Implementing a Circular Economy in the EU. *The road to a sustainable future.*

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Abstract

This paper looks into how the European Union is working towards sustainable development with focus on the Circular Economy (CE), a sustainable economic system that can help achieve EU's sustainable development goals. These goals include responsible consumption and production, climate action, ending poverty and world hunger and sustainable cities and communities . The aim of this paper is to make use of theories in order to be able to better understand and find a valid answer to the question in the problem formulation.

The approach to the problem statement is made by first establishing a defining concept of the CE concept from the various definitions available in the literature on which the research can be conducted. The other definitions that include the main principles of CE are also analysed to provide an understanding of how CE is adopted and viewed in other fields of research.

Through the use of Neo-Functionalism and its concepts of spill-over effect and function-based agents, an analysis is made of the level of implementation of the CE concept across all the sectors of production in the EU and the role of the supranational actors in the implementation process, in particular the EU institutions and NGO organizations.

Document analysis is the preferred method of research which is used to first establish a keystone definition of CE which best applies to our problem formulation, and then, through analysis of EU policies, strategies, and proposed legislations to determine what is currently being done towards achieving this transition. Furthermore, a contribution is made towards the further promotion of the CE concept by presenting the advantages it holds against the linear model and the impact it can have in the fight to save the environment.

Lastly, the challenges that exist in the EU and which may hinder the implementation of the CE are identified and the limitations the concept holds, which stand to affect its core principle of sustainability, are presented with suggestions on what future Action Programmes should focus on in order to address them.

Content

Introduction

Humanity has been following a linear approach regarding the way it uses and then disposes of its natural resources since the times of the first industrial revolution. China's ban on the import of plastic materials with its "National Sword" policy has represented a wake up call for the EU and the rest of the world in the way they deal with the manufacturing and the disposal of these materials, showing the need for infrastructures adapted at recycling the plastics as well as an internal market where the recycled materials can be bought and sold so as to provide a way for them to get back in the life cycle of a product instead of being disposed. This ban came as a need to combat the influx of contaminated and unrecyclable plastics which had started to overwhelm their facilities. The world had been dependent on China since 1992 with importing about half of all the recyclables, and thus avoided the costs and the environmental consequences by leaving these tasks in China's hands.

"This regulation will send shockwaves around the world, and force many countries to tackle the "out of sight, out of mind" attitude we've developed towards waste". (Liu Hua)

With the ban, however, it was quickly discovered how unprepared the rest of the world, including the EU, really was, as many recycling plants had been overburdened by the influx of waste materials and also had no further means to sell their recycled materials, thus having to shut down. This has led to the realization that the existing mentality of consuming and disposing of products is not only detrimental to the environment but also counterproductive and adds more costs in the long term by needing to fix the issues created by the never ending disposal of materials which can instead be useful and profitable. Thus there is a strong need for a sustainable development that guarantees the availability of resources, as the system of consumption and production that is now in use would require about 1.7 Earths to replenish all the resources used (World Economic Forum). In this respect, the Circular Economy (CE) concept could represent a viable sustainable solution as it is opposed to the current linear economic model of take-use-dispose. However, a transition of the entire economic system is a great feat to achieve, that gets even greater due to globalisation and the vastness of industries across the globe that would need to adapt to these changes. At the EU level, this transition can be more easily theorized, by focusing on the cooperation between member states and by the creation of international institutions focused on the implementation of CE and the coordination between the member states.

Different strategies have been suggested to achieve this transition, all having in common the same concepts as motivating factors: industrial symbiosis, eco-design, products created within the reduce-reuse-recycle waste system (Reichel) The impact of these strategies is determined by the use of circularity metrics, which show how well CE is applied to a product. However, there are issues regarding these metrics, with the main one being that there are a plethora of indicators for measuring the sustainability of a product. This stems from the different understandings that actors have of CE, a concept whose definition is still open for debate. Given all these considerations, the issues that this thesis seeks to deal with can be summed up in the following statement.

Problem statement

How can the Circular Economy model be applied in the varying EU states in order to achieve EU's Sustainable Development Goals and what challenges is it facing?

The approach to the "how" part of the statement will be to look at evidences of CE implementation across member states in the reviewed literature and to establish a framework of how CE implementation is being done in different sectors across the EU and the potential for further implementation as well as establishing the promoters of the CE concept and what is their driving factor. Finally we will look at what is hindering the implementation of CE and what future obstacles it faces, for while there has been a lot of progress in implementation of CE strategies in the Western part of Europe, the Eastern states have a very bad record in terms of efficient waste management or sustainability. The guiding principle through which we will deal with the problem statement will be through the use of neo-functionalism, to study how the main actors driving the CE concept interact and manage to promote their idea across all areas and secondly the green theory, a critical theory revolving around the environment that shares many characteristics with CE , especially on reducing waste in the environment and of preserving natural resources.

Literature Review

The literature needed to conduct this research has been gathered through the use of internet search engines, eur-lex, Google Scholar and Scopus, with a process of focus on the abstracts to select articles that concern CE, and CE in the EU context. These articles are used to understand the concept of circular economy and its different interpretations, to identify policies pertaining to CE implementation and observe examples of implementation across the EU. Ghiselini et al. provided reviews for the major EU policies regarding CE, which were also analysed (2016).

Identifying the different concepts of circular economy was done by searching articles and policies with the keywords “circular economy” which identified the Ellen MacArthur Foundation as one of the biggest promoters of the CE with extensive reports published. The Ellen MacArthur Foundation provides not only promotion of the CE concept but also initiatives to help the CE implementation, by providing case studies of how CE can minimise resource losses in various industries, and by the call for the creation of a “Plastics Economy” to urge companies towards an efficient plastics economy less harmful to the environment (Ellen MacArthur Foundation, 2016)

A previous literature review by Kirchherr et al. provided ample varieties of definitions of the CE concept across different fields, and a focus is made on the definitions that include the 3R principle, an essential part of understanding the CE model (Kirchherr et al., 2017).

