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Original Article

Circular economy and sustainable practices adopted by family farmers

Economia circular e práticas sustentáveis adotadas por agricultores familiares

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ABSTRACT

Purpose: This study proposes a Systematic Literature Review (SLR) focusing on the Circular Economy (CE) and entrepreneurial family farming, investigating how the adoption of sustainable practices influences the incorporation of CE principles in this context. In addition, the study aims to map trends and gaps in the scientific literature on this intersection, highlighting the relevance of CE to foster more sustainable and efficient agricultural practices.

Methodology: This is a qualitative study with a descriptive approach, based on an RSL of 49 articles collected from the Web of Science and Scopus databases, whose content analysis was supported by the Rayyan and Atlas ti software.

Findings: The thematic analysis revealed four categories of CE-related practices: (a) CE Practices in Entrepreneurship, emphasizing the role of entrepreneurship in promoting sustainable business models; (b) CE Practices in Agriculture, highlighting the implementation of sustainable agricultural systems, including organic production and effective waste management; (c) CE Practices in the Designer, contemplating the need to rethink product design, production and marketing processes; (d) Sustainable CE Practices, addressing the reorganization of business processes and partnerships to promote sustainability in circular business models.

Originality: This RSL provides a comprehensive overview of CE-related practices in entrepreneurial family farming. The research emphasizes the relevance of entrepreneurial practices as drivers of sustainable business models at the convergence between CE and family farming, while identifying research gaps and suggesting directions for future investigations.

Keywords: Entrepreneurship; Rural entrepreneurship; Circular economy; Sustainability; Family farming

RESUMO

Finalidade: Este estudo propõe uma Revisão Sistemática da Literatura (RSL) com foco na Economia Circular (EC) e na agricultura familiar empreendedora, investigando como a adoção de práticas sustentáveis influencia a incorporação dos princípios da EC nesse contexto. Além disso, o estudo pretende mapear as tendências e lacunas na literatura científica sobre essa interseção, destacando a relevância da EC para fomentar práticas agrícolas mais sustentáveis e eficientes.
Metodologia: Estudo qualitativo, com abordagem descritiva, elaborado por meio de uma RSL de 49 artigos, coletados nas bases de dados Web of Science e Scopus, cuja análise de conteúdo foi apoiada pelos softwares Rayyan e Atlas ti.
Constatações: A análise temática revelou quatro categorias de práticas relacionadas à EC: (a) Práticas de EC no Empreendedorismo, enfatizando o papel do empreendedorismo na promoção de modelos de negócios sustentáveis; (b) Práticas de EC na Agricultura, destacando a implementação de sistemas agrícolas sustentáveis, incluindo a produção orgânica e o manejo eficaz de resíduos; (c) Práticas de EC no Designer, contemplando a necessidade de repensar os processos de design, produção e comercialização de produtos; (d) Práticas de EC Sustentáveis, abordando a reorganização de processos e parcerias empresariais para promover a sustentabilidade em modelos de negócios circulares.
Originalidade: Esta RSL proporciona uma visão abrangente das práticas relacionadas à EC na agricultura familiar empreendedora. A pesquisa enfatiza a relevância das práticas empreendedoras como impulsionadoras de modelos de negócios sustentáveis na convergência entre EC e agricultura familiar, enquanto identifica lacunas na pesquisa e sugere direções para futuras investigações.

Palavras-chave: Empreendedorismo; Empreendedorismo rural; Economia circular; Sustentabilidade; Agricultura familiar

1 INTRODUCTION

Entrepreneurship contributes to economic growth, job and income generation, technological innovation (Ahamed et al., 2021; Schumpeter, 1934; Śledzik, 2013) and sustainability (Hosseinzade et al., 2018; Soleymani et al., 2021). Currently, considering that the search for sustainable economic development is a priority, entrepreneurship plays a key role, especially when we consider its business models, value systems (individual and collective), innovation and the ability to add value to products and services (Lynde, 2020; Śledzik, 2013). In addition, environmental preservation and the responsible management of natural resources have become non-negotiable imperatives (Hosseinzade et al., 2018; Soleymani et al., 2021).

Entrepreneurs perform a fundamental role in generating wealth through their ability to conduct business and face risk (Ahamed et al., 2021). With the growing

appreciation of sustainable development, entrepreneurs have contributed to mitigating environmental impacts and preserving natural resources by developing and participating in ventures with sustainability-oriented purposes (Parrish, 2010; Hosseinzade et al., 2018; Soleymani et al., 2021).

In this scenario of sustainable entrepreneurship, rural entrepreneurship has gained strength and space with producers committed to improving productivity, adapting to the new demands that the market imposes to minimize environmental impacts in rural areas (Endo et al., 2018). From this perspective of sustainable rural entrepreneurship, family farming has stood out in rural areas due to its search for new production models, developed through production processes with a low environmental impact and lower costs, in which farmers act as entrepreneurial producers who, concerned about the environment, seek to use sustainable practices in their production (Hosseinzade et al., 2018; Muñoz & Kimmitt, 2019).

Rural entrepreneurship has supported family farming, contributing to the economic, social and environmental aspects, meeting the three dimensions of sustainability, as well as favoring the production of wealth through environmentally friendly activities (Liontakis & Tzouramani, 2016). When analyzing socio-economic processes in rural areas, it is possible to see that there is a strong relationship between family farmers, entrepreneurship and sustainability, as they are responsible for guaranteeing a large part of food production for society. Entrepreneurship helps them to remain in the countryside with better living conditions, as well as conserving natural resources, ensuring production that is more aligned with economic, social and environmental aspects (Endo et al., 2018; Mendonça & Rocha, 2015).

However, the current economic growth model still presents a series of global imbalances, both social and environmental (Tiossi et al., 2019). On the one hand, great wealth production contrasts with extreme poverty, in addition to vast environmental degradation and growing pollution (Castro et al., 2019; Tiossi et al., 2019). Given this reality, there is a need to adopt sustainable practices in rural areas that are crucial to

preserving the planet, in order to promote the preservation of natural resources, while maintaining or optimizing economic results and guaranteeing workers' rights (Parrish, 2010; Tiossi et al., 2019; Tiossi & Simon, 2021).

