Received: 15 November 2021 | Revised: 17 September 2022 | Accepted: 28 September 2022

DOI: 10.1002/bse.3274

RESEARCH ARTICLE

Business Strategy and the Environment WILEY

# Value optimisation for the agri-food sector: A circular economy approach

Stefano Poponi[1] | Gabriella Arcese[2] | Alessandro Ruggieri[1] | Francesco Pacchera[1]

[1]Department of Economics, Engineering, Society and Business (DEIM), Tuscia University, Viterbo, I-01100, Italy

[2]Faculty of Economics, Niccolò Cusano University, Rome, I-00166, Italy

**Correspondence**
Francesco Pacchera, Department of Economics, Engineering, Society and Business (DEIM), Tuscia University, I-01100 Viterbo, Italy.
Email: francesco.pacchera@unitus.it

## Abstract

Adopting circular economy principles in the agri-food sector is necessary for the conversion of the current economic system. However, there are still many gaps in understanding how the development of circular dynamics within companies can take shape. This study investigates how circular economy principles and factors contribute to value optimisation and proposes a critical discussion and reflection on the economic, social and environmental issues within the agri-food sector supply chain. Multiple-case analysis was conducted to analyse 10 companies. Circular economy principles and factors considered were taken from the BS 8001 standard. Results show two scenarios and three dimensions in which value optimisation takes place. In addition, collaboration is the key to starting a path of optimisation. Finally, the study proposes the evaluation of a new indicator that allows one to act in all different scenarios proposed.

**KEYWORDS**

agri-food, BS 8001, circular economy, optimisation, supply chain, sustainability

## 1 | INTRODUCTION

The BS 8001 standard represents an important first tool for companies that switch towards a circular economy (CE) (Pauliuk, 2018). It focuses on organisations' attitudes to rethink resource management and improve social, environmental and financial aspects (Mosconi et al., 2019). Although it represents a guide to assessing the level of circularity of companies, the standard can be considered a driver for the transition and to help capture value (BSI, 2017). The centrality of value and its optimisation is inherent in the application assumptions of the CE model, initially outlined by the Ellen MacArthur Foundation (EM Foundation, 2015). Moreover, it is reproduced in the intentions of the European Commission in guiding economic development to reach social welfare and environmental sustainability (European Commission, 2019). Value optimisation included within the principles proposed by the BS 8001 standard emphasises that 'organisations keep all products, components and materials at their highest value and utility at all times' (BSI, 2017). Applied at company level, this principle allows the implementation of a management system aimed at identifying scrap, waste and resources to maximise their value (e.g. materials and/or energy sources) in a holistic approach leading to a closed or an open-loop system. Furthermore, it enables economic and environmental benefits through reduced costs and sustainable resource management. In the interpretation provided by Pesce et al.

**Abbreviations:** BSI, British Standard Institute; CE, circular economy; CLSC, closed-loop supply chain; CM, consumption model; ECESP, European Circular Economy Stakeholder Platform; GPP, Green Public Procurement; GrSCM, green supply chain management; IACE, Italian Atlas of the Circular Economy; ICESP, Italian Circular Economy Stakeholder Platform; I-PPS, integrated PSS; LCA, life cycle assessment; MFA, material flow analysis; PSS, product–service system; SCC, supply chain collaboration; SCM, supply chain management; SDGs, Sustainable Development Goals; SRM, second raw materials; SSC, short supply chain; S3, Smart Specialization Strategy; VO, value optimisation; WSCM, waste supply chain management.

(2020), the application of value optimisation supports companies in understanding the real value generated by the CE, considering the business model adopted.

Most applicable business models for implementing CE principles can be contained in the ReSOLVE framework (Lewandowski, 2016), explained by the Ellen MacArthur Foundation (EM Foundation, 2015). It considers several aspects, including *Regenerate*, *Share*, *Optimise*, *Loop*, *Virtualise* and *Exchange*, which can be related to the principles identified by BS 8001 (BSI, 2017). Furthermore, Lewandowski uses optimisation to classify circular business models as asset management, pull logic, waste reduction, lean thinking and product–service systems (PSS) (Lewandowski, 2016). Optimisation value is a strategy to increase product performance and efficiency by reducing or eliminating waste in processes and the supply chain. At the same time, the role assumed by innovation and innovative technologies is to be an enabling factor in driving change and producing value optimisation (Ellen MacArthur Foundation, 2016; Lopes de Sousa Jabbour et al., 2018).

All of this is oriented towards value optimisation for the organisation. However, in the agri-food sector, considering the complexity of the supply chain (Ingrao et al., 2019; Kazancoglu et al., 2021; Notarnicola et al., 2012, 2017), it is a challenge to understand how the CE generates value and how this value can be optimised. Thus, it is necessary to identify the nature of the sources that contribute to generating a CE, the dimensions and factors that compose it and the stakeholders' perception of it. Many scholars have dedicated themselves to researching these issues. Nevertheless, there are still many gaps in how development dynamics within small and medium enterprises (SMEs) in the agri-food sector can take form (e.g. Aznar-sánchez et al., 2020; Esposito et al., 2020). Therefore, the study aims to identify how the CE principles and factors reported in the BS 8001 standard contribute to value optimisation in the agri-food sector and how it affects the three areas of sustainability, economic, social and environmental, in a supply chain approach. The proposed study addresses these gaps by answering the following research question:

> **RQ1.** How do the principles and factors of the CE contribute to value optimisation in the agri-food sector, considering the areas of sustainability?

> **RQ2.** How is value optimisation reflected within the supply chain?

The paper is organised as follows. Section 2 presents the background of published literature wherein authors have based their assumptions. Section 3 explains the materials and methods used for the analysis. Data and results are presented and discussed in Section 4, and some last remarks conclude the paper.

## 2 | LITERATURE BACKGROUND

In literature, value optimisation can assume different shapes related to the capacity of the company to intervene within their supply chain, adding value to the product in a circular approach. In this regard, following the literature, it is possible to construct a boundary focusing on value optimisation and its application in the agri-food sector.

### 2.1 | Optimising value creation in the CE

A vital aspect of the CE is understanding how value is created and identifying the enablers that allow value creation (Lahti et al., 2018). CE is driven by innovations that enable value creation (Ranta et al., 2019). These innovations are the basis of increased environmental, economic and social company performance (De et al., 2020; Klewitz & Hansen, 2014; Kuzma et al., 2020). In fact, there is a strong interconnection between sustainability and innovation (Adams et al., 2016; Lazaretti et al., 2019). Several authors trace the innovations that impact value creation in a CE approach to four main areas: process, product, service and business model (Crossan & Marina, 2010; Ranta et al., 2019). These are a prerequisite for reaching forms of eco-innovation (Prieto-Sandoval et al., 2018) or strategies that favour the switch from a linear to CE (Bocken et al., 2016). Considering the types of innovations reported (Ranta et al., 2019), their function can be traced back to the CE through the following ways discussed below.

#### 2.1.1 | Product innovation

Product innovations lead to value generation through actions aimed at extending its life cycle (Bakker et al., 2014). Such behaviours include product reuse or reconditioning (Cuenca-Moyano et al., 2017; Lieder & Rashid, 2016), reuse of some components (Linton & Jayaraman, 2005) or the use of eco-design, involving reducing the impacts of the product along its life cycle (ISO, 2002) and optimising production, lifetime and recovery (Brezet & Van Hemel, 1997) through the use of several methodologies (Le Pochat et al., 2007; Luttropp & Lagerstedt, 2006).

#### 2.1.2 | Process innovation

Process innovations create value by optimising work steps, manifested in waste reduction and waste valorisation through closed-loop (Devika et al., 2014; Kumar & Malegeant, 2006) or open-loop logic (Deschamps et al., 2018; Ghisellini et al., 2016; Kalverkamp & Young, 2019) and in optimising energy use (Algieri et al., 2020; Bundgaard et al., 2017; Van Fan et al., 2020) and resources in general (Nižetić et al., 2019).

#### 2.1.3 | Service innovation

Service innovations ensure value optimisation of products and materials through sharing (Fargnoli et al., 2018; Mont, 2002; Tukker, 2015) while also enhancing the value of a single product through servitisation (Bustinza et al., 2015; Doni et al., 2019; Gebauer et al., 2011) by dematerialising the products and gaining efficiency (Bartolomeo et al., 2003; Lindahl et al., 2014).

#### 2.1.4 | Business model innovation

Business model innovations generate value in a single product or service by optimising the resources used. This embodies, for example, in business models aimed at reuse and reconditioning (Kissling et al., 2013; Matsumoto, 2009; Moktadir et al., 2020), in PSS logic (Annarelli et al., 2016; Mont, 2002; Tukker, 2015) and more generally through innovative business models capable of integrating sustainability and circularity criteria within companies (Pieroni et al., 2019).

#### 2.1.5 | Tools

Value creation helps to design the framework of organisations by redefining the sustainable supply chain approach (Park et al., 2010) and adopting new models able to stimulate the application of CE principles, such as the environmental value proposition (Manninen et al., 2018), to highlight the economic impact generated as a result of their adoption (Ranta et al., 2018). Furthermore, value creation uses tools that can map it (Evans et al., 2017) to visibly show companies the value created through adopting specific practices that contribute to extending or closing the product life cycle (Nußholz, 2018).

A further aspect concerns value creation within the circular business model. Lahti et al. (2018) highlight an interplay between collaborative factors and technological outcomes in generating value within this model (Leder et al., 2020).

#### 2.1.6 | Dimension of the value

The dimension of value creation takes on multiple perspectives concerning its functional economic value (Jensen et al., 2019; Kristensen & Remmen, 2019; Weissbrod & Bocken, 2017), its symbolic character for the customer (Peronard & Ballantyne, 2019) or the need for managers to acquire new skills or capabilities (Hopkinson et al., 2018). Nevertheless, the context of value creation within enterprises and how it manifests within companies remains relatively explored (Hopkinson et al., 2020).

Considering the economic, environmental, social and technical aspects as essential elements of the multidimensionality of a CE, it is necessary to focus on the value areas it affects, the actors involved (Iacovidou et al., 2017) and its ability to optimise value creation (Devika et al., 2014; Millward-hopkins et al., 2018). Moreover, reflecting the closed-loop supply chain (CLSC), the added value generated by a CE has been classified by various authors into four categories. Firstly, economic value involves cost reduction and revenue increase. Secondly, environmental value is measured through sustainable resources and environmental impact. The third is customer value, relating to customer satisfaction, loyalty and empowerment. Lastly is information value, which includes real-time feedback and information that enables an efficient and effective process (Ketzenberg, 2009; Kumar & Malegeant, 2006; Schenkel et al., 2015).

### 2.2 | Condition for optimising value through CE

Companies heading towards value optimisation must consider two necessary conditions: redesign the value proposition and adopt a systemic approach. Redesigning the value proposition for companies allows them to better understand the opportunities and threats that a CE can bring and, thus, the added value, direct or indirect, that its implementation can result in (BSI, 2017). In addition, adopting a systemic approach implies the simultaneous implementation of different CE practices to generate value within companies (Mura et al., 2020). Significantly, the triple bottom line highlights the multiple impacts of companies on society concerning the three dimensions: economic, social and environmental (Elkington, 1998) and their ability to generate increased value (Elkington, 1999). The triple bottom line value dimensions are aimed at understanding how they complement each other in sustainable companies (Svensson et al., 2016), considering the adoption of sustainable practices in the supply chain (Agrawal et al., 2016; Devika et al., 2014; Flygansvær et al., 2018) or in a business model (Jensen et al., 2019; Joyce & Paquin, 2016; Rosa et al., 2019).

