Chapter N (please do not write anything in this line. Editors will annotate the chapter number)

Circular economy in the agri-food industry. How social media create engagement

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**Abstract.**

The need to redesign the production and consumption models to reach a sustainable development is widely recognized. In this context, the Circular Economy model, based on the reduction, reuse and recycling activities, has emerged as a powerful framework to succeed in this global trial. Scholars have highlighted that the engagement of the whole supply chains is essential to successfully shift from the traditional linear economic framework to the circular economy model, especially in the agri-food sector. Accordingly, stakeholders' engagement plays a crucial role in this process. Recently, scientific literature has demonstrated that companies could use social media as a disclosure instrument to generate engagement between companies and their stakeholders. Starting from this background, this research aims to explore stakeholders' perceptions regarding the disclosure of CE practices and performance in the agri-food sector through social media.

To this end, based on a sample of agri-food organizations set in the Campania Region, this study analyzes stakeholders' reactions to posts published on Twitter from the beginning of the pandemic until now. It also examines communication dynamics regarding "direction" and balance level.

**Keywords.** circular economy, stakeholder engagement, agri-food sector, social media.

# Introduction

The COVID-19 pandemic has intensified the social and environmental crisis on which our ecosystem relay. Accordingly, the urgency to change the actual production and consumption models based on the take-make-dispose paradigm has emerged. To do so, a transition towards a more sustainable paradigm is required. In this scenario, the circular economy (CE) paradigm based on the reduction, reuse and recycling practices (3R) has been garnered as a successful approach to restrain the negative impacts of the current crisis (Merli et al., 2018).

Scholars have demonstrated that the whole supply chain is called for this paradigm shift since all the supply chain actors have to co-operate to successfully implement a circular production and consumption business model (Esposito et al., 2020). In this perspective, stakeholder engagement is acquiring a growing relevance to achieving this global goal. Indeed, if one of the supply chain actors does not share and implement the same circular principles in its operations, all the supply chain effort in being circular would become vain (Gupta et al., 2019). Consequently, public institutions, companies, associations and citizens are called to act coordinately to stimulate the achievement of sustainable goals through adopting CE models (Stahel et al., 2016).

Therefore, organizations adopting CE business models pay particular attention to communicating information about their CE strategies, policies and practices in order to enhance the stakeholders' awareness of sustainability issues and stimulate their collaboration in reaching companies' objectives. Accordingly, stakeholders' engagement strategies become crucial (Barnabè and Nazir, 2020). In this context, the negative impacts of the pandemic on our ecosystem have pointed out the emergency to construct an interactive and dialogic approach with companies stakeholders on CE through the CE disclosure. To do so, companies are using social media (SM) to engage with an extensive symposium of stakeholders (Lytras et al., 2019).

Starting from this background, this research paper aims to investigate the perception of CE disclosure practices via SM in the agri-food industry (AFI). A content analysis of the Titter posts published by three Italian AFI from the beginning of COVID-19 has been performed following a coding framework developed in the light of the CE paradigm. Furthermore, the communication direction and the balance level have been analyzed.

The paper is arranged as follows. The first part focuses on the literature review, and the second details the research methodology. While the third part provides the main results. Finally, conclusions, implications and future research directions are presented.

# Literature review

Over the past few years, the CE notion has been extensively investigated, resulting in the elaboration of multiple concepts in the light of several streams of research. Among them are regenerative design (Stahel, 2016); industrial ecology (Alkmanash et al., 2019); industrial symbiosis (Boons, 2017); the green economy (Mohan, 2016) and the cradle-to-cradle design (Braungart et al., 2012) have been developed. Accordingly, the CE concept has been seen by some scholars as an "umbrella concept" for its characteristic of encompassing all the approaches previously mentioned to reach sustainable development (Blomsma and Brennan, 2017). The Ellen MacArthur Foundation has provided the most recognized CE definition worldwide, whereby CE is "a systems solution framework that tackles global challenges like climate change, biodiversity loss, waste, and pollution" (Ellen MacArthur Foundation, 2013). Considering the relevance of CE to implementing this framework in order to deal with these global trials, European and International policymakers have encouraged several initiatives and developed guidelines to accelerate the CE transition (e.g., the European Circular Economy Action Plan (EU, 2014; EU, 2015; EU, 2016; EU, 2014), the 2030 Agenda for Sustainable Development, the European Green Deal (EU, 2019a; EU, 2019b; EU, 2019c; EU, 2020; EU, 2021) and the UN Climate Change Conference 2021 (COP26, 2021)).