On this path to better results and mitigating environmental impacts, the Circular Economy (CE) has emerged with the aim of changing the traditional economic model, which is considered harmful and unsustainable. The CE is characterized as an economic system with a sustainable approach as opposed to the predominant linear system. Essentially, CE promotes the reuse of materials in subsequent production cycles, minimizing the generation of waste and maximizing the use of resources (EMF, 2013; Poponi et al., 2020; Tiossi et al., 2019; Tiossi & Simon, 2021). In CE, production is based on restoring and regenerating the environment (Geissdoerfer et al., 2017).

CE has emerged as a new paradigm for overcoming the contradictions between economic and environmental aspects. This approach reinforces the fundamental idea that resources should not be turned into waste, but should be kept in the production cycle for as long as possible, with minimal loss of quality (Gandolfo & Lupi, 2021; Geissdoerfer et al., 2017; Martins & Castro, 2019). This concept is an important approach and current trend, which depends on the adoption of circular and sustainable practices in the planning and implementation of production for sustainable development (Jugend et al., 2020). Companies are increasingly adopting circular action practices, which benefit their economic interests but also generate positive environmental and social impacts (Bansal et al., 2022; EMF, 2013; Suchek et al., 2022).

Although some studies have begun to explore the connections between rural entrepreneurship, family farming and CE, it is essential to recognize that these investigations are still in the early stages of development (Quinto et al., 2022). The literature review conducted by Suchek, Ferreira and Fernandes (2022) on entrepreneurship and CE identified four thematic groups, including growing circular Small and Medium Enterprises (SMEs) and social entrepreneurship in CE. These authors point out that although there are promising areas, the body of knowledge

remains dispersed and growing. In addition, Bansal, Jain, Garg and Srivastava (2022) provide valuable insight into the relationship between CE and business sustainability, but point out that there is vast scope for developing practical implementation tools and techniques.

Another study conducted by Wasserbaur, Sakao and Milios (2022) explored the interactions between government policies and business models, including those related to CE. They highlighted the complexity of the possible interactions, but also pointed to gaps in the understanding of the specific dynamics that drive the effective transition to a CE. Another relevant review, conducted by Kuzma, Sehnem, Machado and Campos (2021), explored the relationship between CE and entrepreneurship. They identified the predominant causal logic in the market environment and highlighted the importance of networking, valorization, innovation and regional development in the context of circular entrepreneurship.

However, despite these notable efforts, the scarcity of results suggests that these themes are still little explored in the academic literature, and their specific applications in the context of rural entrepreneurship in family farming remain under-investigated. The research gap identified calls for comprehensive and integrated studies investigating the relationship between CE, rural entrepreneurship and family farming. This need is based on the potential impact that these factors can have on the sustainable practices of family farming, as well as the growing importance of sustainable solutions on the global stage (Quinto et al., 2022).

In this context, the study investigates the following research question: How does the implementation of sustainable practices influence the adoption of CE principles in entrepreneurial family farming? What are the main results, trends and gaps identified in the scientific literature on this intersection? To this end, this study aims to conduct a systematic literature review (SLR) focusing on CE and entrepreneurial family farming, exploring how the implementation of sustainable practices influences the adoption of CE principles in this specific context. In addition, it seeks to identify the main trends

and gaps in the scientific literature on this intersection, highlighting the relevance of CE as an approach to promoting more sustainable and efficient agricultural practices.

This research is a qualitative study, with a descriptive approach, carried out through an RSL of 49 articles, collected from the Web of Science and Scopus databases, whose content analysis was carried out with the help of the Rayyan and Atlas ti software.

2 THEORETICAL FRAMEWORK

This section aims to address theoretical concepts and draw a connection between: CE, rural entrepreneurship, family farming and sustainable practices.

2.1 Rural Entrepreneurship and Family Farming

Entrepreneurship can be described as a complex and diverse phenomenon that transcends the boundaries of knowledge, characterized by the ability to identify and exploit market opportunities. This occurs by establishing and developing profitable ventures or by creating value through new combinations of existing resources and factors (Cullen & De Angelis, 2021; Masaro, 2016; Schumpeter, 1934). Entrepreneurship is closely related to regional development, contributing to transformations in the productive environment, favoring economic dynamism and encouraging competitiveness in the generation of new entrepreneurial opportunities (Miyazaki et al., 2008; Schmidt & Bohnenberger, 2009). The field of study in entrepreneurship has shown interest in issues related to the sustainable development of the planet, including rural entrepreneurship (Endo et al., 2018; Schinaider et al., 2017; Tomei & Lima, 2015).

Rural entrepreneurs are increasingly inserted in competitive environments that demand transformations, requiring initiatives to guarantee the maintenance and occupation of rural space (Miyazaki et al., 2008; Schmidt & Bohnenberger, 2009). Performing various functions, rural entrepreneurs are those who seek the best alternative for organizing their property, whether in the search for new crops, or better animals in their herd, or in the search for alternative technologies, with the aim

of expanding productivity and establishing new strategies (Tomei & Lima, 2015). Thus, rural entrepreneurs seek strategies aimed at reducing costs, differentiating production and increasing productivity, which require different behaviors in the face of changes and demands from the economic environment, especially those related to preserving the natural environment through entrepreneurial action (Endo et al., 2018; Schinaider et al., 2017; Tomei & Lima, 2015).

In this context, agriculture plays a key role in boosting economic growth through income generation (Bahaman et al., 2010; D'Silva et al., 2011), as well as contributing to sustainable development (Liontakis & Tzouramani, 2016), especially family farming, which is responsible for promoting changes in rural production, implementing innovations that strengthen social inclusion and economic development (Miyazaki et al., 2008).

The rural sector is characterized by two types of agriculture, so-called family farming and non-family farming (Velden et al., 2022). Law No. 11.326 of July 24, 2006 establishes the guidelines for formulating the National Policy for Family Farming and Rural Family Enterprises (Brasil, 2006). According to this law, family farmers are those who meet four criteria: whose property is smaller than four fiscal modules; use of predominantly family labor in economic activities; main income from the property's activities; and that the enterprise is managed by family members (Velden et al., 2022; Brasil, 2006).

Family farming in this process plays a fundamental role as a complex unit in animal husbandry and crop production that are interrelated on small farms and, with little capital investment and limited use of external labor, obtain a regular supply of food and adequate income (Toro-Mujica & Riveros, 2021). These farms generally carry out a type of agriculture where livestock and crops are usually integrated (Toro-Mujica & Riveros, 2021).