Value optimisation is achievable through a multi-criteria approach (Eskandarpour et al., 2015). However, it is by no means obvious and can be characterised by managing several trade-offs or contradictions (Jamali, 2006). Moreover, to ensure sustainability, companies must support all the dimensions in a holistic approach (Braccini & Margherita, 2018). Nevertheless, these contributions provide a starting point from which to define the properties of the dimensions (Jensen et al., 2019; Svensson et al., 2016) and quantify the benefits of adopting a CE (Rosa et al., 2019).

### 2.3 | The context in the agri-food sector

The sustainable transformation of the agri-food sector and the adoption of CE principles are crucial steps in undertaking a transformation consistent with the objectives set by the European Commission within the new action plan. According to Gravagnuolo et al. (2019), Caputo et al. (2020) and Paiho et al. (2020), the main point of making communities and cities more circular is because 'a shift to a sustainable food system can bring environmental, health and social benefits, offer economic gains, and ensure that the recovery from the crisis puts us onto a sustainable path' (European Commission, 2020).

Acting on the cycle that characterises agri-food production means focusing on critical points involving the whole supply chain, such as food waste and resource management (Kyriakopoulos et al., 2019), and on the exchange of resources between complementary activities, including agriculture and animal husbandry (Jouan et al., 2020), which can become an important element of competitiveness (Alfiero et al., 2019).

### 2.3.1 | Tools and methods

Many methodologies are used in the literature to evaluate CE in the agri-food sector (Poponi et al., 2022). The assessment of the CE principles can be linked to the use of targeted standards, such as Emas or ISO 14001, and to the sustainable benefits derived from them (Carrillo-Labella et al., 2020; Scarpellini et al., 2020). Management systems certifications are widely used thanks to their ability to assess resource efficiency (e.g. energy, water and waste). However, in some respects, they are not considered fully comprehensive when used individually (Salomone et al., 2013). Similarly, product standards do not have a comprehensive approach to CE principles, including value optimisation. The European Commission promotes the EMAS regulation as 'a means of moving towards a circular economy … and can be used to support this process by allowing organisations to measure resources efficiency, identify innovative actions and continuously improve' (European Commission, 2017). However, to date, the only standard for implementing the CE principles within organisations is the BS 8001 guideline, which is applicable across industries, including agri-food (BSI, 2017). It can also be adopted as a reference point for drafting the future ISO standard on CE (ISO TC/323) (Ruggieri et al., 2020). For this reason, it is taken as a reference point for our analysis.

### 2.3.2 | Agri-food supply chain

A key point of success for companies is to operate at the network level (Min & Zhou, 2002). This is achieved in the supply chain, where a set of interdependent companies act together in managing the flow of materials, products and information to ensure customer and member satisfaction (Lambert et al., 1998). There are various definitions of supply chains in the literature (Christopher, 2005; La Londe & Masters, 1994; Mentzer et al., 2001), but all refer to the importance of the network created between companies. Therefore, network coordination is a pivotal factor in assessing a supply chain's performance (Höhn, 2010). Furthermore, supply chain management (SCM) is a competitive factor for companies (Näslund & Williamson, 2010) that can generate profit, optimise value and increase efficiency and customer satisfaction (Stock & Boyer, 2009).

Environmental aspects have assumed an essential role in SCM (Azevedo et al., 2011; Bose & Pal, 2012). Sustainable SCM is already considered a vital requirement to compete in the market (Chen et al., 2006), which brings several benefits to companies (Chiou et al., 2011; Li & Wang, 2007). The integration of environmental aspects into SCM is referred to as GrSCM (Srivastava, 2007). GrSCM adopts internal and external practices to increase companies' environmental and economic performance (Rao, 2002). Internal practices are those adopted by a single actor in the supply chain, whereas external practices require the cooperation of several actors, from suppliers to consumers (Zhu et al., 2013). Collaboration between network members along the supply chain reduces the environmental impacts of products and processes and generates a competitive advantage (Seuring & Müller, 2008; Vachon & Klassen, 2006).

To optimise the supply chain, companies in the agri-food sector need to collaborate and share resources and knowledge (Bigliardi et al., 2011). Furthermore, it is crucial to share innovation to create better products and services and optimise resources (Bigliardi et al., 2015). In the agri-food sector, a company's ability to innovate is closely linked to its growth (Alfranca et al., 2003; Cuerva et al., 2014). The sector recognised as a low-tech industry (Arcese et al., 2015) is characterised by incremental innovations (Martinez, 2014), where green innovations are mostly linked to waste management, water management, sustainable products and cleaner processes (Cuerva et al., 2014). Therefore, it is clear that innovation, collaboration and the introduction of green practices within the supply chain are crucial elements on which to act to bring the agri-food sector closer to sustainable value creation and the application of CE principles.

## 3 | METHODOLOGY

### 3.1 | Research approach and data analysis

This study is based on a qualitative research approach with explanatory case studies. The use of explanatory case studies allows analysis of business strategies adopted by companies and avoids a simple descriptive approach (Ryan, 2002). In analysing a phenomenon like this, where theoretical knowledge is limited, inductive research is a valid method to overcome this criticality (Siggelkow, 2007). Furthermore, the case study method 'explores a real-life, contemporary bounded system (a case) or multiple bounded systems (cases) over time, through detailed, in depth data collection involving multiple sources of information … and reports a case description and case themes' (Creswell, 2013, p. 97). Thus, multiple-case analysis was used to achieve the research objective (Eisenhardt & Graebner, 2007). This method allows a holistic and systematic understanding of a complex problem and investigates the laws of occurrence, relationships and inferences that occur (Yin & Spinelli, 2005).

Multiple sources were used to conduct the analyses. The data analysis was carried out using two methods: a documentary analysis using secondary data (Fitzgerald, 2012) and a semi-structured interview to validate the data. The documentary analysis was mainly based on the official documents, documents released by a certification standard and data from chambers of commerce documents. Furthermore, this study focused on monitoring the services offered by companies and the effectiveness of communication measures, such as social media and newspapers, as well as the structure of the supply chain. Additionally, semi-structured interviews were conducted with the manager of companies considered for the study (Corbetta, 1999). Finally, data triangulation was used to increase the validity of the analyses by including different materials and methods for the case studies investigated (Eriksson & Kovalainen, 2015).

This study used circular agri-food companies as the unit of analysis. Eisenhardt (1989) suggests that each case study should be chosen by paying attention to 'predict similar results or predict conflicting results but for predictable reasons'. Therefore, the selected companies have a high degree of heterogeneity in terms of raw materials, waste, technologies, skills, suppliers and customers, but a complementarity within the agri-food sector. Furthermore, the selection of case studies with different characteristics makes it possible to strengthen the results obtained, as highlighted by Patton (1990) and Shakir (2002).

In literature, several authors use a qualitative approach to analyse a case study (e.g. Eisenhardt, 1989; Gerring, 2007; Stake, 1994). Sometimes, this approach can be seen as a problem, but Patton (1990, 2014) highlights that in a specific case observed, 'any common patterns that emerge from great variation are of particular interest and value in capturing the core experiences and central, shared aspects'. Equally, 'selecting information-rich cases to study … will illuminate the inquiry question being investigated' (Patton, 2014, p. 265). Also, Fletcher et al. (2018) highlight the great potential of the central and shared aspects in a common pattern that emerges from the analysis of different cases (e.g. Patton, 2014). Furthermore, this approach meets the needs of this study, which is to report the emerging patterns that cut across the observed cases, allowing analysis of different companies without direct interdependencies and highlighting similarities to explain value optimisation, starting from principles and factors of the CE.

### 3.2 | Data sources

Case studies were selected using the IACE database (Ecodom & CDCA, 2020), an operational tool to select companies that have been recognised as adopting a CE. The scientific committee of the Atlas certifies the circularity of companies following an evaluation process based on seven circular dimensions indicators: eco-design, supply of materials and resources, consumption of natural resources, waste management, scarp and emissions, transport and distribution, promotion of sustainable lifestyles and circular supply chain. Further three-dimensional indicators for environmental and social sustainability include shared value and territorial communities, social inclusivity, reporting/accountability/environmental certifications and other forms of environmental management.

The database query for the agri-food sector led to 52 companies for the whole Italian territory. The selection of companies was made considering the national priorities for the CE (e.g. Ministero dell'Ambiente e della Tutela del Territorio e del Mare, 2019). The most advanced region was selected regarding the adoption of circular practices (Regione Lazio, 2020) and the Smart Specialisation Strategy (S3) for the agri-food sector. Furthermore, the Lazio and Tuscany region was identified as reference territories where agri-food is one of the areas of specialisation on which they intend to focus their development strategy (S3) (Smart Specialisation Strategy (S3) – Lazio Region, 2016; Strategia di Ricerca e Innovazione per la Smart Specialisation in Toscana, 2019). Ten circular companies were obtained by 28 January 2020 (three for Lazio and seven for Tuscany), four companies related to agriculture and zootechnics and six referable to the food sector. This number is in line with that defined by Eisenhardt (1989), who, while reiterating that there are no particular rules concerning the number of cases, suggests limiting the number to between 4 and 10 (Eisenhardt, 1989). Following the approach defined by Yin (1989), case studies are epistemologically justifiable, particularly when emphasising contemporary events. A brief description of the companies analysed is provided below (Table 1).

Each company was analysed using the principles and factors defined by the standard BS 8001. Factors considered include usage/share, life extension/service support, reuse/redistribute/repurpose, refurbish/remanufacture/recondition and open or closed loop. The principles considered were innovation, stewardship, collaboration, systems thinking and transparency. The value optimisation principle was seen as the output of our analysis, the reference point for evaluating the application of the circular approach of the companies considered. BS 8001 highlights that 'organisations keep all products, components and materials at their highest value and utility at all times'. For this reason, the principle of value optimisation can also be considered as the result of applying the other principles and factors identified and used as a tool to guide continuous improvement concerning the implications generated at the economic, environmental and social levels.

The output of the first analysis is explained in the concept table (Appendix A), where the contribution of each principle and factor to value optimisation is shown from a CE perspective. Next, the data were coded using the documents and information collected. Each author processed the information iteratively for each principle and factor. Two authors decoded the information into a description of value optimisation, which each successively validated. The next step was to highlight similarities between cases to identify three dimensions prominent for value optimisation: short supply chain (SSC), waste supply chain management (WSCM) and integrated PSS (I-PPS).

### 3.3 | Validation process with interview

Semi-structured interviews were conducted with the company managers to validate the secondary data and collect primary data. The interviews were conducted by telephone and lasted between 15 and 30 min each. The collected data were processed iteratively by the authors. The interviews focused on the companies' experience with CE practices and their adoption of the BS 8001 principles. The questions on the principles were taken from BS 8001 and modified to fit the analysed context.

The conceptualisation of the research steps is shown in Figure 1.

