sustainability

MDPI

Review

Perspectives of Circular Economy in Romanian Space

Horațiu Vermeșan *, Alexandrina Mangău and Ancuța-Elena Tiuc *

Faculty of Materials and Environmental Engineering, Technical University of Cluj-Napoca, Bd. Muncii 103-105, 400114 Cluj-Napoca, Romania; alexandra_alexa198@yahoo.com

* Correspondence: horatiu.vermesan@imadd.utcluj.ro (H.V.); ancuta.tiuc@imadd.utcluj.ro (A.-E.T.)

Received: 14 June 2020; Accepted: 20 August 2020; Published: 22 August 2020

Abstract: The circular economy (CE) is a popular concept in the European Union (EU) space, which has been the subject of numerous research and substantiation activities. In the last years, there has been a growing interest in Romania regarding the characteristics of this new economic model and the principles on which it works. Referring to Romanian specialized literature currently available regarding the submitted topic, we consider that the theoretical part is insufficiently structured. In addition, by pointing out the applicability of the circular economy in Romanian space, we consider this to be represented mainly by the fragility of its effective and practical implementation. The examples of Romanian successes in the field of circular economy are limited, a fact that can be explained—from our perspective—through the aspect that in other EU countries, the process of development of CE has some precedents, a stronger background and a "self-constructed" history in the topic. There is undoubtedly a necessity for adopting this new economic model, considering that, for the most part, Romanian economy is still dependent on the linear economic system. Starting from these arguments, the proposed article uses a thematic debate of the notion of circular economy, presenting, at the beginning, an incursion into the predominantly European variety of theoretical approaches. The selection of definitions and conceptualization is continued with an analysis of the stage of implementation of CE in Romania. The purpose of this approach is to investigate a niche identified in the Romanian space, not covered in the specialized scientific research and to expose the specificity of the process of transition of Romania to a circular economy, of the barriers encountered—namely, the problem related to the attitude and mentality regarding this new concept. We also point out that the intention of the study is to integrate a "different" contemporary and very current economic concept into a real economy, and at the same time, to increase the visibility of its application at the level of a member country of the EU. The challenges encountered in the context of the increasingly present tendency in Romania of assimilating and complying with the precepts of the circular economy are also detailed, proposing, at the end of the study suggestions for improving the gaps identified at this level. The most realistic implementation of the circular model in Romania represents a qualitative plus for the human-society factor, as well as for the environment. In conclusion, we note that, despite the evolution of the number of theoretical approaches and concerns, the field of circular economy and the perspectives it proposes, continues to offer a favorable ground for further research.

Keywords: circular economy; sustainability; resources use; Romania; legislation

1. Introduction

During the last years, it has been shown a growing interest by the academic and nonacademic environment to circular economy (CE), perceived as a concept in continuous evolution, which adjusts and consolidates its definition, boundaries, principles and associated practices [1]. According to the specialized literature, CE is assimilated to a concept currently widely promoted, both within the EU (Germany, France, The Netherlands, Sweden, Finland) and by the national governments of countries such as China, Japan, Canada, the UK and the business environment everywhere [2–7].

CE is explained as "a new development paradigm, (supported by the European Union), which is, in fact, an "old" one moved upwards on a dialectical spiral so that it connects and resonates with the spirit and realities of our times" (p. 78 in [2]). Being perceived as "a political vision around the world in recent years", CE is promoted as "a novel pathway to sustainable development, with sustainable development defined via the triple bottom line concept as simultaneously accomplishing economic performance, social inclusiveness and environmental resilience to the benefit of current and future generations" (p. 1 in [5]).

According to Korhonen et al. [8], CE is described as a notion of topicality within the various means of political support and is appreciated as "a promising concept" among the business community, which was involved through it in the process of materializing the sustainable development of the environment and the development of the economy. Furthermore, the same author argues that it is impossible to elaborate a single definition on the circular economy, as this approach could lead to the exclusion or the blurring of certain valences and nuances of this dynamic notion.

The dynamism of the notion is further affirmed by another formulation, which appreciates the non-static character of the definition of CE, respectively the enrichment of its content through new principles and proposals, such as those of regenerative design, performance economy, cradle-to-cradle and industrial ecology [1]. The singularity of definition is also invalidated in the same sense, in that the author of the study admits the coexistence of several definitions of CE This is explained in that the notion of circular economy does not have a limited character, has undefined boundaries, being in a perpetual evolution and metamorphosis.

Yuan and Moriguichi (p. 5 in [9]) state that "there is no commonly accepted definition of CE so far". Further, Kirchherr et al. [10] point out that there is a lack of common and shared definition and it was not possible to identify not one study to have systematically investigated and balanced the scope of circular economy definitions. In a similar manner, Rizos et al. [11] conclude that in academia there is no common agreement over its definition.

The aforementioned information highlights the dynamic, flexible, progressive character of the circular economy [12], which automatically enforces a concern to develop the concept itself (in order to crystallize the conceptual aspects regarding the circular economy).

Regarding the circular economy applicability perspective in Romania, we consider the fact that the economic model promoted at European level met lately a fertile ground, auspicious to its manifestation and implementation. However, it encountered barriers in its path, especially at the conceptual and attitude level: the lack of a theoretically consistent framework regarding the notion of circular economy, the lack of an indispensable support granted by the specialized academic literature, the skepticism and insufficient involvement of the responsible entities in the process of assimilation and compliance with the precepts of circularity. Implementation of the circular model in Romania was characterized as modest and frail (aspect widely detailed in Section 3.2.2 of the manuscript), but capable to offer positive perspectives of embodiment in the circularity of Romanian economy in the following years, to the extent that Romania understands to comply with European regulations in the field and to perform the met targets.

Having set as an objective the analysis of the concept of circular economy in the EU and its transposition into the context of the Romanian economy, the structure of the article has been thought out for analyzing the following aspects: Section 2.1. the research of specialized academic literature regarding circular economy and its definitions (this implies a synthetic analysis of the notion of CE according to the different approaches of the specialized literature); Section 2.2. an extrapolation of the CE theory towards its practical implementation; Section 3.1. a parallel presentation of the evolution of CE within the EU, respectively in Romania and Section 3.2. an analysis of the stage of implementation and applicability of the principles of the circular economic system related to the Romanian economy This last section is dedicated to discussions whether Romania is currently prepared for the circular economy, the purpose of this approach being:

- To investigate the niche identified in the Romanian space, not covered in the specialized scientific research;
- To expose the specificity of the process of transition of Romania to a circular economy;
- To provide another perspective on the subject addressed, by exposing the given results and the suggestions to improve the identified gaps in the scientific research.

2. Research Method

2.1. Incursion in Specialized Literature: CE and Its Definitions

This section intends to make a review of the theoretical aspects regarding CE, manifested in the European plan. We considered this approach even more useful as the specialized literature dedicated to studying the concept of CE is much more compelling, comparative to the Romanian one, which is mostly lacunar. In the following, we tackle the main with conceptual notions regarding the CE, offering therewith the possibility to make a personal analysis, a comparison between the existent foreign conceptual support compared to the Romanian one. In this regard, we pointed out related issues regarding the perception related to the CE concept, its origins, the evolutionary trend of the CE notion and we proposed a synthesis of some of the most suggestive definitions that captures the essence of this economic model.

The chosen working methodology consisted of a literature review, covering both academic and non-academic literature (NGOs, policy documents, press documents). The collection of informative materials, bibliographic sources and literature research was carried out in the 2018–2019 period. The academic databases that were consulted were Scopus, Web of Science, Google, Google Scholar and ScienceDirect.

The main keyword used on the search was "circular economy". It was considered useful for the documentation process to use also a synonym terminology for CE concepts, such as "closed loop economy" or "zero waste economy", considering that CE uses knowledge from several environmental and engineering fields, which also implies the interference of concepts such as: "green supply chain management", "performance economy", "cradle-to-cradle" and "industrial symbiosis", among others.

By analyzing the notion of circular economy, it is easy to see that it refers to the economy. According to some authors, it seems that the choice was made not by chance, but rather strategically, to draw more attention to this concept [13], as the effects of circularity are considered to affect the economy directly and indirectly [14].

CE is a relatively new field of research (p. 704 in [1]), (p. 760, 762 in [15]) and the specialized literature on this topic has been cataloged as insufficient [16]. Another interpretation confirms the rather conceptual theoretical character of the academic research, to the detriment of the empirical precedent [17].

Although in the academic literature the number of dedicated publications to the CE has grown at an alarming rate, more than 10 times in the last decade [15], it is still appreciated that the theoretical part remains superficially and weakly structured, as well as improperly, insufficiently exploited [13]. Various studies show concern for the study of the origin of the CE, showing that this economic model is based on the different theoretical (thinking) schools, its roots being found, in particular, in fields such as industrial ecology (IE) and ecological economics (EE) [13,18]. These promote the idea of supporting CE by means of concepts and tools already known, existing in other fields, which determines a certain linearity and routine in the information provided to the decision-makers.

Based on the analysis of the theoretical foundation and its empirical precedent, several authors [18–21] have ruled that CE belongs to the IE theory. CE is identified as an integral part of the ecosystem, with an orientation towards closing the loop of material and energy flows, assuming their optimization, the appropriate use of natural resources correlating with limiting environmental discharges [13,22–24]. Another expression emphasizes the essence of the circular economy, focusing on the study of flows of materials, energy and information exchanged between natural and industrial systems [13].

On the other hand, Kenneth E. Boulding (1966) [25], author of The Economics of the Coming Spaceship Earth and an exponent of ecological economy (EE), has argued for the unquestionable contribution of the circularity of the economic system to maintain and enhance the sustainability of humanity on Earth.

Continuing the same track, other studies [26] have identified the convergence between CE and certain concepts developed within the EE. In this regard, it is emphasized that the central element of the CE is based on the notion of efficient management of resources, a process that extends to the proper planning of economic activities, beginning just before the resources are extracted from the environment, continuing as far as their integration into the economic system [13].The same group of authors [13] notices that CE embraced and promoted the EE approach of its basic concepts regarding the scope of the economic activity in relation to the size of the environment, meant to offer the certainty that the economy does not harm the Earth's capacity of support.

Another source (p. 20 in [27]) is based on the aforementioned idea, of a positive manifestation of the circular economy, also resorting to an analysis in parallel with the perspective conferred by steady-state economics: "Steady-state economics claims that a low circulation rate of the natural system and social-economic system is necessary for us, whose aim is to keep the balance between substance and energy, namely, sustainable development. Due to its intrinsic tendency of anti-consumerism and anti-technical omnipotence, steady-state economic theory has never been the mainstream" and another author completes, stating that the evolutionary process of CE will also project its effects on improving the productivity of resources, as it changes the interest set on the recycling of waste, resorting to the adjustment of industrial structures, the development of new technologies and reforming the industrial policies (p. 5 in [9]).

Synthesizing the existing literature, from a statistical point of view, CE seems to have drawn more attention to the IE community than in the EE, being studied how IE and EE, taken separately, can form a theoretical basis for CE. In addition, there have been analyzed the theories, concepts and tools that they have in common. We searched for TOPIC "circular economy" (2910 records) and "industrial ecology" (2058 records) in Web of Science and we analyzed the results according to publication years. As can be seen in Figure 1, the term IE appeared in scientific papers since 1994 and has grown in popularity. Instead, the term CE appeared later in scientific publications, but grew greatly in popularity, far exceedingly IE.

An extremely concise characterization specifies that the notion of CE it is based "on a fragmented collection of ideas derived from certain scientific fields, including in emerging fields and semi-scientific concepts", further showing, for example, that research related to CE found a starting point in the field of engineering, in conjunction with that of industrial ecology (p. 545 in [8]). In addition, in the same sense, this outlines the contribution that CE brings from other research streams, such as: industrial ecological systems and industrial symbioses, cleaner production, product service systems, design-resistance of social-ecological systems, performance economics, natural capitalism, zero emissions concept and others, representing a natural point of departure for them.