The income of family farmers is often below the minimum wage, generating social discomfort due to limited land ownership and low levels of capital (Castro et al., 2019; Velden et al., 2022). Given this reality, rural entrepreneurship within family farming can play an important role in the development of more profitable sustainable practices such as: agro-tourism, production and marketing of natural products, organic

vegetable production, reduction of agricultural waste, sustainable soil management, biological pest management with reduced use of pesticides, as well as the preservation of rural landscapes, natural habitats and natural resources, minimizing negative environmental impacts (Aniah & Yelfaanibe, 2016; Hosseinzade et al., 2018).

In addition, rural entrepreneurship allied to family farming, by carrying out sustainable practices, should achieve the integration of the sustainable development process through the three dimensions of sustainability (economic, social and environmental) (Elkington, 1994), where long-term employment and the stability of agricultural income can minimize the effects of issues relating to soil erosion and degradation, inappropriate use of fertilizer and pesticides, as well as stimulating investments in agricultural research and extension services (D'Silva et al., 2011; Keiko Yamaguchi et al., 2020; Liontakis & Tzouramani, 2016).

The transition from traditional production practices to sustainable practices that preserve the environment with maximum reuse of resources and minimization of waste generation could represent a market opportunity that benefits family farmers (Velden et al., 2022). Among sustainable practices, closed-loop systems on small farms, which apply circular economic principles, not only have the potential to reduce negative environmental impacts, but also improve soil efficiency, which can recover nutrients and energy, offsetting additional costs, as well as optimizing the results of these enterprises (Castro et al., 2019; Velden et al., 2022).

2.2 Sustainability and the Circular Economy

Elkingon (1994) coined the term Triple Bottom Line (TBL) and argues that sustainability represents a balance between three pillars: environmental, economic and social. The economic pillar focuses on the company's financial performance, including its ability to generate profit and its efficiency in allocating resources. The social pillar encompasses the dimensions related to people, covering aspects such as the fair treatment of employees, respect for human rights and community involvement. Finally,

the environmental pillar refers to the consideration of the environmental impacts and responsibilities of the organization's operations, including the reduction of the carbon footprint, conservation of natural resources and ecologically responsible practices.

TBL emphasizes that an organization's true success should not only be measured by financial profit, but also by its social and environmental impact, promoting a balance between these three dimensions for a more sustainable and responsible business approach. This vision is in line with the concept of sustainable development outlined in the Brundtland Report (Brundtland, 1991), which is based on the idea of a development model that seeks to meet the needs of the current generation without harming the ability of future generations to meet their own needs. This concept implies balancing economic, social and environmental progress, ensuring that the exploitation of natural resources and economic growth occur in a responsible and conscious manner, preserving the environment and guaranteeing social justice in the long term (Horbach, 2005; Parrish, 2010; Sartori et al., 2014).

The organizations are increasingly aware of the need to include environmental, social and economic dimensions in different management models in pursuit of sustainability (Bansal et al., 2022; Ghisellini et al., 2016). With increasing pressure on organizations to become sustainable through environmentally appropriate practices, CE has emerged as an alternative model to the traditional (linear) economic system to promote sustainable development (Bansal et al., 2022; Suchek et al., 2022).

CE has received increasing attention in academic literature because of the way it proposes the reuse of materials in subsequent production cycles, minimizing waste generation and making the most of resources (Aguilar-Hernandez et al., 2021; Geissdoerfer et al., 2017). Incorporating the concept of CE means redesigning products and processes so that raw material use and waste are eliminated or minimized in the production and post-consumption system (Ghisellini et al., 2016). In this sense, CE plays a fundamental role in the current global framework proposed by the 2030 Agenda for Sustainable Development (United Nations, 2015), in which it integrates

elements of economic and social development, as well as environmental protection based on innovation through the transition from a linear economy to a CE (EMF, 2019).

According to Ghisellini et al. (2016), CE is guided by the principle of the 3Rs (recycling, reduction and reuse). The recycling principle focuses on recovering waste, materials or substances from their original use for other purposes. The principle of reduction focuses on minimizing the input of primary energy, raw materials and waste through production efficiency and consumption processes. While the principle of reuse aims to use products or components that are not waste to be reused for the same purpose for which they were designed (Geissdoerfer et al., 2017; Ghisellini et al., 2016).

CE represents an economic system designed with the purpose of optimizing the use of resources in subsequent production cycles, aiming to minimize the generation of waste destined for disposal, making the most of it (Deutz, 2020; Johansson & Henriksson, 2020; Poponi et al., 2020). In this way, CE combined with entrepreneurship can contribute to both social well-being and the economy, with an orientation towards sustainability as a competitive advantage (Dean & McMullen, 2007; Neumeyer et al., 2020).

In order to understand the theoretical foundations and build better sustainable and circular practices in business ecosystems, entrepreneurship can contribute to the creation of new business models that promote the necessary changes, for the transition from linear business practices that need to be re-examined and adjusted, to circular practices, aligned with the principles of sustainable resource and waste management, as advocated by the CE (Dean & McMullen, 2007; Joyce & Paquin, 2016; Neumeyer et al., 2020).

There are many environmental and social problems caused by the undue exploitation of natural resources and the intense pursuit of economic results (EMF, 2013). Faced with this reality, it is necessary to adopt sustainable practices in companies, not only as a way of complying with legislation, but also to promote economic results, the preservation of natural resources and social inclusion, as a way of achieving the goals proposed by the triple bottom line (Elkington, 1994). CE can

make a positive contribution to solving these problems (Kirchherr et al., 2017). This is why CE has emerged as a new paradigm, standing out and proposing to overcome the contradiction between the economic and the environmental, reinforcing the idea that resources should be kept in the process for as long as possible and with minimal loss of quality (Kirchherr et al., 2017; Tiossi & Simon, 2021).

3 METHODOLOGY

This current study is a Systematic Literature Review (SLR). It is a qualitative research whose data collection and analysis can be used to describe or construct a theory or to refine an existing theory (Shah & Corley, 2006). RSL is a method that has been widely used in studies on CE and Rural Entrepreneurship (Merli et al., 2018), as it synthesizes existing studies by carrying out a predefined search strategy and adopting quality criteria for each primary study (Kitchenham & Charters, 2007). In order to establish this RSL quality standard, the adoption of a pre-defined research protocol is fundamental and aims to reduce the possibility of researcher bias, in addition to complying with the criteria of transparency, standardization and replicability (Kitchenham & Charters, 2007; Kraus et al., 2020; Tranfield et al., 2003).

