMAS, 2017).

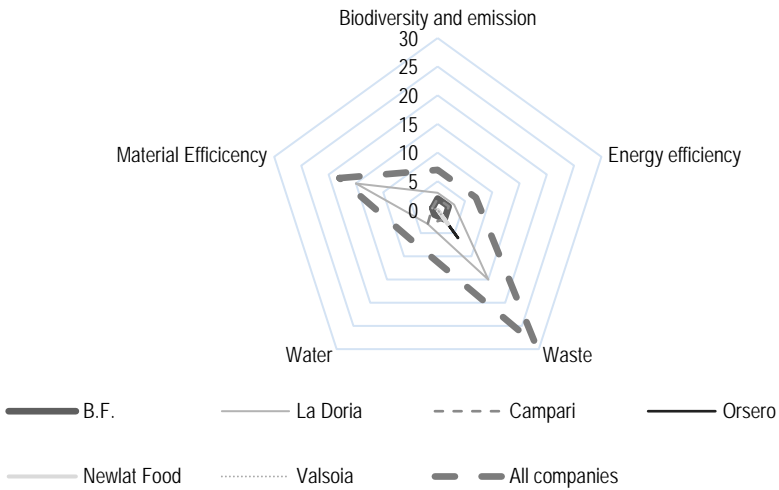
Figure 3 – The EMAS environmental items disclosed for each four R dimension by sampled companies



### Recover



### Recycle



With respect to the Reuse dimension, the spider plot shows that most of the CE information refers to the *biodiversity and emissions* item, followed by the *energy efficiency* and *waste* items. Moreover, all sampled companies disclosed CE information on the *biodiversity and emissions* and *energy efficiency* items. Only three companies (i.e., La Doria, B.F., Campari) released data on the other three environmental items.

Passing to the Reduce dimension, the spider plot reveals that all companies provided CE information on all the environmental items identified by EMAS. Most of the CE information released concerns the *biodiversity and emissions* item, followed by the *energy efficiency*, *material efficiency*, and *water* items. The environmental item with the lowest level of CE information is *waste*.

Concerning the Recover dimension, the spider plot shows that most of the CE information refers to the *biodiversity and emissions* item, followed by the *energy efficiency* and *material efficiency* items. *Waste* is the environmental item with the lowest level of CE information. Moreover, all sampled companies disclosed CE information on the *energy efficiency* and *material efficiency* items. Valsoia did not report data on the *biodiversity and emissions*, *waste*, and *water* items.

With respect to the Recycle dimension, the spider plot reveals that most of the CE information refers to the *waste* item, followed by the *material efficiency* item. Moreover, all sampled companies disclosed CE information on the *waste* item. Only three companies (i.e., La Doria, B.F., Campari) released data on the *biodiversity and emissions*, *energy efficiency*, *water*, and *material efficiency* items; Valsoia only reported on this last environmental item.

Table 3 provides some examples of CE disclosure released by the sampled companies for each environmental item identified by EMAS.

Table 3 – Examples of CE disclosure released by sampled companies

EMAS environmental item	Example of CE disclosure
<b><i>Biodiversity and emissions</i></b>	<ul style="list-style-type: none"> <li>- «Reduce greenhouse gas (GHG) emissions from direct operations by 20% in 2025, by 30% in 2030 and from the total Supply Chain by 25% in 2030, using 2019 as a baseline» (Campari, Sustainability report 2020)</li> <li>- «With the aim of progressively reducing emissions and curbing pollution caused by ships, it was already planned that as of January 1, 2020, the prescribed percentage limit of sulfur (0.5 percent) in marine fuels would come into effect» (Orsero, Sustainability report 2019)</li> <li>- «In 2020, BF Group companies emitted 326.6 t/CO<sub>2</sub> less than in the previous year, a decrease of 8.8 percent» (B.F., Sustainability report 2020)</li> </ul>
<b><i>Energy efficiency</i></b>	<ul style="list-style-type: none"> <li>- «In 2020 the energy consumption per liter manufactured was reduced to 2.57 MJ, an overall -4.4% compared with the previous year (2.69 MJ)» (Campari, Sustainability report 2020)</li> <li>- «In 2018, thermal and energy recovery resulted in a reduction of 5,098 tCO<sub>2</sub>» (La Doria, Sustainability report 2018)</li> </ul>

