

Exploring environmental and social performances of circular start-ups: An orientation and certification assessment

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Abstract

The circular economy (CE) aims to deeply transform the current linear model of economy and society into a business model capable to extend the lifetime of resources and decrease environmental impacts. For this to happen, changes in societal systems and production sectors, from micro to macro, are required.

The present research, based on a multiple case-study explorative approach of circular start-ups (CSUs), investigates their adoption of environmental impact assessment methods, environmental and social certifications and contribution to a better integration of the social dimension in the CE model. Results indicate that three out of six CSUs carefully measure and certify their environmental and social impacts. Life Cycle Assessment resulted the most adopted environmental assessment method, while two CSUs are also certified benefit corporations. CSUs are mainly oriented toward the use of quantitative methods for the measurement of environmental and social impacts. Additional efforts are still needed toward the implementation of qualitative methods to properly highlight the achievement of social benefits (environmental and social awareness, employees' engagement, work time and free time balance, consumers health and safety, among others) for their stakeholders (workers, local community, consumers). Nevertheless, CSUs case studies highlight their potential of supporting the transition toward a fair CE while at the same time facilitating the integration of social dimension aspects into the CE model. Finally, by developing appropriate business to consumer models, CSUs can strongly affect consumption behaviors and habits, making them also more aware and responsible of their environmental and social life cycle impacts and improvement potential.

KEY WORDS

circular economy, circular entrepreneurship, circular start-ups, corporate social responsibility, environmental and social impacts

1 | INTRODUCTION

In the current world situation, characterized by urgent and great challenges such as climate change, over-consumption of resources (Hickel et al., 2022; Marin-Beltran et al., 2022) and social inequality

Abbreviations: CE, Circular Economy; CSUs, Circular Start-ups; SMEs, Small-Medium Enterprises; LCA, Life Cycle Assessment; GRI, Global Reporting Initiative; SDGs, Sustainable Development Goals; B2B, Business to Business; B2C, Business to Consumer; B-Corp, Benefit Corporation; BIA, Benefit Impact Assessment; KPI, Key Performance Indicator; SDGs, Sustainable Development Goals.

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(Schröder et al., 2020; Inigo & Blok, 2019), the transition to a circular economy (CE) is expected to change the dominant neoliberal (linear) model of economy and society (Galindo-Martin et al., 2021; Murray et al., 2017) and contribute to a more sustainable development (De Lima, 2022; Knäble et al., 2022). The pandemic has further acquired the need for adopting economic models more environmentally and socially sustainable (Clube & Tennant, 2023; Ghisellini et al., 2023a; Ceraulo, 2021). Moreover, it has also shown the importance that the key stakeholders (such as citizens/consumers and entrepreneurs) take care of the well-being and happiness of the other actors of the society (Beccetti & Cermelli, 2018) as well as that of the natural environment (Giraud et al., 2023). The quality of life of people is increasingly determined by factors beyond income such as the quality of work, the quality of natural environment, the life in the community, the richness of social relations, the access to education, health services, and so on (Girardo, 2015; Valencia et al., 2023a).¹ To improve these factors characterizing public goods such as the quality of life and the environment, it is crucial and urgent to move beyond the dominant neoliberal socio-economic paradigm, toward socially and environmentally responsible entrepreneurship, where also consumers/citizens, and institutions collaborate to find appropriate solutions to the current environmental and social challenges (Beccetti & Cermelli, 2018; Porter & Kramer, 2011).

In this context, the CE has mainly born in response to reduce the impacts of human activities on the natural environment (Megevand et al., 2022; Mazur-Wierzbicka, 2021). However, the increasing recognition of the strict connection between the ecological and social crisis (Giraud et al., 2023) as well as the CE potential of contributing to the pursuit of sustainable development (Knäble et al., 2022; Terra dos Santos et al., 2022) requires that CE model aligns to all the three dimensions of sustainability (Evans, 2023).

More in depth, CE implementation at all scales (micro, meso, and macro) should contribute to reduce the demand for natural resources and energy (European Parliament, ; Veleva & Bodkin, 2018; Mulvaney et al., 2021; Remme and Jackson, 2023), prolonging the value of all types of resources, as well as to revalorize them (Ghisellini et al., 2016, 2021; Kalmykova et al., 2021; Schögl et al., 2020). Importantly, the CE model should not only focus on how to be practically implemented but also on how to measure the environmental and social impacts of its practices (Lutin et al., 2023; Pitkaenen et al., 2023; Das et al., 2022) and how the benefits and costs of the transition are distributed among the stakeholders throughout the life cycle of products and services (Ghisellini et al., 2023b). Consequently, CE transition should be a participative process in order to assure that all voices and interests are considered (Di Fiore et al., 2022; Purvis et al., 2023; Van Bueren et al., 2023).

Sustainable business models' innovation is a necessary step for successful CE implementation by companies (Costanza, 2023; De Keyser and Mathijs, 2023; Urbinati et al., 2017) and make them more responsible in reducing the environmental and social burdens while keeping economic benefits (Ferlito and Faraci, 2022; Pieroni

et al., 2019; Prieto-Sandoval et al., 2018; York & Venkataraman, 2010). To support a societal transition toward environmentally sound (Ncube et al., 2023) and fairer CE (Berry et al., 2021; Schröder et al., 2020), business models innovation should be adopted by both established firms, the so-called "growing circular firms," and innovative young start-ups, the so-called "born circular firms" (Zucchella & Urban, 2019), although with different challenges (Roos Lindgreen et al., 2022; Mura et al., 2020). Specifically, "growing circular firms" must reconfigure, adapt, or modify their business models to be responsive to the new CE requirements (Bocken et al., 2016; Centobelli et al., 2020; 2021; Urbinati et al., 2017). Conversely, "born circular firms" aim to develop innovative business models based on CE principles from their first inception. As a consequence, all different types of firms should contribute effectively to the pursuit of sustainable development (Terra dos Santos et al., 2022). In such a context, an appropriate measure of the environmental and social performances (in quantitative and qualitative terms) becomes a priority for both growing circular firms and born circular firms, as well as for all type of companies. Therefore, besides the quantitative contribution to the reduction of the impacts to climate change and resources' use, firms should take into account the social impacts (positive and negative) of their products and business models and the relations to their stakeholders (Ghisellini & Ulgiati, 2020; Zahra et al. 2009). In this regard, social impacts are currently mainly measured by qualitative methods (social life cycle assessment) and indicators (e.g., local community engagement, contribution to safe and healthy living conditions, and local employment) (Ghisellini et al., 2023b; Lutin et al., 2023; Kaiser et al., 2022; Padilla-Rivera et al., 2020).

The present study focuses on the "born circular firms," in particular on circular start-ups (henceforth CSUs). Actually, CSUs are expected to be based on disruptive and radical innovations that are able to modify markets, industries, and consumers' habits. Hence, CSUs can be considered an important engine in generating environmental, technological, and social innovations and introducing new values of civil responsibility and cooperation for the common well-being (Bocken et al., 2017; Coscieme et al., 2022; Henry et al., 2020).

Most studies about the implementation of CE models are still focused on small and medium enterprises (SMEs) (Cano-Rubio et al., 2021; Demirel & Danisman, 2019; Linder & Williander, 2017; Mura et al., 2020; Re & Magnani, 2022; Rizos et al., 2016; Sawe et al., 2021; Zamfir et al., 2017) and in general on incumbent companies. Specifically, these studies focus on the analysis of the key factors, barriers, and drivers to the implementation of CE models (von Kolpinski et al., 2023; Dey et al., 2020; Holzer et al., 2021; Mura et al., 2020; Ormazabal et al., 2016, 2018; Prieto-Sandoval et al., 2019; Schmidt et al., 2021), as well as on how they adopt more sustainable business models or adapt the existing ones (Gusmerotti et al., 2019; Urbinati et al., 2017; Urbinati et al., 2021).