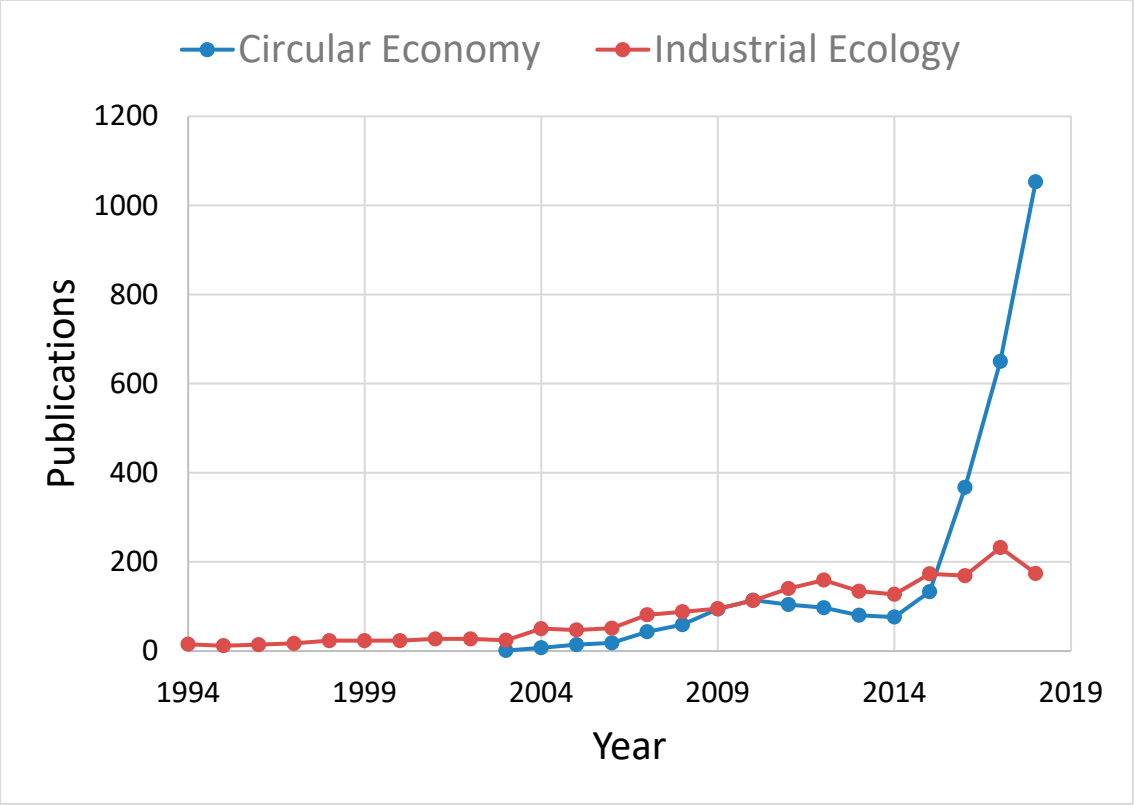

Figure 1. Yearly evolution of the number of publications in Web of Science containing the terms "circular economy" and "industrial economy".

For the purpose of completing the above specifications, we present below Figure 2, which represents a selection of another suggestive definitions regarding the CE concept:

As a pertinent observation of some authors, we recall that among academic sources there is a predominance of case studies on CE, a multitude of theoretical studies describing the implementation (p. 12 in [18]).

The review of the literature, therefore including the major publishing channels, determines the highlighting of the conceptual aspects. An analysis of the works on CE (Figure 3) shows the fact that relevant articles on CE topic have been published in journals in the category of ecological, sustainable and environmental sciences. The search was carried out on Web of Science using the keyword "circular economy" for searching on topic category. The results were analyzed and grouped by Web of Science (WOS) categories and sort by record count. The count includes early access articles that are fully peer-reviewed, citable and published.

Korhonen et al. [8] specify the role of the Ellen MacArthur Foundation (EMAF) in the CE area, considering that its discussions and initiatives represent the main academic bodies of conceptual knowledge, theories and foundations. It is also specified that this body managed to draw positive attention to CE in business, political communities, respectively in the academic environment and in society as well.

Another opinion also affirms the extraordinary contribution of this body, mentioning the interest captured by the concept of circular economy, aroused in civil society through the actions and activities initiated by The Ellen MacArthur Foundation [26].

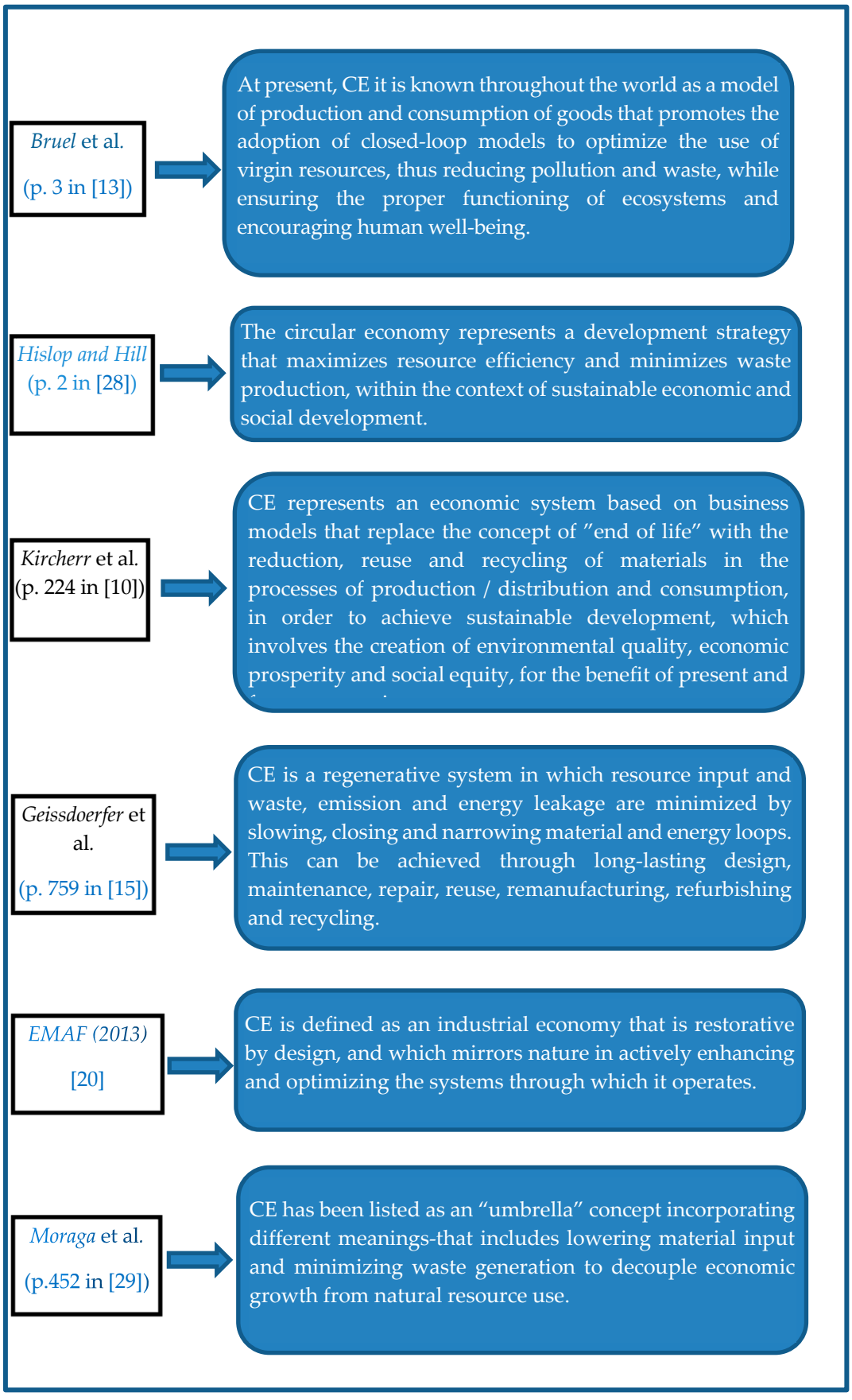

Figure 2. Definitions of the CE concept [10,13,15,20,28,29].

It is worth mentioning two of the most important initiatives of the Foundation materialized in two reports: "Growth within: a circular economy vision for a competitive Europe" [30], respectively "Delivering the circular economy: a toolkit for policymakers" [31], these representing a valuable material for theorizing, conceptualizing within the evolution of policies regarding CE on one hand, while also providing a useful guide to the practical process of implementing CE, on the other.

As a last observation, we mention the aspect related to the increase in popularity of CE in different communities, which is reflected in the number of articles published on this topic in the period 2000–2017, compared to 2018–2019. By searching ScienceDirect using "circular economy" as a keyword in titles, abstracts and keywords of journal articles, the 2000–2017 range offered 2293 articles, while between 2018–2020, range offered 6834 results were obtained (Figure 4). The obvious difference in figures between the two chosen intervals demonstrates the above-mentioned increasing trend of the publications regarding CE.

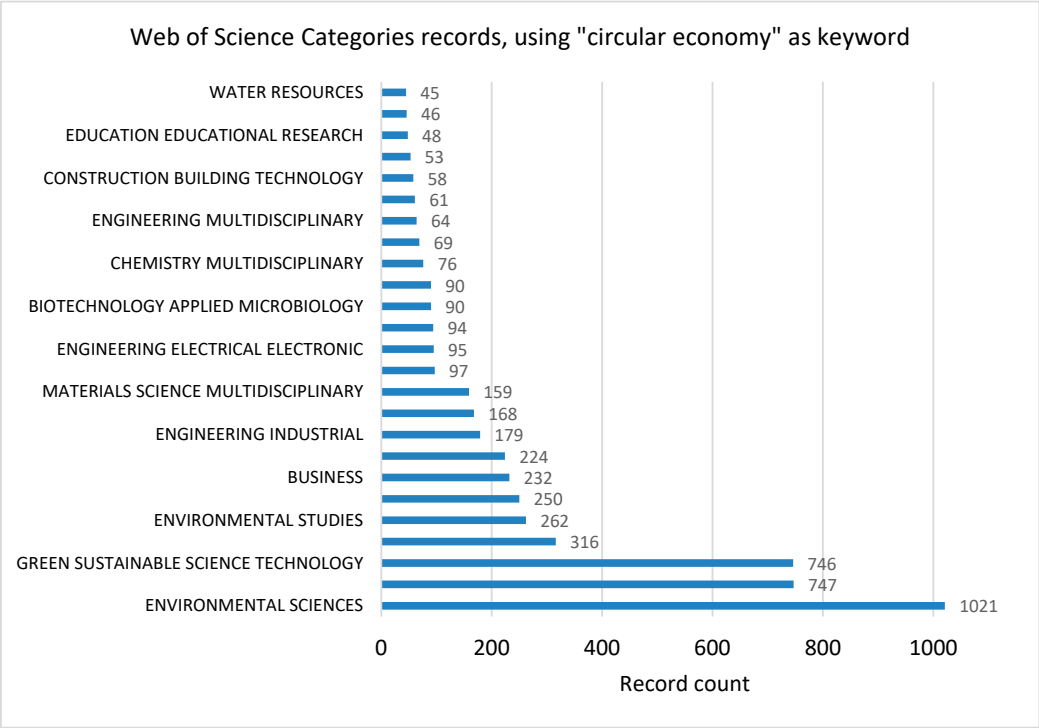

Figure 3. Web of Science categories records, using "circular economy" as keyword.

2293 Publications 2000–2017 6834 Publications 2018–2020

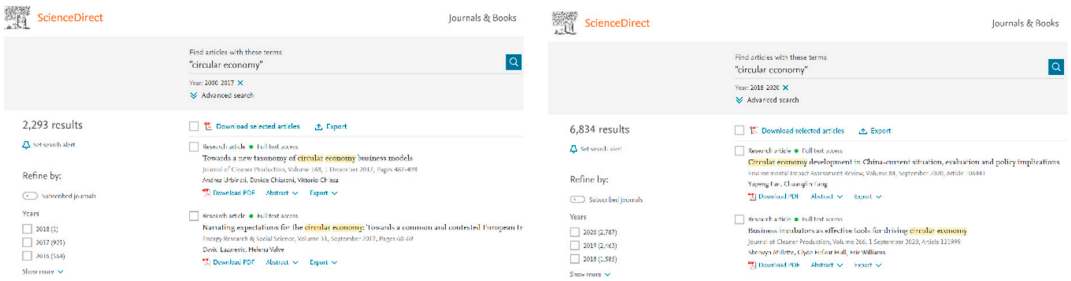

Figure 4. Recurrence of the term "circular economy" in ScienceDirect, comparative between years 2000–2017 and 2018–2020.

2.2. Extrapolations of the CE Theory Towards Its Practical Implementation

CE appeared as a necessity adapted to the evolution of the contemporary world, respectively to the accentuated economic development of the last decades. Representing an answer to the linear and unsustainable "make-take-consume-throw away" economic model, CE assumes thinking from a new perspective, being based on "share, lease, reuse, repair, refurbish and recycle, in an (almost) closed loop, where products and the materials they contain are highly valued. In practice, it implies reducing waste to a minimum" (p. 1 in [32]).

This economic model has quickly gained attention in the EU in recent years, especially after the publishing of the EU Action Plan for the circular economy in December 2015 (European Commission, 2015) [33]. It has been classified as an economy that offers multiple value-creation mechanisms that are decoupled from the consumption of finite resources [34].

Therefore, in the sense of the above, the concept of circular economy aims—by reducing, reusing and recycling the products and materials in the processes of production, distribution and consumption— to replace the "end of life" notion, which is so characteristic of current practices of production and consumption. In this context, its basic vision (waste orientation) has been crystallized, thus creating the premise of developing waste management policies [18].