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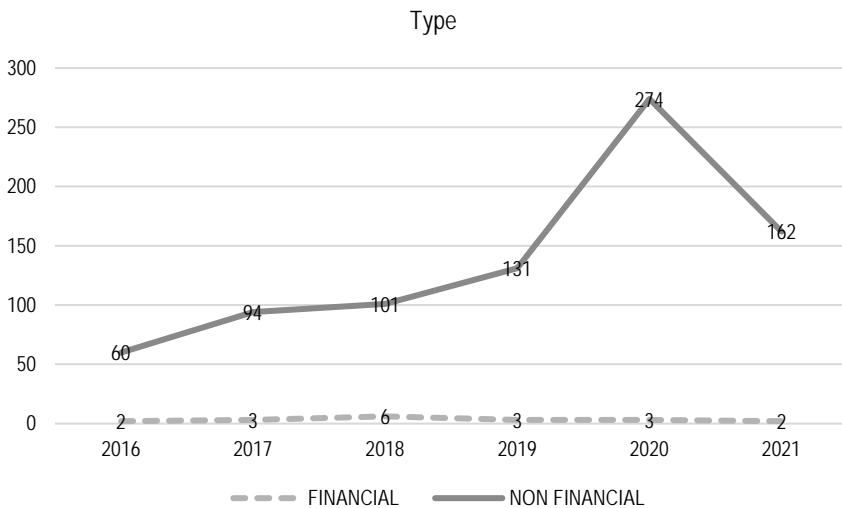
<b>Material efficiency</b>	- «10% reduction in fuel consumption of agricultural vehicles» (La Doria, Sustainability report 2018) - «Amounts to 570,044 kilograms of pits (of peaches and apricots) reused during 2020» (La Doria, Sustainability report 2020)
<b>Water</b>	- «Reduce water usage (L/L) by 20% in 2025 and by 25% in 2030» (Campari, Sustainability report 2020) - «Against a reduction of nearly 20 percent in water supply by the Jamaican sugar mill, there is an increased water withdrawal by other Group production sites due to production needs» (Campari, Sustainability report 2019)
<b>Waste</b>	- «99% of waste is destined for recovery» (La Doria, Sustainability report 2018) - «99.5% of the waste is destined for recovery» (La Doria, Sustainability report 2019)

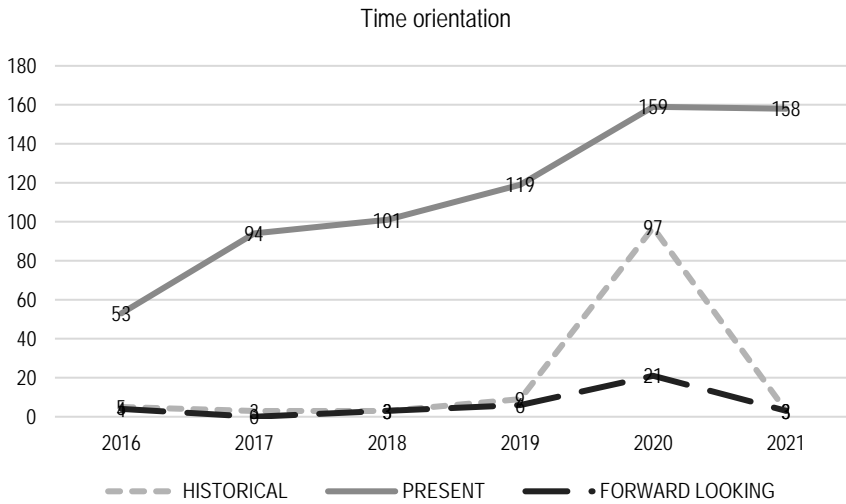
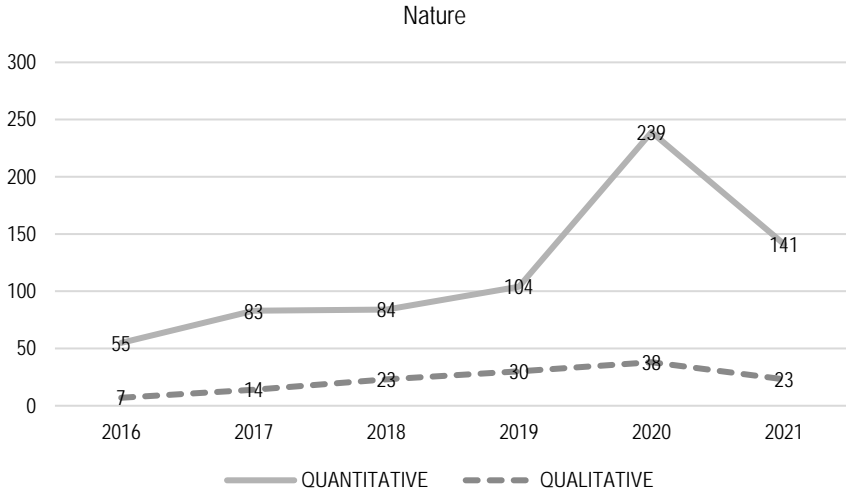
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### 5.3. The evolution of the quality of CE disclosure released by agri-food companies

With respect to the disclosure attributes, it emerged that companies released mainly non-financial, qualitative, and present information. Figure 4 reports the attributes of CE information released from 2016 to 2021.