To the best of our knowledge, in the current literature on CSUs (Awana et al., 2023; Borms et al., 2023; Colucci & Vecchi, 2021; Culien & De Angelis, 2021; Henry et al., 2020; Henry et al. 2022; Hull et al., 2021; Millette et al., 2020; Rok & Kulik, 2021; Scheck et al., 2022; Van Hopstal and Borms, 2023), the evaluation of environmental

¹<https://www.oecd.org/sdd/47918063.pdf>



and social impacts, and performances of the activities of CSUs is still underexplored (Das et al., 2022). The available literature about CSUs mainly focuses on internal barriers, drivers, and competences in the implementation of circular business models (Maglio et al., 2021; von Kolpinski et al., 2023; Van Hopstal & Borms, 2023; Borms et al., 2023; Awana et al., 2023), as well as on the entrepreneurial motivations and identities of CSUs (Voinea et al., 2019; Rok & Kulik, 2021; Henry et al., 2022). This latter study shows that while circular entrepreneurs are oriented toward integrating all three pillars of sustainable development, yet their visions mainly consider the environmental impacts and rarely embed social value creation (Henry et al., 2022).

A few studies have investigated how CSUs are oriented toward the measurement of their environmental (Das et al., 2022) or social performances and impacts, and the adoption of certification schemes including the use of a life cycle assessment approach (Roos Lindgreen et al., 2022) or the move to certified business models, such as the certified benefit corporations (Kirst et al., 2021; Nigri & Del Baldo, 2018).

With this in mind, the paper aims to contribute to this main research streams, namely circular entrepreneurship literature from the perspective of born CSUs (Zucchella & Urban, 2019; Munoz & Cohen, 2017). Specifically, the following research questions are identified and possibly answered:

1. How is the environmental and social performance assessment orientation of selected CSUs structured and performed?
2. How do CSUs certify their environmental and social performances?
3. How CSUs contribute to the integration of the social dimension in the CE model?

The paper is organized as follows: Section 2 provides the theoretical background, and Section 3 details on the method adopted in this study. Section 4 illustrates the main results achieved. Finally, Section 5 concludes by summarizing and discussing the main findings of this study, together with the implications, the limitations, and future research directions.

2 | THEORETICAL BACKGROUND

This section presents the existing literature on circular businesses, how have they measured their environmental and social performances, and how have they integrated the social dimension of sustainability in their circular business model.

2.1 | Environmental and social performance assessment of circular businesses

At a worldwide level, numerous SMEs as well as innovative start-ups are adopting new circular business models, aligned with a sustainable vision of business in which people, environment, and society assume a key integrated and innovative role (El Tarabishi et al., 2021; Parente et al., 2018, 2020). In this regard, their mission is not only just the

generation of profit but also the creation and delivery of environmental and social values to all the stakeholders (Alberti & Varan Garrido, 2017). In this perspective, the evaluation of the environmental and social performances of companies and their products in adopting the CE by means of quantitative scientific methods is essential to support the advancement of CE transition (Haupt & Hellweg, 2019; Moraga et al., 2019) and avoids the risk that CE transition does not fulfil its premises (Harris et al., 2021) failing to contribute to sustainability (Terra dos Santos et al., 2022; Roos Lindgreen et al., 2022). As a matter of fact, there are cases by which companies apply the so-called "greenwashing" approach instead of measuring environmental or social sustainability (Torelli et al., 2020). Some companies may claim that their products are environmentally sustainable based on one indicator or a product stage only, while neglecting to show relevant impacts related to other indicators or stages.

Existing literature studies concerning circular entrepreneurship show that Life Cycle Assessment (LCA) or LCA-based tools are one of the most used by companies, experimenting circular business models, for the evaluation of environmental impacts of products (e.g., Das et al., 2022; Stucki et al., 2021). Some studies distinguish between companies that adopt a linear business model as their core strategy but are experimenting new ways of doing business with the purpose of reducing their environmental impacts and companies that born circular and adopt since their inception a circular business model. However, in this latter case, there are also companies that born circular that experiment new business ideas toward linearity resulting in an increase of their environmental impacts. This could happen since they may not know the environmental impacts of their new circular business ideas. Therefore, it is paramount to measure in all the stages of the experimentation process (Bocken et al., 2017) the environmental as well as social impacts of circular business ideas to prevent that the development of the latter has opposite effects and results in worsening their impacts (Das et al., 2022). Further studies analyzed environmental assessment approaches for assessing CE and sustainability used by frontrunner CE in companies located in the Netherlands and Italy (Roos Lindgreen et al., 2022). These latter authors evaluated a list of 22 methods classified in four categories: life cycle based/footprint (e.g., carbon footprint, environmental life cycle assessment, social life cycle assessment, and life cycle costing), reporting framework (such as environmental accounting and Global Reporting Initiative [GRI] standards), tailor-made indicators (e.g., based on life cycle approach or circularity indicators measuring direct impacts), and single indicators (e.g., the material circularity indicator by the Ellen Mac Arthur Foundation). Their results show that 36% of the companies of the sample analyzed did not implement any assessment methods for the evaluation of the impacts of their processes or products. Instead, for those who did, the most adopted tools for impacts assessment are tailor-made sustainability indicators (based on a life cycle approach and direct impacts), single indicators, and environmental life cycle assessment, while material flow accounting, product environmental footprint, life cycle costing and social life cycle assessment were adopted to a lower extent. Some approaches such as the GRI standards are applied by the companies to assess their impacts at company level,

while the LCA is applied by about 70% of the companies to assess the performances of products. Such results show that social impacts are still underexplored both by firms and academics.

2.2 | Contribution of CSUs to the integration of the social dimension

Most scholars increasingly underline that social aspects of CE implementation should be taken into account in CE literature and practice (Schröder et al., 2020; D'Urzo & Campagnaro, 2023; Quintelier et al., 2023), in order to increase the CE model contribution to sustainable human development and to the improvement of societal well-being (Kirchherr et al., 2017; Quintelier et al., 2023; Rodriguez-Antón et al., 2019; Schröder et al., 2020). Specifically, the existing literature underlines the need to apply a triple bottom line perspective to CE models (Elkington & Rowlands, 1999; Evans, 2023), since the focus appears to be mainly on economic–environmental perspectives, while the social aspects and impacts are still missing (e.g., Homrich et al., 2018; Mies & Gold, 2021; Padilla-Rivera et al., 2020; Clube and Tennat, 2023; Quintelier et al., 2023). In line with this, Borrello et al. (2020) appraise CE as focusing only vaguely on sustainable development goals, and in general on the social dimension. The latter comprises different aspects that evolved over time. Talan et al. (2020) point out that “Traditional themes of social sustainability such as employment and poverty are now substituted by soft and few measurable ideas such as joy and happiness, social interactions and maturity. Social equity, diversity, social quality of life and integrated governance including corporate sustainability and hybrid business models are newly added sectors to the social dimension of sustainability. These newly added themes are creating intricacy in the analysis of social sustainability from an assessment point of view.” It is important to point out that most of these ideas and aspects cannot be measured in a quantitative way but can be assessed through qualitative evaluation and description, which would make their understanding and acceptance even easier and faster (Lutin et al., 2023; Valencia et al., 2023a).

To fill this gap, a shift toward a just CE at individual and global levels, to ensure environmental protection and a sustainable human development path, appears to be necessary (Ashton et al., 2022; Padilla-Rivera et al., 2020; Schröder et al., 2020). In other words, it is critical to integrate and reinforce the social pillar of sustainability (Vanhuyse et al., 2022), together with environmental and economic aspects, to boost an effective sustainability transition worldwide (Evans, 2023). In line with this, some authors have suggested incorporating sustainable development goals (SDGs) into the CE agenda as a promising way to address this pressing issue (e.g., Padilla-Rivera et al., 2020; Schröder et al., 2020).

In this framework, firms may be drivers of inclusiveness, competitiveness, and fair CE transition for the territories where they operate (Nogueira et al., 2023). In particular, all the actors in a socio-economic system (e.g., large firms, SMEs, start-ups, etc.) have the responsibility to implement innovative strategies that are able to take care of and protect people, the environment, and the whole of society (Ostermann et al., 2021).