However, several initiatives were also identified, which focused on energy supply, construction and green materials, rethinking the repair and reuse options, resulting in the diversification of the CE and its extension on different urban topics and targets [16]. Petit-Boix and Leipold [16] take a useful approach to the reader, radiographing the application of CE and establishing that, out of these, 80% were in Europe, 10% in North America and 10% in East Asia. As an observation of the authors, we noted that the implementation of the CE is more likely to occur in the "developed countries", because developing countries are still following a trend of increasing the stocks and thus, in a significant percentage, circularity is excluded.

In the context of the manifestation of the consequences generated by the accelerated industrial development, the circular economy has increasingly become lately an instrument of effective management of the environmental challenges and promoting the sustainable development [8].

In the same sense, it is estimated that through active support policies worldwide, circular economy gains popularity at different levels. Starting from the premise of creating more sustainable processes, the following steps are indicated as necessary: quantifying the impact on the environment and, respectively, identifying strategies that support urban sustainability, especially considering that according to the UN forecast (2015) on urban agglomeration, by 2050, 66% of the world's population would be concentrated in the urban environment [16].

By adopting The 2030 Agenda for Sustainable Development (at the September 2015 UN Summit), the United Nations provide an answer to global challenges by corroborating the circular economy with some of the 17 approved Sustainable Development Goals (poverty—SDG1, industry, innovation and infrastructure—SDG9, sustainable cities and communities—SDG11, responsible consumption and production—SDG12), setting an ambitious action agenda for the next 15 years. The program was conceived as one of global action, with a role in affirming and supporting the integrated economic, social and environmental dimensions of sustainable development, its actions targeting for the first time, both developed and developing states [35].

By analyzing the concept of CE from the perspective of sustainable development and its three dimensions (economic, environmental and social), the following new definition has been suggested in the specialized literature: "Circular economy is an economy constructed from societal production-consumption systems that maximizes the service produced from the linear nature-society-nature material and energy throughput flow. This is done by using cyclical materials flows, renewable energy sources and cascading-type energy flows. Successful circular economy contributes to all the three dimensions of sustainable development. Circular economy limits the throughput flow to a level that nature tolerates and utilizes ecosystem cycles in economic cycles by respecting their natural reproduction rates. CE should utilize nature's cycles for preserving materials,

energy and nutrients for economic use. The material flows released from economy to nature should be in a form in which nature can utilize them in its own functions" (p. 39–40 in [3]).

Adding to the above, Ghisellini et al. (p. 24 in [18]) specify that the final purpose of promoting CE is the decoupling of the environmental pressure from the economic growth, aspect resumed in another approach as well [12].

Figure 5 summarizes the definition of CE which has been previously presented. The authors of the study [3] capture the essence of this concept, incorporating economic reasons, tangent to the business logic. In this respect, processes such as: product reuse, remanufacturing and refurbishment are considered clearly superior to conventional recycling of materials as low-grade raw materials, by involving less resources and energy. The recovery of materials for reuse, refurbishment and repair is considered a priority, rather than for remanufacturing, and only afterwards is it necessary to access them for raw material utilization. Maintaining for as long as possible in the economic circuit the product, service, function or value resulting from the processing of raw materials, considerably reduces combustion for energy and landfill disposal and causes an increase in the value of the product value chain and life cycle, in terms of quality and efficiency.

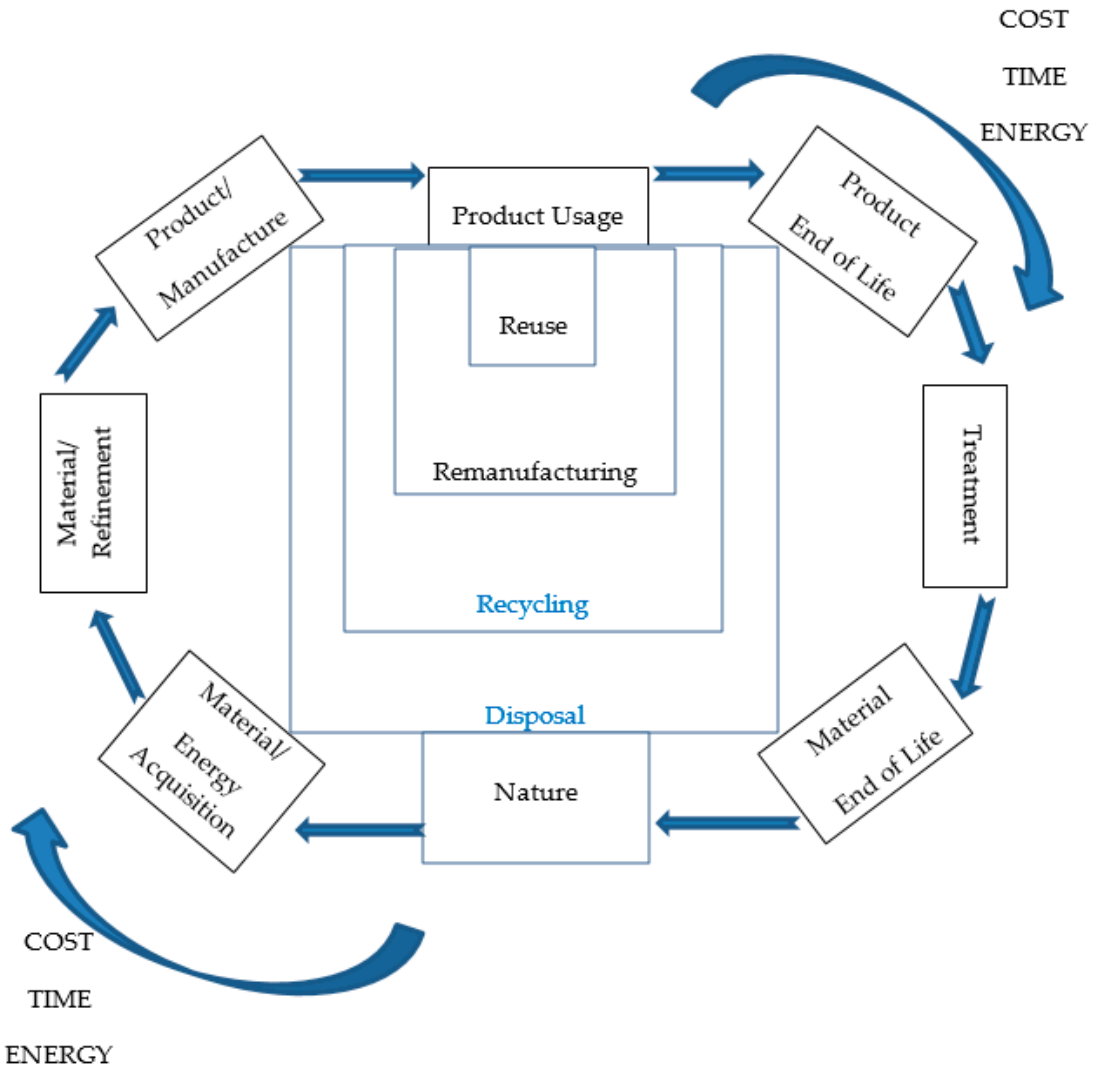

Figure 5. Circular economy: the concept and its mechanism (modified from Korhonen et al. 2018) [3].

Furthermore, Ritzén and Sandström [17] state that circular economy is little implemented in practice, a synonymous aspect with the fact that the global economy is only to a certain extent circular, leaving a certain "circularity gap" (quantified at 8,6% by The Circularity Gap Report) [36] of the

world economy. Berg et al. [37] refer to the substantial potential for the creation of several flows of circular materials, while also estimating significant benefits in the ecological and socioeconomic domains that would result by the adjustment of the respective percentage.

Thus, it is estimated a reduction in material needs of 17–24% by 2030 [38] with a more efficient use of resources along the value chains. This would significantly reduce the material costs for the EU industry and represents an increase of the EU GDP to 3.9% [20].

From another point of view [39], a more circular economy would operate on heavy industry emissions (targeted at industries that consume plastics, steel, aluminum and cement), reducing them by up to 56% by 2050.

In addition to the above, other statements [30,39] confirm the potential of the circular economy to create economic and social benefits: from opportunities in the labor market, transport, to improving the trade balance and welfare. In addition, CE has the ability to forecast benefits to companies and municipalities by reducing the need for waste management, increasing the efficiency of the use of resources and reducing environmental problems, pollution.

Figure 6 illustrates some of the expectations and benefits of the circular economic model:

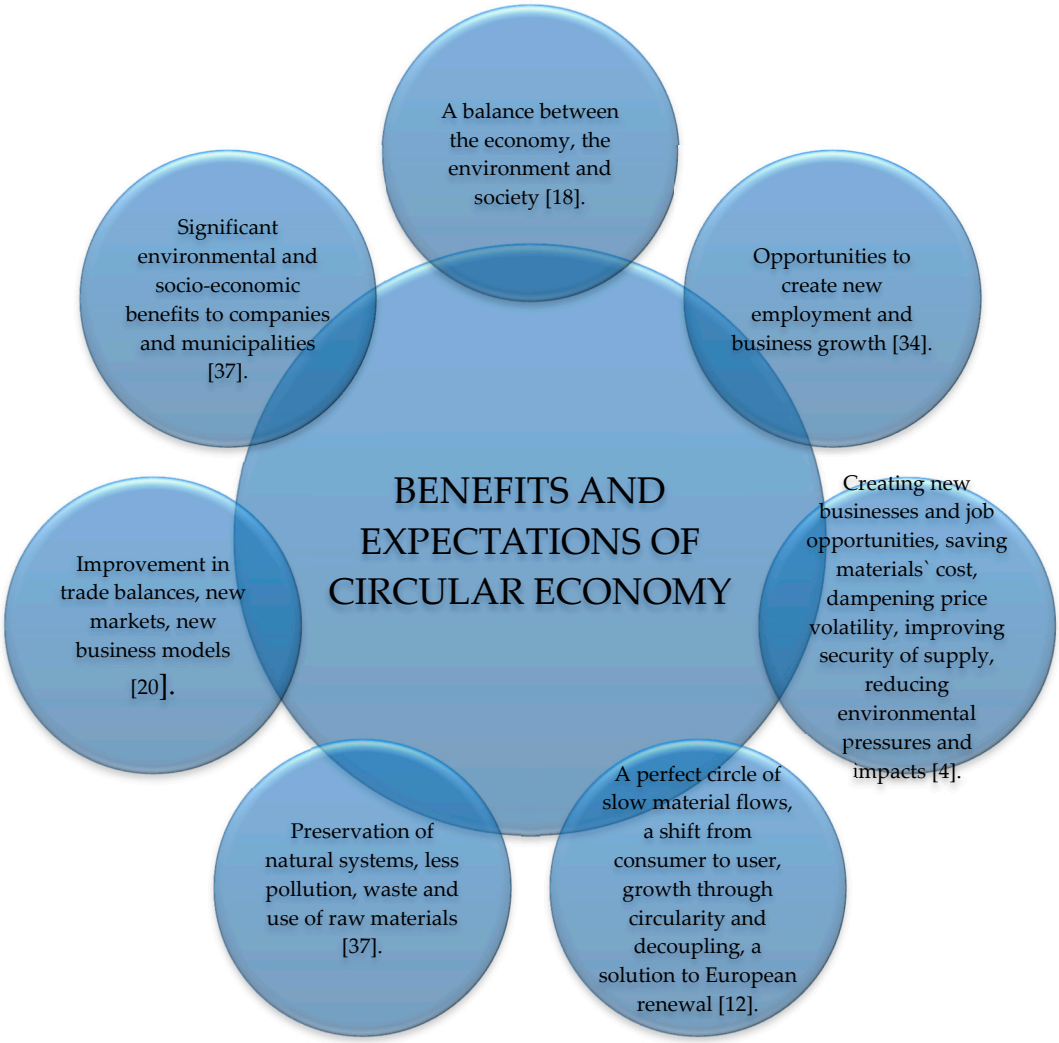

Figure 6. Expectations and benefits of the circular economic model [4,12,18,20,34,37].

CE has been cataloged as a promising concept, being evaluated its capacity to attract and involve the business community towards the area dedicated to sustainable development [3].

In correlation with the efficiency of the productivity and the increase of the yield, respectively of the quality of the economic activity, CE comes as a viable alternative to the traditional flow of the global economy, proposing to reduce the quantity of raw materials incorporated, their waste, hence the amount of waste resulting from the economic activity.

In another approach, it is specified that CE can be a way to set up mechanisms to induce regenerative industrial transformations that pave the way for sustainable production and consumption [8]. The same source presents the practitioners' conclusions based on CE instead of the predominant linear models, meant to have a positive impact on the environment and economic growth.