3.1 Search Strategy

A survey was carried out of publications related to the concepts of CE, rural entrepreneurship, sustainability and family farming in the adoption of sustainable practices, in an attempt to answer the proposed research problem, as well as the established objective.

The databases were searched using various synonyms for the keywords and following the procedures established in the research protocol. The search strings used were: (“circular* economy**” OR “circular* economy* practices**”) AND (“entrepreneur* rural**” OR “entrepreneur***” OR “rural* entrepreneur**”) AND (“famil* agricult**” OR “famil* farm**” OR “sustain*” OR “sustainable* practices**”),

which are detailed following the criteria proposed by Kitchenham and Charters (2007); Kraus et al. (2020) and Tranfield et al. (2003), according to the search protocol described in Table 1.

Table 1 – Research protocol

Research Protocol	Description
Data base	Web of Science (WoS) and Scopus
Type of publication	Peer-reviewed article and review
Language	English
Period Areas	Publications up to May, 2022
Search fields	Title, abstract and keywords.
Search terms	(“circular* economy**” OR “circular* economy* practices**”) AND (“entrepreneur* rural**” OR “entrepreneur***” OR “rural* entrepreneur**”) AND (“famil* agricult**” OR “famil* farm**” OR “sustain*” OR “sustainable* practices**”)
Inclusion criteria	Peer-reviewed articles; circular economy approach, rural entrepreneurship, sustainability and family agriculture
Exclusion criteria	Not related to the search strings; not related to rural entrepreneurship, sustainable practices and circular economy.

Source: Prepared by the authors (2022)

Were collected until May 2022 a total of 224 articles published in peer-reviewed journals, freely available through the Federated Academic Community (CAFe) through the university’s agreement with the Coordination for the Improvement of Higher Education Personnel (CAPES) in the Scopus and Web of Science (WoS) databases, were collected until May 2022. These databases were selected because they include a large volume of peer-reviewed journals, which are generally used for RSL studies (Farrington et al., 2017). In the next stage, in order to refine the sample collected, some filters were set: only articles, peer-reviewed articles, all areas of study and only in English (Kitchenham & Charters, 2007; Tranfield et al., 2003).

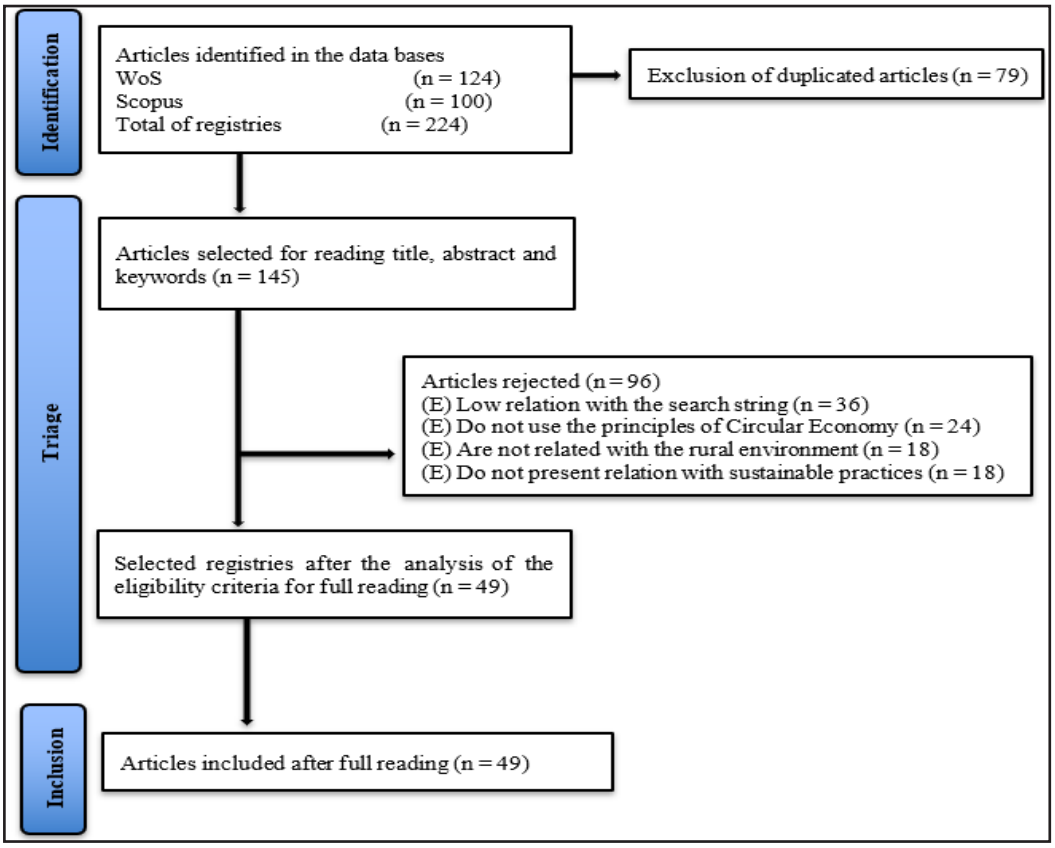
In order for the research to cover a longer period, with the aim of better understanding the progress of the topic and the possible contributions presented in the time interval, there was no limitation in relation to the search period analyzed,

thus observing new publications and citations on this emerging topic (Farrington et al., 2017). After these procedures, the sample was reduced to n=145 articles.

3.2 Study Selection

At this stage of the research, the studies were grouped together using Rayyan software. The software identified 79 duplicate studies, which were excluded from the sample. Next, the title, abstract and keywords of each selected article were analyzed, and the inclusion and exclusion criteria were applied, culminating in the exclusion of 96 articles that were not relevant to this study. After applying these exclusion criteria, the primary research produced a total of 49 selected articles, which were submitted to in-depth reading. The methodological procedures for the RSL are shown in Figure 1.

Figure 1– Design of the methodology applied in the Systematic Literature Review



Source: Prepared by the authors (2022)

Following the recommendations of Tranfield et al. (2003), for the 49 articles selected, a summary was developed with input into a data extraction table built in Microsoft Excel software, to identify the evolution of concepts and the theoretical currents used to define CE, rural entrepreneurship, family farming and sustainable practices, then these studies were classified using Rayyan software.

After selecting the studies in the proposed sample, the Atlas ti software was used as a tool to integrate the research and identify the pre-established categories according to the literature review of the selected articles (Walter & Bach, 2015). Thus, the categories were identified and defined *a priori* based on the literature surveyed. Table 2 shows the categories defined.