Start-ups are new ventures characterized by highly innovative performance and are potentially able to offer new products or services of elevated technological value (Dullius & Schaeffer, 2016; Kohler, 2016; Passaro et al., 2017). CSUs can effectively react to the current unsustainable approaches and practices, shaping new market logics and shifting toward sustainability (Pisoni & Onetti, 2018; Bocken et al., 2017). CSU entrepreneurs can be considered as a diverse entrepreneurial archetype (Henry et al., 2022), characterized by distinct motivating factors. Specifically, according to the literature, CSU founders, besides profits, are motivated “*by social and biospheric altruism and by the opportunity to work according to their personal, holistic principles of circularity*” (Henry et al., 2022). For all these reasons, it is worth underlining that CSUs are able to address simultaneously environmental, social, and economic issues, not only through technological innovations and customers' awareness-raising but also by revising various actors' roles and responsibilities and encouraging them to adopt more sustainable behaviors and actions (Ostermann et al., 2021). This innovative characteristic makes start-ups a potential engine able to accelerate the transition toward CE and more sustainable human development (Padilla-Rivera et al., 2020; Schröder et al., 2020). Specifically, in the near future, start-ups may have an influential role in enabling social and institutional shifts toward CE adoption (Merli et al., 2018; Närvenänen et al., 2021). In other words, CSU companies seem currently to be more suitable to adopt radically innovative circular strategies (Henry et al., 2020), and to move away from the linear model of production and consumption of resources (Persson & Hinton, 2023), since they are endowed with the necessary cultural and ethical advancements for the CE transition (Bressanelli et al., 2019; Sentuti & Cesaroni, 2021).

3 | METHODOLOGICAL APPROACH

In order to achieve the goals mentioned in the research questions, the present study adopts a multiple case-study approach which focuses mainly on qualitative data. In fact, the multiple case-study analysis makes it possible to investigate real, unique phenomena of interest in their natural real-life context and their dynamics from different standpoints (Eisenhardt, 1989; Eisenhardt & Graebner, 2007; Patton, 1990; Yin, 2003).

The choice of a multiple case-study approach appears to be coherent both with the explorative nature of this study and with other recent studies on CSUs (e.g., Von Kolpinski et al., 2022; De Angelis & Feola, 2020; Rok and Kulik, 2021).

Finally, we have chosen to analyze a group of start-up companies selected for being very innovative at a cultural level (Bressanelli et al., 2019) and particularly meaningful for CE implementation, as they are less constrained in adopting CE in a radical way compared to traditional companies (Bressanelli et al., 2019; Gusmerotti et al., 2019; Mura et al., 2020). In other words, these firms originated as CSUs show characteristics that are very interesting for the goals of this study.

Hence, this method can be considered an appropriate method for gathering the necessary data and information to facilitate an in-depth understanding of how start-ups can be considered as CSUs and how they support the industrial transition toward greener models.

Moreover, to optimize the validity and reliability of our results and gain an in-depth understanding of the research phenomenon (Denzin & Lincoln, 2000; Yin, 2003), we triangulate the data by using a variety of data sources (i.e., statistics, website information, press releases, and newspaper articles) to collect additional information on each case study analyzed. In particular, triangulation facilitates the validation of data through cross-verification, thereby compensating for potential weaknesses in the data through the strengths of other data collected (Angers & Machtmes, 2005; Bowen, 2009).

3.1 | Data collection and analysis

In this study, six case studies were analyzed, consistently with the suggestions of leading researchers on multiple case-study methodology (Eisenhardt, 1989; Yin, 2003). Although some information was retrieved from the Internet, CSUs' websites and secondary sources (e.g., specialized magazines, press in general, and scientific papers), structured interviews provided the main source of data, focusing on individual and group decisions related to the CE approaches adopted and characterized the selected CSUs. Interviews were guided by a case study protocol (Eisenhardt, 1989; Gibbert et al., 2008; Yin, 2003) that was developed according to the literature about CE (De Vita et al., 2023; Kolling et al., 2023; Van Langen et al., 2021). However, during the interviews, further questions emerged based on the answers received. We validated all the information received from the key respondents with the information collected via the Internet, companies' websites and secondary sources (Angers & Machtmes, 2005; Bowen, 2009; Eisner, 1991; Patton, 1990).

To be included in the study, the start-ups must (i) be listed in the Atlas of the Circular Economy²; (ii) have been operative on the market for at least 2 years; and (iii) propose creative and innovative solutions based on circular principles.

The Atlas of the CE is an online platform that hosts many secondary data exclusively on circular organizations, including start-ups. For each company, the Atlas has a dedicated web page, which communicates how each organization is experimenting with the CE, the features of their products/services, and their environmental and social policies. The Atlas is also a channel for providing information about the organizations' circular products to consumers and the construction of "circular" supply chains based on the principles of sustainability and circularity.

Based on the selection criteria considered, a group of 10 CSUs was identified, operating in different economic sectors that are responsible for significant environmental impacts in the life cycle of products, such as textiles/fashion, construction, solid waste, and the food supply chain (European Commission, 2020; Ghisellini et al., 2019;

TABLE 1 Information about the interviewees and length of each interview.

Circular start-up	Interviewee	Interview length in first round
Packtin	Founder	2 h
Prespaglia	Founder	2.5 h
Ricehouse	Chief executive officer	2 h
Rifò	Chief executive officer	1.5 h
Squiseat	Founder	2 h
Wolfia	Founder	2.5 h

Mc Dowall et al., 2017). We contacted each start-up by email to ask them to participate in the interviews, but only 60% provided a positive answer (6 out of 10). Two of the selected CSUs works in food sector (Packtin and Squiseat) recycling food waste and food leftovers, respectively, while Rifò is active in the textile sector producing garments by regenerating yarns. Prespaglia and Ricehouse recycle local agricultural residues to produce bio-construction products and circular buildings. Wolfia has created a platform for the trading and reuse of industrial leftovers including that of aerospace.

Before the interviews, all the interviewed start-ups were invited to read the participant information sheet and the consent form to determine if they were available to participate in the interview, and to inform them why they had been chosen and in which way the information provided during the interview would be managed and used. Meanwhile, the researchers carefully investigated the activities of the organizations on their websites. During the interviews, respondents were reminded of some of the activities mentioned in their website or press releases in order to stimulate and enrich the discussion. Respondents were also asked for permission to record the interview, in order to improve its effectiveness.

Due to the emergence of the current pandemic, the interviews were performed through the videoconference platforms (e.g., Microsoft Teams and Skype) most preferred by the participants in order to avoid any type of technical impediment and to create as friendly climate as possible. The interviews were handled in the form of conversational interviews around a predefined set of questions and topics such as mission, development of the entrepreneurial idea, education of the founders and employees, and balance among environmental, social, and economic goals of the start-up activity.

The overall questions are available in the Appendix. Each conversation was recorded, transcribed into an interview report, and then mailed to the start-uppers with two main aims (Gibbert et al., 2008): (a) to prevent misunderstandings and errors of transcription and interpretation, and (b) to add further comments and implement fine tuning of the model in line with the start-up experience. Validation of the written-up inputs optimized their internal validity and reliability (Gibbert et al., 2008; Patton, 1990), thereby substantiating the conclusions drawn (Gibbert et al., 2008). In particular, Table 1 shows that a total of four founders and two Chief Executive Officers (CEO) from

²Atlas of the Circular Economy, available at: <https://economiacircolare.com/atlante/>.

the six start-ups have been interviewed to obtain complete responses to all our questions. In fact, due to their top position in the companies, these individuals have ensured a significant level of knowledge of the motivations underlying the genesis of the companies, of the current managerial and organizational problems, and of the prospective strategic choices of their own company (McCarthy et al., 2023; Rok & Kulik, 2021).

The information emerged from the interviews have been summarised in reports, analyzed, and classified according to a defined procedure aimed to link the main quotations of the interviewees to the main themes investigated in this study such as their orientation to the environmental and social assessment and certifications and integration of social dimension in their circular business models.