Regarding the particularization of the process of implementation of the CE strategies, Ghisellini et al. (p. 12 in [18]) noted that some countries promote the development of CE at the micro level (company or consumer level), others at the meso level (at the eco-industrial park level) and the latter at the macro level (cities, provinces and countries).

In addition, Korhonen et al. [8] identify the drawback of the respective process, in the existence of an accumulation of concepts existing in other areas that are too easily used, to the detriment of promoting new and innovative practices.

Furthermore, the example of China is used—as a country which was among the first to include CE in its policy towards a more sustainable economic system [40,41], whose policy includes numerous economic and management tools.

While overall, at European level, the interest stirred in business communities and governments is considered relatively recent, there are still positive examples of implementation initiatives, such as Sweden and Germany [42].

The broad process of transition to the circular model involves overcoming some real challenges, adjacent to the process of integration and implementation in practice of this concept's principles. Of all the multiple barriers, some of the most "sensitive" were categorized as cultural ones (lack of consumer interest and awareness, consumer behavioral rigidity, hesitant or routine corporate culture, rooted in old conceptions and prejudices) and, respectively, those of the market—regarded as consequences of non-aligned and incongruent initiatives of the decision-makers (p. 77 in [43]), [44].

Another assessment [17] highlights the similarities between barriers in industry and a category of barriers opposed to the transition to the circular economy—named "barriers in the literature" (the financial, structural, operational, attitudinal and technological ones) and a partial similarity to barriers for integrating sustainability issues in general.

Furthermore, Korhonen et al. [3] warn that if the current consumption culture mentality does not undergo any significant change in the future, CE there will remain nothing, but a utopia, a kind of technical instrument incapable of changing the course of a current unsustainable economic system.

In addition to the above, we can also note that "Where governmental officials have better awareness and strong drivers to make changes, the actual official's understanding toward circular economy development is higher" (p. 192 in [45]).

The circular economy relies on new and innovative business models (p. 228 in [10]), (p. 414 in [34]), Finland standing out (in the context offered by The Finnish Innovation Fund Sitra) in identifying and promoting the most successful national businesses which involve the circular model [46].

It was appreciated that the circular economy model would be able to create direct benefits of primary resources worth 600 billion euros by 2025 [20], and on the other hand, in the context of technological development, data collection technologies, data integration technologies, artificial intelligence would offer vast opportunities under the patronage of this economic model [37].

It is categorically admitted and confirmed by the surrounding reality, the fact that the transition to a more circular economy is and will be a large, complex and lengthy process, which cannot imply an automatic and instantaneous abolition of the current "make-take-dispose" business model. This is being done gradually and requires fundamental changes in technologies, markets and customs, practices of use, institutions, public policies, environment, mentalities. Continued investments in current waste production and management infrastructures will continue to be required. In addition,

an in-depth reform of the economic model will be welcomed but corroborated with a diversification of the policy instruments and the promotion of the best practical models.

Monitoring the concerns expressed in the field of circular economy is extremely valuable and useful in understanding its mechanisms developed over time. Monitoring is also considered necessary for other reasons: on one hand, in order to identify the success factors in countries and regions and, on the other hand, in order to evaluate the measures taken. This is possible due to the set of ten circulating economic indicators, which represent the "Monitoring Framework of the CE by the EU", launched in 2018 [4,7,37]. The entire monitoring process provides extremely valuable insights towards setting new priorities for different stakeholders over the long-term objective of a circular economy.

3. Particularization of the Theme

3.1. The Evolution of the Notion of CE in the EU

Although the concept of circular economy is somewhat a topical one, within the specialized studies we find the opinion that the circular economy has ancient roots, exemplifying by the case of date palm industry in the Gulf Basin, having as a starting point the long-term human concern regarding the efficient use of natural resources [37].

The same interest regarding the balanced management of the natural resources is transposed (including at a legislative level) in the present, contemporary times.

For example, the European Union has legislated over 30 years ago issues related to waste disposal and the legislation on the environmental performance of products exists for over 20 years [47]. Gradually, there was an attempt to standardize the legislation, because of its disparate existence. As a result, in 2014 was published the Communication from the Commission to the European Parliament, the Council, the European Economic and Social Committee and the Committee of the Regions, called "Towards a circular economy: A zero waste program for Europe" (European Commission 2014 [48]), followed in December by the publication by the European Commission (the body responsible for proposing new EU legislation) of its circular economy Package [33]. It was perceived as an EU action plan for the circular economy, with a more ambitious and broader approach, with the stated goal of "closing the loop of product life cycles" [49,50]. In 2018, it was completed by the European Commission by adopting new measures, including an EU strategy for plastics in the circular economy [51]; a communication on options for addressing the interface between the laws on chemicals, products and waste [50]; a monitoring framework on progress towards a circular economy [52].

One of the pioneering examples worth mentioning is Germany, which in 1994 drafted the Closed Substance Cycle Waste Management Act [40]. Then, six years later, Japan initiated a plan to promote waste and recycling measures, namely, to create a society based on recycling—Basic Law for Establishing a Recycling-Based Society" (p. 2 in [53]).

Another circular example supported with perseverance is the Chinese one, which, once started in 1998, took root and was officially accepted by the central government in 2002 [9]. Thus, China was the first country to use the term circular economy in the context of waste and resources policy, noting that the Chinese approach was more waste oriented than the current European one [37].

Other examples of involvement in the circular economy initiatives are provided by the U.E. Member States (Finland, Slovenia, Denmark, Scotland, France).

It was explained that the realization of strategies and / or action plans for the European circular economy involves consulting all the stakeholders (specifying that this process is coordinated by the central public environmental authority in the Netherlands and Spain, respectively), with inter-ministerial working groups being created, dedicated to the implementation of the concept of the circular economy, respectively of the circular bioeconomy [54].

Thus, the above source identified the following initiatives:

- Slovakia has amended its legislation on waste management to include the circular economy and bioeconomy (considering the adoption of the new law at the end of 2019);

- In 2017 the Italian Government published a strategic document on the circular economy, which is accompanied by a "manifesto" of support signed by several private companies;
- In 2018, France adopted a roadmap on the circular economy, a move that stimulated the emergence of strategies at regional / city level (e.g., Paris circular economy strategy).

In the case of Finland, the outlook is more than encouraging, supported by obvious results: this was the first country in the world with a target map for a circular economy in 2016, assuming the involvement of all important bodies (relevant ministries, business sector, other directly interested parties), promoting viable projects, strategically implemented, in five areas of interest [46]. In 2017, the National Plan for the circular economy of Finland was adopted, a real pivot for the development of the regional plans for the circular economy. Finland's ambitions capture its intention to become, by 2025, a front man of the circular economy [37]. The same authors note the initiatives of several African countries in promoting the circular economy: Rwanda, South Africa and Nigeria, which launched the Circular Economic Alliance at the end of 2017, aimed at facilitating the transformation of Africa into a circular economy (together with the World Economic Forum and of Global Facilitation for the Environment), to ensure economic growth, jobs and positive results for the environment in Africa. Addressing the topics of discussion generated by the evolution of the industrial sector, respectively the inherent environmental particularities, under the patronage of the decision-makers from regional and national level, up to the European Commission, similar initiatives are carried out, belonging to the business advocacy bodies, such as the Ellen MacArthur Foundation [8].

On a global scale, the World Circular Economy Forums (WCEFs) have been set up, regarded as links between theorists and practitioners on the CE everywhere, respectively as important means of examining the circular economy solutions, of the opportunities launched for the industrial sector and of analyzing how the circular economy contributes to the achievement of the UN Sustainable Development Goals [37].

It was concluded that the role of politics and communication are defining for the CE approach, directing to the implementation of new initiatives by generating knowledge and innovation [16]. In another interpretation, the authors of the study [8] conclude that CE is not limited only to the old industrialized nations. They appreciate this economic model as a potential future industrial paradigm, an expression of the premise of achieving sustainable economic and environmental development [8].

3.2. The Evolution of the Notion of CE in Romania

This section intends to make a review of the theoretical aspects regarding CE, manifested in the Romanian plan.

3.2.1. Legislative Considerations Favorable for Implementing the Circular Economy in Romania

In the context of the accelerated evolution of the circular economy, both at European and global level—and given the fact that Romania is an integral part of the EU—in the last years there is a certain tendency to adopt the principles of this economic model and to implement them in the Romanian space.

The moment Romania adhered to the European Union (2007) marked the assumed obligations established in its task as a member state of the European Union according to the objectives agreed in the Community. In subsidiary level, it has determined a starting point regarding the management and addressing the problem of the waste in terms of selective collection, recycling and its capitalization [55].

One year later (12 November 2008), the Romanian Government debated and approved Romania's National Strategy for Sustainable Development "Orizonturi" (Horizons) 2013–2020–2030, this being a joint project between Romania's Government (through the Ministry of Environment and Sustainable Development) and United Nations' Development Program (through the National Center for Sustainable Development). The strategy proposes practical objectives for the staged transition to the sustainable development model, exposing a vision of developing Romania in the perspective of the next decades, as follows:

- Orizont (Horizon) 2013: It proposes the organic incorporation of the principles and practices for sustainable development in Romania's ensemble of public programs and policies;
- Orizont (Horizon) 2020: It establishes the current average level of achievement for Romania to the main indicators of sustainable development in European countries;
- Orizont (Horizon) 2030: It supports Romania's significant approach to the average level of EU countries in that year.

It is estimated that the results of achieving these strategic objectives will be reflected in the high economic growth, in the medium and long term, inevitably leading to the significant improvement of the economic and social gaps between Romania and the other community states [56].

Regarding the Horizon Strategy for 2013–2020–2030, the following specifications [55] are required:

- currently, there is no available report regarding the stage of its implementation;
- there have been developed nationally applicable sustainable development indicators (13 in number) and a set of territorial sustainable development indicators (10 in number), in order to monitor the Strategy;
- in 2018, a review process of the Strategy began in accordance with the 2030 Agenda for Sustainable Development, under the supervision of the Department for Sustainable Development within the Romanian Government.

In February 2016, Senate Decision no. 3 on the Circular Economy Package [57] has been adopted, document attesting Romania's opening to the circular economic model. In this regard, we mention the provisions of the art. no. 1, letters (h): "Romania supports the main objective of the Circular Economy Package, that of stimulating the development of new markets and business models in order to develop the economy and create new jobs" and (i): "the transition to a circular economy will allow the restructuring of the economy and the improvement of European competitiveness, by reducing the consumption of raw materials, the sustainable use of resources and the capitalization of waste by transforming them into products."

The above-mentioned decision expresses Romania's intent to build an auspicious framework to the implementation of the circular economy by the transposition of the acquis communautaire. This has been fully transposed, regarding to postconsumer waste [55], being materialized in various forms, such as: Law no. 211/2011 regarding waste regime (which is based on the Directive 2008/98/EC on waste (Waste Framework Directive), Law no. 249/2015 regarding the management of packaging and packaging waste (its base is Directive 94/62/EC), Law no. 2012/2015 regarding the management of vehicles (this represents the result of the transposition of Directive 2000/53/CE), GEO (Government Emergency Ordinance) no. 5/2015 regarding electric and electronic equipment waste (Directive 2012/19/EU)—with subsequent amendments.

In order to facilitate the implementation of circular economy in Romania, it is considered necessary to update Romania's industrial policy for perspective of 2030 (Government Decision no. 1171/2005), Law no. 69/2016 regarding green public acquisitions and GD (Government Decision no. 775/2015 regarding the approval of the National Strategy for competitiveness 2015–2020 [55].

Updating the Romanian legislation and including references regarding circular economy, are mandatory route stages, considering that recently, there have been reported problems concerning legislation and its enforcement, caused by continuous changes from the legislative area, improper implementation and by the failure of various key actors in assuming responsibilities (MOVECO Project, April 2019) [58]. Efforts put at national level regarding laying the foundation of a functional ecosystem "from waste to resource", were appreciated as insufficient, so recommendations were made in the direction of legislative clarifying (its "oxygenation"), of its firm application, eliminating bureaucracy and accountability of the interested parties [58].

3.2.2. Romania—Face-to-Face to Circular Economy

Having a modest start in the Romanian space, circular economy was initially designed, mostly as an answer to the problematic area of waste management. To the extent of getting acquainted to the Romanian society with the new economic concept and acquiring knowledge in the field, it was understood that: circular economy assumes in itself, more than waste management; this promotes the idea of closing the resource consumption loops every time it is doable technically speaking and it supports recirculation and resource recycling.

Regarding the answer to the question whether Romania is prepared for the circular economy, respectively if sufficient initiatives, actions and activities are undertaken to effectively embrace economic circularity in the local environment, the opinions are obviously delimited. State agencies with economical, environmental and business tangents provide a constructive response through their operations.