## 4 | RESULTS AND DISCUSSION

The compared multiple analysis was conducted on 10 companies operating in the agri-food industry to study how adopting CE

**TABLE 1** Case study

| Case study | Description |
|---|---|
| CS-1 | Retailers of organic food and products. It promotes the short supply chain of organic products and a home delivery or shipping service. It promotes the reduction of packaging and the sharing self-catering facilities for customer |
| CS-2 | A non-profit organisation that deals with the recovery and reintroduction of food surpluses in the consumer supply chain. It promotes the distribution of recovered food through public awareness events |
| CS-3 | Retailers of organic food and products. It promotes the short supply chain (farm to fork) and sells bulk product to reduce the consumption of packaging |
| CS-4 | Producer of organic compost through the innovative vermicomposting technique. Engaged in research and development of sustainable solutions, they raise awareness on the issues of sustainable and organic agriculture |
| CS-5 | Producer of fresh mushrooms using coffee grounds. It promotes the exploitation of waste through training courses and awareness-raising events |
| CS-6 | Producer of modular systems for organic compost through the innovative vermicomposting technique |
| CS-7 | Producer of dispenser for beverage and food and concentrates and soluble for cold drinks, hot drinks, homogeneous foods and desserts and equipment. It promotes sustainable purchases and helps services on machinery as old, rented or given on loan |
| CS-8 | Horticultural producers using the aquaponics method. They manage water, soil and energy resources efficiently through an innovative approach |
| CS-9 | A non-profit organisation that deals with the recovery and reintroduction of food surpluses in the consumer supply chain. It promotes the distribution of recovered food through public awareness events |
| CS-10 | A non-profit organisation that deals with the redevelopment of the territory and social inclusion. Produces food, goods and tools from agriculture |

*Source*: Author's elaboration.

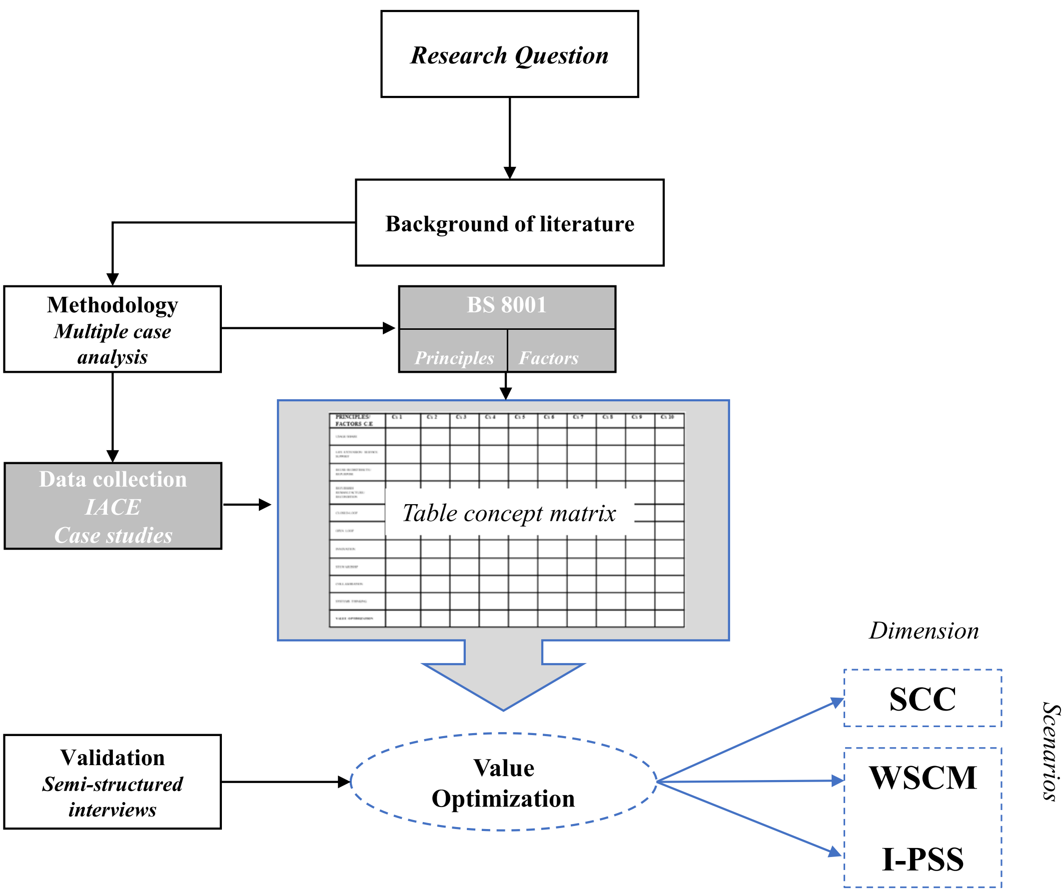


**FIGURE 1** Overview of research. *Source*: Author's elaboration

principles and factors contribute to value optimisation. The analysis of results summarised in the concept table (Table A1) shows the attitude of the companies in adopting CE principles to implement sustainable practices related to waste management, seen under various aspects, from the reduction of packaging in use to waste optimisation, in particular on its environmental and social value. Organisations engage in various activities to promote a culture related to sustainability at all levels of the society around them (citizens, students and supply chain actors) and include people with various problems (social, economic and health).

This first consideration reflects the literature on the Italian SME (Mura et al., 2020), where companies show interest in the economic and environmental benefits and obtaining social value achieved through new practices. It is possible to detect the contribution to value optimisation within two scenarios characterised by an alternative consumption model for the customer and the companies.

## 4.1 | First scenario

The first scenario discussed is a consumption model (CM) focusing on the customer. Consequently, practices are oriented to promote new behaviours and awareness, educating the final consumer on a quality and sustainability-oriented approach. In turn, the consumer must be involved in adopting new consumption practices. For example, companies are pushing for a reduction in the amount of packaging used, introducing new sales and purchasing solutions, making them more sustainable in terms of the environmental impact generated and more competitive by reducing costs throughout the supply chain. This leads to a shortening of the supply chain, influenced not only by the company's environmental policies but by more active collaboration between supplier and customer and aimed at offering a product with more distinctive characteristics than competitors (Murfield & Tate, 2017). This leads to a new management strategy that passes through the association between product quality, in the case of organic products, and local community involvement. Furthermore, community involvement aims to create social and cultural value in addition to environmental value, involving waste prevention and reduction and economic value through cost reduction in the supply chain.

This approach is in line with what Murfield and Tate (2017) suggest, where environmental initiatives lead to elements of differentiation and reduce risk in the supply chain. The principle of collaboration is reflected throughout the value chain. Supply chain collaboration (SCC) can generate benefits in terms of performance, synergies and profitability, especially in SMEs (Cao & Zhang, 2011), contributing to the reduction of food waste (Aschemann-Witzel et al., 2017).

Although innovation is considered an enabling factor for adopting a CE model, as previously reported by Ranta et al. (2019), in the cases analysed, this takes on a purely symbolic value when referring to the product (low capacity to innovate the performance of a product). On the contrary, when aimed at service management, innovation is reflected in the need to adopt new business models supported by the principle of collaboration. In addition, innovation in the supply chain with new products and services is 'pulled' by the customer (Flint et al., 2005). Supply chain learning positively impacts integration, performance, relationships and innovation (Flint et al., 2008).

In this first scenario, value optimisation results from the interconnection of practices aimed at building frameworks. This is achieved through the consumer's willingness to change their behaviour, driven by the community to interact and influence the entire value chain so that the new business model gains acceptance and is strengthened as a means to generate new value (Figure 2).

## 4.2 | Second scenario

The second scenario refers to the production model, consisting of two dimensions. The first is an alternative business model, focusing on the second raw materials (SRM), and the second is the adoption of the PSS approach.

In the first dimension, companies activate a supply system for waste exchange and management. However, there are low levels of innovation, showing how available technologies and techniques can be used to activate a process of value optimisation both for the transport phase for the procurement of second raw materials and for the internal production phase, which contributes to shortening the supply chain. This is the situation proposed by Case 5, where innovative recovery systems are activated through cargo bikes or integrated services in companies that allow the reduction of internal waste processing (Cases 4 and 6). Also, through an internal waste recovery process and its valorisation as a secondary raw material, benefits are generated in terms of costs regarding disposal chain management and administrative simplification through overcoming the bureaucratic constraints related to waste treatment, in this case, non-hazardous special waste, with a gain from the sale of a valued waste (Freitas & Magrini, 2017; Pal, 2017).

Furthermore, systemic thinking is the principle that most characterises this dimension. The holistic approach to understanding the system's complexity is indispensable to activating value optimisation and switching to a circular model. Instrumental to this purpose is the principle of collaboration, where the involvement of the local community is fundamental to finding possible reuse of waste through high valorisation (Poponi et al., 2020). In addition, an open-loop system characterises the context in which companies operate with interconnection with other sectors for waste recovery and valorisation in other product categories.

In the second dimension, the optimisation value is pursued through the life cycle extension. The company's proposed solution (e.g. Case 7) is a product loan for use and supply. Companies are incentivised to ensure their technology but with a high degree of collaboration with the value chain actor. Companies integrate the closed loop into a reverse logistic system (Liu et al., 2014). Also, collaboration and relationships in the value chain ensure an exemplary implementation of the reverse supply chain (Östlin et al., 2009). Moreover, the manufacturer is in charge of product management, maintenance,

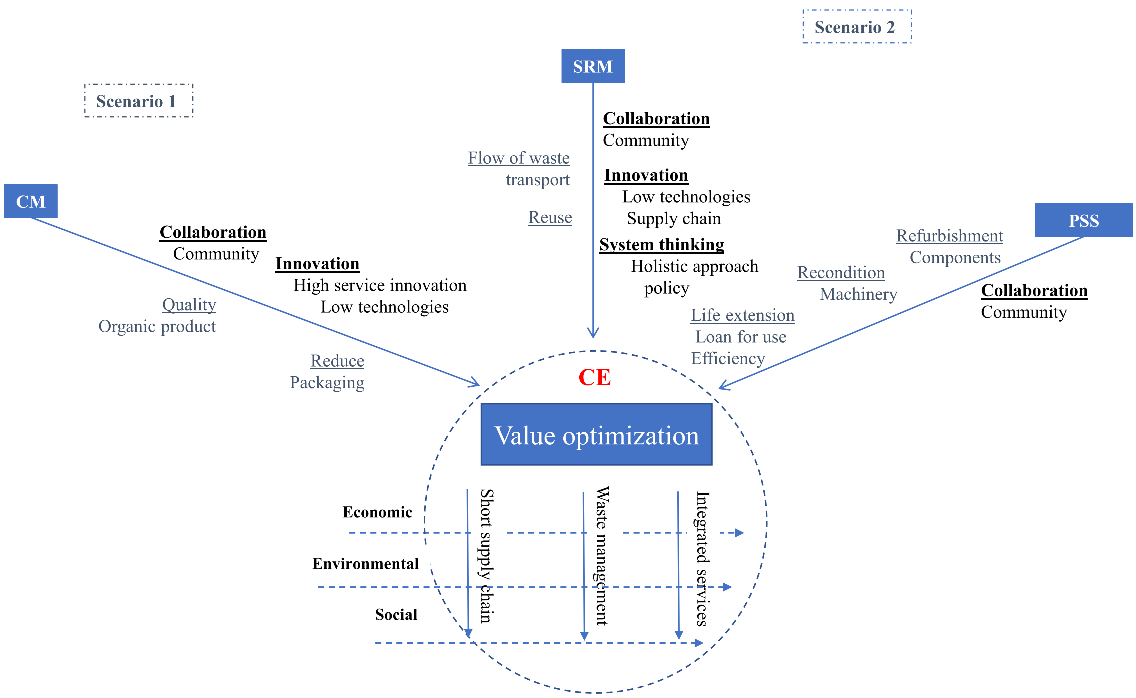


**FIGURE 2** Conceptual model of value optimisation in agri-food circular sector. *Source*: Authors elaboration

reconditioning and product recall (exhausted), according to the approach described by Jayaraman et al. (2003). The manufacturer also offers product customisation according to specific business needs. This contributes to value co-creation (Liu et al., 2014) in promoting and making users aware of product quality and sustainability. For example, in Case 7, influencers are used to promote the biological, nutritional characteristics and environmental of the product through plastic-free campaigns.