3.2 | Methodological approach to link CE practices with SDGs

In order to properly match CE practices adopted by CSUs and SDGs, we adopted a heuristic research approach, which can be described as

a problem-solving technique where rules are used to select the most appropriate solutions (Myers & Maulsby, 1993). Our qualitative heuristic approach begins with a research question or problem that we sought to explore or address (Moustakas, 1990). This approach allowed us to discover qualitative relations, such as patterns or structures (Kleining & Witt, 2000) that in our specific case bring out the relationships between CE practices and SDGs. According to Neth and Gigerenzer (2015), heuristics are effective in providing accurate and robust inferences, particularly in situations of uncertainty where optimization is not feasible. Given the complexity and uncertainty of organizational sustainability efforts and the SDGs (Swart et al., 2004), we found heuristics to be a suitable approach to finding practical solutions for these intricate problems. Specifically, we adopted a qualitative research method consisting of two main steps: (i) data extraction from interviews with regards to the social initiatives and (ii) a matching exercise to link CE practices with the potential “social” SDGs.

Therefore, to understand the contribution of CSUs to the implementation of the social aspects and dimension of sustainable development in the current CE models, we focused on how their initiatives and activities promote the achievement of specific social SDGs.

TABLE 2 Main information about CSUs interviewed.

Circular start-up	Year of foundation	Location	Industry	Business model	No. of employees (2022)	Class of revenue (2021)	Mission
Packtin	2017	Emilia Romagna	Agriculture/ food	B2B	5	100–500 k	Reduction of the amount of industrial food waste by recovering them in multiple uses to maximize their value at cascade.
Prespaglia	2017	Apulia	Bio-construction	B2C	9	0–100 k	Design and innovate conventional building products and technologies with products manufactured with local by-products.
Ricehouse	2016	Lombardia	Bio-construction	B2B/ B2C	19	1–2 M	Design and innovate conventional building products by using by-products derived from the local rice supply chain.
Rifò	2017	Tuscany	Fashion/ textiles	B2C	11	2–5 M	Design and creation of ethical fashion that is versatile and unique, reversing completely the concept of fast fashion.
Squiseat	2019	Emilia Romagna	Agriculture/ food	B2C	4	0–100 k	Reduction of food waste through an app able to connect food shops, bakeries, restaurants, and consumers. The app lets consumers buy leftover food before it becomes waste.
Wolffia	2020	Campania	Solid waste	B2B	4	0–100 k	Reduction/reuse of solid waste by offering targeted services to their customers for the reuse of production residues and scrap.

Note: Revenue classes are defined according to the classes used in the Start-ups Register of MISE (Italian Minister of Economic Development). CSUs, circular start-ups.

TABLE 3 Classification of CSUs according to the circular production models.

Circular start-up	Circular production model	CE principles	Production process	Main quotations
Prespaglia	Design-based	Reduced use of resources (e.g., water, energy, raw materials).	The production process is highly centered on the use of bio-based materials and in particular on straw.	<i>"Straw is one of the oldest and most used building materials due to its recyclability and properties ... the principal characteristic of straw is its high thermal insulating and sound-absorbing properties, which are essential for creating soundproof and relaxing environments."</i>
Rifò	Design-based	Reduced use of resources (e.g., fibers, water, and raw materials). Reuse and regeneration of yarns and scraps to produce new clothes.	The production processes of new clothes are based on the use of regenerated yarns (cashmere, wool, and cotton for jeans), which are, in turn, easily and completely recyclable.	<i>"The circular design has a key role for our start-up since our garments are designed to be more durable in their whole life cycle, and at the end-of-life they can be easily disassembled to return as quickly as possible into a new production cycle."</i>
Packtin	Waste-based	Recovery/recycling of external food waste streams	The production process allows to recycle by-products coming from the regional agri-food industry so providing the opportunity to maximize their value.	<i>"Our production process lets to transform food waste into an opportunity, producing new products with increased value."</i> <i>"The process includes two subprocesses, namely stabilization and extraction, obtaining a specific product from each of them."</i>
Ricehouse	Waste-based	Recovery/recycling of rice processing waste streams	The production process lets the development of a line of building products derived from the reuse of by-products from the rice supply chain.	<i>"The idea of Ricehouse was born from seeing rice growers burning by-products of rice." "We can make rice waste a real resource that leads to the production of building materials to create new housing models in the frame of the circular economy, but also that at the end of their life they become new resources, many of which return to the field in the form of compost and fertilizer"</i>
Squiseat	Platform-based	Facilitating trading and recovery of unsold food.	The online platform enhances food leftovers, giving consumers the opportunity to select food that is still available at the end of the day before it becomes waste.	<i>"We sell the products at 50% less than the list price: Customers can choose them, and we take a commission on those sales. The sellers have no entry costs or recurring fixed costs, but simply a commission that remains lower than that of other platforms. In this way we provide advantages for all, from food shops to consumers, and society as a whole in preventing food waste."</i> <i>"Allowing customers to choose the products to buy, we reduce the risk that the food bought becomes domestic food waste, because maybe what is in the box is not liked or cannot be eaten by the buyer."</i>
Wolfia	Platform-based	Facilitating trading and reuse of by-products deriving from different	The online platform supports the total reallocation of scraps in the	<i>"Wolfia helps manufacturing companies, mostly in the field of</i>

TABLE 3 (Continued)

Circular start-up	Circular production model	CE principles	Production process	Main quotations
		manufacturing activities realized by diverse firms	form of raw or semi-finished items to be provided to different users, by simplifying the procurement of specific materials.	aerospace, that work with composite materials to solve the problem of disposal of production scraps in an alternative ways, reintroducing them onto the market at an advantageous cost, for companies, universities and research centres." "In our case, the composite materials we deal with are composed of fibres and materials with thermosetting resins. The combination of these two parts generates an artifact with high mechanical characteristics, but difficult to recycle, if not using large amounts of energy to separate them."

Putting things differently, through this quantitative approach we are able to better address the third research question ("How CSUs contribute to the integration of the social dimension in the CE model?").

During the data extraction from the interviews and the matching exercise, we implemented start and stop rules. For data extraction from case studies, the search rule was to identify one or more specific CE initiatives, and we stopped once these were identified. In the matching exercise, the search rule was to find a SDGs to which the CE activities could offer a solution or contribution (Schröder et al., 2019).

4 | RESULTS

This section presents the results derived from the analysis of the preliminary data collected from the interviews as well as CSUs' websites and other secondary sources. It starts by briefly describing the stories of the interviewed start-ups and proceeds with the description of their circular production models. Table 2 provides an overview of the CSUs in terms of foundation year, business model, geographical localization, industry, number of employees, and class of revenue. It is worth underlining that the CSUs interviewed operate in different industries characterized by relevant environmental impacts in the life cycle of products, such as textiles, construction, and food (European Commission, 2020).

4.1 | Overview of CE practices adopted by the selected start-ups

This section describes how the selected start-ups are applying the principles of the CE (*reduction, reuse, and recycling*) to understand better why they can be defined as CSUs. Specifically, the selected CSUs can be classified further according to the framework proposed by

Henry et al. (2020). These scholars identified five main start-ups categories based on the implemented CE models (design/reduction, reuse, and recycling) or aspects strictly connected to the CE practices (such as the use of digital technologies for/or the adoption of ecologically regenerative natural solutions), namely, (i) design-based, (ii) waste-based, (iii) platform-based, (iv) service-based, and (v) nature-based. Regarding our results, two start-ups belong to the design-based category, while two of them are waste-based start-ups, and two can be classified in the platform-based category (Table 3). In particular, design-based category focuses on start-ups (Rifò and Prespaglia) having developed their circular production models on the principles of *reduction* or *reuse* or both, mainly by means of circular design. These start-ups focus mostly on the design of products/components and materials. Their design aims to reduce and improve the environmental and energy impacts of the product/materials, eliminate waste and pollution, and use and reuse products/materials to the greatest possible extent. Waste-based CSUs seek to extract value from unexploited external waste streams (e.g., from food waste and solid waste) by means, most often, of innovative processes (Henry et al., 2020). Two of the selected start-ups belong to this category (Packtin and Ricehouse). Finally, platform-based CSUs (Squiseat and Wolffia) adopt circular business models that basically focus on the three following production and distribution solutions for delivering the surplus of resources: Business to Business (B2B), Business to Consumers (B2C), and Consumer to Consumer (C2C). The implementation of platforms supports the trading or sharing of products, waste, knowledge, infrastructure, or services (Henry et al., 2020).