There has been little evidence of theories in the social sciences pertaining to the CE concept as the topic is still considered a niche in academic circles, besides the ample studies focused on China, which was the first country to codify a CE policy (Geng, 2013). This is due to the lack of focus of the CE promoters on the social dimension and how the implementation of CE will affect it. In areas where CE implementation causes direct effects such as the Management sector, numerous theories for the advancement of CE concepts can be found (Liu, J., 2018).

Further limitations of literature use were caused due to the narrow scope of observing CE implementation only in the EU, where up until now there has been little concrete action taken towards the implementation of the CE and the predominance is on legislative initiatives and

agenda settings in the scope of future implementation. In a more general scope, China would have presented a better subject of study for the implementation of the CE where the concept was first proposed as a sustainable development strategy back in 2002 and was part of their last "Five Year Plans" making it an effective system already in use there (Zhijun and Nailing, 2007). Claims have been made that the concept of CE also originated in China, in an unreferenced paper in 1998 (Yuan et al., 2006) however other sources have been identified that predate this, with one going as far as 1966: "Man must find his place in a cyclical ecological system which is capable of continuous reproduction of material form even though it cannot escape having inputs of energy" (Boulding, 1966).

Defining the concept of CE

The transition to a CE promotes durable models of production and consumption, which can be implemented in a society always in pursuit of resources for economic growth. However, the concept of CE is still new, and its definition varies based on the actors involved. A literature review by Kirchherr has found 114 definitions of CE, which shows the different interpretations actors give to CE based on how they think best to apply it. Most of the definitions contain the reduce-reuse-recycle principle, but some argue against the need for a change of the entire system (Kirchherr, 2016).

Therefore, before continuing, it is necessary to establish a general definition of CE which will serve as the model for the transition, in order to then establish the necessary steps towards such a transition and means of cooperation. While looking at the different definitions of CE we also get a better understanding of why certain actors would choose to adopt the concept, through the prevalence of some concepts over others pertaining to different types of actors.

"The CE can be a complete solution for complex problems existing in Europe and the rest of the world" (Bonciu, 2014).

The idea of circularity, referring to closing the economic buble, first appears in 1976 in "The potential for substituting manpower for energy" (Stahel et al), in which it is presented as an economic bubble which can generate new jobs, save resources and prevent waste while at the same time raise the economic competition. Stahel, therefore, sees the CE concept strictly from an economic point of view, at an industrial level, pertaining to economic efficiency. For this, he sees the innovation in science and technology as the main drive towards a more efficient economy.

The Mckinsey Center for Business and Environment proposes a different view of CE, which needs to be guided by three principles, conserving capital, optimising the use of resources and optimising the system by eliminating negative externalities (2016).

A more comprehensive definition, which pertains the best to CE as a means to achieve sustainable development is proposed by Kirchherr et al: "An economic system that replaces the

‘end-of-life’ concept with reducing, alternatively reusing, recycling and recovering materials in production/distribution and consumption processes. It operates at the micro level (products, companies, consumers), meso level (eco-industrial parks) and macro level (city, region, nation and beyond), with the aim to accomplish sustainable development, thus simultaneously creating environmental quality, economic prosperity and social equity, to the benefit of current and future generations. It is enabled by novel business models and responsible consumers” (2017).

It is worth also mentioning the definition of this concept from the raport made by the Ellen MacArthur Foundation, “Towards the Circular Economy”, who are one of the main actors who popularized the CE concept today. They propose an approach to CE in a pragmatic way, seen as “an industrial system which can be restored and regenerated through design and will”, bringing forth a series of principles which, if implemented, would bring economies equal to 3-3,9% of EU’s GDP in 2010 (Ellen macArthur Foundation, 2013).

The European Commission, on the other hand, provides a more basic and general definition of CE. It states that CE: “aims to maintain the value of products, materials and resources for as long as possible by returning them into the product cycle at the end of their use, while minimising the generation of waste.” However, it is clear from its actions that EU’s understanding of CE goes beyond industrial production, as can be seen through the adoption of the Action Plan for the Circular Economy (2015) aimed at developing a sustainable and resource efficient economy that puts less strain on the environment while creating more innovation and working opportunities. But despite all this, the EU has yet to provide a legal definition of “circular economy”.

The European Commission has taken the initiative through the “Proposal for a regulation of the European Parliament and of the council on the establishment of a framework to facilitate sustainable investment” (2018), which also provides requirements and targets for a sustainable development. For the purpose of this paper, which aims to look at how the EU can achieve sustainable development through a transition to CE, the definition provided in this proposal will be used.

The proposal defines CE as: “It [circular economy] means maintaining the value of products, materials and resources in the economy for as long as possible, and minimising waste, including through the application of the waste hierarchy as laid down in Article 4 of Directive 2008/98/EC of the European Parliament and of the Council;” (2018).

The waste hierarchy being as follows:

1. Prevention

2. Preparing for re-use

3. Recycling

4. Other recovery (e.g. energy recovery)

5. Disposal

This proposal, if adopted, could help determine which economic activities are sustainable and functioning in the parameters of CE, and which economies help the most in the transition towards CE. These are the ones who: help improve the use of raw materials in production, increase the durability and reusability of products; increase the recyclability of products, reduce waste and lead to more efficient use of natural resources. A detrimental economic activity to CE would be the one found to lead to inefficient use of raw materials in the creation of a product which affects its durability, reusability or recyclability, or if it leads to the creation of big amounts of waste.