Table 2 – Categories of the practices defined in the analyzed studies

Code	Definition
ECE	Circular Economy in Entrepreneurship
ECA	Circular Economy in Agriculture
ECD	Circular Economy in Designer
ECS	Circular Economy in Sustainability

Source: Prepared by the authors (2022)

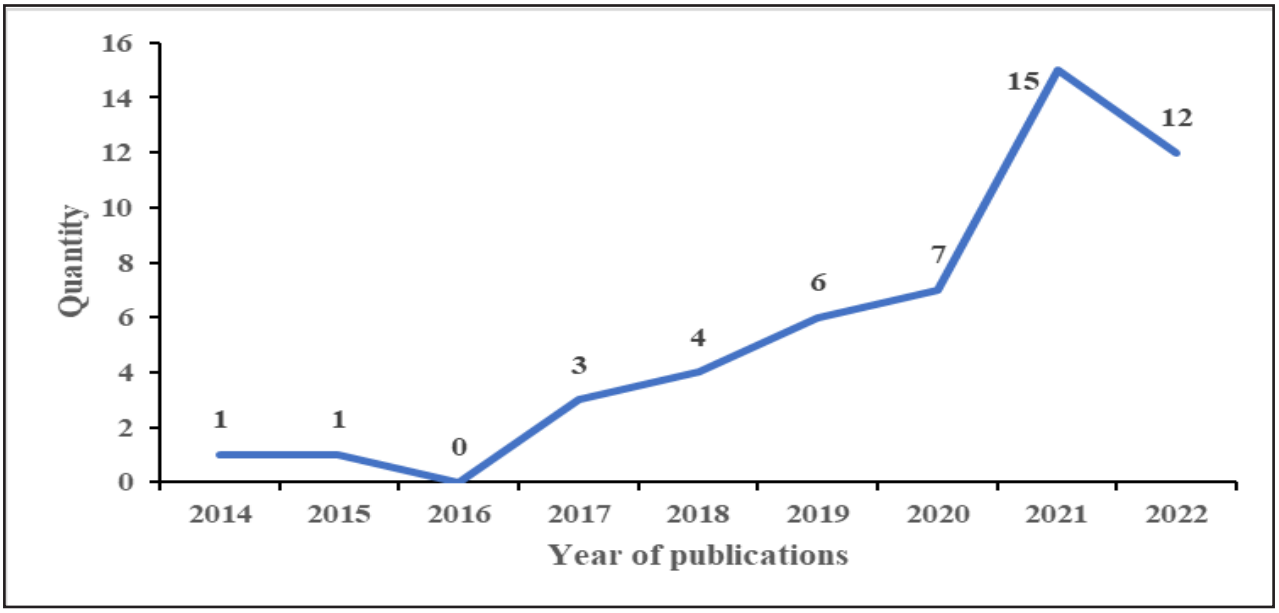
With the help of Atlas.ti, it was possible to establish relationships between the articles analyzed and the categories established *a priori* and, from this, carry out an inductive analysis of the content of the studies (Woods et al., 2016). In addition, using the Excel spreadsheet, the methods, data collection techniques and approaches used in the studies that make up this RSL were identified and checked using Atlas.ti.

4 ANALYSIS AND DISCUSSION OF RESULTS

In the sample of this RSL, it was possible to see that studies relating CE, rural entrepreneurship, family farming and sustainable practices, the focus of this research, began to be published in 2014 and that there has been a significant increase in the

number of publications since 2021, demonstrating the emergence and importance of the topic for sustainable development objectives in general, as shown in Figure 2.

Figure 2: Evolution of publications on CE, rural entrepreneurship, family farming and sustainable practices



Source: Research data (2022)

Of the 49 articles retrieved from the databases, 23 were published in 4 main scientific journals, representing 46.9% of the sample. The remaining 26 articles were published in 24 journals, representing 53.1% of the sample, as shown in Table 3.

Table 3 – Scientific journals that published the most

Periodicals	Absolute Freq.
1. Sustainability	9
2. Journal of Cleaner Production	7
3. Journal of Business Strategy and the Environment	4
4. Management Decision	3
5. Others	26

Source: Prepared by the authors (2022)

Among the articles analyzed, we found that the research came from 23 countries. The top five countries that published the most articles on the subject are shown in Table 4.

Table 4 – Countries of origin of the authors who published the most

Countries	Absolute Freq.
1. The Netherlands	9
2. Italy	6
3. Sweden	5
4. The United States	5
5. Brazil; Portugal; The United Kingdom	3
11. Others	20

Source: Prepared by the authors (2022)

Most of the articles published come from European countries with over 37% of the publications (Netherlands: 16.7%; Italy: 11.1%; and Sweden: 9.3%). The United States accounted for 9.2% of publications. Brazil came in fifth place, along with Portugal and the United Kingdom, with 5.6% of the articles published. The other countries published 20 articles, which corresponds to 37% of the sample.

Publications on CE, rural entrepreneurship, sustainability and family farming are concentrated among around 129 authors. The authors who contribute most to this line of research have published at least two articles (18.6% of the sample), while there are another 120 authors with only one published study (Table 5).

Table 5 – Authors who most published

Authors	Absolute Freq.
Brown P.	4
Bocken N.	3
Hull C. E.	3
Kirchherr J.	3
Millette S.	3
Baldassarre B	2
Balkenende R	2
Bosone M.	2
Callegaro-de-menezes D.	2

Source: Prepared by the authors (2022)

With regard to the most cited authors in the sample, it was observed that the first most cited author has more than 260 citations in his article and the five most cited authors in the sample have at least 70 citations in each of their published articles, according to Table 6. It is important to note that this survey was carried out based on the information provided by the databases consulted, Web of Science and Scopus, which highlights the notoriety of these authors in academic literature and their significant contributions to these areas of research.

Table 6 – Most cited works

Most cited works	2017	2018	2019	2020	2021	Total of citations
Linder & Williander (2017)	14	35	58	75	87	269
Despeisse et al. (2017)	7	20	27	52	49	155
Nosratabadi et al. (2019)	0	0	11	43	60	114
Todeschini et al. (2017)	1	5	15	34	53	108
Curtis & Lehner (2019)	0	0	8	30	39	77

Source: Prepared by the authors (2022)

4.1 Methodological Survey

After an in-depth reading of the final sample of 49 selected articles, it was possible to identify the methodological proposal, as well as the techniques used in the research carried out on CE, rural entrepreneurship, family farming and sustainable practices. The vast majority of the studies were empirical (63%), with a total of 31 studies. The remaining studies in the final sample (37%) were theoretical studies, 17 of which used qualitative methods, while 1 used quantitative methods. Of the sample of 49 articles, a total of 42 studies used qualitative methods. Of these studies, 4 used quantitative methods, while 3 studies used mixed methods (qualitative and quantitative), as shown in Table 7.