4.2 | Environmental and social assessment orientation of the CSUs

In this section, this study focuses on the analysis on the methods adopted by the CSUs for the evaluation of their environmental and

social performances. All the interviewees pointed out that, in their managerial decisions, besides the economic aspects, they take into account the environmental and social impacts of their activities and actions.

During the interviews, the founders and CEOs were requested to clarify the main aspects useful to define their orientation in environmental and social performance assessment and certifications.

About the measurement of the environmental impacts, the orientation of the CSUs is at product, company, and supply chain level (Table 4). At product, LCA resulted the main method adopted by the CSUs. Specifically, the founders by Rifò, Ricehouse, and Prespaglia pointed out that their knowledge of the LCA method is good. These CSUs did not perform the LCA on their own but are supported by environmental consultants. They also confirmed that they started to assess the environmental performances of their products by means of an LCA, being convinced of the importance of quantifying the environmental impacts of their products by means of a scientific method.

However, they claim that the costs of an LCA study are too high. The activity of other start-ups (Wolfia, Packtin, Squiseat) does not currently require/justify a LCA, but in particular Wolfia and Packtin are planning to perform the latter in the short- to mid-term, in spite of the relatively high cost of doing so. Ricehouse applies the LCA as a method to assess the environmental performances of its materials and products also in the whole context of a building (compared to Prespaglia). The results of a specific project of a building have been also published in the international literature (Giordano et al., 2018). Ricehouse conceives buildings as natural ecosystems completely self-sufficient and in harmony with the other existing systems. Buildings are long lasting and sustainable in the whole life cycle according to the three pillars of sustainability: economic, environmental, and social and are circular since they are built with recycled materials as well as natural materials that are recyclable or reusable at the end-of-life.

All the selected CSUs show a high social commitment and awareness toward the improvement of well-being of their stakeholders.

TABLE 4 List of the CSUs investigated that measure their performances and adopted certifications.

	Start-up	Product/material certifications	Company certifications	Supply chain certifications
Design-based start-ups	Rifò	<ul style="list-style-type: none"> • Global recycled standard (GRS)¹; • Responsible wool Standard² • Recycled 100³ • OEKO TEX 100⁴; • Better Cotton⁵ • Life cycle assessment of their products; 	Certified benefit corporation;	Adoption of the international labor organization principles
	Prespaglia	CE marking, ⁶ ICEA-ANAB certification for green materials, ⁷ started the process to obtain an EPD ⁸ for their products.	Still under evaluation	
Platform-based start-ups	Squiseat	Certifications are not applicable/required currently	Benefit company	
	Wolfia	Life cycle assessment is under evaluation	Still under evaluation	
Waste-based start-ups	Ricehouse	CE marking, solar impulse efficiency solution label, ⁹ CO ₂ coalition ¹⁰	Certified benefit corporation	Rice charter ¹¹
	Packtin	Life cycle assessment is planned in the future	Still under evaluation	

¹Global Recycled Standard (GRS), available online: <https://textileexchange.org/knowledge-center/documents/global-recycled-standard-grs/> Rifò has certified under GRS the following yarns and fabrics having a variable recycled and recyclable content: Cashmere, Wool Cloth, Denim Sweatshirt, Cotton, Light Cashmere, Wool, Silk.

²Responsible Wool Standard, the standard promotes a better welfare of sheeps and the improvement of the land where they graze on, available online: <https://textileexchange.org/responsible-wool-standard/>

³Recycled Claim Standard 100 encourages the use of recycled materials, available online: https://textileexchange.org/recycled-claim-global-recycled-standard/?psafe_param=1&gclid=CjwKCAjwsKqoBhBPEiwALrrqjPYOUZETAM3Q73KM99w8VI_n6aM8mdw1fsqzp0BtHSBDceNwnrMyaBoCxfUQAvD_BwE

⁴OEKO TEX 100 label is awarded to textiles tested for harmful substances to ensure customer trust and high safety of the product, available online: <https://www.oeko-tex.com/en/our-standards/oeko-tex-standard-100>

⁵Better Cotton Initiative certifies that the cotton used to make garments was grown adopting crop protection practices, available online: <https://bettercotton.org>.

⁶CE Marking, available online: https://europa.eu/youreurope/business/product-requirements/labels-markings/ce-marking/index_it.htm

⁷ANAB-ICEA Certification for green buildings, available online: <https://icea.bio/en/certifications/non-food/green-building/>

⁸EPD (Environmental Product Declaration) international system, available online: <https://www.environdec.com/home>

⁹The Label is awarded by the Solar Impulse Foundation, available online: <https://solarimpulse.com/companies/ricehouse-s-r-l>

¹⁰CO₂ coalition, available online: <https://co2alizione.eco/>

¹¹Riso Gallo Charter, available online: <https://www.risogallo.it/ilrisochesostiene/risicoltori/> This charter is an agreement created and shared by a well-known Italian Rice Company "Riso Gallo" with rice growers to give the entire supply chain a more responsible horizon, through sustainable and good everyday practices that contribute significantly to the valorization and protection of the rice paddy ecosystem of the local communities and of those who live and work in a specific area between Lombardy and Piedmont region.

However, at the moment only Rifò and Ricehouse adopt methods/tools for the assessment of social impacts as they are certified benefit corporations (hereinafter certified B-corp). None of the CSUs adopt a social life cycle assessment. This method would also introduce qualitative indicators to better define social impacts (positive and negative) that cannot only be captured in numbers.

4.3 | Environmental and social certifications adopted by the CSUs

Table 4 shows the certification schemes adopted by the CSUs to measure their environmental and social performances in product/material, company and supply chain. Overall, it is interesting to note that CSUs adopting certifications are mainly in the fashion and construction sectors, and that they use more than a product or material certification scheme.

As concerns Rifò, Prespaglia, and Ricehouse, they indicated they have adopted product or material environmental certifications with the purpose of communicating to their consumers their efforts to improve their environmental performances.

The selected start-ups also present their environmental and social projects and certifications on their websites, in the sustainability area or in a dedicated space for certifications.

Rifò, in its website, includes information about their certification schemes such as the Global Recycled Standard that attests that Rifò uses yarns and fabrics having a recycled content and are recyclable. Further, Oeko-Tex standard certifies that products by Rifò are safe and sustainable and those made of wool also pay attention (adhering to the Responsible Wool Standard) to the sheep welfare and land grazing management while those about cotton are covered by the Better Cotton initiative that certifies sustainable cotton produced by minimizing the use of pesticides and taking care of cotton farmers welfare and development. Rifò also highlights that its supply chain is entirely located in the textile district of Prato, within a range of 30 km for the purpose of limiting fuel consumption as well as adhere with its external collaborators to the four principles of the International Labor Organization (including the avoidance of child labor).

Prespaglia adopts for its products the ICEA-ANAB certification scheme specific for green buildings and eco-sustainable building materials. This scheme requires the use of an LCA for the evaluation of the environmental performance of the product/materials. Ricehouse adopts for its products the Solar Impulse Efficiency Solution label that is awarded to products, services, and/or processes that guarantee credible economic and environmental performance and is part of the CO₂ coalition that is an Italian platform among companies committed for the climate neutrality and a model of stable collaboration. The CO₂ coalition is based on two pillars: commitment in the statute of the company of the achievement of the goal of climate neutrality and a training and sharing path of best practice, strategies, tools, best solutions, and available technologies.