In response to this proposal, the European Economic and Social Committee came forward with an Opinion, in which the EESC welcomes several of the proposals put forward by the EC, acknowledging them as first steps towards a sustainable future, such as the ones regarding "taxonomy as a first step towards implementing the action plan on financing sustainable growth", and to "make the EU taxonomy highly granular" in able to be able to determine which activities are genuinely sustainable. However, the EESC points out that the proposals made relate to environmental aspects only, and there is a need for attention to how CE applied to social sustainability and governance goals. It also stresses the importance of establishing a good understanding of the terms "green" and "sustainable", and of a defining concept or taxonomy which will form the foundation on which any actions can be built.(EESC)

Methodology

Design

In order to best approach the thesis statement a certain order needs to be followed. Thus the first chapter of the thesis provides an introduction to the main topic dealt with and sets the parameters of the research while providing the reason for the emergence of the problem statement. In the second chapter, the tools through which the research is achieved are explained in a structured fashion, which include the type of data that is collected, the tools used for the analysis and the limitations of the research. The third chapter presents the theories chosen to help the analysis, which can best explain the specific barriers and challenges for the adoption of CE. These theories will be used in the following chapter to look at the data gathered through their lens. Finally, the results and the conclusion are presented in the final chapter, and there is a discussion whether the results have been satisfactory to answer the research question.

Data Gathering

The first challenge of the paper was to establish a clear definition of the concept of CE which best applies to the needs and challenges that the EU faces in the transition. Searches were made through Google Scholar, Google and the Jstor database with keywords such as “circular economy”, “green economy”, “closed loop economy” which resulted in literature of both academic and non-academic type such as policies, articles and reports.

Different sources of definitions include NGO’s like the Ellen MacArthur Foundation and European Commission's Proposals. The policies and proposals that were analysed were found on EU portals and also helped determine effective changes being already made towards a transition to CE. Other web searches provided different articles on the topic of sustainable development and Circular Economy that were used to establish the current awareness of this concept in the public discourse.

After a definition has been established, the next step is to analyse the steps taken towards the development of CE in the EU, through the use of the EUR-Lex database to look at recent legislations and proposals regarding sustainable development. This also helps determine the barriers that CE is currently facing.

Searches were made for policies regarding CE at the national level as well in various member states, in order to observe the differing modes of implementation and the challenges faced, as well as to establish the level of popularity of the CE model across the EU.

Although the data analysed is mostly qualitative, some quantitative data was also used, such as statistics of waste generation from Eurostat.

Document Analysis

For the purpose of this thesis Document analysis will be employed in order to determine the relevance of CE in the public discourse and to assess its development through published results. This is a form of qualitative research in which documents are interpreted to give voice and meaning around a topic (Bowen, 2009). The advantage of using this tool is the ease of accessing the data required, which in this case is represented by three main types of documents: public records (such as annual reports, policy manuals, official proposals and strategic plans), personal documents(in this case articles, journals, opinions and newspapers), and physical evidence (agendas, handbooks) (O'Leary, 2014).

There are however issues that need to be taken into consideration with employing document analysis. The main one being the risk of bias, either from the researcher or the author of the document (O'Leary, 2014). It is therefore imperative to examine the purpose of the document and who it is meant for (Bowen, 2009). Another issue to be considered is the hidden meaning of the document, or the latent content, which has to do with the style, tone and the agenda that have been chosen by the author (O'Leary, 2014).

The way in which the document is employed is by treating it as a source for providing the needed information. Basically, the researcher should have certain questions in mind when pursuing the document and highlighting the relevant answers to his questions.(O'Leary, 2014). Another

method is to quantify the use of certain words or concepts by counting how many times it appears in a certain document. After this is done, the information gathered has to be prioritized based on how it relates with the main question of the research (Bowen, 2009). Document analysis also features thematic analysis, which uses the data to determine emerging themes which can be easily categorized and analyzed, through careful reading of the chosen data and determining categories (Bowen, 2009).

Advantages and limitations

The advantage of choosing this method is the efficient and accessible way of gathering the required data, which are predominantly public documents accessible over the internet. The abundance of documents that can be found on a specific topic is also a benefit, with more data to work with providing a more reliable result. Lastly, the procurement and analysis of the documents is far less costly and more time saving than conducting own experiments (Bowen 2009).

Apart from the risk of bias already mentioned in the interpretation as well as the creation of the data used, there are other critiques to the analysis. In case of interview transcriptions, Bowen observes, it obscures the interpretive process (2009). However, this will not affect the research in question as interviews have not been used. Other negative aspects of this analysis consist in the limitations of the data. A document will not be able to provide all the necessary information required to answer the problem statement. A lot of documents vary in relevancy, with some that might be able to provide little to no relevant data. Other documents might simply be inaccurate.

Theory

The EU has made significant changes that proves its commitment towards sustainable development through its legislative measures, the bans imposed and the agendas set. These changes will affect not only the member states but others as well, as the EU can use its power and influence over the candidate states and foreign allies to further promote the ideals of sustainable development and the transition to a CE. Therefore it is fair to say that the concepts of sustainable development and CE are now part of the EU integration process, and as such, can be approached through the lenses of an integration theory. As such, we will use the theory of Neo-functionalism to see how the EU can further spread the concept of CE, its sustainable goals and create a recyclables market between all the different states and the different industries. Another theory that could be of use will be touched upon, the Green theory, which in short stands for global cooperation for environmental purposes.

Neo-functionalism

In the Commission Staff Working Document of 2020 titled "Leading the way to a global circular economy", the European Commission addressed the concerning and potential candidates to join the EU with direct opportunities for the development of circular economy in the region. It offered strategies, programmes and legislations that will help with the development, but it also set forward the Green Agenda for the Western Balkans, which, it states, will benefit from developing a CE in the region (European Commission, 2020)

The influence the EU exerts on the third countries to be able to achieve such a feat as promoting these new and for many foreign concepts of the circular economy, and to give up an already established system, to be able to completely upend the status quo, can better be understood through the theory that stands at the base of European integration, neo-functionalism.

To get a better grasp of the theory we have to look at its history and the context in which it was created. In light of the creation of the European Coal and Steel Community (ECSC), Ernst B.

Haas aimed to provide a theoretical analysis of how a cooperation between these states has been achieved and possibly provide an example for other places of the world (1958).