In this light, governments have started a process of awareness-raising among citizens to trigger a circular cycle of materials, resources and energies. Several scholars have confirmed and demonstrated this proactive approach toward the engagement of all stakeholders in activating virtuous strategies for waste and loss reduction (e.g., Gusmerotti et al., 2019; Barnabè and Nazir, 2021; Esposito et al., 2021). Accordingly, companies, associations, and governments are called to provide comprehensive and reliable information on CE practices and policies (EU, 2020). Moreover, companies ought to assess the impacts of the CE investments on their results to follow up actions to continuously improve their business models. Therefore, sustainable and circular-related information is pivotal in building successful circular strategies (Esposito et al., 2021).

Furthermore, the growing interest in these issues makes CE information focal also for funders, authorities, banks and other stakeholders. Some scholars have shown that information asymmetries are one of the principal barriers to the effective implementation of CE parading within a SC. Accordingly, information pooling and sharing could be considered the best approach to reduce these asymmetries and succeed in shifting toward sustainable business models (Testa et al., 2022).

In this scenario, customers are also more engaged in environmental and sustainable issues. As a result, CE information disclosure is becoming essential to involve the last stage of the SCs, the consumption stage, in changing their consumption models inspired by the 3R paradigm. Accordingly, industries are called to disclose CE information for a double reasons. From one side, firms can obtain a competitive advantage by enhancing their corporate image. On the other side, their stakeholders could be involved in their CE practices (Kazancoglu et al., 2021).

Regarding the importance of this issue, academics have started inquiring about the function of CE strategies and practices disclosure (i.e., Jakhar et al., 2019; Unal et al., 2019; Scarpellini et al., 2020). Jakhar et al. (2019) have investigated how companies' circular economy practices could be influenced by the stakeholder pressures on their resultant disclosure level. Unal et al. (2019) have analyzed how companies can build value through implementing a CE business model and how they disclose this value beyond the organization. While Scarpellini et al. (2020) have investigated how industries that implement CE models develop environmental accounting practices to engage their stakeholders. To the best of the authors' knowledge, no scientific articles have examined the CE disclosure to reach the stakeholders' engagement. Aiming to fill this gap, this study is developed using two theoretical backgrounds based on the stakeholder and legitimacy theories.

According to Carroll (2021), the stakeholder theory is built on the premise that companies ought to create value in the long term, which could be reached through stakeholder engagement. Freeman (1984) defined stakeholders as a group or individuals that could impact or be impacted by the company's practices and actions. In this journey toward a CE transition, the AFS must engage with its stakeholders in order to make them the primary actors of this paradigm change (Barnabè and Nazir, 2020).

Accordingly, "the more an organization engages with its stakeholders, the more accountable and responsible that organization is towards these stakeholders" (Greenwood et al., 2007, p. 1). In particular, in the agri-food sector, industries are asked to meet the stakeholders' demand for accountability. The adoption of SM strategies to communicate sustainable actions can support the AFS in enhancing stakeholder engagement by establishing a bidirectional dialogue between companies and SM users (Bellucci and Manetti, 2017). Scholars have defined SM as supporting dialogic instruments for information pooling and sharing to grasp the stakeholders' expectations (Bebbington et al., 2007). Hence, SM are incrementally becoming vital for CE transition since the compelling need to involve all the supply chain actors in this paradigm shift (Esposito et al., 2021).

Furthermore, SM help obtains stakeholders' collaboration and bring legitimacy in order to become increasingly competitive. The legitimacy theory claim that companies should comply with the values, norms, and expectations system of the social context they act (Suchman, 1995). As a result, the AFS is summoned to carry out activities and policies to obtain societal legitimacy and endure over the long run (Esposito et al., 2021).

Starting from this background, the present research aims to explore how agri-food firms engage with their stakeholders.

# Methodology

The present research aims to investigate the CE disclosure and the stakeholder engagement level of CE posts published by three agri-food companies on Twitter.