Romanian government has undertaken other actions aimed to strengthen and promote the implementation of CE. One example is the participation in the Visegrad+4 Group Meeting focused on circular economy, climate change and invasive foreign species [59]. As an another example, we present below a press release from the Ministry of Environment, as Operator for the EEA Grants 2009–2014, issued on the 5th of October 2017 [60], regarding the organization of the conference "Circular economy in Romania", an event funded by the R004 Program "Reduction of dangerous substances", which tackled the following topics:

- Circular economy from the perspective of Romania, Waste Management in Romania;
- Presentation of examples of good practices in the circular economy;
- Contribution of the instruments realized through the projects carried out within the R004 Program "Reduction of Dangerous Substances" to the achievement of the objectives of the circular economy.

The results of the Program represent instruments that aim to facilitate the implementation of the circular economy concept by ensuring the conditions of identification/reduction of the dangerous substances in the products that can be recycled as well as improving the management of chemicals and waste. The press release underlined the non-reimbursable financing of 10,000,000 Euros that Romania benefited from through the Program, plus the co-financing from the national budget of 1,764,706 Euros.

Another example of a positive approach is the transposition in the Romanian space of the European Commission Project which aims to promote CE among European SMEs, within the LIFE Program [61].

On the other hand, members of the public opinion, representatives of some NGOs, come from a different perspective, a pessimistic one, identifying shortcomings and gaps in terms of compliance with the precepts of circularity.

Here is an outline of some concrete measures (results of debates between representatives of European producer associations and non-governmental organizations that promote circular economy) included in the European legislative package "Circular economy" [49,62], which Romania needs to implement:

- Introducing compulsory recycling rates for the different categories of waste, subsequently cascaded, based on the obligations of EPR—Extended Producer Responsibility, to the companies that put on the market goods that subsequently result in waste; For example, plastic, glass, metal, paper and cardboard waste, as well as biodegradable waste, will no longer be accepted for final storage;
- Introducing the obligation to redesign products with two objectives: a) increasing the proportion of raw materials from recycling in the total of raw materials used by companies; and b) increasing the recyclability of the products at the end of their life cycle, concurrently with the rewriting of the European waste code in order to reconsider some waste as secondary raw materials;
- Adopting economic tools to promote the reuse and stimulation of industrial symbiosis and greener products;

- Increasing the municipal waste recycling rate to at least 65% by 2030;
- Increasing the recycling rate of packaging waste to a minimum of 75% by 2030;
- Capping the final disposal rate for all categories of waste up to a maximum of 10% by 2030, including through fiscal and coercion instruments, such as prohibiting the collection of separately collected waste and overcharging the waste storage;
- A 50% reduction of food waste by 2030;
- Introducing minimum standards and obligations to water users regarding compulsory recycling rates, depending on the sector.

From the aspects listed above, the issue of waste management represents one of the biggest challenges met by Romanian economy in the process of transitioning to circularity.

The results of the analyses of the Ministry of Environment capture obvious differences in terms of solid municipal waste management in the EU, between the Member States, the most obvious discrepancy being generated by the percentage comparison of the storage/recycling ratio. Although waste disposal should be kept to a minimum by 2020 (according to the "Resource Efficiency Roadmap"), it remains in certain areas of Europe the main management tool [63]. Considering this, it was appreciated that Romania has taken modest steps [55,62] in the process of implementing efficient mechanisms to achieve the objectives of the specific directives on waste streams.

It should be noted that, although "in the programming documents of the Structural Funds 2014–2020, the ex-ante conditionality of adopting a set of economic instruments to determine the fulfillment of the municipal waste recycling obligations is specified, in the Romanian space, the collection of mixed waste without the separation of recyclable materials at source is still practiced, unfortunately (about 96% of household waste and similar waste)" [63]. Although the local public administrations (either directly, by their own means or indirectly, through the concession of the sanitation service), are responsible for ensuring the separate collection, transport, treatment, recovery and final disposal of these wastes), they practically act rather clumsy and delayed. (For example, waste treatment is carried out to a small extent and only for certain waste flows) [62]. The same source [63] acknowledges that "achieving the objectives of the Waste Framework Directive (which was transposed in 2011 in the Law no. 211) remains a challenge for Romania" admitting the need to initiate legislative proposals (to supplement and amend Law no. 211/2011 regarding the waste regime), which aims to: "define the method of putting into practice the system of "paying for how much you throw" with the responsibilities of each actor involved in the chain of municipal waste management; extended producer responsibility as defined by the new European approach in the circular economy containing a package of amendments to six directives."

Another document (which can even be considered as a legislative support) to which Romania should comply is the EU directive for plastic in the context of the circular economy [64], which guides to the practical way in which plastic and plastic products must be designed, produced, used and recycled. In this sense, all plastic packaging should become recyclable, including in Romania, by 2030, a process that should be supported by specific measures, including legislative ones, to reduce the impact of plastic use [65].

Applying such recommendations is meant to prevent the exacerbation of waste pollution and to limit the unfortunate events with a major impact on the environment (for instance, the outrageous situation from July 2018, when, on the background of a rainy season, Lake Bicaz, Romania, was "suffocated" by tons of plastic waste and plastic bottles (PET) brought by upstream waters). We must point out that, in Romania, plastic waste recycling capacity was appraised to approximately 284 kt/year −134 kt/year for waste such as PET bottles and 150 kt/year for other types of waste plastic products, according to National Waste Management Plan. In addition, it is estimated both the increase in the production of plastic products (from 151 kt for 2018, to 164 kt for 2020) and the consumption of such materials (698 kt for 2018 and 748 kt for 2020), these tendencies falling within the regional production and consumption prospects [55].

A founding member of the Coalition for Circular Economy and also an environmental activist concludes that the legal obligations previously mentioned, "do not refer only to municipal waste and sanitation services, but rather to the industrial sectors that place goods and packaging that turn, after use into waste that needs to be recovered for their economic value or for minimizing the impact on the environment" [62]. Of course, this general observation has applicability also in the Romanian economic space.

Continuing its approach, the source mentioned uses an analysis of several basic macro-economic indicators, internal, which reflects the level of "absorption" of the circular economic model in the Romanian space. Thus, regarding the efficiency of the use of resources, the source specifies that "Romania is the least performing economy in the European Union", respectively regarding the internal consumption of resources, that "Romania uses more and more natural resources, but produces low economic value". Moving on to the analysis of specific indicators, the result seems to be a dramatic one, "illustrating the failure of national policies in the field of sustainable management of natural resources". For example, in terms of water productivity, it is specified that Romania "is once again in the last place in Europe, producing an economic value of 10 Euros per each m^3 of water extracted from the natural environment".

Another example offered by the source quoted refers to greenhouse gas emissions, an indicator of the energy-intensity of the economy. According to it, Romania is the 23rd country in the Union when related to the economic value unit in GDP, even though is among the first positions of Europe in terms of emissions per capita. The author [62] expresses doubts about the data reported within Eurostat, respectively by the Ministry of Environment and the National Institute of Statistics, explaining that this apparent performance related to greenhouse gas emissions must be understood rather as an indicator of poverty: we are poor and what we produce, we produce with very low energy efficiency.

In terms of waste management, the situation is considered—by the same source—to be somewhat worrying in relation to the objectives set by the European Package, specifying still the existence of significant flows of municipal waste and wastes from agriculture and biomass, which are not quantified with acceptable accuracy" [62]. In addition, Mușuroaea et al. [66] state the lack of anaerobic digestion facilities for biologic municipal waste.

The author [62] continues to express his skepticism regarding the materialization of the circular concept regarding the decoupling of the economic growth from the pressure exerted on the environment and natural resources soon (note: the technical details are fully contained in the source document).

In another approach [67], it is specified that, although some evolution has been noticed, the percentage recently recorded by Eurostat—of 13.3%—places Romania far behind the results obtained by the neighboring countries or by other European countries (Figure 7). We recall the observation of the source regarding the small percentage, of only 0.4%, regarding the recycling rate of household waste in cities, which was registered in Romania at the time of accession to the European space.

The author notices the acceptable pace of investments made in the field, but also diametrically opposed, "the chronic delays in applying pressing environmental measures, from the achievement of ecological pits and to the quality of the air".

By performing an analysis of the specialized literature, we find that Romania is not on the map of the municipalities' initiatives regarding CE, a fact supported by figure presented by Petit-Boix and Leipold's study "Circular economy in cities: reviewing how environmental research aligns with local practices" [16].

One of the immediate consequences of the accelerated industrialization in the contemporary period, besides the increase of the consumption, was identified as the perpetuation of a behavior developed in the context of the development of the technology, which implies, in broad lines, throwing the used or obsolete electrical and electronic equipment, a fact which is contrary to the circular principles [68].

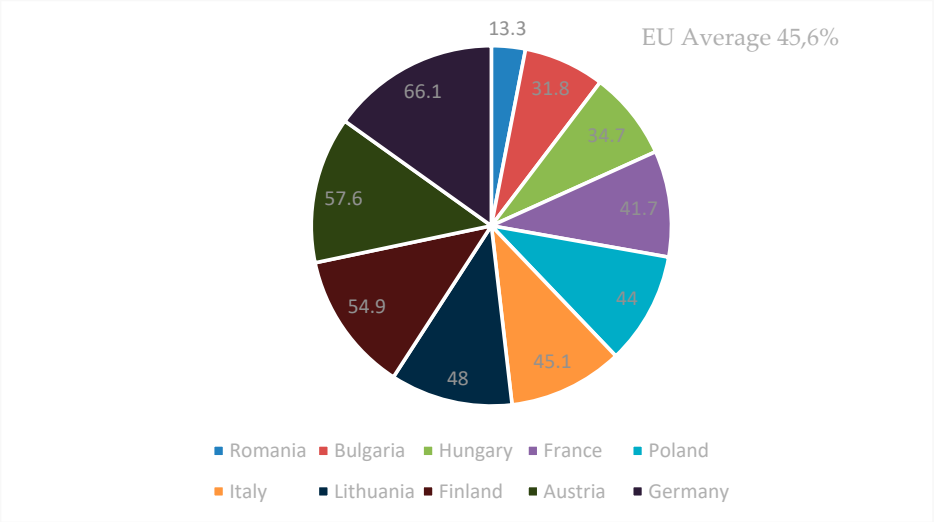

Figure 7. Rate of recycling of household waste in cites in several EU countries: percentage of total waste, 2016 (modified from Pana, 2018) [67].

An Italian study that also analyses the issue of Waste Electrical and Electronic Equipment (WEEE)/collection of e-waste, finds Romania in a less comfortable position [62]. Although the authors of the academic text mention the efforts of recent years, however, they note the limited nature of this collection process, with worrying differences between the EU Member States: "the WEEE collection rate per capita ranges from 1.6 kg in Romania to 16.5 kg in Sweden" (p. 20 in [69]).

According to an analysis of another Romanian NGO [70], regarding the chapter "Energy from renewable sources in Romania", it seems that "in 2014, Romania produced and exported the largest amount of energy in the last decade, according to the data published by the European Network of Transmission System Operators for Electricity (ENTSO-E), being injected into the grid over 7.85 TWh of energy coming from wind, solar or small hydro power plants, 25% more than in 2013, according to Transelectrica; the share of green energy in the total production was over 13%". Although 2014 was an extremely encouraging year, according to the percentages registered, starting from 2015, the field of green energy has been declining due to the reduction of the green certificates system.

The European Institute of Romania initiated in 2018 a complex material, the project SPOS Study 2018: The transition to a circular economy. From waste management to a green economy in Romania [55], with the following specific objectives: I. Analysis of the European and national framework regarding the transition to a circular economy; II. Identification of the main national implications (including on the environment, the plastics industry and job creation) of the measures proposed by the European Commission in the mini-package on the circular economy, in particular of the actions included in the Communication on the European Strategy for plastics; III. Identifying good practices at European and national level in applying the principles of the circular economy; IV. Evaluation of waste management and their degree of recycling in Romania (SWOT analysis); V. Propose measures and tools to streamline the use of resources in Romania. VI. Making public policy recommendations regarding the transition to a circular economy in Romania.

The conclusions obtained after the consultation period (17 July–2 October 2018) are quite interesting: of the 49.02% respondents from the private sector, respectively 50.98% (the public environment), 76.47% were acquainted, the remaining 23.53% not having clarified the concept of circular economy. In contrast, 96.08% of those surveyed answered the question regarding the knowledge of the concept of green economy.

In addition, the question "Is the transition to the circular economy integrated in the development strategies or plans of the company/institution you work for?" found a positive background of only 52.94%. When the questioned persons were asked if they are interested and if they want/can

carry out social-economy activities for waste management in their localities (activities involving socially assisted people or people with limited ability to work due to certain forms of disability), 70.59% answered with a categorical "no".

The following were assessed as "The biggest obstacles in the process of transition to a circular economy": costs with infrastructure, operating costs, lack of efficient recycling solutions, lack of a public–private partnership.

According to the mentioned source, "The growth of the potential of the circular economy in Romania" can be achieved by online transport platforms development, implementation of a calendar of measures, creation of an online database, better recycling of resources, information and education of the population.