The main three characteristics of the neo-functionalism theory provide the best understanding of what the theory means. The first and main one, the spill-over hypothesis, which originally, as it was on the subject of integration, explained how the member states would each be affected by change through cooperation, respectively, how the policies in one country would affect the policies in another (Haas, 1975). Today this characteristic of the theory is used to explain not only the political agenda but also the technological and cultural changes between cooperative states. In observing all the different ways of spill-over, we can also determine how these effects can be directed towards the transition to CE through institutions or stakeholders. The second defining characteristic of neo-functionalism is the role of interest groups in the process of integration, and with that, the process of CE, where Haas observes that the interest groups might be more eager than a government to push further an agenda if it servers their interest, and they will always see integration as a way to solve their common issues. This might affect the promotion of CE and of sustainable development from an ideological point of view, as the moral goal for humanity, as this would not be the driving factor between the main actors promoting it, but a better focus would be on the advantages and benefits that the actors stand to gain from CE such as cost savings from better resource management.

Finally, neo-functionalism gives the European integration the aspect of a members-only club, an exclusivist and elitist group, where the cooperating actors will develop in time preference and loyalty to the EU, and which can be seen as criticism, but it helps give EU the power it needs to affect significant change between its members and the others, by requiring, for example, potential candidates to adopt its agendas and adhere to its standards and ideas. This elitism can be seen as an example in the institutions that form the EU and which rely on European norms and ideas. Through neo-functionalism we can then ascertain how these institutions are expected to behave: the European Commission is seen as the “policy entrepreneur” which will always pursue greater integration between members in a way that will confer more power to the supranational agencies; the European Parliament is also expected to act as a supranational agent in support of the EC and that the actors involved will serve European ideals and interest; the Court of Justice of the EU the neo-functionalists see as a further promotour of political integration as well as the EU Council (Cini, 2000).

We also need to explain the five foundational assumptions that neo-functionalism rely on and which need to be taken into consideration. The first one, bounded rationality, assumes that the

actors involved are all rational actors but are limited by unexpected events or unclear information which leads them to unintended changes in the decision-making process (Haas, 2004). The second one assumes that the preferences of the actors will change in time through socialisation processes and development of identities and groups (Pierson, 1996). The third assumption regards the role of the government in the integration process, where in the classic view of neo-functionalism, Haas saw the role of governments as that of supporting the supranational institutions while the more accepted view of the modern neo-functionalists is that of Schmitter where the governments play a bigger role in integration, albeit only in vital cases or what are considered high politics (Schmitter, 1970). Fourthly, the neo-functionalism theory assumes that the governments are always seeking a strategy of minimum integration as not to lose any national sovereignty, which creates a structural bias by which governments are less willing to relinquish power to supranational agents (Ibid.). Finally, the last assumption is that of functional synergies, by which neo-functionalists assume that policies can form certain functions together and be more effective if run at the same level of governance.

While the functionalist theory sees the creation of supranational agencies as groups created with specific functions that serve a purpose, the neo-functionalists see the creation of the groups as a bid to match the rising level of political and economical integration (Cini, 2000). These groups would then have the power to pressure governments to further the integration process, and in time develop common interests in line with other supranational agents (Haas, 1958).

The European Commission is the main institution that is responsible for setting agendas, as can be seen by all the new policies regarding CE that have been put forward by the institution since the first Circular Economy Action Plan in 2015, but while the Commission is able to provide sound policies for the advancement of CE it can do little in the decision-making process of how these policies are applied. Therefore there is a need for other actors to take on the roles not filled by the Commission, international or European bodies with the power to ensure the application of a legislative proposal over national sovereigns, all driven with the same purpose, Circular Economy (European Commission, 2015).
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Criticism of Neo-functionalism

In academic discourse, the neo-functionalist theory has had a huge falling out, due to mainly not being able to keep up with its predictions of European integration. "Insofar as neo-functionalism advances a clear precondition about the trajectory in the European Community over time, it was that the technocratic imperative would lead to an "incremental" "gradual", and "automatic" progression towards greater integration and greater supranational influence" (Moravcsik, 1993). This criticism has lessened in more recent times, with the creation of the EU, the development of the single market and the European Community, which were all effects of the spill-over envisioned by the neo-functionalist theory.

Another point of criticism of neo-functionalism is that it places too much focus on the supranational agents in the process of integrations where others like Moravcsik suggest that the nation states are of more importance and cooperation between regions should be seen as intergovernmental organizations (Moravcsik, 1993). Its focus on the political elites under the assumptions that their cooperation would cause the rest to cooperate as well had proved detrimental as well, seen in more recent times with Brexit, or how often EU treaties fail to pass the national referendums.

Finally, the main issue with the neo-functionalist theory and its drawback as a guiding theory for CE cooperation is its assumption that the supranational agents will share the same ideals and norms and work towards the same benefits, an idea which in this case is on par with Europeanism, and which is something that is not commonly established or embraced.

Green Theory

One of the key moments in history for the advancement of environmental issues in social sciences represented the Stockholm Conference, held in Sweden in 1972, which led to the first development of international environmental politics. This led to the need to develop a theory which would be able to deal with these issues at the scale required. Given that the environmental problems are something that affect the entire globe, the actions needed to affect change also need to be taken at a global level, which leads to the question, how do we affect change globally?

Neo-functionalism, and other International Relations theories in general, are usually focused on the states and their needs, while ignoring other actors with the potential to affect change such as NGOs, communities, or even individuals. In the implementation of Circular Economy, the Green theory view would be that of cooperation between all the stakeholders involved, which essentially means everyone. However, Goodin suggests that a special feature of the Green theory is that it goes beyond political agency or practices, as it has in its main view strictly the safe being of the environment, and the needs and wants of humanity are put in a wider ecological perspective (Goodin, 1992).

Therefore, through Green theory we can see the transition towards Circular Economy as a long-term objective for every stakeholder, and not something that might serve some short-term political interests (McGlinchey, 2017). Just like with the issue of climate change, a main reason for the creation of the Green theory, the transition towards CE requires the involvement and cooperation at a global scale and thus requires an immense transformation of the values and actions of everyone involved, which inadvertently leads to the need for political innovation at a global scale (Trainer, 1985).