The principles underlying optimisation can be traced back to systems thinking, which, in this case, enables the implementation of sustainable development policies aimed at reducing packaging, transport costs and related environmental impact, supported by the collaboration principle that supports sustainable collaborative consumption.

## 4.3 | Triple bottom dimension

Adopting the principles and factors of the CE can further help in analysing how the value generated and optimised is reflected in the economic, social and environmental dimensions, as described below in the triple bottom line approach.

### 4.3.1 | Economic

At an economic level, value optimisation has generated benefits of reduced cost (purchasing and management), increased revenues due to the valorisation and redevelopment of assets and the creation of new revenues supported by the development of a local economy. Through waste management and implementing a waste management culture, companies have eliminated disposal costs and benefited from the processed product (natural soil improver). Innovation in practices (sustainable agriculture, aquaponics and unpackaged products), business models (PSS) and waste management of local waste and food surplus has reduced purchase costs of raw materials, machinery and packaging, ensuring more significant resource independence. Using an innovative model, such as PSS, should not only improve financial performance but also minimise the environmental impact of resource consumption by closing material cycles (Mont, 2002). Further, the redevelopment of land and building assets has led to the generation of new income, driven by a focus on the territory and social inclusion, which has allowed the creation of new jobs. The use of SSC has guaranteed the development of a local economy with the creation of economic well-being in the area.

### 4.3.2 | Environmental

At the environmental level, the optimisation of value has generated benefits in terms of waste prevention and reduction of packaging and food waste, land productivity, biodiversity, reduced consumption of soil, water and energy resources and sustainable production through the elimination of chemical products. Companies have limited and prevented waste generation by reducing the related negative external factors by applying alternative consumption methods, such as unpackaged products and food recovery. The management and exploitation of waste by creating a natural soil improver has generated more productive fertile soil and avoided the use of chemicals. Applying a new way of consuming, like food recovery, and innovative practices like those mentioned above have reduced resource consumption and raw materials. Reduced energy consumption has also been achieved by applying sustainable transport models (bikes) and reduced transport (local transport). By exploiting local resources and using urban mining logic, companies have ensured sustainable development of land, integrating economic growth and environmental well-being. Finally, the redevelopment of land and real estate assets has allowed the improvement of abandoned land through efficient soil resource management, which has also been enhanced through innovative production models, such as aquaponics, vertical agriculture and hydroponics.

#### 4.3.3 | Social

At the social level, value optimisation has generated benefits in creating and promoting a culture of sustainability, quality and innovation. Furthermore, it has contributed to job creation, social inclusion, training so good practices can be adopted, and the area's liveability. Creating a culture of sustainability and quality is linked to adopting an alternative consumption model, including unpackaged products, 0 km food and organic food, that trains consumers to consume more consciously. It also promotes good practices to the actors in the supply chain, such as innovation, sustainability and green purchasing. The generation of a more aware community is also guaranteed by the promotion of training courses in waste management, organic products and packaging reduction addressed to consumers and other actors in the supply chain (e.g. Case 5). This social value is closely linked to the attention companies in the area pay to the community with which they interact. This attention is also manifested through the redevelopment of land and real estate assets that ensures greater liveability of the areas in question. Additionally, the social value generated is manifested through practices like food recovery that guarantee the continued fight against hunger and business models that guarantee social inclusion and the generation of a new workforce.

### 4.4 | Dimension for value optimisation

From the analysis of the integration of the CE principles and actions under the triple bottom line perspective, three dimensions can be identified to answer the research questions, namely, SSC, WSCM and I-PPS. These dimensions highlight how value optimisation is reflected in the areas of sustainability within the supply chain.

On an economic level, the SSC has ensured the development of the local economy, with an increase in revenue for local companies. Cases 1 and 3 show a relationship between the supplying and selling enterprises (buyer–supplier relationship) where relationships promote the growth of both types of companies. Promoting local, organic and sustainable products ensures risk reduction, strategic purchasing, differentiation and competitiveness (Murfield & Tate, 2017). At the environmental level, the SSC allows a reduction in emissions related to the transport of goods and an increase in land quality due to the sustainable management of resources. On a social level, it has allowed the building of a community that promotes a culture of sustainability and quality, with respect for the land territory and responsible for production and consumption.

The collaboration principle and the sharing factor enable the integration of consumption tools (e.g. Cases 1 and 3, as box, bag or crockery) and resources linked to reducing food waste (e.g. Cases 9 and 2). It further encourages the generation of local purchasing groups that contribute to the construction and strengthening of the SSC. Additional elements not covered by the standard are related to the reduce principle (MacArthur, 2013), which in this case acts mainly on reducing the packaging and its generated impact. An additional factor not classified by BS 8001 but found in this analysis is *quality* in association with organic products or production. Quality is presented as an element that describes the distinctiveness of the production and is a central factor characterising the supply chain.

The WSCM focuses on the valorisation of waste. An integrated supply chain, supported by collaborative actions between supplier and buyer, becomes essential to value optimisation and express the potential of CE. However, it is the collaboration and the local system that wins the challenge to close the cycle of the products at the end of life, overcoming the complexities generated in SCM in a circular perspective (Östlin et al., 2009). The relationship is direct with no broker, and there is a perfect integration before the waste is disposed of through the traditional channels. This integration ensures a reduced transaction cost attributable to the broker (Kalverkamp, 2018), a relationship in which many benefits can be generated, for example, economies of scale with the suppliers, supply chain transparency and delivery time reduction (Herrmann & Hodgson, 2001).

A locally scalable model has been created, giving innovative startups a chance to emerge. This is reflected at an environmental level in the reduction of waste downstream in the value chain (urban mining and waste resources) and the use of virgin raw materials. On a social level, they have triggered accountability mechanisms of the chain actors and created a waste management culture within companies where waste has value.

Furthermore, the systemic thinking principle contributes to adopting or constructing sustainability policies within organisations through a holistic approach. This is supported by the principle of collaboration and the flow of waste. This has allowed the activation of a system of interchange or reuse of the second raw materials and the finished product supply through a complete logistic structure.

Finally, the use of services integrated into the PSS approach has made it possible to increase the catchment area of technology, enhancing it economically and reducing costs. This approach reduces negative externalities linked to the sale of products, such as factors relating to transport, energy consumption, raw materials and waste production at the end of life. This motivates organisations to 'optimise the value of a resource for a single customer' (Ranta et al., 2019). At the social level, the responsibility of the actors along the supply chain has been emphasised through the promotion of sustainable purchases and Green Public Procurement (GPP) of reconditioned products. From this logic, systems thinking and collaboration principles affect value optimisation. The integration of a reserve logistic SCC into PSS enables the manufacturer (Case 7) to generate value in the triple bottom line dimensions, according to Liu et al. (2014). Through an overview, we see the promotion of collaborative consumption of products and services, ensuring reconditioning and sharing factors to extend the product life cycle. Overall, the analysis shows how companies share the principle of collaboration in generating and optimising value. In particular, a collaborative network is vital to improving circularity in a company, where information flow and material standards ensure teamwork (Ripanti & Tjahjono, 2019).

## 5 | CONCLUSION

This study aimed to analyse how CE principles and factors contribute to value optimisation within the supply chain, highlighting how it is reflected in the economic, environmental and social issues. Starting with a literature review, a multiple-case analysis was conducted on 10 circular companies in the agri-food sector. The results show that, in the face of low investments and a low level of technology, it is possible to bring companies closer to the CE approach by focusing on specific priorities. Furthermore, the study highlighted three critical guidelines or dimensions within which optimisation of value takes place: SSC, WSCM and I-PPS. Principles and key factors become guiding elements to prevent companies from getting lost in pursuing out-of-context objectives or actions (Pauliuk, 2018).

Based on the analysed principles, collaboration is vital to start a path of optimisation. It is also linked to the strengthening of sharing factors, particularly building community, as a driver of a sustainable and inclusive system. In the first dimension, namely, SSC, this is supported by the additional *reduce* principle (MacArthur, 2013) that intervenes in packaging, optimising its use and raising consumer awareness. Furthermore, quality is the defining factor of the entire supply chain associated with organic products. In the second dimension, namely, WSCM, the vision expressed by the systems thinking principle allows holistic sustainability policies to be adopted within organisations. Finally, the main factor for value optimisation is *reuse*, conveyed through activating the *flow of waste* for both the second raw material and the finished product.

Companies have thus gained more influence on land territory, promoting sustainable and quality production and consumption models. Furthermore, the adoption of SSC has allowed the creation and marketing of quality and eco-sustainable products and stimulated a new demand in the area for products and services that respect these principles. Therefore, in addition to contributing to the development of the local economy from a sustainable perspective, the community manages to create a culture of sustainability in the local population, involving both actors in the supply chain and consumers, generating awareness and belonging.

Finally, through an integration of services, it is possible to push the PSS approach towards optimising value for a single customer. Here, the organisation's responsibilities are, first and foremost, the promotion of sustainable purchases (GPP) of refurbished products, contributing to extending their product life cycle, increasing their level of circularity and generating value co-creation.

### 5.1 | Implication and limits of the analysis

This paper contributes to the debate in the literature on value optimisation and the application of CE principles and factors. By identifying the causal configuration at the economic, social and environmental levels, models can be created to address value optimisation. Furthermore, it represents a tool to outline the implications that may arise from applying the CE, considering the ability to influence development policies. Also, this study contributes at different levels to applying CE principles in companies, taking factors proposed by BS 8001 as a reference and highlighting how they contribute to value optimisation.

#### 5.1.1 | Implication at research level

The results suggest implications at the research level, and it is necessary to deepen the study on adopting value optimisation in the CE in the agri-food sector. The scenarios proposed identifies the primary factors that affect value creation considering the consumption and production model. However, considering enabling factors, both are based on the need to intervene in a culture of CE. Much remains to be investigated regarding how to apply the tools to measure value optimisation. In the literature, few studies define metrics to connect the factors that affect the value optimisation models to measuring (e.g. Linder et al., 2017). In this regard, this study recommends developing and validating new indicators to measure the value. Considering the factors and principles outlined here, the new indicators can lead to the definition of new tools to measure the CE value in the considered sector. Therefore, in line with the recommendation of the EU Commission, indicators in the first phase of the CE action plan should have the character of simplicity and applicability for the business system (Poponi et al., 2022). This would help to quantify the value derived from switching towards CE.

In particular, a standard indicator of the considered scenarios may concern the measurement of the community influence in relation to the economic, social and environmental context. The relationship between community and agri-food is highlighted by several authors, especially in the community-supported agriculture model. Balázs et al. (2016) define it as an 'alternative vision on the future of food, which implies lifestyle changes, food activism, experimenting, as well as redirection of food research to sustainable forms of food supply'. It can also be considered a 'future transition to sustainability' (Bloemmen et al., 2015; Nost, 2014). Developing a specific indicator supporting those proposed in the literature would allow defining more precisely the framework within which circular companies contribute to value optimisation by classifying the level of influence and/or conditioning that the community exerts on the organisation's choices (Poponi, Mosconi, et al., 2019) or consumption choices.

### 5.1.2 | Implication for practice

At the managerial level, the study increases knowledge on the topic and suggests important factors companies can invest in to receive a return in value from CE, paying particular attention to the role of the consumer and the community as a driver of change. Moreover, the study suggests developing new entrepreneurial strategies to address the CE practices in the agri-food sector at the process or consumption level.