This SM was selected for multiple rations. Twitter is a commonly used social network worldwide (Mergel, 2013). Furthermore, being an open-source platform, it helps researchers collect and analyze data (Panagiotopoulos et al., 2014). Finally, the post's brevity can achieve a broader audience, and companies can publish posts several times (Kim et al., 2014). Therefore, Twitter has been defined as a proper social network for building engagement (Boons et al., 2017).

Three big Italian companies have been chosen from the "AIDA Breau van Dijk International" database per capital market using the ATECO codes "10- food processing industries" and "11-beverage companies" in the Campania region.

The dimension criterion has been chosen since the company's size affects its attitude towards circular and environmental investments (D'Amico et al., 2016; Giannarakis et al., 2020). Accordingly, larger companies can be considered more willing to disclose CE practices.

All tweets published by each company from the 9th of March 2020 until the extraction data on the 10th of June 2022 were extracted, purified and analyzed using data mining techniques since our research purpose was to explore the engagement level from Twitter's accounts on CE in the AFS during the pandemic and post-pandemic period. However, our analysis does not include Tweets published after the 10th of June 2022 and, as a consequence, shows only a partial view of the 2022 trend.

The data mining was performed using the NVivo software. More specifically, the open-source extension "NCapture" drawing on Application Programming Interface (API) has been adopted in order to easily access Twitter's accounts (Reyes-Mendez et al., 2018). The Tweet's publication date, the number of "likes", and the number of "retweets" were extracted for each post. In detail, the number of likes provides insights into the level of users' agreement with specific content, albeit the number of retweets is used to interpret the debate degree among Twitter's users (Pizzi et al., 2020).

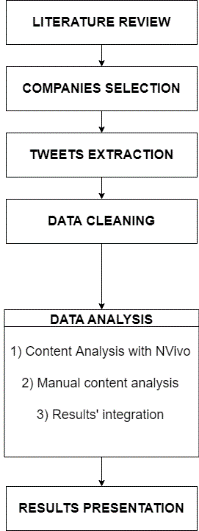
The data analysis has been structured into three phases (Figure 1): 1) dictionary-based content analysis with NVivo, 2) manual content analysis, and 3) results integration.

Fig. 1. Research methodology.

Sources: (Esposito et al., 2022).

The authors have developed a coding framework based on the reduce-reuse-recycle-redesign paradigm, reclassifying the word presented in the "Circular Economic glossary". Furthermore, a "general" CE bracket has been added to enclose tweets linked to the CE but that are not related to the other categories "Reduce", "Reuse", "Recycle", and "Redesign. Table 1 presents the coding framework adopted to perform the content analysis.

Table 1. Circular Economy glossary reclassified according to the 4-R paradigm

|  |  |
| --- | --- |
| Categories | Words |
| Reduce | carbon footprint reduction; environmental impact reduction; raw materials reduction; waste reduction; emissions reduction; |
| Reuse | alternate materials; disassembly; durability; maintain; redistribute; refurbish; remanufacture; repair; reuse; upcycling; waste diversion: |
| Recycle | anaerobic digestion; compostable; composting; end-of-life; Radio-Frequency Identification; recyclability; waste conversion; water conservation |
| Redesign | dematerialization; design; Raw Material Conversion; |
| General | circular economy; biodiversity; closed-loop; finite materials; green financing; regenerative production; renewable energy; renewable materials; renewable source; reverse logistics; sharing; virgin materials; |

Source: (Barnabè and Nazir, 2020) and "Glossary of Circular Economy"

The automated measurement of the occurrence was allowed by implementing a Supervised Machine Learning technique through NVivo software.

Moreover, to strengthen the analysis and investigate the type of content in terms of informing or interacting nature (Schroder, 2021), two independent researchers have carried out a manual content analysis through an empirically grounded approach. In detail, the coders have classified the tweets as "informing" if they communicate an action, an initiative, a goal or a policy. Quite the opposite, the posts that show an engagement with stakeholders have been classified as "interacting" (Esposito et al., 2021).

Furthermore, this research has investigated the stakeholder engagement level, investigating the posts' communication direction. The tweets that enable a comment by an account were classified as "two-way communication"; alternatively, the posts were categorized as "one-way communication" (Schroder, 2021). Furthermore, Krippendorff's alpha index (α) was calculated to prevent subjective interpretation and evaluate the inter-coder reliability. The coefficient, computed on the first 25% of posts, equals 0.87. This value can be considered adequate since it is within the range of 1.00 (equivalent) and 0.00 (entirely different) (Krippendorf, 1980). In conclusion, the results have been combined and systemically illustrated in the following section.