The conclusions of the Interactive Laboratory for Circular Economy (held on 21 August 2018), namely the circular economy group, have noticed the barriers encountered by the circular economic model, the opportunities that it can provide, but also the steps to follow towards a circular economy model applicable to Romania by considering the DPSIR components (driving forces—pressures—states—impacts—responses).

In addition, the study presents the necessary public policy recommendations for Romania in order to make the transition to a circular economy, incorporating the components of nature: legislative, structural, economic, social and educational, in the fields of research and communication (Figure 8).

On the other hand, European-level initiatives (such as: the European Circular Economy Stakeholder Platform—with a role in facilitating the exchange of best practices among stakeholders, making available a database that includes good practices at European level; the European Cluster Collaboration Platform, ECCP—supporting collaboration between EU thematic clusters, as well as international initiatives; the Enterprise Europe Network—including about 600 organizations from over 60 countries in order to support SMEs for access to financing opportunities for eco-innovation, energy efficiency and resources, etc.) are extremely useful for Romania and a proper use of all opportunities offered in circular field is required [68].

The analysis of the stage of the circular economy in Romania—respectively of the actions taken in this direction—have been the subject of several activities constantly supported by the Green Revolution Association, of which we mention the most recent: WASTE Circular Conference—The economic system pay as you throw (PAYT), the first analysis (28 February 2019) and the Circular 4R Economy (May 2019). Organized in partnership with the Ministry of the Environment, these initiatives have succeeded in bringing the business, legislative and administrative components to the debate. By bringing together representatives of the central and local public authorities, the recycling, collection and waste industries, waste generators and the media, the February 2019 conference aimed at identifying and presenting the necessary steps to be implemented regarding building an efficient system to reach the aims of the circular economy, relying on the development of the recycling industry and the one in the following period aimed at mobilizing stakeholders from the industry and services area, together with the public actors and citizens, around the challenges and opportunities created by the development of a circular economy [71,72].

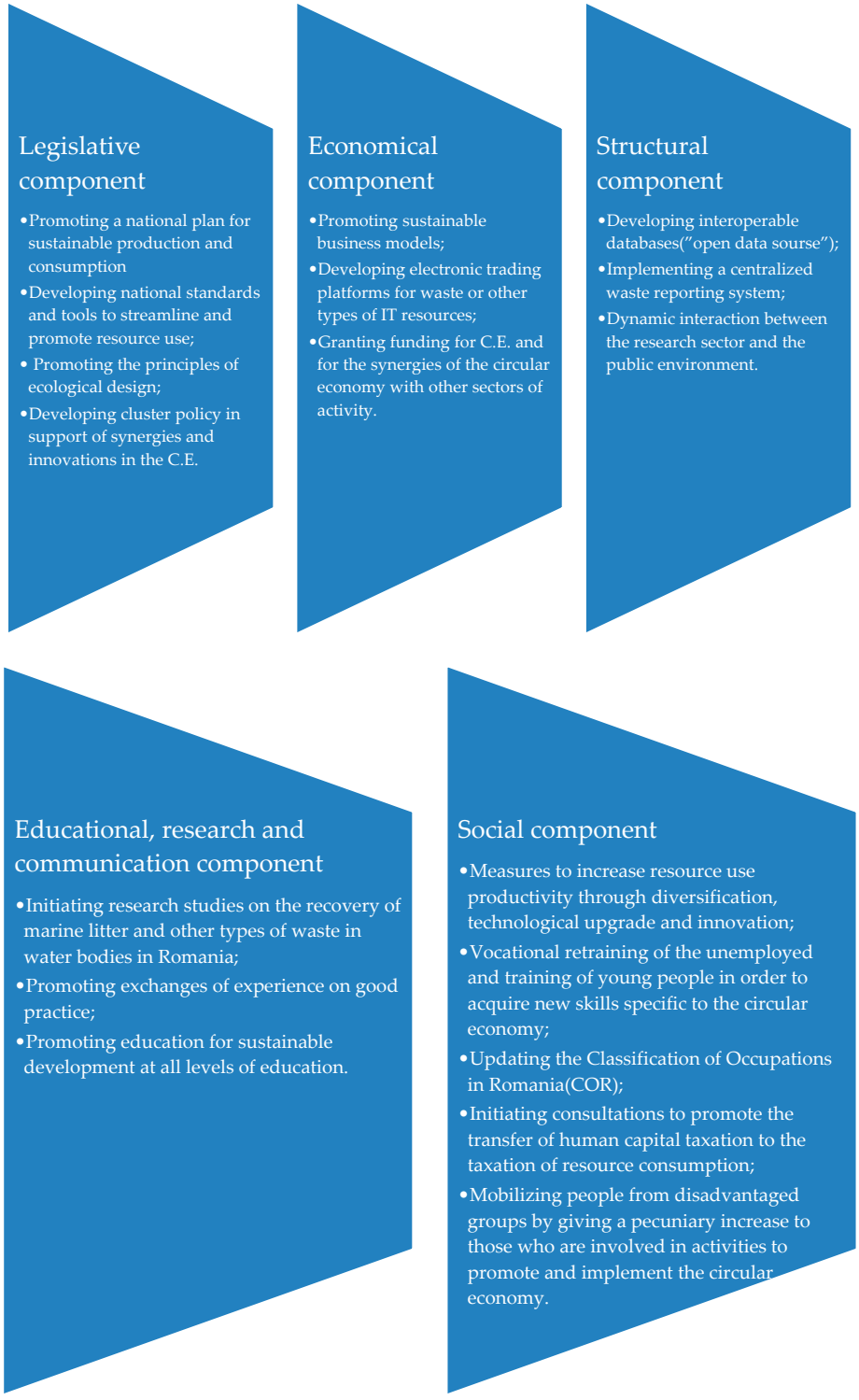

Figure 8. Public policy recommendations for Romania in the process of transition to a circular economy.

4. Discussions

Based on the reality of the last years, it is increasingly considered that the model of the linear economy begins to show its limits, its applicability no longer being a current requirement.

In response, over the last decade, the concept of circular economy has been gaining increasing ground, with a focus on the efforts needed to build a more sustainable society [73].

As a support and incentive for change, it is appreciated that the circular economy operates as a concept capable of redefining the socio-technological present, by offering a viable perspective [12].

According to the initial opinion, it is claimed that "the future seems to belong to the circular economy, whose basic principle is the reintroduction into the production cycle of all the mineral resources initially used—elements resulting from the processing of raw materials already used, byproducts or recycled products" [74].

Another opinion specifies the main aim of the circular economy: achieving the economic prosperity and environmental quality assurance; the same source notices the fact that its impact on social equity and future generations is barely mentioned [10].

Further it is mentioned the potential to bring economic and environmental co-benefits, as a result of minimization of waste generation and material through recycling and reusing of products [45].

The successful examples of transition to CE substantiate the idea of the need for the continued involvement of society, of all its factors, independent entities, in the process of collaboration, creation and exchange of appropriate economic models. At the same time, all these also underline the idea of cooperation regarding economic profitability, in the context of an opinion which also sounds like a slogan, it is undoubtedly claimed that: the CE transition has just started (p. 11 in [18]).

As a trend of the last two decades, the evolution of the relationship between production-consumption of products, environmental protection and sustainability in accordance with environmental awareness has been highlighted (p. 11 in [69]).

Although the circular economy is viewed in the most positive way by its most ardent supporters as a solid reply to Pandora's box of the world economy and the environment, we must be aware that this model does not work without our full support and involvement. It is extremely important not to skip the basic, necessary input from the human factor. It is extremely important not to skip the basic, necessary input from the human factor. That is, it is imperative that we realize that all the necessary measures for a sustainable development, as well as for a clean environment, are within our reach.

Although Romania is currently in the transition to CE (without remarkable success in terms of implementing and exploiting the circular economic potential [75] however, there is hope that in the future, we will embrace and apply the model proposed by this type of economy as accurately as possible.

Another approach [55] claims as well, the necessity to accelerate Romania's efforts in the transitioning process towards circular economy, considering that there are still big steps to be made towards this economic model and it also shares the confidence in positive results, offering the example of reifying the first Romanian cases of industrial symbiosis (assimilated as tools to provide viable solutions to waste management). The most relevant projects in this regard [55], carried out or in progress, are shown schematically (Table 1) as it follows:

The experience accumulated by Romania in the transition process is an asset, more so as Romania contributes to the achievement of the Sustainable Development Goals not only from the national perspective, but also at an international level, through the official development assistance [35].

Furthermore, in an extremely positive and confident manner, in the Romanian space it is appreciated that new directions will create development opportunities for a circular economy, which will stimulate global competitiveness, sustainable economic growth and generate new jobs.

The findings of the European Commission (2019) on policy issues [76] surprise a strengthening of the political framework for the circular economy starting in 2017. According to the quoted text, Romania is among the Member States:

- That should better implement the principles of circular economy in different areas (such as water and energy economics, waste prevention, materials recycling, promotion of reuse and repair and adoption of secondary raw materials);
- For which there is a need to stimulate measures for the efficient use of resources; these states need to improve their performance in the field of eco-innovation; to raise awareness and encourage the adoption of voluntary tools (such as the EU eco-label and the environmental and audit

management system); to increase recycling and circular measures in the SME sector; and/or to facilitate green investments and access to finance;

- That have been identified as risking not meeting the target of 50% municipal waste recycling set for 2020.

Table 1. Romanian cases of industrial symbiosis registered as part of the transition process towards CE.

PROJECTS	PERIOD OF TIME	GOALS
ECOREG	• It was carried out in the period 2009–2011	• The first project in Romania on testing the feasibility of the concept of industrial synergy • Proposes the approach of sustainable synergies • Presents case studies related to the area of food waste, those resulting from construction and demolition and wood waste
CICERONE (CIrCular Economy platfoRm for eurOpean priorities strategic agEnda)	• It is carried out between 2018–2020	• It aims to create a platform for streamlining the programming of the circular economy at European level
C-VoUCHER35 (Circularize ValUe CHains across European Regional Innovation Strategies)	• It is carried out between 2018–2021	• The new models of circular economy are targeted as a sphere of interest through the innovative approach
ColectareDeșeuri.Ro	• It was started in 2015	• It is an online platform dedicated to the selective collection, recycling and reuse of waste
Iași zero waste—RETRACE—CE și designul sistemic în România	• It is carried out between 2016–2020	• It is part of the RETRACE—A Systemic Approach for Regions Transitioning project towards a CE • Its final purpose is facilitating the transitioning process towards CE
Proiectul Urban Wins	• It aims for the range 2016–2020	• It promotes the idea of urban agora and involves the analysis of urban management strategies at the level of 24 cities from six EU countries (for Romania, it was selected the city of Bucharest)It aims to develop tools for participatory and scientific planning for waste management
EcoBihor	• 2018	• In the village of Sălacea (Bihor County) the household waste was selected in five fractions (study and cardboard, plastic and metal, glass, biowaste, residual waste)
Proiectul BIOREGIO—Modele regionale de CE și cele mai bune tehnologii disponibile pe fluxuri organice	• It is carried out between 2017–2021	• It reunites eight partners from six regions • By improving the implementation of regional development policies and programs, it aims to increase resource usage efficiency, sustainable development, eco-innovation and environmental performance management • It aims to develop an action plan to support the circular
Compostarea nămolurilor de la stațiile de epurare-Mioveni (județul Argeș)	• Pilot project launched in 2016	• It involves the development of an ecological solution for the use as compost of organic waste collected from the public domain of the city of Mioveni
Genesis BIOPARTNER	• 2012	• It represents the first Romanian station to produce renewable energy in co-generation, based on biogas (Prahova county)
IRCEM-Institutul pentru Cercetări în Economie Circulară și de Mediu "Ernest Lupan"	• Founded in 2012	• It represents the initiative of young researchers from the Technical University of Cluj-Napoca • The interest is directed towards the sustainable development of resources

The 2017–2019 evaluations on the implementation of environmental policies (Environmental Implementation Review—EIR) [77] capture the main difficulties encountered by Romania regarding the implementation of the EU environmental policy and legislation. Thus, the 2017 Assessment indicates to Romania the optimization of compliance with EU legislation on urban waste and wastewater in order to reach EU targets, and as regards the public administration, it is recommended to strengthen its capacity in water and waste management. The topic of waste, wastewater and air quality was resumed during 2018 at national level, and then, EIR 2019 punctuated the progress made by Romania after the 2017 Evaluation, while also mentioning the directions of action in which the results remained insufficient. Figure 9 gives a synthetic image of these:

Regarding the circular economy, the quoted source specifies that it is poorly developed in Romania, yet there is potential for this direction, with the recommendation for the adoption and precise application of coherent measures, in parallel with the increase of the awareness regarding the circular economy.