For the CM, the activation of SSC for distribution and consumption acts as a stimulus for the active involvement of the local community. In the first scenario, improving the quality of innovative services and introducing sustainable packaging, such as new materials or acting through a drastic reduction, can stimulate the consumer's purchasing behaviour towards the CE. In the second scenario, the value optimisation implies interventions in the production model, stimulating the reuse of waste or activating industrial symbiosis for the 'high valorisation of waste' (Poponi, Colantoni, et al., 2019). SRM dimension suggests that companies activate a waste recovery and management chain through actions in low level but with cost-effective innovations. However, even in this dimension, companies must invest in the collaboration and involvement of the local community (Atanasovska et al., 2022) to enhance waste from an SSC perspective (Kiss et al., 2019). This entails a further integration with the PSS approach, which assumes product life cycle extension and the activation of consolidated networks in the value chain to obtain value optimisation through economic and environmental benefits (Chierici & Copani, 2016; Widmer et al., 2018) together with an improvement of social aspects (Ebikake et al., 2018).

### 5.1.3 | Implication for policymakers

For the policymaker, the study highlights implications regarding CE application and the ability to influence the development of the new regional policies, including S3. In addition, the study stimulates the adoption of measurement models for the agri-food specialisation areas in the region considered. As emerged above, value optimisation implies the need to encourage new forms of collaboration between companies. The public policy represents the stimulus factors for adopting the systems thinking principle, which can activate inter-organisational cooperation by introducing financial/fiscal or regulatory stimuli (Ruggieri et al., 2016), particularly with cascade systems capable of self-regulating and self-feeding. Furthermore, this study can be used as a reference point to extend the observation to contexts that are different from agri-food and intend to orient their evaluations on the benefits obtained by applying CE principles and factors. Finally, future research aims to understand a quantitative dimension of value optimisation, starting from the cut-off point, where companies switch from a linear to a circular approach.

## ACKNOWLEDGEMENTS

Open Access Funding provided by Universita degli Studi della Tuscia within the CRUI-CARE Agreement.

## ORCID

*Francesco Pacchera* https://orcid.org/0000-0002-5809-392X

## REFERENCES

Adams, R., Jeanrenaud, S., Bessant, J., Denyer, D., & Overy, P. (2016). Sustainability-oriented innovation: A systematic review. *International Journal of Management Reviews*, *18*(2), 180–205. https://doi.org/10.1111/ijmr.12068

Agrawal, S., Singh, R. K., & Murtaza, Q. (2016). Triple bottom line performance evaluation of reverse logistics. *Competitiveness Review*, *26*(3), 289–310. https://doi.org/10.1108/CR-04-2015-0029

Alfiero, S., Christofi, M., & Bonadonna, A. (2019). Street food traders, farmers and sustainable practice to reduce food waste in the Italian context. *British Food Journal*, *122*(5), 1361–1380. https://doi.org/10.1108/BFJ-04-2019-0265

Alfranca, O., Rama, R., & Von Tunzelmann, N. (2003). Competitive behaviour, design and technical innovation in food and beverage multinationals. *International Journal of Biotechnology*, *5*(3–4), 222–248. https://doi.org/10.1504/ijbt.2003.004096

Algieri, A., Zema, D. A., Nicotra, A., & Zimbone, S. M. (2020). Potential energy exploitation in collective irrigation systems using pumps as turbines: A case study in Calabria (southern Italy). *Journal of Cleaner Production*, *257*, 120538. https://doi.org/10.1016/j.jclepro.2020.120538

Annarelli, A., Battistella, C., & Nonino, F. (2016). Product service system: A conceptual framework from a systematic review. *Journal of Cleaner Production*, *139*, 1011–1032. https://doi.org/10.1016/j.jclepro.2016.08.061

Arcese, G., Flammini, S., Lucchetti, M. C., & Martucci, O. (2015). Evidence and experience of open sustainability innovation practices in the food sector. *Sustainability*, *7*(7), 8067–8090. https://doi.org/10.3390/su7078067

Aschemann-Witzel, J., de Hooge, I. E., Rohm, H., Normann, A., Bossle, M. B., Grønhøj, A., & Oostindjer, M. (2017). Key characteristics and success factors of supply chain initiatives tackling consumer-related food waste – A multiple case study. *Journal of Cleaner Production*, *155*, 33–45. https://doi.org/10.1016/j.jclepro.2016.11.173

Atanasovska, I., Choudhary, S., Koh, L., Ketikidis, P. H., & Solomon, A. (2022). Research gaps and future directions on social value stemming from circular economy practices in agri-food industrial parks: Insights from a systematic literature review. *Journal of Cleaner Production*, *354*, 131753. https://doi.org/10.1016/j.jclepro.2022.131753

Azevedo, S. G., Carvalho, H., & Cruz Machado, V. (2011). The influence of green practices on supply chain performance: A case study approach. *Transportation Research Part E: Logistics and Transportation Review*, *47*(6), 850–871. https://doi.org/10.1016/j.tre.2011.05.017

Aznar-sánchez, J. A., Manuel, J., Mendoza, F., Ingrao, C., Failla, S., Bezama, A., Nemecek, T., & Gallego-schmid, A. (2020). Indicators for circular economy in the agri-food sector. *Resources, Conservation and Recycling*, *163*, 105028. https://doi.org/10.1016/j.resconrec.2020.105028

Bakker, C., Wang, F., Huisman, J., & Den Hollander, M. (2014). Products that go round: Exploring product life extension through design. *Journal of Cleaner Production*, *69*, 10–16. https://doi.org/10.1016/j.jclepro.2014.01.028

Balázs, B., Pataki, G., & Lazányi, O. (2016). Prospects for the future: Community supported agriculture in Hungary. *Futures*, *83*, 100–111. https://doi.org/10.1016/j.futures.2016.03.005

Bartolomeo, M., Dal Maso, D., De Jong, P., Eder, P., Groenewegen, P., Hopkinson, P., James, P., Nijhuis, L., Örninge, M., Scholl, G., Slob, A., & Zaring, O. (2003). Eco-efficient producer services - What are they, how do they benefit customers and the environment and how likely are they to develop and be extensively utilised? *Journal of Cleaner Production*, *11*(8), 829–837. https://doi.org/10.1016/S0959-6526(02)00157-9

Bigliardi, B., Bottani, E., & Galati, F. (2011). Open innovation and supply chain management in food machinery supply chain: A case study. *International Journal of Engineering, Science and Technology*, *2*(6), 244–255. https://doi.org/10.4314/ijest.v2i6.63715

Bigliardi, B., Galati, F., Marolla, G., & Verbano, C. (2015). Factors affecting technology transfer offices' performance in the Italian food context. *Technology Analysis & Strategic Management*, *27*(4), 361–384. https://doi.org/10.1080/09537325.2014.1002464

Bloemmen, M., Bobulescu, R., Le, N. T., & Vitari, C. (2015). Microeconomic degrowth: The case of community supported agriculture. *Ecological Economics*, *112*, 110–115. https://doi.org/10.1016/j.ecolecon.2015.02.013

Bocken, N. M. P., de Pauw, I., Bakker, C., & van der Grinten, B. (2016). Product design and business model strategies for a circular economy. *Journal of Industrial and Production Engineering*, *33*(5), 308–320. https://doi.org/10.1080/21681015.2016.1172124

Bose, I., & Pal, R. (2012). Do green supply chain management initiatives impact stock prices of firms? *Decision Support Systems*, *52*(3), 624–634. https://doi.org/10.1016/j.dss.2011.10.020

Braccini, A. M., & Margherita, E. G. (2018). Exploring organizational sustainability of industry 4.0 under the triple bottom line: The case of a manufacturing company. *Sustainability (Switzerland)*, *11*(1), 36. https://doi.org/10.3390/su11010036

Brezet J. C., & Van Hemel, C. (1997). Ecodesign-A promising approach to sustainable production and consumption.

BSI. (2017). BS 8001:2017. Framework for implementing the principles of the circular economy in organizations. The British Standards Institution (ed.).

Bundgaard, A. M., Mosgaard, M. A., & Remmen, A. (2017). From energy efficiency towards resource efficiency within the ecodesign directive. *Journal of Cleaner Production*, *144*, 358–374. https://doi.org/10.1016/j.jclepro.2016.12.144

Bustinza, O. F., Bigdeli, A. Z., Baines, T., & Elliot, C. (2015). Servitization and competitive advantage: The importance of organizational structure and value chain position. *Research Technology Management*, *58*(5), 53–60. https://doi.org/10.5437/08956308X5805354

Cao, M., & Zhang, Q. (2011). Supply chain collaboration: Impact on collaborative advantage and firm performance. *Journal of Operations Management*, *29*(3), 163–180. https://doi.org/10.1016/j.jom.2010.12.008

Caputo, P., Ferrari, S., & Zagarella, F. (2020). In S. Della Torre, S. Cattaneo, C. Lenzi, & A. Zanelli (Eds.), *Urban renovation: An opportunity for economic development, environmental improvement, and social redemption BT - Regeneration of the built environment from a circular economy perspective* (pp. 125–135). Springer International Publishing. https://doi.org/10.1007/978-3-030-33256-3_13

Carrillo-Labella, R., Fort, F., & Parras-Rosa, M. (2020). Motives, barriers, and expected benefits of ISO 14001 in the agri-food sector. *Sustainability (Switzerland)*, *12*(5), 1–17. https://doi.org/10.3390/su12051724

Chen, Y.-S., Lai, S.-B., & Wen, C.-T. (2006). The influence of green innovation performance on corporate advantage in Taiwan. *Journal of Business Ethics*, *67*(4), 331–339. https://doi.org/10.1007/s10551-006-9025-5

Chierici, E., & Copani, G. (2016). Remanufacturing with upgrade PSS for new sustainable business models. *Procedia CIRP*, *47*, 531–536. https://doi.org/10.1016/j.procir.2016.03.055

Chiou, T.-Y., Chan, H. K., Lettice, F., & Chung, S. H. (2011). The influence of greening the suppliers and green innovation on environmental performance and competitive advantage in Taiwan. *Transportation Research Part E: Logistics and Transportation Review*, *47*(6), 822–836. https://doi.org/10.1016/j.tre.2011.05.016

Christopher, M. (2005). *Logistics and supply chain management: Creating value-added networks*. Pearson Education.

Corbetta, P. (1999). *Metodologia e tecniche della ricerca sociale*. Il Mulino.

Creswell, J. W. (2013). *Qualitative inquiry and research design: Choosing among five approaches*. Sage.

Crossan, M. M., & Marina, A. (2010). A multi-dimensional framework of organizational innovation: A systematic review of the literature. *Journal of Management Studies*, *47*(6), 1154–1191. https://doi.org/10.1111/j.1467-6486.2009.00880.x

Cuenca-Moyano, G. M., Zanni, S., Bonoli, A., & Valverde-Palacios, I. (2017). Development of the life cycle inventory of masonry mortar made of natural and recycled aggregates. *Journal of Cleaner Production*, *140*, 1272–1286. https://doi.org/10.1016/j.jclepro.2016.10.029

Cuerva, M. C., Triguero-Cano, Á., & Córcoles, D. (2014). Drivers of green and non-green innovation: Empirical evidence in low-tech SMEs. *Journal of Cleaner Production*, *68*, 104–113. https://doi.org/10.1016/j.jclepro.2013.10.049

De, D., Chowdhury, S., Dey, P. K., & Ghosh, S. K. (2020). Impact of lean and sustainability oriented innovation on sustainability performance of small and medium sized enterprises: A data envelopment analysis-based framework. *International Journal of Production Economics*, *219*, 416–430. https://doi.org/10.1016/j.ijpe.2018.07.003

Deschamps, J., Simon, B., Tagnit-Hamou, A., & Amor, B. (2018). Is open-loop recycling the lowest preference in a circular economy? Answering through LCA of glass powder in concrete. *Journal of Cleaner Production*, *185*, 14–22. https://doi.org/10.1016/j.jclepro.2018.03.021

Devika, K., Jafarian, A., & Nourbakhsh, V. (2014). Designing a sustainable closed-loop supply chain network based on triple bottom line approach: A comparison of metaheuristics hybridization techniques. *European Journal of Operational Research*, *235*(3), 594–615. https://doi.org/10.1016/j.ejor.2013.12.032

Doni, F., Corvino, A., & Bianchi Martini, S. (2019). Servitization and sustainability actions. Evidence from European manufacturing companies. *Journal of Environmental Management*, *234*, 367–378. https://doi.org/10.1016/j.jenvman.2019.01.004

Ebikake, O. E., Sassanelli, C., & Terzi, S. (2018). PSS design through Design for Supply Chain: State of the art review. *Procedia CIRP*, *70*, 198–203. https://doi.org/10.1016/j.procir.2018.03.279

Ecodom, & CDCA. (2020). Atlante Italiano dell'Economia Circolare.