Table 7 – Methodology adopted in the studies analyzed

Method	Author (date)	Approached themes
Theoretical Empiric Qualitative (n = 25)	(Ariztia & Araneda, 2022; Borrelli, 2018; Brown et al., 2019; Bux & Amicarelli, 2022; Coghlan et al., 2021; Colpo et al., 2022; Cramer, 2020; Cullen & De Angelis, 2021; Donner & Radić, 2021; Droege et al., 2022; Gaudig et al., 2021; Gravagnuolo et al., 2021; Henry et al., 2022; Hrušovská et al., 2020; Hull et al., 2021; Kahupi et al., 2021; Linder & Williander, 2017; Martín Martín et al., 2022; Miranda et al., 2021; Mochalova et al., 2021; Pla-Julián & Guevara, 2019; Poponi et al., 2020; Reckinger, 2018; Wasserbaur et al., 2022; Zhu et al., 2019)	Boost sustainability; circular entrepreneurship; sustainability; residues; business models; negative impacts; environment; retail of local food; social innovations; agri-ecological practices; cooperative governance; practices workshops; climate changes; non-sustainable products; competitive advantages; sustainable entrepreneurs; global barriers; circular agriculture; emergent economies.
Theoretical Empiric Quantiative (n = 3)	(Kostakis & Tsagarakis, 2022; Le et al., 2022; Viaggi, 2015)	Innovation in agriculture; environmental performance; livestock farming; development of bio-economy; Eco-innovation; life cycle assessment; sustainability of services human development index; CE practices; supply chain; structural equation modeling; horticulture industry; productive greenhouses; agrobiodiversity; ecosystem services; biomass; bio-resources.
Theoretical Empiric Mixed Method (n = 3)	(Brown et al., 2021; Del Vecchio et al., 2021; Zamfir et al., 2017)	Design thinking; workshops; circular innovation; Entrepreneurship Innovation; entrepreneurship education; competences and abilities; emergent tendencies; stakeholders; learning process; theme areas; CE business model; decision tree model.
Theoretical Qualitative (n = 17)	(Bansal et al., 2022; Brás & Moniz, 2021; Conlon et al., 2019; Dentchev et al., 2018; Dobermann et al., 2022; Heshmati, 2017; Johansson & Henriksson, 2020; Kuzma et al., 2021; Lammerts van Bueren et al., 2018; Manea et al., 2021; Narayan & Tidström, 2020; Neumeyer et al., 2020; Nosratabadi et al., 2019; Refsgaard et al., 2021; Suchek et al., 2022, 2022; Vermeulen et al., 2020; Zhu et al., 2022)	Entrepreneurship; CE; multiannual plan; resources management; sustainable economy; sustainable development; technosphere; global industries; sanitary landfill; waterways; new business models; eco-designs; sustainable production; entrepreneurship analysis; market environment; creation of networking and value net; market environment innovation; value networks; innovation in production; regional development; theory and practice of CE.
Theoretical Quantitative (n = 1)	(Asciuto et al., 2019)	Aquaponics; sustainable food production; non-agricultural land; agricultural inputs; residual waste; aquatic plant; technical data; break-even-point; operating costs; business plans; aquaponic entrepreneurs.

Source: Elaborated by the authors (2022)

It was observed that in the qualitative methodology studies (n = 42), the predominant methods were respectively multiple case studies, focus groups, interviews (with a semi-structured script, in-depth, face-to-face), in local or national communities. For data collection, the predominant technique was the in-depth interview with an interpretative approach. In this RSL, it was possible to observe that in most of the articles in which interviews were carried out, the data was predominantly processed using inductive content analysis.

In the analysis of studies using quantitative methodologies (n = 4), there was a predominance of the multivariate analysis method. The main statistical techniques used were structural equation modeling and numerical analysis. In the mixed methodology studies (n = 3), the main procedures adopted were semi-structured interviews and content analysis; and the application of decision tree models, with logistic regression techniques, multivariate discriminate regression and neural network models (Brown et al., 2021; Del Vecchio et al., 2021; Zamfir et al., 2017).

4.2 Thematic Analysis of the Studies

The analysis of the 49 articles selected revealed four distinct categories: a) studies whose main focus is the concept of CE practices in entrepreneurship; b) studies that focus on highlighting the main CE practices in agriculture; c) studies that highlight CE practices in designers; and d) studies that highlight sustainable CE practices, as shown in Table 8.