**4. Results and discussion**

Table 2 presents the descriptive statistics of the total tweets published by the three companies from March 2020 to May 2022. The results display that 39.33% of the extracted tweets can be categorized as CE content concerning the whole tweets. Nevertheless, according to Esposito et al. (2020), our findings show that non-CE messages have a lower level of stakeholder engagement than CE messages. The retweets values are low since the highest part of the Twitter users is likely to interact with the contents through the feedback mechanism: through the likes.

Table 2. Classification of Tweets

|  |  |  |
| --- | --- | --- |
|  | **CE Tweet extracted** | **Total Tweet** |
| **Like** | 82.68% | 54.40% |
| **Retweet** | 14.32% | 12.13% |
| **Obs** | 363 | 923 |
| **Obs%** | 39.33% | 100% |

Table 3 describes the frequency of likes and retweets retrieved for each company analyzed. In particular, Company C shows the highest number of likes and retweets for the CE messages (i.e.,119; 32), while, concerning the total messages published, Company A shows the highest number of likes (i.e., 178). Company B shows the lowest level of engagement and agreement with only five retweets compared to the 278 posts examined.

Table 3. Classification of Tweets per companies

|  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- |
|  | **Company A** | | **Company B** | | **Company C** | |
|  | **CE** | **Total** | **CE** | **Total** | **CE** | **Total** |
| **Like** | 98 | 178 | 83 | 95 | 119 | 148 |
| **Retweet** | 15 | 40 | 5 | 25 | 32 | 47 |
| **Obs** | 120 | 330 | 95 | 278 | 148 | 315 |
| **Obs%** | 36.36% | 100% | 34.17% | 100% | 46.98% | 100% |

Figure 2 describes the communication trend from the pandemic's start until data extraction. Each company represents a progressive development trend in CE communication. The spread of Covid-19 has determined a growing interest in sustainability and CE-related issues. Furthermore, our results suggest an increasing awareness of agri-food industries and institutions of the need to be proactive in overcoming the crisis allowing the disclosure of sustainability and CE performances in order to conquer legitimacy from stakeholders and engage with them in the restart of the whole agri-food supply chain.

Fig. 2. Evolution of CE Tweets from 2020 to 2022 (as of 10th of June 2022).

Source: authors' elaboration

The CE tweets have been classified according to the 4 R analytical framework developed. Table 4 shows the descriptive statistics of each CE side (reduce, reuse, recycle, redesign, general). The results indicate that the CE disclosure of the agri-food companies examined has been mainly focused on the "recycling" dimension both for company A (i.e. 37.5%) and Company B (i.e., 25.67), while the "reduce" dimension is the most disclosed by Company B (i.e., 36.84). On the contrary, the reuse and redesign dimensions are generally less disclosed. In particular, Company A does not disclose reuse messages, while Company B does not provide redesign content in their twits. Company C, instead, equally unveils each dimension, focusing on reducing and recycling practices. Our findings are in line with other research on CE disclosure (e.g., Barnabè and Nazir, 2020; Barnabè and Nazir, 2021), according to which the interest in recycling practices is antecedent concerning the spread of CE models and – in turn- there has been a greater awareness among stakeholders. Since recycling practices are more straightforward than reducing, reusing and redesigning, disclosing these issues is easier for companies, no-profit organizations and policymakers.

Table 4. Classification of Tweets according to the CE framework per company

|  |  |  |  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- |
| **A** | **Reduce** | | **Reuse** | | **Recycle** | | **Redesign** | | **General CE** | |
|  | **Freq.** | **%** | **Freq.** | **%** | **Freq.** | **%** | **Freq.** | **%** | **Freq.** | **%** |
| **Like** | 12 | 12.24 | - | - | 49 | 50 | 9 | 9.18 | 28 | 28.57 |
| **Retweet** | - | - | - | - | 13 | 86.66 | 0 | 0 | 2 | 13.33 |
| **Obs** | 23 | | 0 | | 45 | | 17 | | 35 | |
| **Obs%** | 16.66% | | 0% | | 37.5% | | 14.66% | | 29.16% | |