However, states still have to contend with their own citizens and thus have to choose between long-term changes for the environment or short-term changes that are beneficial to the economy. Which leaves the responsibility on all the great powers. the EU, the US and China, to set the path towards CE and to develop a global framework.

A key aspect and the first principle of the Green theory is the concept of ecocentrism, where one puts value on all the living beings on this planet and the ecosystems they live in and not only centered around the human population and their needs (Eckersley, 1992).

The second principle of the Green theory is that it focuses on the moral duty of us as humans to make changes that don't impact other life forms (Barry, 1992), which includes the continuous depletion of natural resources, as per the linear economy, which people do for their own benefits even at the expense of leading entire species of animals to extinction. To that extent, the Green theory proposes a limit to economic growth to stop the complete depletion of natural resources (Dobson, 2011). This is in agreement with CE practices that also aim to reduce the use of resources.

The third principle of the Green theory is that of decentralization, by which it is meant switching the responsibility and the power to act on climate issues from international institutions to that of

states, as global environmental issues become too much to handle for the international agents and get switched to local ones. The international institutions and other forms of global governance emerge because states become too limited in dealing with the environmental issues, as these are affected by actions on a global scale, thus the responsibility is being constantly switched between international and national agents (Hempel, 1996). The scope and size of transitioning the entire global economy to a circular model could also be helped through the creation of international institutions, as it becomes impossible for a state alone to adhere to CE practices if simply other neighbouring states do not share the same ideals and continue, for example, the depletion of natural resources in the area, or continue in the creation of waste and pollution, thus impacting everyone living.

Another characteristic of the Green theory is the concept of Ecological Modernization which requires that technological innovation and economic growth is done using the least amount of resources and energy, with minimum amount of waste, a characteristic in terms with the eco-design and the other principles of CE. According to green theorists, each nation needs their own environmental governance program that can guarantee economical modernization with minimised resource depletion (Hajer, 1995).

Lastly, an aspect shared by both the Green theory and CE is their focus on establishing the responsibility shared by the states for the betterment of the environment, as well as the citizens, who need to change their consumption behaviour in order to remove the impact on the planet. This can be something as easy as not throwing away unwanted objects but simply gifting them away through the use of online markets.

Analysis

Advantages of the Circular Economy

Based on the numerous definitions of Circular Economy available in literature, Kirchherr discovered that the majority of them describe the CE by pointing out its 3Rs principle, Reduce, Reuse and Recycle (2017). The idea behind the principle is retaining the value of a material even after it has passed through a life cycle. In this sense, CE creates the possibility for a lot of value creation. This value can be attained, firstly through "smart design", where the least amount of resource is used to create a product and through the use of "smart materials", where the more durable and environmentally friendly materials are used. A good example of eco-design is the Dutch company Fairphone, which developed a smartphone that has its various parts easily removable and upgradable so people don't have to discard their phone for a better model (Fairphone, 2013).

Secondly, value can be created by switching certain aspects of the linear economy to the service economy, in which more importance is given to the service of a product than the product itself. A good example of this is Apple who, aiming to totally drop its carbon dependency and developing a sustainable business model, has decided to remove the charger and any other accessories from the package of a phone, hoping in the future to change to a model where using their products would mean using their services and not owning the actual products themselves, thus switching from the concept of ownership to that of functional use (Shead, 2020).

Thirdly, since the producers are the ones in charge of obtaining the materials needed for creating a product, they are more determinant to create a longer lasting product, by ensuring that the product can live through multiple cycles before needing repairing.

The advantages of the CE can be seen in the disadvantages that the current linear economic system presents today. Firstly, in light of the continual depletion of resources on Earth, putting a further strain on the resources instead of providing a solution for reducing their use. In the last

century alone the use of materials has increased more than 30 times, and as the population grows, the use of materials will only increase further, which is expected to arrive to ten billion people by 2050 (SER, 2016). However, CE could help reduce the use of materials to over 70%, with better consumption models which in turn produce less waste, adding to approximately $630 billion for the medium life products sector such as electronic and approximately $700 billion in the short life products sector such as foods (Ellen MacArthur Foundation, 2016).

Secondly, the rising demand for corporate responsibility and responsible products, plays a major factor as to why the CE is enjoying such attention as there has been more demand on companies on behalf of consumers to negate the effects of the linear economy and develop sustainable practices. Thus, it can be seen as detrimental to a company's image not pursuing sustainable measures and the risk of losing customers will convince businesses of the benefits of transitioning to a circular model.

The third disadvantage of the linear economy is the increased environmental damages that the system incurs, which spills over to affect marine life, the climate and cause destruction of natural resources. On the contrary, CE, if implemented correctly, can not only ensure a sustainable production and consumption model but also help reach the climate goals of reducing the emission of CO2 and keeping the temperatures from rising, pursued by the Paris Climate Agreement (CEE, 2016).

Other advantages of the CE can be seen in the opportunities for job creation, where the transition is expected to create new employment opportunities by: a rise in the recycling and repairing activities, a rise in opportunities for work in the logistics sector in charge of retrieving products for material extraction and the creation of new businesses as a result of new and innovative business models (Ellen MacArthur Foundation, 2015).

CE also has the role of incentivising innovation across all sectors through the creation of new business models needed to adapt to the circular model, the creation of new designs. Further opportunities are possible by changing how the consumer relates to the product, by creating the idea of functional use instead of ownership of a product which will cause the consumer to be part of the circular model and by promoting the concept of sharing economy, where goods are not immediately discarded but exchanged on a goods market. Consequently, the producers will also have more interest in developing durable products to satisfy the new consumer demands (SERV, 2017).