Table 8 – Codes applied in the studies analyzed

Codes	Categories	Authors	Subjects approached in the articles
ECE	Practices of Circular Economy in Entrepreneurship	(Bansal et al., 2022; Cullen & De Angelis, 2021; Dentchev et al., 2018; Droege et al., 2022; Gaudig et al., 2021; Henry et al., 2022; Heshmati, 2017; Hull et al., 2021; Kahupi et al., 2021; Kuzma et al., 2021; Manea et al., 2021; Martín Martín et al., 2022; Mochalova et al., 2021; Neumeyer et al., 2020; Nosratabadi et al., 2019; Refsgaard et al., 2021;Suchek et al., 2022; Zamfir et al., 2017; Zhu et al., 2019)	Business management; circular entrepreneurship; opportunity entrepreneurship; necessity entrepreneurship; policy entrepreneur; innovation; entrepreneurial motivation and identity; barriers; innovation; entrepreneur behavior, up-cycling, rural tourism; COVID-19, entrepreneurial ecosystems; sustainable business model; SMEs, entrepreneur process; decision tree; circular business; entrepreneur strategy; gender economy.
ECA	Practices of Circular Economy in Agriculture	(Castro et al., 2019; Coghlan et al., 2021; Conlon et al., 2019; Dobermann et al., 2022; Donner & Radić, 2021; Lammerts van Bueren et al., 2018; Miranda et al., 2021; Martín Martín et al., 2022; Poponi et al., 2020; Vermeulen et al., 2020; Zhu et al., 2019)	Food security; food systems and agro-ecosystems; residues; improvement strategies; circular agri-food systems; circular agriculture; agricultural practices; urban agriculture; Green jobs; Sustainable environment; Rural tourism; Horticulture circular agri-food systems.
ECD	Practices of Circular Economy on Designer	(Bansal et al., 2022; Brown et al., 2021; Coghlan et al., 2021; Cullen & De Angelis, 2021; Donner & Radić, 2021; Droege et al., 2022; Gravagnuolo et al., 2021; Henry et al., 2022; Heshmati, 2017; Hull et al., 2021; Johansson & Henriksson, 2020; Kahupi et al., 2021; Kuzma et al., 2021; Manea et al., 2021; Miranda et al., 2021; Neumeyer et al., 2020; Refsgaard et al., 2021; Suchek et al., 2022; Zamfir et al., 2017; Zhu et al., 2019)	Circular agriculture; circular business model; circular entrepreneurship; policy making; motivation and identity; barriers; competitive advantage; COVID-19, Business ecosystems; SMEs; decision making; circular food economy; bio-economy; residues and sub-products; Agricultural business; governance mechanisms; emergent economies; collaborative innovation; environmental politicy.
ECS	Practices of Sustainable Circular Economy	(Bansal et al., 2022; Brown et al., 2021; Coghlan et al., 2021; Conlon et al., 2019; Dentchev et al., 2018; Donner & Radic, 2021; Droege et al., 2022; Gaudig et al., 2021; Heshmati, 2017; Kahupi et al., 2021; Kuzma et al., 2021; Miranda et al., 2021; Neumeyer et al., 2020; Nosratabadi et al., 2019; Zamfir et al., 2017)	Business sustainability. Cooperate sustainability; sustainable public policies; innovation; sustainable business model; sustainable business decisions; SDGs/UN perceived values; residual conversion ; regenerative sustainable industrial development; sustainable products; value chain; sustainable management of resources and residues.

Source: Prepared by the authors (2022)

a) Circular Economy Practices in Entrepreneurship: entrepreneurial circular practices play a key role in promoting business models that address environmental degradation, representing opportunities and new for-profit ventures as a complement to regulations, corporate social responsibility and individual environmental activism in the search for solutions to environmental challenges (Bansal et al., 2022; Heshmati, 2017; Neumeyer et al., 2020).

These entrepreneurial practices inspire the transition towards a CE through the implementation of innovative business models and the introduction of new technologies to optimize organizational processes, ensuring sustainable growth through entrepreneurial actions aimed at sustainable business (Bansal et al., 2022; Kuzma et al., 2021; Martín Martín et al., 2022; Nosratabadi et al., 2019).

The new business model designs seek to highlight the role of CE principles in various elements and stages of the processes, including strategic business models, managerial decision-making, the company's economic performance, human resource management practices, business intelligence and knowledge sharing, relations with suppliers and customers, entrepreneurial orientation and family control in the business (Bansal et al., 2022; Suchek et al., 2022).

The uncertainties surrounding the environment represent significant opportunities for innovative entrepreneurial practices, taking risks in developing new initiatives to address these market failures, make new discoveries and exploit opportunities to promote the more efficient and natural use of resources, thus contributing to promoting the development of an ecologically sustainable economy (Kuzma et al., 2021; Suchek et al., 2022). Thus, circular entrepreneurial practices contribute to the creation of new business model designs with circular characteristics, requiring sustainable practices in the reorganization of business processes and partnerships to establish a structure that supports and is compatible with sustainability (Bansal et al., 2022; Henry et al., 2022; Neumeyer et al., 2020).

b) Circular Economy Practices in Agriculture: one of the fundamental concerns for the new generations is the ability to guarantee sustainable food production systems and the implementation of resilient agricultural practices. These practices not only seek to increase productivity and production, but also play a key role in maintaining ecosystems, strengthening the capacity to adapt to climate change, extreme weather conditions, droughts, floods and other disasters. In addition, these practices aim to progressively improve land and soil quality (Coghlan et al., 2021; Dobermann et al., 2022; Donner & Radić, 2021).

A production aligned with good agricultural practices that respect the environment and guarantee sustainable development are the main drivers of agricultural production, while preserving the environment (Donner & Radić, 2021; Lammerts van Bueren et al., 2018). Biodiversity and ecosystem services are considered key factors (Lammerts van Bueren et al., 2018), regulating and sustaining the environment in agroecosystems. This includes ensuring future food production, contributing to natural pest control, pollination, nutrient recycling, soil conservation, provision of quality water, carbon capture and promoting sustainability in the environment (Coghlan et al., 2021; Donner & Radić, 2021; Lammerts van Bueren et al., 2018).

To contribute to this trajectory, CE is emerging as a key approach to reducing the amount of waste generated in the agroecological system. It focuses on valorizing and adding value to agricultural or food waste and by-products, promoting nutrient recycling and the transition to more sustainable and efficient production and consumption patterns (Coghlan et al., 2021; Donner & Radić, 2021).

The agricultural practices are aligned with the principles of CE, they represent a new alternative for reconciling economic growth with the responsible use of natural resources. This approach seeks to close resource cycles, considering the economic and environmental dimensions, and promoting the development of sustainable economic systems (Coghlan et al., 2021; Dobermann et al., 2022; Lammerts van Bueren et al., 2018).

c) Circular Economy Practices in the Designer: CE is based on redefining the way products are designed, produced and marketed, with the aim of ensuring the intelligent use and recovery of natural resources in a sustainable way (Henry et al., 2022; Suchek et al., 2022). To this end, business models seek to develop mechanisms that facilitate the implementation of circular practices at all stages of the processes. This implies promoting a holistic implementation of these practices in companies, favoring the systemic and disruptive change that CE requires (Coghlan et al., 2021; Henry et al., 2022; Zhu et al., 2019).

It is important to note that human factors play a significant role in the implementation of CE. This involves making people aware of new ways to reduce their impact on the extraction of natural resources, reducing waste production, ensuring a longer lifespan for materials used in production, through circular practices (Bansal et al., 2022; Henry et al., 2022; Suchek et al., 2022).

Circular practices are closely related to the framework of corporate sustainability (Johansson & Henriksson, 2020; Zamfir et al., 2017). In this respect, circular practices contribute to both economic growth and environmental resilience, taking on the role of a circular business model. This is based on the principle of material balance, emphasizing that the circulation of matter and energy will be reduced through the use of new inputs (Henry et al., 2022; Suchek et al., 2022; Zamfir et al., 2017).