Eisenhardt, K., & Graebner, M. E. (2007). Theory building from cases: Opportunities and challenges. *Academy of Management Journal*, *50*(1), 25–32. https://doi.org/10.5465/amj.2007.24160888

Eisenhardt, K. M. (1989). Building theories from case study research. *Academy of Management Review*, *14*(4), 532–550. https://doi.org/10.2307/258557

Elkington, J. (1999). The link between accountability and sustainability–Theory put into practice. Conference on the Practice of Social Reporting for Business.

Elkington, J. (1998). Partnerships from cannibals with forks: The triple bottom line of 21st-century business. *Environmental Quality Management*, *8*(1), 37–51. https://doi.org/10.1002/tqem.3310080106

Ellen MacArthur Foundation. (2016). Intelligent assets: Unlocking the circular economy potential. Ellen MacArthur Foundation, 1–25. http://www.ellenmacarthurfoundation.org/assets/downloads/publications/EllenMacArthurFoundation_Intelligent_Assets_080216.pdf

EM Foundation. (2015). Towards a circular economy: Business rationale for an accelerated transition. In Ellen MacArthur Foundation.

Eriksson, P., & Kovalainen, A. (2015). *Qualitative methods in business research: A practical guide to social research*. Sage.

Eskandarpour, M., Dejax, P., Miemczyk, J., & Péton, O. (2015). Sustainable supply chain network design: An optimization-oriented review. *Omega (United Kingdom)*, *54*, 11–32. https://doi.org/10.1016/j.omega.2015.01.006

Esposito, B., Sessa, M. R., Sica, D., & Malandrino, O. (2020). Towards circular economy in the agri-food sector. A systematic literature review. *Sustainability (Switzerland)*, *12*(18), 7401. https://doi.org/10.3390/SU12187401

European Commission. (2017). Moving towards a circular economy with EMAS - Best practices to implement circular economy strategies (with case study examples). DOI: https://doi.org/10.2779/463312

European Commission. (2019). The European green deal COM/2019/640. European Commission.

European Commission. (2020). Communication from the commission to the European Parliament, the council, the European economic and social committee of the regions, a farm to fork strategy for a fair, healthy and environmentally-friendly food system EN.

Evans, S., Fernando, L., & Yang, M. (2017). In R. Stark, G. Seliger, & J. Bonvoisin (Eds.), *Sustainable value creation—From concept towards implementation BT - sustainable manufacturing: Challenges, solutions and implementation perspectives* (pp. 203–220). Springer International Publishing. https://doi.org/10.1007/978-3-319-48514-0_13

Fargnoli, M., Costantino, F., Di Gravio, G., & Tronci, M. (2018). Product service-systems implementation: A customized framework to enhance sustainability and customer satisfaction. *Journal of Cleaner Production*, *188*, 387–401. https://doi.org/10.1016/j.jclepro.2018.03.315

Fitzgerald, T. (2012). Documents and documentary analysis. In A. R. Briggs, M. Coleman, & M. Morrison (Eds.), *Research Methods in Educational Leadership & Management* (pp. 296–308). SAGE Publications Ltd. https://doi.org/10.4135/9781473957695.n20

Fletcher, M., Zhao, Y., Plakoyiannaki, E., & Buck, T. (2018). Three pathways to case selection in international business: A twenty-year review, analysis and synthesis. *International Business Review*, *27*(4), 755–766. https://doi.org/10.1016/j.ibusrev.2017.12.004

Flint, D. J., Larsson, E., & Gammelgaard, B. (2008). Exploring processes for customer value insights, supply chain learning and innovation: An international study. *Journal of Business Logistics*, *29*(1), 257–281. https://doi.org/10.1002/j.2158-1592.2008.tb00078.x

Flint, D. J., Larsson, E., Gammetgaard, B., & Mentzer, J. (2005). Logistics innovation: A customer value-oriented social process. *Journal of Business Logistics*, *26*(1), 113–147. https://doi.org/10.1002/j.2158-1592.2005.tb00196.x

Flygansvær, B., Dahlstrom, R., & Nygaard, A. (2018). Exploring the pursuit of sustainability in reverse supply chains for electronics. *Journal of Cleaner Production*, *189*, 472–484. https://doi.org/10.1016/j.jclepro.2018.04.014

Freitas, L. A. R. U., & Magrini, A. (2017). Waste management in industrial construction: Investigating contributions from industrial ecology. *Sustainability (Switzerland)*, *9*(7), 6, 1251–8. https://doi.org/10.3390/su9071251

Gebauer, H., Gustafsson, A., & Witell, L. (2011). Competitive advantage through service differentiation by manufacturing companies. *Journal of Business Research*, *64*(12), 1270–1280. https://doi.org/10.1016/j.jbusres.2011.01.015

Gerring, J. (2007). Is there a (viable) crucial-case method? *Comparative Political Studies*, *40*(3), 231–253. https://doi.org/10.1177/0010414006290784

Ghisellini, P., Cialani, C., & Ulgiati, S. (2016). A review on circular economy: The expected transition to a balanced interplay of environmental and economic systems. *Journal of Cleaner Production*, *114*, 11–32. https://doi.org/10.1016/j.jclepro.2015.09.007

Gravagnuolo, A., Angrisano, M., & Girard, L. F. (2019). Circular economy strategies in eight historic port cities: Criteria and indicators towards a circular city assessment framework. *Sustainability (Switzerland)*, *11*(13), 3512. https://doi.org/10.3390/su11133512

Herrmann, J., & Hodgson, B. (2001). SRM: Leveraging the supply base for competitive advantage. SMTA International Conference, *5*.

Höhn, M. I. (2010). Literature review on supply chain contracts. In *Relational supply contracts* (pp. 19–34). Springer.

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

Hopkinson, P., Zils, M., Hawkins, P., & Roper, S. (2018). Managing a complex global circular economy business model: Opportunities and challenges. *California Management Review*, *60*(3), 71–94. https://doi.org/10.1177/0008125618764692

Iacovidou, E., Velis, C. A., Purnell, P., Zwirner, O., Brown, A., Hahladakis, J., Millward-hopkins, J., & Williams, P. T. (2017). Metrics for optimising the multi-dimensional value of resources recovered from waste in a circular economy: A critical review. *Journal of Cleaner Production*, *166*, 910–938. https://doi.org/10.1016/j.jclepro.2017.07.100

Ingrao, C., Faccilongo, N., Valenti, F., De Pascale, G., Di Gioia, L., Messineo, A., & Arcidiacono, C. (2019). Tomato puree in the Mediterranean region: An environmental life cycle assessment, based upon data surveyed at the supply chain level. *Journal of Cleaner Production*, *233*, 292–313. https://doi.org/10.1016/j.jclepro.2019.06.056

ISO. (2002). Environmental management, integrating environmental aspects into product design and development.

Jamali, D. (2006). Insights into triple bottom line integration from a learning organization perspective. *Business Process Management Journal*, *12*(6), 809–821. https://doi.org/10.1108/14637150610710945

Jayaraman, V., Patterson, R. A., & Rolland, E. (2003). The design of reverse distribution networks: Models and solution procedures. *European Journal of Operational Research*, *150*(1), 128–149. https://doi.org/10.1016/S0377-2217(02)00497-6

Jensen, J. P., Prendeville, S. M., Bocken, N. M. P., & Peck, D. (2019). Creating sustainable value through remanufacturing: Three industry cases. *Journal of Cleaner Production*, *218*, 304–314. https://doi.org/10.1016/j.jclepro.2019.01.301

Jouan, J., Ridier, A., & Carof, M. (2020). SYNERGY: A regional bio-economic model analyzing farm-to-farm exchanges and legume production to enhance agricultural sustainability. *Ecological Economics*, *175*, 106688. https://doi.org/10.1016/j.ecolecon.2020.106688

Joyce, A., & Paquin, R. L. (2016). The triple layered business model canvas: A tool to design more sustainable business models. *Journal of Cleaner Production*, *135*, 1474–1486. https://doi.org/10.1016/j.jclepro.2016.06.067

Kalverkamp, M. (2018). Hidden potentials in open-loop supply chains for remanufacturing. *International Journal of Logistics Management*, *29*(4), 1125–1146. https://doi.org/10.1108/IJLM-10-2017-0278

Kalverkamp, M., & Young, S. B. (2019). In support of open-loop supply chains: Expanding the scope of environmental sustainability in reverse supply chains. *Journal of Cleaner Production*, *214*, 573–582. https://doi.org/10.1016/j.jclepro.2019.01.006

Kazancoglu, Y., Ekinci, E., Mangla, S. K., Sezer, M. D., & Kayikci, Y. (2021). Performance evaluation of reverse logistics in food supply chains in a circular economy using system dynamics. *Business Strategy and the Environment*, *30*(1), 71–91. https://doi.org/10.1002/bse.2610

Ketzenberg, M. (2009). The value of information in a capacitated closed loop supply chain. *European Journal of Operational Research*, *198*(2), 491–503. https://doi.org/10.1016/j.ejor.2008.09.028

Kiss, K., Ruszkai, C., & Takács-György, K. (2019). Examination of short supply chains based on circular economy and sustainability aspects. *Resources*, *4*, 1, 161–21. https://doi.org/10.3390/resources8040161

Kissling, R., Coughlan, D., Fitzpatrick, C., Boeni, H., Luepschen, C., Andrew, S., & Dickenson, J. (2013). Success factors and barriers in re-use of electrical and electronic equipment. *Resources, Conservation and Recycling*, *80*(1), 21–31. https://doi.org/10.1016/j.resconrec.2013.07.009

Klewitz, J., & Hansen, E. G. (2014). Sustainability-oriented innovation of SMEs: A systematic review. *Journal of Cleaner Production*, *65*, 57–75. https://doi.org/10.1016/j.jclepro.2013.07.017

Kristensen, H. S., & Remmen, A. (2019). A framework for sustainable value propositions in product-service systems. *Journal of Cleaner Production*, *223*, 25–35. https://doi.org/10.1016/j.jclepro.2019.03.074

Kumar, S., & Malegeant, P. (2006). Strategic alliance in a closed-loop supply chain, a case of manufacturer and eco-non-profit organization. *Technovation*, *26*(10), 1127–1135. https://doi.org/10.1016/j.technovation.2005.08.002

Kuzma, E., Padilha, L. S., Sehnem, S., Julkovski, D. J., & Roman, D. J. (2020). The relationship between innovation and sustainability: A meta-analytic study. *Journal of Cleaner Production*, *259*, 120745. https://doi.org/10.1016/j.jclepro.2020.120745