Evolution of sustainable development in the EU

Sustainable development has a bit of a history and it's not at all a new concept, first being mentioned in an environmental debate that ended with a report from the Brundtland Commission in 1987 (Garcia, 2006). Sustainable development is described by the Brundtland Commission as a development that "meets the needs of the present without compromising the ability of future generations to meet their own needs." (World Commission, 1987). However, initiatives in the EU regarding environmental protection began earlier than that, after the 1970's, where member states took an agreement to help the environment, however it wouldn't be until 1987 and the adoption of the Single European Act that exact policies regarding the environment were set. SEA described the environmental goals as the "prudent and rational utilization of resources" and that the environmental policies should be a part of all the other policies. This was further clarified in the Maastricht Treaty where there was an explicit call for "sustainable and non-inflationary growth respecting the environment." (European Consultative Forum, 2001). The Treaty of Amsterdam further solidified what sustainable growth meant by asking for "balanced and sustainable development of economic activities" (Garcia, 2006).

The EU sees its work towards sustainable development not only as a goal that would help save costs and waste but also as a moral obligation, as EC puts it:

"Along with other developed countries, we are major contributors to global environmental problems such as greenhouse gas emissions and we consume a major, and some would argue an unfair, share of the planet's renewable and non-renewable resources." (Commission of the European Communities, 2001).

Thus, by promoting the ideals of sustainable development the EU can fulfill its moral obligations to the world, but if the EU wants to be a leader in the promotion of sustainability it first has to change its own means of production, and it can only do that through environmental policies (Commission of the European Communities, 2001).

The EU sets environmental policies through the use of environmental action programs (EAP). The EAPs that have been set in the EU provide a history and progress of sustainable

development. The first EAP, from 1973 to 1976, describes economic growth not as a goal to pursue but as a means of achieving a sustainable model of development (Jordan, 1999). It also gives a general description of what needs to be done in terms of initiatives for reducing pollution. It sees the role of the environmental policies as "to improve the setting and quality of life, and the surroundings and living conditions of the peoples of the Community" (Commision of the European Communities, 1981).

The second EAP from 1997 to 1981 brought forward the idea that environmental protection is needed in order for the economic activities to enjoy a harmonious expansion and that economic growth should not be seen "solely in its quantitative aspects" (Commision of the European Communities, 1977). Criticism was received however for having too general views on the importance of prevention of waste without providing any solutions.

The third EAP, from 1982 to 1986 focused on the significance of the environmental policies and how they are able to increase the EU economy's competitiveness and promoted policies for the reduction of pollution (Commission of the European Communities, 1983). This programme saw the first of the word sustainable in regards to an objective that concerned sustainable use of resources (EU, 2012), and the adoption of a fundamental environmental directive, the Environmental Impact Assessment Directive by which there would need to be made an assessment before engaging in activities that could hurt the environment.

The fourth EAP from 1987 to 1992 focused on the industry and how it could benefit from ecological design and modernization where the natural resources are treated as factors of production and not as free and limitless resources. This EAP represented the basis on which sustainable development was to be built upon. The fourth programme did not look to establish new decisions but rather elaborate on what was already there. Thus more emphasis was made on ensuring the implementation of policies through the use of environment inspectors that can engage with national agents. "The Commission intends to intensify the dialogue with national (or, as the case may be, regional) administrations (...) to promote a more fully harmonised understanding of,and approach to,both legal and practical questions concerning implementation; and to persuade them to ensure the effective implementation of Community acts and the national laws based on them" (Official Journal of the European Communities, 1987). Besides the implementation of policies, another goal of the programme was to spread the environmental policy across all the other policies through the use of economic incentives for environmental friendly activities.

The biggest change however came with the fifth EAP, from 1993 to 2000, where we first find the mention of "sustainable development" with specific policies , where it is described as "continued economic and social development without detriment to the environment and natural resources, on the quality of which continued human activity and further development depend" (Commission of the European Communities, 1993). This programme focused on setting objectives for the future regarding the quality of life, the availability of resources and reducing the environmental impact (EC, 2005). It also further pushed the integration of environmental policies in the other policy areas until they became the norm in the Treaty of Amsterdam. "Environmental protection requirements must be integrated into the definition and implementation of the Community policies [.] in particular with a view to promoting sustainable development" (EC, 1997). Criticism of the programme was that it did little progress compared to the goals that it set out, and that there hasn't been any reduction in the environmental damage , which led the programme to conclude that: "unless more fundamental changes are made, the prospects of promoting sustainable development remain poor." (European Environment Agency, 1999).

In an attempt to resolve these issues the sixth EAP, from 2001 to 2010, puts in the limelight the biggest concerns, climate change, depletion of natural resources, animal extinctions and toxic pollution, and proposes effective thematic strategies such as sectoral policy integration, effective policy implementation and increased engagement from stakeholders. The programme provides a comprehensive framework for environmental policy, and a group of seven thematic strategies which could create effective policy measures for the objectives not covered by the programme (IEEP, 2011). The concluding assessment of the 6th EPA observed an increasing difficulty for implementation in the areas of waste and water and nature conservation, where the EU is suffering the most in terms of environmental impact. A novelty of the programme was in the way it came to be adopted, through the involvement of the Council and the Parliament , which meant that the task environmental policy is to be a shared responsibility, which became the normal procedure.

The final and current programme, the 7th EAP, built upon the framework of the Europe 2020 strategy, from 2011 to 2020 draws on the assessment of the previous programme and on the challenges established by European Environment and Health Action Plan to bring forward a clear plan and nine objectives divided into three main objectives and the other supportive objective. The main objectives are the protection and enhancement of the natural capital of the EU, the transition to a green, resource-efficient economy and protecting its citizens from the pressure and risks related to the environment (EC, 2012). The other objectives are scientific

based environmental policies, incentives for environmental protection, implementation of environmental legislations, environmental integration, urban sustainability and the global reach of the EU in guiding the climate discourse. Achieving such objectives cannot be accomplished however without the help of supranational actors as well as national actors from all levels of governance.