Nowadays, CE is emerging as a new sustainability paradigm and a new economic model that is an alternative to the traditional linear model, which is based on the "take-make-use-discard" principle (Bansal et al., 2022; Miranda et al., 2021; Zamfir et al., 2017). It offers an approach that promotes maximizing the value of resources and minimizing waste.

d) Sustainable Circular Economy Practices: the circular business model requires significant reorganization of business processes and partnerships to create a solid structure that supports sustainability (Kuzma et al., 2021). This goes beyond the conscious use of resources and energy; it is about the effective systemic insertion of sustainable practices (Kostakis & Tsagarakis, 2022; Kuzma et al., 2021; Suchek et al., 2022).

This approach implies strategic planning and an orientation towards long-term results, promoting the creation of circular business models that require the reorganization of business processes and partnerships to create a structure that supports sustainability (Kahupi et al., 2021; Kuzma et al., 2021). With entrepreneurship playing a key role in both social well-being and the promotion of an ecologically sustainable economy (Suchek et al., 2022), the emphasis on sustainable practices can become a competitive advantage, driving the need for new products and services that seek balance with CE principles and that adopt or develop sustainable resources and waste management technologies (Neumeyer et al., 2020).

On this path, creating business opportunities based on the transition to a CE, facing sustainability challenges such as resource scarcity, pollution and climate change (Neumeyer et al., 2020), favors the creation of new products and services with a design focused on replacing non-sustainable products and services with sustainable alternatives, with greater added value and innovation. This requires the implementation of new sustainable practices in various branches of activity (Brown et al., 2021; Kahupi et al., 2021). In this context, the close link between agriculture and the natural ecosystem allows for the creation of a harmonious process in which it is possible to establish a circular flow of materials and energy. This favors environmental protection and resource conservation, contributing to awareness in the implementation of an agrocircular economy. The expectation is to achieve better energy exploitation, promote ecological reproduction, make comprehensive use of agricultural waste and establish agricultural ecotourism patterns (Heshmati, 2017; Kahupi et al., 2021; Neumeyer et al., 2020).

4.3 Future Research Agenda

After the in-depth analysis of the articles that made up this systematic literature review, insights for future research emerged, based on the indications in the articles, which have been systematized and are presented in Table 9.

Table 9 – Insights for future researches

Future researches	Author (Date)
Action-research approach in a patrimony community that may play a meaningful role for the recognition, adaptive reuse and valorization of cultural heritage, from an entrepreneurial perspective, adopting the CE paradigm.	(Gravagnuolo et al., 2021)
Descriptive studies to provide answers on the extent to which point entrepreneurs have the potential to create sustainable economies that require insights into how to transform economies into sustainable systems by providing sustainable products and services.	(Suchek et al., 2022)
Researches that reviews linear business practices aligned with the principles of sustainable resource and waste management, as well as with CE, may bring important contributions to the society and the academy.	(Neumeyer et al., 2020)
Studies that make an international comparison between rural tourism companies that work with the reuse of materials and objects that are not used and are reused to generate added value (upcycling) in different regions and analyze their differences in terms of resources and infrastructure.	(Martín Martín et al., 2022)
Spin-offs studies as drivers of CE, with emphasis no public and private policy actions to encourage sustainability and circularity.	(Poponi et al., 2020)
Researches that uses quantitative methods and tools to support the decision making process in measuring different concepts of economic, environmental and social business models.	(Bansal et al., 2022)

Source: Prepared by the authors (2022)

5 FINAL CONSIDERATIONS

This study aimed to provide an up-to-date survey of bibliographic research related to the concept of rural entrepreneurship, circular economy, sustainable practices and family farming. Considering that these are emerging themes with a wide repercussion and impact on society as a whole, the articles analyzed addressed a variety of issues, including new business models in food CE, the adaptive reuse of abandoned heritage resources, promoting efficient waste management as a basis for CE with articulation of global value chains, business model innovation, with an emphasis on the circular bioeconomy.

Based on the analyses carried out, it was possible to see that studies on the subject are quite fragmented and are evolving rapidly, given the urgency of measures

to minimize the environmental impacts caused by human activity, as well as the need to promote food security and the absolute use of resources extracted from nature.

CE and rural entrepreneurship play key roles in promoting sustainable practices to minimize environmental impacts. The permanent gaps in solving economic, social and environmental problems need continuous support, and CE has emerged as an important and current approach that promotes the adoption of sustainable practices in the transition to more sustainable agricultural production (Jugend et al., 2020). These circular practices not only benefit economic interests, but also generate positive social and environmental impacts.

Based on the inductive thematic content analysis carried out using Atlas ti software, it was possible to group the studies into four main categories:

(a) Circular Economy Practices in Entrepreneurship: Studies in this category highlighted the crucial role of entrepreneurship in promoting sustainable business models in line with circular economy principles.

(b) Circular Economy Practices in Agriculture: Research focused on agricultural practices has highlighted the implementation of sustainable and resilient systems aimed at increasing productivity, preserving nature and adopting practices such as organic production, reducing agricultural waste and sustainable soil management.

(c) Circular Economy Practices in the Designer: This category emphasized the importance of rethinking the design, production and marketing processes of products in order to guarantee the sustainable use and efficient recovery of natural resources.

(d) Sustainable Circular Economy Practices: Studies in this category have addressed the reorganization of business processes and partnerships to create a structure that promotes sustainability in circular business models.

Although this research has been focused on articles published in journals, future research could broaden the scope to include articles published in the annals of academic events, given that these studies are also peer-reviewed. In addition, few studies have been carried out using quantitative methodology, and this is a limitation

of the literature, as it makes it impossible to generalize the results due to the small samples. Therefore, future research using quantitative approaches could make a significant contribution to supporting decision-making in circular business models.

Both CE and sustainability share the objective of balancing the environmental, social and economic dimensions. While CE focuses on the rational use of the environmental system, sustainability seeks to guarantee the well-being of future generations through the responsible use of environmental resources. This study highlights the importance of these interconnected themes and aims to stimulate the development of future research that further explores rural entrepreneurship, circular economy, sustainable practices and family farming.

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1. Definition of research problem	√	√	√
2. Development of hypotheses or research questions (empirical studies)			
3. Development of theoretical propositions (theoretical work)	√	√	√
4. Theoretical foundation / Literature review	√		√
5. Definition of methodological procedures	√	√	√

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