Kyriakopoulos, G. L., Kapsalis, V. C., Aravossis, K. G., Zamparas, M., & Mitsikas, A. (2019). Evaluating circular economy under a multi-parametric approach: A technological review. *Sustainability (Switzerland)*, *11*(21), 1, 6139–24. https://doi.org/10.3390/su11216139

La Londe, B. J., & Masters, J. M. (1994). Emerging logistics strategies blueprints for the next century. *International Journal of Physical Distribution & Logistics Management*, *24*(7), 35–47. https://doi.org/10.1108/09600039410070975

Lahti, T., Wincent, J., & Parida, V. (2018). A definition and theoretical review of the circular economy, value creation, and sustainable business models: Where are we now and where should research move in the future? *Sustainability (Switzerland)*, *10*(8), 2799. https://doi.org/10.3390/su10082799

Lambert, M. D., Cooper, C. M., & Pagh, D. J. (1998). Supply chain management: Implementation issues and research opportunities. *The International Journal of Logistics Management*, *9*(2), 1–20. https://doi.org/10.1108/09574099810805807

Lazaretti, K., Giotto, O. T., Sehnem, S., & Bencke, F. F. (2019). Building sustainability and innovation in organizations. *Benchmarking*, *27*, 2166–2188. https://doi.org/10.1108/BIJ-08-2018-0254

Le Pochat, S., Bertoluci, G., & Froelich, D. (2007). Integrating ecodesign by conducting changes in SMEs. *Journal of Cleaner Production*, *15*(7), 671–680. https://doi.org/10.1016/j.jclepro.2006.01.004

Leder, N., Kumar, M., & Sanchez, V. (2020). Influential factors for value creation within the circular economy: Framework for waste valorisation. *Resources, Conservation and Recycling*, *158*, 104804. https://doi.org/10.1016/j.resconrec.2020.104804

Lewandowski, M. (2016). Designing the business models for circular economy-towards the conceptual framework. *Sustainability (Switzerland)*, *8*(1), 1, 43–28. https://doi.org/10.3390/su8010043

Li, X., & Wang, Q. (2007). Coordination mechanisms of supply chain systems. *European Journal of Operational Research*, *179*(1), 1–16. https://doi.org/10.1016/j.ejor.2006.06.023

Lieder, M., & Rashid, A. (2016). Towards circular economy implementation: A comprehensive review in context of manufacturing industry. *Journal of Cleaner Production*, *115*, 36–51. https://doi.org/10.1016/j.jclepro.2015.12.042

Lindahl, M., Sundin, E., & Sakao, T. (2014). Environmental and economic benefits of integrated product service offerings quantified with real business cases. *Journal of Cleaner Production*, *64*, 288–296. https://doi.org/10.1016/j.jclepro.2013.07.047

Linder, M., Sarasini, S., & Van Loon, P. (2017). A metric for quantifying product-level circularity. *Journal of Industrial Ecology*, *21*(3), 545–558. https://doi.org/10.1111/jiec.12552

Linton, J. D., & Jayaraman, V. (2005). A framework for identifying differences and similarities in the managerial competencies associated with different modes of product life extension. *International Journal of Production Research*, *43*(9), 1807–1829. https://doi.org/10.1080/13528160512331326440

Liu, C. H., Chen, M. C., Tu, Y. H., & Wang, C. C. (2014). Constructing a sustainable service business model: An S-D logic-based integrated product service system (IPSS). *International Journal of Physical Distribution and Logistics Management*, *44*(1), 80–97. https://doi.org/10.1108/IJPDLM-02-2013-0039

Lopes de Sousa Jabbour, A. B., Jabbour, C. J. C., Godinho Filho, M., & Roubaud, D. (2018). Industry 4.0 and the circular economy: A proposed research agenda and original roadmap for sustainable operations. *Annals of Operations Research*, *270*(1–2), 273–286. https://doi.org/10.1007/s10479-018-2772-8

Luttropp, C., & Lagerstedt, J. (2006). Ecodesign and the ten golden rules: Generic advice for merging environmental aspects into product development. *Journal of Cleaner Production*, *14*(15–16), 1396–1408. https://doi.org/10.1016/j.jclepro.2005.11.022

MacArthur, E. (2013). *Towards the circular economy* (Vol. 1). Ellen MacArthur Foundation.

Manninen, K., Koskela, S., Antikainen, R., Bocken, N., Dahlbo, H., & Aminoff, A. (2018). Do circular economy business models capture intended environmental value propositions? *Journal of Cleaner Production*, *171*, 413–422. https://doi.org/10.1016/j.jclepro.2017.10.003

Martinez, M. G. (2014). Co-creation of value by open innovation: Unlocking new sources of competitive advantage. *Agribusiness*, *30*(2), 132–147. https://doi.org/10.1002/agr.21347

Matsumoto, M. (2009). Business frameworks for sustainable society: A case study on reuse industries in Japan. *Journal of Cleaner Production*, *17*(17), 1547–1555. https://doi.org/10.1016/j.jclepro.2009.07.011

Mentzer, J. T., DeWitt, W., Keebler, J. S., Min, S., Nix, N. W., Smith, C. D., & Zacharia, Z. G. (2001). Defining supply chain management. *Journal of Business Logistics*, *22*(2), 1–25. https://doi.org/10.1002/j.2158-1592.2001.tb00001.x

Millward-hopkins, J., Busch, J., Purnell, P., Zwirner, O., Velis, C. A., Brown, A., Hahladakis, J., & Iacovidou, E. (2018). Fully integrated modelling for sustainability assessment of resource recovery from waste. *Science of the Total Environment*, *612*, 613–624. https://doi.org/10.1016/j.scitotenv.2017.08.211

Min, H., & Zhou, G. (2002). Supply chain modeling: Past, present and future. *Computers and Industrial Engineering*, *43*(1–2), 231–249. https://doi.org/10.1016/S0360-8352(02)00066-9

Ministero dell'Ambiente e della Tutela del Territorio e del Mare. (2019). Testimony of Ministery of Environment.

Moktadir, M. A., Kumar, A., Ali, S. M., Paul, S. K., Sultana, R., & Rezaei, J. (2020). Critical success factors for a circular economy: Implications for business strategy and the environment. *Business Strategy and the Environment*, *29*(8), 3611–3635. https://doi.org/10.1002/bse.2600

Mont, O. K. (2002). Clarifying the concept of product–service system. *Journal of Cleaner Production*, *10*, 237–245. https://doi.org/10.1016/S0959-6526(01)00039-7

Mosconi, E. M., Poponi, S., Fortunati, S., & Arezzo di Trifiletti, M. (2019). B corp certification for a circular economy approach and a sustainable pathway. In *Customer satisfaction and sustainability initiatives in the fourth industrial revolution* (pp. 167–188). IGI Global. https://doi.org/10.4018/978-1-7998-1419-1.ch009

Mura, M., Longo, M., & Zanni, S. (2020). Circular economy in Italian SMEs: A multi-method study. *Journal of Cleaner Production*, *245*, 118821. https://doi.org/10.1016/j.jclepro.2019.118821

Murfield, M. L., & Tate, W. L. (2017). Buyer and supplier perspectives on environmental initiatives: Potential implications for supply chain relationships. *International Journal of Logistics Management*, *28*(4), 1319–1350. https://doi.org/10.1108/IJLM-06-2016-0138

Näslund, D., & Williamson, S. (2010). What is management in supply chain management? A critical review of definitions, frameworks and terminology. *Journal of Management Policy and Practice*, *11*, 11–28.

Nižetić, S., Djilali, N., Papadopoulos, A., & Rodrigues, J. J. P. C. (2019). Smart technologies for promotion of energy efficiency, utilization of