As can be seen, each Action Programme builds upon the assessments of the programme that preceded it, assessments which identify potential gaps in the implementation of the programme and which become main objectives in the programme that follows. Therefore, the assessment of the 7th EPA will play a crucial role into what the following programme will focus on.

Implementation of CE strategies in the EU

This section looks at existing literature and through the use of document analysis evidentiates instances of implementation of CE strategies across the different sectors of the EU and the potential for further implementation in those sectors.

For an effective transition to CE, implementation of the strategies needs to happen at all levels of analysis. The analysis shows that the predominance of CE actions have been taken at the macro-level, meaning by governments or authorities, with most initiatives taken in waste management (Luttenberger, 2020). This signifies that there is an active desire for governments to promote the circular system.

The information and communication services area, as a start, has been implementing CE strategies for a while now, through the transition of businesses from physical data and human operated services to data virtualization and online service providers, which has not only increased the efficiency of those businesses but has also helped reduce the environmental impact (Lindstrom et al, 2018). As a result, many governments have started using collaboration networks, virtual data storage and integration programs to encourage the development of CE (Lisjak, 2017). This strategy of virtualization is also applied in the consultancy sectors where a lot of businesses have also transitioned to clean energy sources and focused on reducing the carbon emissions (Lindstrom et al, 2018).

The dependency on wood in the manufacturing sector can also be reduced by the CE strategy of cycling products back into the system through the 3Rs principle and by the development of smart and eco-friendly design, as it is already in use in many furniture companies (Rieckhof et al., 2018). Husgafvel observes in the paper manufacturing and the construction industry the use of CE strategies of reuse of products or reuse of different parts of the products after the end of their cycles, in the life cycles of other products (2018).

Even in the health sector, where the selection of products or equipment that can be reused or recycled is very limited, there are other CE strategies that are being proposed and which might help reduce the amount of waste created. The use of biodegradable products, for example in the production of medical tissues, would be one effective way to ensure reduced waste, as the demand for eco-friendly products rises from the conscious consumers (Dalhammar, 2019).

The sector where the need for CE is more strongly felt is that of construction, where the most amount of resources are used in the life-cycle of a product without being regenerated while huge amounts of waste are being created, and representing a third of the total annual EU greenhouse gas emissions. Therefore, there is a strong need for a circular supply chain in the construction sector which will allow the reusing and recycling of waste, while at the same time also generating jobs in waste management (Nasir et al., 2017).

The electronics industry has also been slowly transitioning towards a circular system, with the implementation of recovering facilities meant to recover the materials that comprise the products, comprising of rare metals, which has reduced the dependency on raw materials and by consequence the need for mining of said materials, translating into reduced carbon footprint of the electronics (Unger et al., 2017).

The agricultural industry implements CE strategies through the reuse of waste as fertilizer, or to generate energy (Wandl et al., 2019). Smart packaging is also a vital strategy used in the foods sector to ensure a durable product which generates less waste, along with product labelling which focuses attention on organic products (Wohner et al., 2020).

There is no better sector to observe the implementation of CE than the power sector, where nowadays more and more focus is put on renewable energy sources and energy efficiency. It has been observed that in the fabrication of solar panels the recycling of the materials has proved to lower the carbon footprint as opposed to fabrication based on resources (Charles et al., 2018).

The most important sector where CE needs to be implemented is unquestionably the waste industry, where the waste generated by all the other sectors is dealt with. CE strategies that have been implemented in this sector are of course separation of waste into eco-friendly, recyclable, or trash, as well as the generation of energy through waste incineration as opposed through fossil fuels (Bringsken et al., 2018).

At the consumer level, a good example of CE practices can be seen through the availability and the popularity of online marketplaces where people can sell or give away products they have no longer a use for, extending the life cycle of the product instead of discarding it and turning it into waste (Konietzko, 2019).

The need for a plastics economy in the EU

The amount of resources used is of crucial importance in a durable development, and the CE strategy is to change the approach to the life cycle of products from their start to their end. The need for a redesign to create longer lasting products in the plastics sector as well, in order to reduce the carbon footprint. Because plastics play an important role in day to day life, a change in the approach requires the involvement of all the stakeholders, as the decision affects more than the benefitting actors.

In this respect, The MacArthur Foundations proposes a new *plastics economy* (2016) which is based on three main points of actions:

The development of an efficient economy of plastics after it has been used. In this sense, plastic materials and technological systems need to offer an increase in quality and economic performance. The proposed model is focused on an increase in reutilization, recycling and composting. The foundation proposes a Global Plastics Protocol to which states can adhere to and engage in promoting the plastics economy.

Companies from the plastics industry need to reduce all negative externalities, including marine pollution. The plastics industry needs to also engage actively for the improvement of the collecting industry in regards to operations occurring in developing countries.

The production of plastics materials needs to be separated from the utilization of fossil fuels through research and innovation for finding several regenerative raw materials.

These recommendations come in support of the steps already started at the European level in regards to identifying the main implications at a national level of the measure proposed by the European Commission regarding the European Strategy for plastics materials.

At the international level, the global production of plastics materials has increased 12 times in the last 50 years, with an estimation that it will double in the next 20 years. The demand for recycled plastics materials represents just 6 percent of the total demand of plastics in the EU. The main causes are the low prices of raw materials as well as the difficulty in finding buyers for the recycled plastic (CE, 2017).

At EU level, the quantity of plastics waste which finds its way to the marine environment is between 150.000-500.000 tons. Besides the impact on the marine environment, the pollution of waters with plastics waste also creates damages to other activities such as tourism, pisciculture and navigation. This is made even worse by the usage on a global scale of a wide variety of single use items which are collected and recycled (plastic bags, cups, cutlery) (Ibid).

At the european level, the first steps have been made through the adoption of the first strategy at european level regarding plastics materials, the taxation of bags or even banning the usage of bags made of thin plastic, promoting biodegradable products, of durable models of production and consumption and better informing of the consumers.