|  |  |  |  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- |
| **B** | **Reduce** | | **Reuse** | | **Recycle** | | **Redesign** | | **General CE** | |
|  | **Freq.** | **%** | **Freq.** | **%** | **Freq.** | **%** | **Freq.** | **%** | **Freq.** | **%** |
| **Like** | 13 | 15.66 | 28 | 33.73 | 39 | 46.98 | 0 | 0 | 3 | 3.61 |
| **Retweet** | - | - | - | - | 5 | 100 | - | - | - | - |
| **Obs** | 35 | | 20 | | 32 | | 0 | | 8 | |
| **Obs%** | 36.84% | | 21.05% | | 33.68% | | 0% | | 8.42% | |

|  |  |  |  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- |
| **C** | **Reduce** | | **Reuse** | | **Recycle** | | **Redesign** | | **General CE** | |
|  | **Freq.** | **%** | **Freq.** | **%** | **Freq.** | **%** | **Freq.** | **%** | **Freq.** | **%** |
| **Like** | 48 | 32.43 | 5 | 3.37 | 35 | 23.64 | 19 | 12.83 | 12 | 8.10 |
| **Retweet** | - | - | - | - | 18 | 56.25 | 3 | 9.37 | 11 | 34.37 |
| **Obs** | 37 | | 22 | | 38 | | 27 | | 24 | |
| **Obs%** | 25% | | 14.86% | | 25.67% | | 18.24% | | 16.21% | |

Concerning the engagement level, the highest content that has generated engagement among users are the recycling posts for each Company A and B (i.e., 50% for Company A; 46.98 % for Company B). Company C instead shows the highest percentage of likes for the reduce posts (i.e., 32.43%). However, a low rate of retweets has been retrieved from the analysis in general for each company.

Table 5. Direction and balance of communication of the CE tweets from 2020 to 2022\*(As of the 9th of June 2022).

|  |  |  |
| --- | --- | --- |
| **Direction Type** | **Total** | |
|  | ***n*** | ***%*** |
| One-way communication | 65 | 17.90 % |
| Two-way communication | 289 | 82.09% |
| Informative communication | 158 | 43.52% |
| Interacting communication | 207 | 57.02% |
| **Total CE tweets** | 363 | 100% |

Concerning the direction and balanced nature of the published posts, Table 5 shows the distribution from 2020 to 2022 of all the companies analyzed. Generally, the lowest percentage of CE messages is classified as one-way communication (i.e. 17.90%), while 82.09% provide two-way communication content.

The communication balance shows that an interacting nature characterizes 57.02% of the CE posts published by the companies, while 45.56 % have a communicating nature.

5. Conclusions

In conclusion, the preliminary findings presented have outlined that social media have the potential to communicate and disclose to a whole forum of stakeholders CE-related information, such as practices, initiatives and performances. Moreover, SM could also be useful tools to stimulate a dialogue with stakeholders and society. This engagement can support agri-food companies in raising awareness among social network users of the need to be part of the CE transition to allow ecosystem survival. In fact, the stakeholder dialogue raises as a pivotal topic that enables agri-food managers to encompass stakeholders' expectations in their strategies.

This study can be helpful both for scholars and agri-food managers who can count on our findings to explore and adopt SM to disclose their commitment towards CE to enhance the stakeholder engagement level, stimulating the digital debate. In the end, institutions can establish frameworks and guidelines for CE reporting through SM at the European and international levels.

This study attempts to provide also some theoretical implications. Despite the literature on stakeholder engagement and CE disclosure being still poor, SM can be considered one of the most helpful tools for creating a dialogue between agri-food companies and their stakeholders. Accordingly, scholars can explore this research window in-depth to provide practical recommendations and proposals to the agri-food managers to establish engaging disclosure strategies.

Moreover, scholars can explore CE disclosure via SM according to different theoretical perspectives.

Nevertheless, this research has some limitations. First of all, it is limited to a defined period. Consequently, future research could employ different instruments to extract and analyze data, following other analytical frameworks. Furthermore, academics can investigate the use of other SM like Instagram, Facebook and LinkedIn or perform the analysis on a higher company sample in different geographic areas.

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