About the certification of the social impacts, as mentioned previously, two CSUs are Certified B-Corp (Rifò, Ricehouse) and one is a

Benefit Company (Squiseat). The Benefit Companies are regulated by a specific Italian law of late 2015, according to which companies are obliged to meet the following requirements: have a dual purpose in their corporate statute (balance the interests of the shareholders with those of stakeholders), identify internally a human resource for the pursuit of the common benefit, and produce an annual report about the company's activity and the assessment of the social and environmental impacts along with the economic ones (Ventura, 2022). The report provides an overview of the impacts of the company according to the three pillars of sustainability. The reference model for reporting such impacts suggested by the Italian legislation is the B Impact Assessment (BIA),³ which assesses the impacts in five areas: governance, workers, community, environment, and customers (Ventura, 2022). The B-Corp Certification is awarded to benefit companies that meet the standards of social and environmental impact verified by the B Impact Assessment, commit to transparency requirements related to their business impacts and operations, and are legally accountable to all their stakeholders.⁴

Rifò and Ricehouse have been awarded by the B-Corp Certification since the year 2020 and year 2022, respectively. The choice of becoming a B-Corp for Ricehouse responded to the need for endowing the organization with a monitoring and governance system underpinned by specific planned impactful actions to achieve a positive impact in the local community. At this regard, Ricehouse, in the sustainability report 2023, stated that “*With rigor, completeness and transparency, we will communicate the objectives annually achieved and the challenges we still face, beyond the typical results economic and financial which, however fundamental, are increasingly prove inadequate to qualify the role and purpose of a company in the society.*” In the same line, the sustainability report by Rifò indicates that “*since two years now, we are part of a global community of Certified B-Corporations who meet the highest standards of verified performance, overall social and environmental performance accountability and transparency. We are committed to have a positive impact on environment and local communities as well as promoting cultural and social activities.*”⁵

The overall score achieved in the BIA is very high for the two CSUs and double the median score for conventional businesses that is 50.9. In the year 2022, Rifò totaled 99.9 while Ricehouse earned an overall score by 110.4.

Both CSUs measure their environmental and social performances by means of the BIA tool as well as through an additional set of Key Performance Indicators (KPI). Ricehouse adopted specific KPI for the rice industry summarized in Table 5, while the KPI of Rifò are tailored for the fashion industry and described in Table 6. The KPI are useful to monitor the performances in some of the areas of the BIA tool. The structure of the monitoring and evaluation tool, which includes the KPI presented in Tables 5 and 6, differs between the two CSUs,

³<https://www.bcorporation.net/en-us/programs-and-tools/b-impact-assessment/>

⁴<https://www.bcorporation.net/en-us/faqs/whats-difference-between-certified-b-corp-and-benefit-corporation>

⁵Rifò, Sustainability Report 2022, available online: https://cdn.shopify.com/s/files/1/0293/9627/1197/files/SUSTAINABILITY_REPORT_2022-giugno_2023-rifo-lab.com.pdf?v=1687958926

TABLE 5 Specific KPI introduced by Ricehouse to monitor its performances.

Subject area	Impact	Outcome year 2022	Forecast year 2023	Key performance indicators
Environment	Reduction of CO ₂ emissions due to the avoided burning of rice by-products	1138 t (sequestered)	1189 t (sequestered)	Avoided CO ₂ emissions
	Reduction of the consumption of energy (difference of energy consumption between a conventional house and that designed by Ricehouse)	485,267 kWh (saved)	970,533 kWh (saved)	kWh of saved energy compared to the energy consumption of a building designed by Ricehouse
	Savings of embodied carbon emissions per m ² of project	13,530 kg CO ₂ /eq per year (avoided)	16,236 kg CO ₂ /eq (avoided)	Ratio between stratigraphy Ricehouse vs stratigraphy conventional brick-cement
	Savings of embodied energy per m ² of project	106,887 MJ per year (avoided)	128,264 MJ per year (avoided)	Ratio between stratigraphy Ricehouse vs stratigraphy conventional brick-cement
Community	Additional income revenues provided to farmers for the provision of rice by-products	105,000 Euro	105,000 Euro	Revenues per farmer (in Euro)
Governance	Dissemination activities aimed to improve the knowledge of public opinion about sustainability, circular economy, and the use of natural materials and by-products and citations in journal articles	730 events/citations	745 events/citations	Number of organized events/number of citations

Note: Source of the data: annual sustainability report year 2023. KPI, Key Performance Indicators.

TABLE 6 Specific KPI introduced by Rifò to monitor its performances.

Subject area	Goals	Actions	Environmental and social impacts	Key performance indicators
Environment	Adoption of new production processes	Innovative processes mainly based on the use of recycled fibers	Reduction of the use of raw materials	Percentage of recycled fibers compared to the whole amount of fibers used in the production process
	Production of sustainable garments	Organization of the collection of old garments	Reduction of the impacts of the production of new garments	Percentage of cashmere/wool and jeans collected compared to the whole amount of cashmere/wool and denim yarns used in the production process
Community	Providing jobs for vulnerable people	The project "Nei nostri panni" provides paid internship and training to vulnerable people and immigrants with the aim of favor their employment in the local textile companies.	About 100 people will be involved in the project by the year 2026.	Number of jobs and integration opportunities generated for vulnerable people and immigrants
	Enhancing the participation of local artisans to the circular economy projects	Maintaining the production of recycled yarns and garments within 30 km from the Rifò facility	Generation of jobs in the local territory and participation of local artisans in the circular economy projects	Number of local artisans included in the circular economy projects of Rifò
Workers	Supporting gender equality	Favoring the adoption of women permanent work	Women are very well represented in the Rifò team	Percentage of women employed in the Rifò team

Note: Source of the data: annual sustainability report year 2022. KPI, Key Performance Indicators.

as do the areas of impact covered by the KPI. Rifò considers "Workers" in addition to "Environment" and "Community," whereas Ricehouse includes the category "Governance" along with "Environment," and "Community."

In the interviews to the two CSUs, the founder of Rifò underlined that he handles with a sustainability manager the B-Corp certification requirements and the pursuit of the goals having a social impact as well as the consistency of the planned actions as required by the Law 208/2015, while in the case of Ricehouse, the B-Corp certification is a task of one of the two co-founders that is chief operating officer of the CSU. Finally, the advantages of becoming a certified B-Corp are for both founders the appurtenance to a community that shares the values of quality in production processes, sustainability, and responsibility. On the other side, the annual costs associated to the maintenance of the certification depend on the size of the company.

4.4 | The contribution of CSUs in promoting the integration of social dimension in the CE model

This section explores how CSUs are contributing to the integration of some of the themes belonging to the social dimension (such as employees' engagement, social inclusion, environmental, and social awareness of consumers) in their activities.

The interviews provided with the opportunity of understanding how the CSUs handle the social impacts and relations with the internal and external stakeholders and in particular the involvement of their workers/employees as well as of the local community in terms of organization of social projects improving the well-being and social inclusion at the local level. Moreover, from almost all the websites of the six CSUs and sustainability reports (in the case of the two certified B-Corp), a relevant attention to the social relations with the consumers/customers emerges, including their education to the values of responsible consumption and to how they can contribute, as consumers, to tackle the current environmental and social challenges. This is the case of Squiseat which business model entails a closer relationship with consumers, thus being able to promote changes in consumption behaviors and habits. This kind of CSU aims to reduce inequalities arising from different economic status by offering their products at lower prices. The same also applies to Rifò, which defines fair prices for all products and repurposes unsold products with the new collections year by year since their products are designed to last longer and emotionally attached. The impacts of the business model of Rifò can be measured in environmentally and socially quantitative and qualitative terms as the reduction of consumption of clothes generate lower use of resources and emissions (quantitative dimension) and long-lasting clothes create the affection of the consumers (qualitative dimension).

All the CSUs appear to pay great attention to developing a very participative and collaborative organizational culture and climate. The founder of Rifò indicated that they "try to involve continuously the employees in the business activities through weekly and monthly meetings to guarantee the diffusion of the organizational culture based on sustainability values," while the Ricehouse founder highlighted that

they share with their employees the social role of a building and the added value for their team: "*The home is a space in which society is formed and organized, a society is made up of relationships. We are honoured by the added value that all team members can give to the Rice-House.*" "*Working in a team means for each member the provision of time, energy and skills towards individuals, but also the shared goal of the entire organization.*"

With the regards to the working conditions, the founders of Squiseat plan to integrate the take-away offering with an ethical and sustainable delivery system. As stated by the founder, "*Soon we will be able to guarantee this service to our Bolognese customers with ethical delivery to avoid employee exploitation and the promotion of hire regular delivery staff.*"

Regarding the gender balance, women are fairly well represented among employees of the CSUs. Additionally, one of the two founders of Ricehouse is a woman, as are two of the three founders of Wolffia.