Figure 4 – The evolution of CE disclosure quality released by sampled companies over the period 2016-2021





As the figure shows, companies mainly provided non-financial information, reporting on average three financial sentences that referred to the data contained in the income statement, balance sheet, or cash flow statement. In addition, the information mainly refers to the reporting year. However, in 2020, companies reported a greater amount of both historical and forward-looking information compared to previous years, probably as a consequence of the issue of the EC (2015), GRI (2020), WEF (2020). With re-

spect to the nature of information, Figure 4 reveals an increase in the number of quantitative sentences released. This rise is particularly significant in the 2020 disclosure, probably due to the issue of the GRI (2020) and WEF (2020). However, although there emerged a rise in the quantitative information released over the years (except for the last one), the sampled companies mainly released qualitative CE information rather than quantitative data. The findings are in line with those of previous studies (e.g., Stewart & Niero, 2018; Tiscini et al., 2022) revealing the prevalent release of non-financial and non-time-specific information, as well as insufficient use of KPIs to describe CE issues. Although GRI (2020), WEF (2020), (EMAS, 2017) sustain that it is important for companies to report CE KPIs in addition to narrative information, companies do not release many CE KPIs.

## **6. Conclusions**

The paper investigated the CE information released by listed Italian agri-food companies. The results show that companies disclosed little CE information. More specifically, while the attention toward CE issues appeared to heighten during the period analyzed, the companies investigated provided relatively little disclosure in relation to CE problems (albeit it did increase across the period) when compared to information relating to environmental issues. Therefore, it appeared that the companies analyzed were deflecting attention from CE issues. This could result from the lack of strategic relevance attributed to the issue and the absence of standards controlling the release of CE information (Opferkuch et al., 2021). However, the results could also reveal companies' scarce implementation of CE business models. In addition, agri-food companies mainly disclosed information on the Reduce dimension, meaning that they were implementing CE business models aiming at redesigning and reducing resource use.

The findings also show an increase in CE disclosure in response to the issue of a CE-related policy or a new framework/guidance, supporting the theoretical arguments of the institutional view of legitimacy theory. According to this vision, agri-food companies disclose CE information to comply with both laws and the voluntary frameworks developed by other professional bodies (Ismail et al., 2021) to achieve the ultimate objective of maintaining legitimacy.

In this sense, the increasing attention by regulators worldwide to introducing the CE paradigm would boost companies' implementation of CE business models, also bringing an increase in the release of CE disclosure in

the coming years. By way of example, CSRD issued by EC should promote the release of more comparable and reliable CE information, e.g., considering the requirement for companies to rely upon mandatory ESRs in drawing up their sustainability reports.

This paper contributes to the existing literature in different ways. First, it sheds light on the CE information released by companies, on which few studies have focused (Opferkuch et al., 2021). In addition, the paper focuses on the food industry, whereas most previous disclosure studies mainly investigated the wider CSR information provided. Only Stewart and Niero (2018) investigated the CE disclosure released by agri-food companies in 2016 within the wider sample of international fast-moving consumer goods companies. This study complements Stewart and Niero's (2018) previous research by being the first to investigate the CE information released by listed Italian agri-food companies since the EC (2015). Finally, the focus on the food industry encourages the understanding of the CE business models implemented in this sector, which presents a strong environmental impact. The paper contributes to regulators and standard-setters by highlighting the presence of an information gap on the CE business model, as noted also by the GRI (2019). The study's results suggest the need to develop new CE-related rules and reporting guidance that provide detailed suggestions on the CE information companies should disclose. In this sense, the issue of the ESRs E5 should lead to higher levels of CE disclosure.

The study presents some limitations. First, the study investigated the CE information companies released in their sustainability reports without identifying *a priori* the items to search for by developing a disclosure index. Future research could develop such an index based on the new standards developed by EFRAG and the requirements of the CSRD. In addition, the present research analyzed the type of information released without investigating the CE KPIs disclosed. Future research could deepen this aspect to understand which circularity indicators companies report and which guidelines they rely upon. Finally, in future works, it could also be interesting to deepen the analysis by investigating companies operating in other countries to understand if the presence of different institutional factors influences the CE disclosure released.

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