sustainable resources and waste management. *Journal of Cleaner Production*, *231*, 565–591. https://doi.org/10.1016/j.jclepro.2019.04.397
Nost, E. (2014). Scaling-up local foods: Commodity practice in community supported agriculture (CSA). *Journal of Rural Studies*, *34*, 152–160. https://doi.org/10.1016/j.jrurstud.2014.01.001
Notarnicola, B., Hayashi, K., Curran, M. A., & Huisingh, D. (2012). Progress in working towards a more sustainable agri-food industry. *Journal of Cleaner Production*, *28*, 1–8. https://doi.org/10.1016/j.jclepro.2012.02.007
Notarnicola, B., Sala, S., Anton, A., McLaren, S. J., Saouter, E., & Sonesson, U. (2017). The role of life cycle assessment in supporting sustainable agri-food systems: A review of the challenges. *Journal of Cleaner Production*, *140*, 399–409. https://doi.org/10.1016/j.jclepro.2016.06.071
Nußholz, J. L. K. (2018). A circular business model mapping tool for creating value from prolonged product lifetime and closed material loops. *Journal of Cleaner Production*, *197*, 185–194. https://doi.org/10.1016/j.jclepro.2018.06.112
Östlin, J., Sundin, E., & Björkman, M. (2009). Product life-cycle implications for remanufacturing strategies. *Journal of Cleaner Production*, *17*(11), 999–1009. https://doi.org/10.1016/j.jclepro.2009.02.021
Paiho, S., Mäki, E., Wessberg, N., Paavola, M., Tuominen, P., Antikainen, M., Heikkilä, J., Rozado, C. A., & Jung, N. (2020). Towards circular cities—Conceptualizing core aspects. *Sustainable Cities and Society*, *59*, 102143. https://doi.org/10.1016/j.scs.2020.102143
Pal, R. (2017). Value creation through reverse logistics in used clothing networks. *International Journal of Logistics Management*, *28*(3), 864–906. https://doi.org/10.1108/IJLM-11-2016-0272
Park, J., Sarkis, J., & Wu, Z. (2010). Creating integrated business and environmental value within the context of China's circular economy and ecological modernization. *Journal of Cleaner Production*, *18*(15), 1494–1501. https://doi.org/10.1016/j.jclepro.2010.06.001
Patton, M. Q. (1990). *Qualitative evaluation and research methods*. Sage Publications.
Patton, M. Q. (2014). *Qualitative research & evaluation methods: Integrating theory and practice*. Sage Publications.
Pauliuk, S. (2018). Critical appraisal of the circular economy standard BS 8001:2017 and a dashboard of quantitative system indicators for its implementation in organizations. *Resources, Conservation and Recycling*, *129*, 81–92. https://doi.org/10.1016/j.resconrec.2017.10.019
Peronard, J. P., & Ballantyne, A. G. (2019). Broadening the understanding of the role of consumer services in the circular economy: Toward a conceptualization of value creation processes. *Journal of Cleaner Production*, *239*, 118010. https://doi.org/10.1016/j.jclepro.2019.118010
Pesce, M., Tamai, I., Guo, D., Critto, A., Brombal, D., Wang, X., Cheng, H., & Marcomini, A. (2020). Circular economy in China: Translating principles into practice. *Sustainability (Switzerland)*, *12*, 1, 832–31. https://doi.org/10.3390/su12030832
Pieroni, M. P. P., McAloone, T. C., & Pigosso, D. C. A. (2019). Business model innovation for circular economy and sustainability: A review of approaches. *Journal of Cleaner Production*, *215*, 198–216. https://doi.org/10.1016/j.jclepro.2019.01.036
Poponi, S., Mosconi, E. M., Ruggieri, A., & di Trifiletti, M. A. (2019). Ethic values for sharing communities. In *Organizing for the digital world* (pp. 175–187). Springer Cham. https://doi.org/10.1007/978-3-319-90503-7_14
Poponi, S., Arcese, G., Mosconi, E. M., & Di Trifiletti, M. A. (2020). Entrepreneurial drivers for the development of the circular business model: The role of academic spin-off. *Sustainability (Switzerland)*, *12*(1), 423. https://doi.org/10.3390/su12010423
Poponi, S., Arcese, G., Pacchera, F., & Martucci, O. (2022). Evaluating the transition to the circular economy in the agri-food sector: Selection of indicators. *Resources, Conservation & Recycling*, *176*, 105916. https://doi.org/10.1016/j.resconrec.2021.105916
Poponi, S., Colantoni, A., Cividino, S., & Mosconi, E. (2019). The Stakeholders' perspective within the B corp certification for a circular approach. *Sustainability*, *11*(6), 1584. https://doi.org/10.3390/su11061584
Prieto-Sandoval, V., Jaca, C., & Ormazabal, M. (2018). Towards a consensus on the circular economy. *Journal of Cleaner Production*, *179*, 605–615. https://doi.org/10.1016/j.jclepro.2017.12.224
Ranta, V., Aarikka-Stenroos, L., & Mäkinen, S. J. (2018). Creating value in the circular economy: A structured multiple-case analysis of business models. *Journal of Cleaner Production*, *201*, 988–1000. https://doi.org/10.1016/j.jclepro.2018.08.072
Ranta, V., Keränen, J., & Aarikka-stenroos, L. (2019). How B2B suppliers articulate customer value propositions in the circular economy: Four innovation-driven value creation logics. *Industrial Marketing Management*, *87*, 291–305. https://doi.org/10.1016/j.indmarman.2019.10.007
Rao, P. (2002). Greening the supply chain: A new initiative in South East Asia. *International Journal of Operations & Production Management*, *22*(6), 632–655. https://doi.org/10.1108/01443570210427668
Regione Lazio. (2020). SRSvS – Focus Group Economia Circolare|Paper introduttivo.
Ripanti, E. F., & Tjahjono, B. (2019). Unveiling the potentials of circular economy values in logistics and supply chain management. *International Journal of Logistics Management*, *30*(3), 723–742. https://doi.org/10.1108/IJLM-04-2018-0109
Rosa, P., Sassanelli, C., & Terzi, S. (2019). Circular business models versus circular benefits: An assessment in the waste from electrical and electronic equipments sector. *Journal of Cleaner Production*, *231*, 940–952. https://doi.org/10.1016/j.jclepro.2019.05.310
Ruggieri, A., Braccini, A. M., Poponi, S., & Mosconi, E. M. (2016). A meta-model of inter-organisational cooperation for the transition to a circular economy. *Sustainability (Switzerland)*, *8*(11). https://doi.org/10.3390/su8111153
Ruggieri, A., Mosconi, E. M., Poponi, S., & Fortunati, S. (2020). Closing the loop: Circular economy and BS 8001 as value chain optimization tools for SME's. In Le scienze merceologiche nell'era 4.0. Franco Angeli.
Ryan, B. (2002). *Research methods and methodology in finance and accounting*. Cengage Learning EMEA.
Salomone, R., Rupo, D., & Saija, G. (2013). In R. Salomone, M. T. Clasadonte, M. Proto, & A. Raggi (Eds.), *Innovative environmental management tools for the Agri-food chain BT - product-oriented environmental management systems (POEMS): Improving sustainability and competitiveness in the Agri-food chain with innovative environmental management tools* (pp. 3–25). Springer Netherlands. https://doi.org/10.1007/978-94-007-6116-2_1
Scarpellini, S., Valero-Gil, J., Moneva, J. M., & Andreaus, M. (2020). Environmental management capabilities for a "circular eco-innovation". *Business Strategy and the Environment*, *29*(5), 1850–1864. https://doi.org/10.1002/bse.2472
Schenkel, M., Caniëls, M. C. J., Krikke, H., & Van Der Laan, E. (2015). Understanding value creation in closed loop supply chains – Past findings and future directions. *Journal of Manufacturing Systems*, *37*, 729–745. https://doi.org/10.1016/j.jmsy.2015.04.009
Seuring, S., & Müller, M. (2008). From a literature review to a conceptual framework for sustainable supply chain management. *Journal of Cleaner Production*, *16*(15), 1699–1710. https://doi.org/10.1016/j.jclepro.2008.04.020
Shakir, M. (2002). The selection of case studies: Strategies and their applications to IS implementation cases studies. *Research Letters in the Information and Mathematical Sciences*, *3*, 191–198.
Siggelkow, N. (2007). Persuasion with case studies. *Academy of Management Journal*, *50*, 20–24. https://doi.org/10.5465/amj.2007.24160882
Smart Specialisation Strategy (S3)- Lazio Region. (2016). (testimony of Lazio Region).

Srivastava, S. K. (2007). Green supply-chain management: A state-of-the-art literature review. *International Journal of Management Reviews*, *9*(1), 53–80. https://doi.org/10.1111/j.1468-2370.2007.00202.x

Stake, R. E. (1994). Case study: Composition and performance. *Bulletin of the Council for Research in Music Education*, *122*, 31–44. http://www.jstor.org/stable/40318653

Stock, J. R., & Boyer, S. L. (2009). Developing a consensus definition of supply chain management: A qualitative study. *International Journal of Physical Distribution & Logistics Management*, *39*(8), 690–711. https://doi.org/10.1108/09600030910996323

Strategia di Ricerca e Innovazione per la Smart Specialisation in Toscana. (2019). Testimony of Tuscany region.

Svensson, G., Høgevold, N., Ferro, C., Varela, J. C. S., Padin, C., & Wagner, B. (2016). A triple bottom line dominant logic for business sustainability: Framework and empirical findings. *Journal of Business-to-Business Marketing*, *23*(2), 153–188. https://doi.org/10.1080/1051712X.2016.1169119

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

Vachon, S., & Klassen, R. D. (2006). Green project partnership in the supply chain: The case of the package printing industry. *Journal of Cleaner Production*, *14*(6–7), 661–671. https://doi.org/10.1016/j.jclepro.2005.07.014

Van Fan, Y., Chin, H. H., Klemeš, J. J., Varbanov, P. S., & Liu, X. (2020). Optimization and process design tools for cleaner production. *Journal of Cleaner Production*, *247*, 119181. https://doi.org/10.1016/j.jclepro.2019.119181

Weissbrod, I., & Bocken, N. M. P. (2017). Developing sustainable business experimentation capability – A case study. *Journal of Cleaner Production*, *142*, 2663–2676. https://doi.org/10.1016/j.jclepro.2016.11.009

Widmer, T., Tjahjono, B., & Bourlakis, M. (2018). Defining value creation in the context of circular PSS. *Procedia CIRP*, *73*, 142–147. https://doi.org/10.1016/j.procir.2018.03.329

Yin, R. K. (1989). *Case study research: Design and methods* (2nd ed.). Sage.

Yin, R. K., & Spinelli, S. (2005). Lo studio di caso nella ricerca scientifica: Progetto e metodi.

Zhu, Q., Sarkis, J., & Lai, K.-h. (2013). Institutional-based antecedents and performance outcomes of internal and external green supply chain management practices. *Journal of Purchasing and Supply Management*, *19*(2), 106–117. https://doi.org/10.1016/j.pursup.2012.12.001

**How to cite this article:** Poponi, S., Arcese, G., Ruggieri, A., & Pacchera, F. (2022). Value optimisation for the agri-food sector: A circular economy approach. *Business Strategy and the Environment*, 1–18. https://doi.org/10.1002/bse.3274

## APPENDIX A

**TABLE A1** Concept matrix case study

| | Principles/factors CE | CS-1 | CS-2 | CS-3 | CS-4 |
|---|---|---|---|---|---|
| Factors | Usage/share | | Resource sharing with stakeholders to reduce food waste | Resource sharing with companies from another sector | |
| | Life extension/service support | | | | Waste valorisation |
| | Reuse/redistribute/repurpose | | | | |
| | Refurbish/remanufacture/recondition | | | | |
| | Closed loop | | | | |
| | Open loop | Interaction between different sectors | Interaction between different sectors | Interaction between different sectors | Interaction between different sectors |
| Principles | Innovation | Innovative service: new consumption practices (unpackaged) | Innovative service: new consumption practices (food recovery) | Innovative service: new consumption practices (unpackaged) | Business model: waste valorisation |
| | Stewardship | Make quality products affordable for health and the environment. Short chain/ km.0 | Food recovery at “km 0” to minimise transport | Reduction of packaging | Development of a new agricultural system, connection between plant production and animal husbandry |
| | Collaboration | | Involves the local community, which is encouraged to minimise excessive waste | Collaboration with companies from another sector | Local purchasing groups |
| | Systems thinking | Organic farming and waste reduction | Raising public awareness of food waste and consumption practices | Careful selection of suppliers (organic) for the creation of a sustainable supply chain | Sustainable agriculture based on the regeneration of soil biodiversity without the use of synthetic chemistry |
| Output | Value optimisation | Formation of a culture of sustainability: increased awareness in consumption, reduction of packaging, creation of a short chain, promotion of organic products | Reduction of raw materials used and awareness of stakeholders towards food waste | Reduction of packaging, reduction of food waste, creation of a community, promotion of organic products | Transforming a potentially negative environmental pressure, represented by waste, into an ‘ecologically’ advantageous product |

**TABLE A1** (Continued)

| | CS-5 | CS-6 | CS-7 | CS-8 | CS-9 | CS-10 |
|---|---|---|---|---|---|---|
| Factors | Use of waste (coffee grounds) from other companies to produce their products | Production of modular systems | PSS approach machinery loan | | Resource sharing with stakeholders to reduce food waste | |
| | | | PSS approach product loan | | | |
| | Reuse coffee grounds to produce mushrooms | Redistribution of part of waste processing | | Reuse of irrigation water as a fishpond | | Reuse of waste to create new products |
| | | | Recondition of machinery on loan free of charge | | | |
| | | | Reverse logistic | | | |
| | Interaction between different sectors | Interaction between different sectors | | Interaction between different sectors | Interaction between different sectors | Interaction between different sectors |
| Principles | Business model: vertical cultivation of mushrooms to reduce soil use; waste valorisation | Business model: patented production process | Innovative service: use of the PSS model, develop customised solutions | Business model; innovative production process Acquaponica | Innovative service: new consumption practices (food recovery) | Business model: social integration to promote inclusion and sustainability |
| | Works to limit the production of waste and to recover energy from waste materials. Purchase certified and organic raw materials | The entire production process takes place directly on the farm | Verticalisation of food and non-food production | Development of a new agricultural system | Food recovery from local events | Requalification of a territory to generate a social and environmental responsibility on the topics of inclusion and sustainability |
| | Collaboration with local bars and restaurants to find the waste of coffee | Collaboration and consultancy with farms and equestrian centres for waste management | Promoting collaborative consumption of products and services from an environmental perspective | Creation of a local sales network, and a network of stakeholders | Involves the local community, which is encouraged to minimise excessive waste | Involves various non-profit associations and creates an inclusive network on the territory |
| | Development of an integrated and sustainable supply chain system | Bio-economic, eco-sustainable and bio-sustainable model | Implementation of sustainable development policies and GPP, prevention of packaging waste, reduction of transport, | Sustainable and self-sustaining agricultural production system | Raising public awareness of food waste and consumption practices | Realisation of sustainable products, born from the redevelopment of people and abandoned environments |
| Output | The waste is enhanced to produce food with high nutritional value with reduced impact | Eliminate disposal costs and earn money with the processed product. | Adoption of solutions for cost reduction and promotion of quality and sustainability | The system adopted allows an optimisation of the resource (soil, water, energy) | Reduction of raw materials used and awareness of stakeholders towards food waste | Sustainable management of resources from social exclusion and abundance |