Most of the investigated start-ups show a strong relationship with the local community and the territory where they are located. In particular, all the founders claimed that they want to maintain their local identity and contribute to its sustainable development. Currently, this aspect appears to be less relevant for Wolffia compared to the other start-ups, as it was founded only 2 years ago, although the founders claimed that, in the future, they would like to launch projects for the local community, aiming to raise people's awareness of environmental issues.

With regard to this aspect, the CSU Packtin stated that "*our plant is implemented very close to the agri-food industries, generating in this way a virtuous relationship with the local community, not only in economic terms but especially in social ones.*" Similarly, the founder of Pre-spaglia claimed that "*I would like to contribute to the dissemination of information about sustainable initiatives, for example the Eco-bonus, in incentivizing the use of building materials of high quality that comply with the principles of CE.*" The CEO of Ricehouse claimed that "*the rice by-products become the protagonists of a project that harmonizes and positively impact our territorial system. Indeed, the use of local agricultural by-products represents a benefit for our communities both in terms socio-economic and sustainable development. In other words, it creates a new process of rural development in the most fragile territories and economies.*" Additionally, Ricehouse supports the local community by involving mainly local firms in the production processes with the aim of developing human and social relationships. As stated by the CEO of Ricehouse, "*in this way, we are supporting the creation and survival of new economies in vulnerable areas and the development of awareness of social and environmental issues contributing to tackling the concentration of pollutants, climate change and nature degradation.*"

The CEO of Rifò also referred to their goals of maintaining a positive impact in the territory by providing job opportunities to local artisans, sharing with them relationships based on human values. Moreover, as stated by the CEO, "*Rifò collaborates with, promotes and funds several solidarity projects; for us, this represents a way to give something back to the local community where our start-up was born.*" Currently, three projects are in progress.⁶ The most recent started last

⁶Social Projects of Rifò are available online at: <https://rifo-lab.com/en/pages/responsabilit%C3%A0-sociale/>

TABLE 7 SDGs and social activities of the CSUs investigated that have certifications.

CSU	Circular business model	Links to SDG	Initiatives/activities
Packtin	Waste-based	1. SDG8 (decent work) 2. SDG12 (responsible production and consumption)	1. Job creation and job opportunities at local level; inclusiveness and positive climate in the organizational context 2. Recycling of by-products coming from the regional agri-food industry
Prespaglia	Design-based	1. SDG3 (good health and well-being) 2. SDG8 (decent work) 3. SDG12 (responsible production and consumption)	1. Design and production of innovative building products without chemical components 2. Job creation and inclusiveness in organizational context. 3. Design and production of innovative building products with straw,
Ricehouse	Waste-based	1. SDG3 (good health and well-being) 2. SDG5 (gender equality) 3. SDG8 (decent work) 4. SDG12 (responsible production and consumption)	1. Design and production of building products 100% made of natural materials, formaldehyde free and VOC free, that capture CO ₂ in their whole life cycle. 2. Focus on the gender balance and women's empowerment. The team mainly consists of women. 3. Job creation in vulnerable areas and inclusiveness in the organizational context 4. Design and production of building products that being natural and biodegradable are recyclable at the end-of-life.
Rifò	Design-based	1. SDG3 (good health and well-being) 2. SDG5 (gender equality) 3. SDG8 (decent work) 4. SDG10 (reduced inequalities) 5. SDG12 (responsible production and consumption)	1. No use of chemicals in the production systems, and the same for its suppliers (ethical protocol) 2. Focus on the gender balance and women's empowerment. The team mainly consists of women. 3. Job creation and job opportunities at local level; inclusiveness and positive climate in the organizational context 4. Several social projects oriented to reduce inequalities (e.g., migrants, children, and local communities) 5. Design and production of garments with recycled fibers, without chemicals, more durable in their whole life cycle, and easy to disassemble and recycle
Squiseat	Platform-based	1. SDG8 (decent work) 2. SDG10 (reduced inequalities) 3. SDG12 (responsible production and consumption)	1. Development of an ethical and sustainable delivery system 2. Reduction of inequalities due to different economic status by proposing food leftovers at lower prices (e.g., project with Caritas Bologna, a private Bank, and Bologna University) 3. Development of a transparent and fair system (online platform) aimed to reduce the food waste
Wolfia	Platform-based	1. SDG5 (gender equality) 2. SDG8 (decent work) 3. SDG12 (responsible production and consumption)	1. Focus on the gender balance and women empowerment 2. Inclusiveness and positive climate in the organizational context 3. Development of an online platform to support the reallocation of scrap in the form of raw or semi-finished items

Note: SDGs, sustainable development goals.

in March 2022 and is in collaboration with the municipality of Prato, the Santa Rita Foundation, and other local partners in Prato (near Florence). The project promotes the inclusion of migrants arriving in Prato

and living in tough situations. Migrants undergo work training to become "cencialoli," which is a specific clothing recovery worker in the Prato area, first established over 100 years ago. This work is

practised day-by-day less, and there is a risk that it will not be handed by future generations. In doing so, the project also aims to preserve this long and now very relevant local tradition over time.⁷

Focusing on Squiseat, as claimed by the founders of this start-up, “*In addition to spreading greater awareness of the use of unsold food products, what interests us is to encourage the development of human relationships based on mutual aid.*” Moreover, since May 2022 they have been participating in a social project with the Caritas organization of Bologna and a local bank, named “*Exquisite, sustainable and for everyone,*” in which the use of the Squiseat App and its food services becomes a tool for favoring social inclusion of university students.

4.5 | Measuring the impacts on sustainable development goals

As shown above, all the CSUs, although following different approaches, create positive social impacts (mainly qualitative) in their circular business models contributing to the achievement of SDG. For example, they are trying to stimulate responsible production and consumption behaviors (SDG12), as well as creating a participative and positive organizational climate in which to work (SDG8) and ensuring a gender balance (SDG5). For instance, the waste-based CSUs are trying to contribute to the achievement of SDG12 by supporting the re-use of by-products and production waste in new industrial cycles for the realization of new outputs. In this way, these CSUs promote the reduction of the waste generated and avoid surpassing planetary limits with regard to the use of natural resources. Meanwhile, the design-based CSUs, for example, pay great attention to improving the production processes to reduce resource consumption, and facilitating the transition toward a sustainable, circular, toxic-free, energy-efficient, and climate-resilient environment. In fact, it is important to underline that Rifò, Prespaglia, and Ricehouse aim to reduce the production, use and emissions of hazardous chemicals, as well as reducing the exposure of humans and the environment to those chemicals, improving the quality of life in terms of increasing people's standard of living (SDG3). Finally, platform-based CSUs contribute to the accomplishment of SDG12 mainly by feeding up a cultural change. For instance, Wolffia may strongly affect organizational approaches and models, showing them different ways to work and manage waste.

As a corollary to this section, Table 7 provides a summary of a matching exercise useful to determine the relationship between CE initiatives of selected CSUs and SDGs show, and shows that CE practices, potentially, can contribute directly to achieving a significant number of social SDGs. Hence, through this qualitative analysis, we have identified the contributions of CE practices adopted by CSUs to these specific social SDGs. The United Nations (UN) emphasizes that firms have the responsibility of contributing to the achievement of the SDGs. This contribution can be made through various cleaner production and social impact practices, such as promoting fair working

conditions or reducing social inequalities in the local community (Mies & Gold, 2021).

5 | CONCLUDING REMARKS

This explorative study was aimed to evaluate how the six selected CSUs are oriented toward the measurement of their environmental and social impacts, how they certify their commitment in improving such impacts, and finally, what is their contribution in integrating the social dimension of sustainability in the CE model. For this purpose, a multiple case-study analysis of a sample of six CSUs has been conducted to gather the required information.