Because circular economy benefits from "an eminently integrative approach" (covering a set of connections between different sectors of activity, which through their interference produce changes and positive or negative results at the level of the economic system), it is claimed—as a pillar of the transitioning process towards the circular concept—the necessity of getting involved in promoting relevant synergies for the Romanian CE, of those with impact over biodiversity, of the energy sector, of projecting products for raising the degree of recycling vs. increasing energy efficiency; impact on human health, impact on the soil, mining waste, impact on water and agriculture [55].

Figure 9. Deficiencies identified by the environmental implementation review (EIR) 2019 for Romania.

5. Conclusions

To improve the gaps identified in the implementation of the circular economy in Romania, we propose solutions such as:

- Appropriate legislation, evolution in the legislative plan and their immediate application;
- The need to change the paradigm, approach and attitude;
- Orientation towards innovation, scoring coordinated actions, with the involvement of the public and private environment;
- To follow long-term economically viable results and solutions, capitalizing on the potential offered by the circular economy;
- Developing sustainable economic practices;
- Educating participants and those responsible for implementing the circular economy.

As a result of this approach regarding: (1) the incursion into the different theoretical approaches regarding the circular economy; (2) systematizing its evolution over time, transposed in the

implementation process and (3) analyzing its practical dimension in relation to the Romanian space, we consider that the proposed study offers a useful starting point (both for theorists and practitioners) in terms of research, to subsequent scientific studies, respectively a current and comprehensive vision on the issues related to the specificity of the circular economy. In addition, a contextualization and a nuance of the syncope encountered after analyzing the overall conceptual and respective aspects, those resulting from the analysis of the implementation stage of this concept in Romania, offered us the possibility to propose concrete suggestions for amelioration of the shortcomings found. The knowledge of all the highlighted aspects seems to us more important, as:

- The objectives of the circular economy are still far from being fully realized (both globally and directly reported in Romania);
- The legislation in this field is in a continuous "improvement", imposed by the evolution of The political, social and economic context;
- The concept itself of circular economy is in a dynamic process, of metamorphosis and adaptation, both as regards its theoretical side, but also regarding its practical aspect;
- The dynamic character of the CE concept demands a concern to develop the concept itself, in order to crystallize the conceptual aspects regarding the circular economy, its practices and methodologies, its policies and strategies (creating the empirical precedent, obtaining successful examples in the context of circular economic implementation, manifestation of openness to the practical implementation of the principles of the circular economic model and towards innovation).

The most realistic implementation of the circular model in Romania represents a qualitative plus for the human-society factor, as well as for the environment. Given that the first steps have already been taken in the direction of taking the conceptual bases and the practical examples, we consider it absolutely necessary to adopt a coherent direction in the internal legislative plan, namely the harmonization of the one already existing in the Romanian space, with the international norms.

A reconsideration of the sustainability dimension, the development philosophy, a more realistic and practical approach to the prejudices and barriers encountered in the process of implementing the circular economic system is welcome.

The most active implication of Romania towards the practical transposition of the circularity of the economy, namely the provision of immediate and certain examples of successes, corresponds to the creation and support of the premise of a mature and harmonious, economically efficient society, concerned with the conservation of the resource-environment balance.

The reconsideration of the equation human–environment-science in an intense period of modernization, galloping evolution and technologization is compulsory, taking into account the extremely topical and pronounced economic dimension of the contemporary society.

The surrounding world is a projection of our actions, so we are responsible for what we generate. It remains up to us if we want to value resources and use them responsibly, if we firmly say "no" to waste and landfills, if we call for selective collection, if we promote innovative economic models and if we protect the environment effectively.

All these represent an additional guarantee for maintaining the balanced existence of humanity on Earth, both for the present and for future generations.

Author Contributions: Conceptualization, H.V. and A.M.; methodology, H.V. and A.M; resources, H.V.; writing—original draft preparation, H.V., A.M. and A.-E.T.; writing—review and editing, H.V., A.M. and A.-E.T.; supervision, H.V.; funding acquisition, H.V. All authors have read and agreed to the published version of the manuscript.

Funding: This research received no external funding.

Acknowledgments: This work was supported within the research program PN-III-P1-1.2-PCCDI-2017-0652, project NR. 84PCCDI - 01/03/2018 TRADE-IT.

Conflicts of Interest: The authors declare no conflict of interest.

References

1. Merli, R.; Preziosi, M.; Acampora, A. How do scholars approach the circular economy? A systematic literature review. *J. Clean Prod.* **2018**, *178*, 703–722. [CrossRef]
2. Bonciu, F.I. The European Economy: From a Linear to a Circular Economy (December 5, 2014). *Rom. J. Eur. Aff.* **2014**, *14*. Available online: https://ssrn.com/abstract=2534405 (accessed on 3 August 2020).
3. Korhonen, J.; Honkasalo, A.; Seppälä, J. Circular Economy: The Concept and its Limitations. *Ecol. Econ.* **2018**, *143*, 37–46. [CrossRef]
4. Kalmykova, Y.; Sadagopan, M.; Rosado, L. Circular economy–From review of theories and practices to development of implementation tools. *Resour. Conserv. Recycl.* **2018**, *135*, 190–201. [CrossRef]
5. Kirchherr, J.; Piscicelli, L. Towards an Education for the Circular Economy (ECE): Five Teaching Principles and a Case Study. *Resour. Conserv. Recycl.* **2019**, *150*, 104406. [CrossRef]
6. Flynn, A.; Hacking, N.; Xie, L. Governance of the circular economy: A comparative examination of the use of standards by China and the United Kingdom. *Environ. Innov. Soc. Trans.* **2019**, *33*, 282–300. [CrossRef]
7. Sánchez-Ortiz, J.; Rodríguez-Cornejo, V.; Del Río-Sánchez, R.; García-Valderrama, T. Indicators to Measure Efficiency in Circular Economies. *Sustainability* **2020**, *12*, 4483. [CrossRef]
8. Korhonen, J.; Nuur, C.; Feldmann, A.; Birkie, S.E. Circular economy as an essentially contested concept. *J. Clean Prod.* **2018**, *175*, 544–552. [CrossRef]
9. Yuan, Z.; Bi, J.; Moriguichi, Y. The Circular Economy: A New Development Strategy in China. *J. Ind. Ecol.* **2006**, *10*, 4–8. [CrossRef]
10. Kirchherr, J.; Reike, D.; Hekkert, M. Conceptualizing the circular economy: An analysis of 114 definitions. *Resour. Conserv. Recycl.* **2017**, *127*, 221–232. [CrossRef]
11. Rizos, V.; Tuokko, K.; Behrens, A. The Circular Economy: A review of definitions, processes and impacts. *Res. Gate* **2017**, *8*, 1–45.
12. Lazarevic, D.; Valve, H. Narrating expectations for the circular economy: Towards a common and contested European transition. *Energy Res. Soc. Sci.* **2017**, *31*, 60–69. [CrossRef]
13. Bruel, A.; Kronenberg, J.; Troussier, N.; Guillaume, B. Linking Industrial Ecology and Ecological Economics: A Theoretical and Empirical Foundation for the Circular Economy. *J. Ind. Ecol.* **2018**, *1*, 1–11. [CrossRef]
14. Potting, J.; Hanemaaijer, A.; Delahaye, R.; Ganzevles, J.; Hoekstra, R.; Lijzen, J. *Circular Economy: What We Want to Know and Can Measure-System and Baseline Assessment for Monitoring the Progress of the Circular Economy in the Netherlands*; PBL Netherlands Environmental Assessment Agency: Hage, The Netherlands, 2018.
15. Geissdoerfer, M.; Savaget, P.; Bocken, N.M.P.; Hultink, E.J. The Circular Economy: A new sustainability paradigm? *J. Clean Prod.* **2017**, *143*, 757–768. [CrossRef]
16. Petit-Boix, A.; Leipold, S. Circular economy in cities: Reviewing how environmental research aligns with local practices. *J. Clean Prod.* **2018**, *195*, 1270–1281. [CrossRef]
17. Ritzén, S.; Sandström, G.Ö. Barriers to the Circular Economy–integration of perspectives and domains. *Procedia CIRP* **2017**, *64*, 7–12. [CrossRef]
18. Ghisellini, P.; Cialani, C.; Ulgiati, S. A review on circular economy: The expected transition to a balanced interplay of environmental and economic systems. *J. Clean Prod.* **2016**, *114*, 11–32. [CrossRef]
19. Preston, F.A. Global Redesign? Shaping the circular economy. *Chatman House, Energy, Environment and Resource Governance*. March 2012|EERG BP 2012/02. pp. 1–20. Available online: https://www.chathamhouse.org/publications/papers/view/182376 (accessed on 4 May 2019).
20. Ellen Mac Arthur Foundation 2013 Towards the Circular Economy: Economic and business rationale for an accelerated transition. Available online: https://www.ellenmacarthurfoundation.org/publications/towards-the-circular-economy-vol-1-an-economic-and-business-rationale-for-an-accelerated-transition (accessed on 21 August 2020).
21. Chiu, A.S.F.; Yong, C. On the industrial ecology potential in Asian Developing Countries. *J. Clean Prod.* **2004**, *12*, 1037–1045. [CrossRef]
22. Geng, Y.; Doberstein, B. Developing the circular economy in China: Challenges and opportunities for achieving 'leapfrog development. *Int. J. Sustain. Dev. World Ecol.* **2008**, *15*, 231–239. [CrossRef]

23. Ayres, R.U.; Ayres, L.W. *A Handbook of Industrial Ecology*; Edward Elgar Publishing Limited: Cheltenham, UK, 2002; Available online: http://pustaka.unp.ac.id/file/abstrak_kki/EBOOKS/A%20Handbook%20of%20Industrial%20Ecology.pdf (accessed on 21 August 2020).
24. Frosch, R.A.; Gallopoulos, N.E. Strategies for Manufacturing. *Sci. Am.* **1989**, *261*, 144–152. [CrossRef]
25. Boulding, K.E. The Economics of the Coming Spaceship Earth. In *Environmental Quality in a Growing Economy*; Johns Hopkins Press: Baltimore, MD, USA, 1966; pp. 3–14. Available online: http://arachnid.biosci.utexas.edu/courses/THOC/Readings/Boulding_SpaceshipEarth.pdf (accessed on 21 August 2020).
26. Loiseau, E.; Saikku, L.; Antikainen, R.; Droste, N.; Hansjürgens, B.; Pitk€nen, K.; Leskinen, P.; Kuikman, P.; Thomsen, M. Green economy and related concepts: An overview. *J. Clean Prod.* **2016**, *139*, 361–371. [CrossRef]
27. Pin, X.; Hutao, Y. Re-reading Steady-state Economy: Calm Thinking on Hot Circular Economy. *China Popul. Resour. Environ.* **2007**, *17*, 20–23. [CrossRef]
28. Hislop, H.; Hill, J. *Reinventing the Wheel A Circular Economy for Resource Security*; Green Alliance: London, UK, October 2011; p. 2. Available online: https://www.green-alliance.org.uk/resources/Reinventing%20the%20wheel.pdf (accessed on 4 May 2019).
29. Moraga, G.; Huysveld, S.; Mathieux, F.; Blengini, G.A.; Alaerts, L.; Van Acker, K.; de Meester, S.; Dewulf, J. Circular economy indicators: What do they measure? *Resour. Conserv. Recycl.* **2019**, *146*, 452–461. [CrossRef] [PubMed]
30. Ellen MacArthur Foundation 2015 (EMF, 2015) Growth Within: A Circular Economy Vision for a CompetitiveEurope. Available online: https://www.ellenmacarthurfoundation.org/assets/downloads/publications/EllenMacArthurFoundation_Growth-Within_July15.pdf (accessed on 4 May 2019).
31. Ellen MacArthur Foundation 2015 (EMF, 2015) Delivering the Circular Economy a Toolkit for Policymakers. Available online: http://www.ellenmacarthurfoundation.org/ (accessed on 4 May 2019).
32. Bourguignon, D. Closing the loop- New circular economy package, Briefing January 2016, EPRS | European Parliamentary Research Service, Members' Research Service PE 573.899. Available online: http://www.europarl.europa.eu/RegData/etudes/BRIE/2016/573899/EPRS_BRI(2016)573899_EN.pdf (accessed on 3 December 2019).
33. Communication from the Commission to the European Parliament, the Council, the European Economic and Social Committee and the Committee of the Rregions Closing the loop - An EU action plan for the Circular Economy. Available online: https://eur-lex.europa.eu/legal-content/EN/TXT/?uri=CELEX:52015DC0614 (accessed on 3 December 2019).
34. Manninen, K.; Koskela, S.; Antikainen, R.; Bocken, N.; Dahlbo, H.; Aminoff, A. Do circular economy business models capture intended environmental value propositions? *J. Clean Prod.* **2018**, *171*, 413–422. [CrossRef]
35. Agenda 2030 Pentru Dezvoltare Durabilă, DONUISF. August 2017. Available online: https://www.mae.ro/node/35919 (accessed on 9 October 2019).
36. The Circularity Gap Report 2019. Available online: https://www.circularity-gap.world/ (accessed on 3 December 2019).
37. Berg, A.; Antikainen, R.; Hartikainen, E.; Kauppi, S.; Kautto, P.; Lazarevic, D.; Piesikand, S.; Saikku, L. Circular Economy for Sustainable Development. *Rep. Fin. Environ. Inst.* **2018**, *26*, 1–24.
38. Meyer, B. Macroeconomic Modelling of Sustainable Development and the Links between the Economy and the Environment, Final Report Bernd Meyer Osnabrück, 30.11.2011, GWS. 2011. Available online: https://ec.europa.eu/environment/enveco/studies_modelling/pdf/report_macroeconomic.pdf (accessed on 3 December 2019).
39. Material Economics 2018 The Circular Economy- a Powerful Force for Climate Mitigation. Available online: https://materialeconomics.com/publications/the-circular-economy-a-powerful-force-for-climate-mitigation-1 (accessed on 3 December 2019).
40. Su, B.; Heshmati, A.; Geng, Y.; Yu, X. A review of the circular economy in China: Moving from rhetoric to implementation. *J. Clean. Prod.* **2013**, *42*, 215–227. [CrossRef]
41. Zhijun, F.; Nailing, Y. Putting a circular economy into practice in China. *Sustain. Sci.* **2007**, *2*, 95–101. [CrossRef]
42. Murray, A.; Skene, K.; Haynes, K. The Circular Economy: An Interdisciplinary Exploration of the Concept and Application in a Global Context. *J. Bus. Ethics* **2017**, *140*, 369. [CrossRef]
43. de Jesusa, A.; Mendonça, S. Lost in Transition? Drivers and Barriers in the Eco-innovation Road to the Circular Economy. *Ecol. Econ.* **2018**, *145*, 75–89. [CrossRef]

44. Kirchherr, J.; Piscicelli, L.; Bour, R.; Kostense-Smit, E.; Muller, J.; Huibrechtse-Truijens, A.; Hekkert, M. Barriers to the Circular Economy: Evidence From the European Union (EU). *Ecol. Econ.* **2018**, *150*, 264–272. [CrossRef]
45. Ilic, M.; Nikolic, M. Drivers for development of circular economy- A case study of Serbia. *Habitat Int.* **2016**, *56*, 191–200. [CrossRef]
46. Sitra, The Most Interesting Companies in the Circular Economy in Finland. Available online: https://www.sitra.fi/en/projects/interesting-companies-circular-economy-finland/#latest (accessed on 3 December 2019).
47. Hughes, R. The EU Circular Economy package–life cycle thinking to life cycle law? *Procedia CIRP* **2017**, *61*, 10–16. [CrossRef]
48. Comunicare a Comisiei către Parlamentul European și Consiliu, Comisia Europeană, Comitetul Economic și Social European și Comitetul Regiunilor: Spre o Economie Circulară: Un Program „Deşeuri Zero" Pentru Europa, Comisia Europeană, Bruxelles, 2.7.2014, COM(2014) 398 Final. Available online: https://ec.europa.eu/transparency/regdoc/rep/1/2014/RO/1-2014-398-RO-F1-1.Pdf (accessed on 3 December 2019).
49. Closing the loop: Commission adopts ambitious new Circular Economy Package to boost competitiveness, create jobs and generate sustainable growth. Available online: https://ec.europa.eu/commission/presscorner/detail/en/IP_15_6203 (accessed on 21 August 2020).
50. Comunicare a Comisiei Către Parlamentul European, Consiliu, Comitetul Economic și Social European și Comitetul Regiunilor cu Privire la Punerea în Aplicare a Pachetului de Măsuri Privind Economia Circulară: Opțiuni Pentru Abordarea Interfeței Dintre Legile Privind Substanțele Chimice, Produsele și Deșeurile, Comisia Europeană, Strasbourg, 16.1.2018 COM(2018) 32 Final. Available online: http://data.consilium.europa.eu/doc/document/ST-5479-2018-INIT/ro/pdf (accessed on 3 December 2019).
51. Communication from the Commission to the European Parliament, the Council, the European Economic and Social Committee and the Committee of the Regions: A European Strategy for Plastics in a Circular Economy, Brussels,16.1.2018 COM(2018) 28 Final. Available online: https://eur-lex.europa.eu/legal-content/EN/TXT/?uri=COM%3A2018%3A28%3AFIN (accessed on 15 January 2020).
52. Communication from the Commission to the European Parliament, the Council, the European Economic and Social Committee and the Committee of the Regions on a Monitoring Framework for the Circular Economy, Strasbourg, 16.1.2018, COM(2018) 29 Final. Available online: https://eur-lex.europa.eu/legal-content/EN/TXT/?uri=COM%3A2018%3A29%3AFIN (accessed on 15 January 2020).
53. Berkel, R.V.; Fujita, T.; Hashimoto, S.; Geng, Y. Industrial and urban symbiosis in Japan: Analysis of the Eco-Town program 1997–2006. *J. Environ. Manag.* **2009**, *90*, 1544–1556. [CrossRef] [PubMed]
54. Institutul European din România: Studiu SPOS 2018: Tranziția către o Economie Circulară. De la Managementul Deșeurilor la o Economie verde în România. Available online: http://ier.gov.ro/wp-content/uploads/2018/12/Mihaela-Stefanescu_Prezentare-SPOS2018_Economia-circulara.pdf (accessed on 2 October 2019).
55. Final_Studiul-3_Spos-2018_Economie-circulară-1.pdf, Tranziția Către o Economie Circulară. De la Managementul Deșeurilor la o Economie verde în România. Available online: http://ier.gov.ro/wp-content/uploads/2019/03/Final_Studiul-3_Spos-2018_Economie-circular%C4%83-1.pdf (accessed on 2 July 2020).
56. Strategia Naţională a României 2013–2020–2030. Available online: http://www.mmediu.ro/beta/domenii/dezvoltare-durabila/strategia-nationala-a-romaniei-2013-2020-2030/ (accessed on 22 July 2020).
57. Hotărârea Senatului nr. 3/2016 - Pachetul privind Economia Circulară: COM (2015) 614 final — Comunicare a Comisiei către Parlamentul European, Consiliu, Comitetul Economic şi Social European şi Comitetul Regiunilor „închiderea Buclei. Available online: https://legeaz.net/monitorul-oficial-92-2016/hotarare-senat-3-2016 (accessed on 22 July 2020).
58. New Material Pathways Handbook - Danube Goes Circular . . . -Dunărea Curge Circular, Foaie de Parcurs Transnațională Pentru Accelerarea Trecerii la o Economie Circulară în Regiunea Dunării: Bulgaria, România, Serbia. Available online: https://danube-goes-circular.eu/sites/default/files/uploaded%20files/AP-Romanian.pdf (accessed on 22 July 2020).

59. Informare de presă-Participarea delegației Ministerului Mediului la cea de-a 5-a Conferință a Părților la Convenția-Cadru Privind Protecția și Dezvoltarea Durabilă a Carpaților (Convenția Carpatică), Data publicării: 13 Oct 2017. Available online: http://www.mmediu.ro/articol/informare-de-presa-participarea-delegatiei-ministerului-mediului-la-cea-de-a-5-a-conferinta-a-partilor-la-conventia-cadru-privind-protectia-si-dezvoltarea-durabila-a-carpatilor-conventia-carpatica/2397 (accessed on 10 October 2018).
60. Comunicat de Presă-Viceprim-Ministrul Grațiela Leocadia Gavrilescu, Ministrul Mediului, Participă la Conferința "Economia circulară în România" București, 05 octombrie 2017, Data Publicării: 04 Oct 2017. Available online: www.mmediu.ro/articol/comunicat-de-presa-viceprim-ministrul-gratiela-leocadia-gavrilescu-ministrul-mediului-participa-la-conferinta-economia-circulara-in-romania-bucuresti-05-octombrie-2017/2385 (accessed on 10 October 2018).
61. Noi Ajutoare pt IMM-uri în Economia Circulară, Data Publicării: 06 Sep 2017. Available online: http://www.mmediu.ro/categories/view/life/87/page:3 (accessed on 10 October 2018).
62. Pop, R. Este România Pregătită Pentru Economia Circulară? 15 April 2016. Available online: /https://www.green-report.ro/este-romania-pregatita-pentru-economia-circulara (accessed on 22 August 2019).
63. Închiderea buclei" Ciclului de Viață al Produsului Prin Reciclare și Reutilizare, cu Beneficii Atât Pentru Mediu, Cât și Pentru.Economie-Data-Publicarii: 17 Jan. 2018. Available online: http://www.mmediu.ro/articol/inchiderea-buclei-ciclului-de-viata-al-produsului-prin-reciclare-si-reutilizare-cu-beneficii-atat-pentru-mediu-cat-si-pentru-economie/2467 (accessed on 22 August 2019).
64. Directive (EU) 2019/904 of the European Parliament and of the Council of 5 June 2019 on the Reduction of the Impact of Certain Plastic Products on the Environment. Available online: http://www.mmediu.ro/app/webroot/uploads/files/DirectivaSUP_EN.pdf (accessed on 15 January 2020).
65. Strategia UE Pentru Plastic în Contextul Economiei Circulare, Data.Publicarii:17 Jan 2018. Available online: http://www.mmediu.ro/articol/strategia-ue-pentru-plastic-in-contextul-economiei-circulare/2475) (accessed on 22 August 2019).
66. Mușuroaea, O.; Oberdorfer, A.; Mușuroaea, V. Study on the Assessment of Romanian Waste Market. Available online: https://www.innovasjonnorge.no/globalassets/eea-grants/romania/in_market_study_romanian_waste_sector.pdf (accessed on 23 July 2020).
67. Pana, M. Cum vrea România să Treacă la Economia Circulară Fără Reciclare, 11.3.2018. Available online: https://cursdeguvernare.ro/cum-vrea-romania-sa-treaca-la-economia-circulara-fara-reciclare.html (accessed on 22 August 2019).
68. Ciobanu, L. Primii pasi catre economia circulară in Romania. Available online: https://www.solutiidemediu.ro/primii-pasi-catre-economia-circulara-in-romania/ (accessed on 26 November 2018).
69. Isernia, R.; Passaro, R.; Quinto, I.; Thomas, A. The Reverse Supply Chain of the E-Waste Management Processes in a Circular Economy Framework: Evidence from Italy. *Sustainability* **2019**, *11*, 2430. [CrossRef]
70. Kipper, L. Ce este Economia Circulara si Care este Contextul European?, 29 June 2015. Available online: https://www.prwave.ro/ce-este-economia-circulara-si-care-este-contextul-european/ (accessed on 22 August 2019).
71. Circular 4R Economy. Available online: https://greenreport-conferinte.ro/circular-4r-economy/ (accessed on 15 January 2020).
72. Conferinta Circular WASTE- Sistemul Economic "Plătești Pentru cât Arunci", Prima Analiză. Available online: https://www.econet-romania.com/ro/event/conferinta-circular-waste-sistemul-economic-platesti-pentru-cat-arunci-prima-analiza/ (accessed on 15 January 2020).
73. Reikea, D.; Vermeulena, W.J.V.; Witjesb, S. The circular economy: New or Refurbished as CE 3.0? — Exploring Controversies in the Conceptualization of the Circular Economy through a Focus on History and Resource Value Retention Options. *Resour. Conserv. Recycl.* **2018**, *135*, 246–264. [CrossRef]
74. Economia Circulară, un Model Pentru Generațiile Viitoare, 28 Septembrie 2018. Available online: https://intelligence.sri.ro/economia-circulara-un-model-pentru-generatiile-viitoare/ (accessed on 26 November 2018).
75. Avram, S. Economia Circulară este Departe de a se fi Realizat în mod Concret, 06 Octombrie 2019. Available online: https://www.bursa.ro/sever-avram-economia-circulara-este-departe-de-a-se-fi-realizat-in-mod-concret-82321839 (accessed on 12 December 2019).

76. Communication from the Commission to the European Parliament, the Council, the European Economic and Social Committee and the Committee of the Regions: Environmental Implementation Review 2019: A Europe that Protects its Citizens and Enhances Their Quality of Life, Brussels, 4.4.2019 COM(2019) 149 Final. Available online: https://ec.europa.eu/transparency/regdoc/rep/1/2019/EN/COM-2019-149-F1-EN-MAIN-PART-1.PDF (accessed on 12 December 2019).
77. Commission Staff Working Document The EU Environmental Implementation Review 2019 Country Report - ROMANIA, Brussels, 4.4.2019 COM(2019) 130 Final. Available online: https://eur-lex.europa.eu/legal-content/EN/TXT/PDF/?uri=CELEX:52019SC0130&from=da, (accessed on 16 March 2020).