The selected CSUs of this study are all born as circular and are experimenting circular business models aimed to reduce the negative impacts to the environment and society rather than increasing them (Das et al., 2022). In general, results highlight that Italian CSUs show a still scarce orientation toward the measurement of environmental and social impacts. In fact, the results point out that the LCA method is applied by three CSUs out of six. The other three CSUs are planning in the future to perform an LCA. From the interviews emerged that the main barrier to the application of the latter is the high costs of conducting an LCA study. The results are consistent with the existing literature (Das et al., 2022; Roos Lindgreen et al., 2022), where the LCA resulted the most applied method for the environmental assessment at the product level.

Focusing on social aspects, three of the CSUs are Certified B-Corp and Benefit corporation. In line with this, it is worth underlining that these latter CSUs devote a great attention to the environmental and social impacts and relations with the employees, the supply chain, the local community, and their customers. However, it is important to mention that also the other CSUs without certification declare a focus on building social relations with the employees and in particular with the local community, showing high awareness about the importance of generating positive social impacts from their activities.

The results that emerged from the investigated sample show that CSUs highlight the potential of supporting the transition of local systems toward a fair CE model and facilitating the integration of some themes concerning the social dimension in the CE model. Accordingly, CSUs can also represent a valid support for larger incumbents or SMEs, toward further development of circular business model innovations (Ostermann et al., 2021), that are environmentally and socially sustainable (Fonseca et al., 2021). Based on this, it is possible to claim that CSUs both by driving and triggering innovation through their economic and social activities are representing important examples to imitate for all actors in the industrial ecosystem. This is in line with other related contributes (Henry et al., 2020; Ostermann et al., 2021; Suchek et al., 2022; Todeschini et al., 2017). Moreover, the CSUs having as type of business model the Business to Consumer are involved in direct and closer relationships with consumers and can strongly affect consumption behaviors and habits, making them also more aware and responsible of their environmental and social life cycle

⁷See for more detail about this project: <https://rifo-lab.com/en/pages/nei-nostri-panni>



impacts. In a nutshell, these two kinds of business models (B2B and B2C) are able to affect two critical actors in socio-economic ecosystems, namely consumers and organizations.

5.1 | Implications

The results of the present research are characterized by numerous theoretical, managerial, and political implications. Regarding the theoretical implications, the study seeks to identify new models of sustainable entrepreneurship that are able to pay greater attention simultaneously to environmental and social aspects. Specifically, this study expands the existing literature on circular entrepreneurship by providing further evidence of how CSUs have based their success and competitiveness on the pursuit of social, environmental, and economic values. Focusing on this, the paper tries to respond to the calls of some authors (e.g., Calzolari et al., 202; Clausen & Gyimóthy, 2016; Igno & Blok, 2019; Schröder et al., 2020; Evans, 2023) about the need to identify processes, mechanisms, and practices that are able to support a CE transition in line with all the three pillars of sustainability. In fact, our results show that it is possible to pursue simultaneously environmental, social, and economic values, thereby enabling the practical implementation of more responsible and socially CE initiatives. In particular, we argue that CSUs may actually have a greater impact, as they are continuously disrupting established assumptions, norms, approaches, and practices, by creating new ones at organizational and societal levels, also by involving consumers and employees alike to play their parts in resolving the environmental and social issues. Therefore, our study contributes to four different literature streams: (i) the circular entrepreneurship literature (Zucchella & Urban, 2019) from the perspective of born CSUs; (ii) the emerging literature on the responsible and just CE transformation (Schröder et al., 2020); (iii) the emerging literature that aims to link CE and the social dimension by focusing on the social values of CSUs, and (iv) the literature dealing the place-based sustainability that stresses the potential role of place-based enterprises in facilitating the pursuit of environmental and social sustainable development for the local communities (Shrivastava and Kennelly, 2013).

With regard to the managerial implications, our study offers several implications. First, our results may help (born) CSUs to identify further opportunities to take forward a more environmentally and socially CE transition. Second, our study may provide guidelines and insights to inspire established SMEs to adopt, reframe, and/or refocus their businesses more in line with CE models and able to pursue simultaneously economic, social, and environmental goals. In doing so, several benefits can arise for the whole of society. Third, the paper contributes to identifying some leverage points on which organizations have to focus to improve their social commitment, such as working conditions, responsible production, the improvement of healthiness, and the wellness of

local communities. Fourth, our results provide some insights about what kind of approaches and indicators can be adopted to measure social and environmental impacts. More generally, the lessons learned from the CSUs case studies highlight that the proposition of a business idea based on the balance between economic, social, and environmental goals can lead start-ups and SMEs to reach better organizational interaction, performance, and resilience capacity to react and adapt the business to the external phenomena of change and instability.

Policymakers could improve their understanding of the models of circular born start-ups to better focus their interventions to promote more sustainable business initiatives. Environmental and social certification could be an important tool for selecting such initiatives, by providing transparent and reliable information on their environmental and social performance. Furthermore, the support of appropriate start-up initiatives can provide a key contribution to the development of CSUs and, at the same time, to the innovation and strengthening of the three pillars of sustainability. Specifically, they could define tailored policy measures to effectively support, on the one hand, the transition of established SMEs toward circular entrepreneurship models and, on the other hand, the birth of circular innovative start-ups able to promote technological innovation aligned with environmental and social renewal. Additionally, policymakers can play a critical role in increasing the social commitment of CSUs, as well as SMEs and innovative start-ups in general, by defining measures and policies able to incentivize firms to undertake social projects for the communities or improve their internal working conditions. Finally, our results highlight that still there is a scant diffusion of approaches and techniques able to properly measure environmental and social impacts; according to this, policymakers should develop interventions aimed at supporting such adoption.

5.2 | Main limitations and future research

This study does have some limitations due to the multiple case-study approach adopted. First, because of the small group of CSUs investigated, we covered only a restricted number of industrial sectors (food, construction, solid waste, and fashion). Second, the use of a narrow number of case studies limits the generalizability of our findings. This study is mainly explorative, with plans to expand the investigated research topics to a larger sample of CSUs in the future. Third, different geographical locations could have an impact on results, bringing out diverse behaviors and characteristics of CSUs. Fourth, for a greater generalizability of the results, industry-related aspects may also have an influence and require a greater industry representation of case studies to be analyzed. These limitations can be overcome by extending the empirical analysis to a broader number of case studies distributed in different countries, as well as in other industrial sectors beyond those investigated in the

present study. In order to investigate a wider number of CSUs, we should adopt a survey approach through the administration of an online questionnaire.

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APPENDIX A: Questions for the Interviews:

1. Please kindly let us know the year of foundation of your start-up, the number of the founders as well as their level of education;
2. What is your mission?
3. What is the number of employees and their level of education/ specialization?
4. Please kindly describe the production process and products of your start-up or the services that you provide;
5. What are your future projects related to the activity of the start-up;
6. How do you pursue the three pillars (economic, environmental, and social) of sustainable development? Is there a hierarchy among the three pillars?
7. Is it difficult to comply with all three pillars? What are the obstacles and what are the drivers?
8. What tools do you use to communicate your commitment to sustainability? Do you use a Sustainability Report?
9. How do you measure your company's environmental impacts? Do you adopt environmental certification labels?
10. Do you pay attention to the entire product life cycle? Did you perform a Life Cycle Assessment?
11. Are you involved in social impact projects of the local community?
12. What are the motivations that led you to adopt the certified benefit corporation or the benefit corporation models? (if applicable)
13. What indicators/tools have you identified for assessing and monitoring your environmental and social impacts over time (e.g., community, environment, and workers)?
14. What are the requirements that your startup must meet to obtain Benefit Corporation certification?
15. What are the main obstacles you had to overcome to obtain Benefit Corp certification?
16. What are the benefits of being a certified benefit corporation?
17. How is the certification managed (e.g., use of specialized human resources, protocols, and tools to meet the necessary requirements for being a certified benefit corp)?