The EU Council of 25th of June 2018 adopted the "Conclusions on delivering on the EU action plan for the circular economy" restating the potential of the CE for a durable increase and for reducing the dependency of the EU on raw materials. An important step was realized through the new Directive proposal regarding the decrease of the impact of certain plastic products over the environment (COM 340, 2018).

The measures proposed aim to forbid the introduction on the market of single use products for which there are durable alternatives available at accessible prices. In the case of single use plastic containers meant for drinks, they will be allowed only if their caps remain attached to the container.

Other measures proposed have as objectives:

- **Reducing Consumption**: Member states will have to reduce the utilization of plastics for vegetables and plastic cups for drinks.

- **Collection**: Member states will be obliged to collect 90% of the single use plastic bottles until 2025.

- **Producer's obligations**: The producers will contribute to covering the costs of waste management and of depollution, as well as measures of awareness regarding containers for vegetables, packages and wraps.

- **Labeling requests**: Certain products will require a clear and standardized labelling regarding the means of disposing of the waste, the impact the product has over the environment and the presence of plastic materials in production.

- **Awareness measures**: Raising awareness for consumers with regards to the negative impact of pollution with plastic waste.

The main reason for analysing the impact of single use plastic products on the environment is because it is an area less covered by legislation, despite the deep environmental damage it is guilty of (Pinto da Costa et al., 2020).

CE in Practice and Policy

In July of 2014 the European Commission released a communication called "Towards a Circular Economy: a zero waste programme for Europe", which the European Parliament adopted in December, a move that according to EC will: "boost recycling and prevent the loss of valuable materials; create jobs and economic growth; show how new business models, eco-design and in-dustrial symbiosis can move us towards zero-waste; reduce greenhouse emissions and environmental impacts (European Commission, 2014)."

The communication thus was able to establish a common and coherent EU framework for the promotion of the CE, its biggest contribution to CE strategies that can help with better resource management being "The circular Economy Package", whose main goals were reducing the carbon footprint, the increase of recycling and saving of materials, generating economic growth and jobs and the adoption of eco-designed products that generate no waste (European Commission, 2015b). However, with the following leadership in the Commission, the package was dropped, the argument being that there was little focus on the different production structure of the member states and too much on waste. This in turn caused an increase in the number of promoters of CE, with many businesses coming to adopt CE practices, which led the Commission to rethink the package dismissed and proposing a new one, "Closing the Loop - An EU action Plan for the Circular Economy", in 2015, which was more specific to the different members comprising the EU, and which focused on the importance of eco-design and the rethinking of the entire life cycle of a product. The package also included a legislative proposal aimed at "long-term targets to reduce landfilling and to increase preparation for reuse and recycling of key waste streams such as municipal waste and packaging waste." (European Commission, 2015).

One of the main reasons why CE is such a popular topic in the public discourse nowadays, as stated before is due to the Ellen MacArthur Foundation, one of the main promoters of the concept, who have commissioned up until this point three reports on CE starting from its potential for helping reduce the carbon footprint as opposed to the problems the linear economy presents. The first report focuses on the potential for value creation of CE by minimising resource losses, and applies the CE concepts to case studies of various industries to see how they benefit from them (Ellen MacArthur Foundation, 2012). The following reports gives further details of how the CE model can be implemented and focuses also on the importance of identifying the different types of materials used in the production of goods to determine which materials can't be reused, which ones have high recycling potential and which ones are fully reusable (Ellen MacArthur Foundation, 2014).

Following these reports, further involvement in CE practices could be seen in the UK with a report coming from the UK Parliament, "Growing a circular economy: Ending the throwaway society", which aimed at urging the government to take steps towards the transition to CE (House of Commons Environmental Audit Committee, 2014).

The importance of eco-design is also evidentiated through the Eco-Design directive proposed by the European Parliament and the European Council which is meant to establish "consistent

EU-wide rules for improving the environmental performance of products, such as household appliances, information and communication technologies or engineering" (European Parliament and Council, 2009). This has proved to be a factor in lower carbon footprint of products through the provision of regulations to provide products that are reusable, recyclable and long lasting (Dalhammar et al., 2014).

Another big step towards CE implementation taken by the EU is represented by the Horizon 2020 funding programme, with a budget of close to €80 billion to be focused on societal challenges, technological and industrial development and of which nearly €1 billion will be invested into research focused solely on CE practices and CE promotion (European Commission, 2017).

As of 2018, Denmark has become one of the main supporters of the CE concept in the EU, when it released the "Danish National Strategy for Circular Economy", with the deadline for 2022, through which it aims to accelerate the transition to a sustainable model of economy and urges companies to develop products based on the 3Rs principle, as well as looking to create a market for the waste materials and the recycled goods . Denmark sees the main driving force for CE implementation in its companies, which it aims to strengthen, so the CE transition is done without losing any competitiveness, and the CE strategy as in close correlation to the utility strategy by which it aims to increase competition in the waste sector. (State of Green, 2018).

The Netherlands has opted to think of CE implementation as a long-term goal, setting up a programme that could help implement the CE model by 2050, with a provisional objective of a 50% reduction in the use of primary raw materials by 2030 (Dijksma et al., 2016)

Another leader in sustainable development is represented by Germany. Their packaging law of 1991 which made the manufacturer responsible to recycle all the packaging materials they sell has led in turn to the development of a collection system of recyclable materials, which has helped Germany become the 1st country in the EU in terms of recycling rates (EEA, 2013). Evidence of a transition towards CE in Germany is evidentiated by their research for sustainability programme, FONA (Lah, 2016).

In France, a law has been passed called "La loi anti-gaspillage pour une économie circulaire " ("The anti-waste law for a circular economy") providing around 50 measures focused on adapting the nation to CE practices including: new obligations for the manufacturers to adapt their products to CE principles, with one big problem being the cigarette industry and the

discarding of the cigarette butts, toys manufacturers, etc; bans on single-use plastics and measures to combat food waste; new tools to help companies pass to an eco-design model of production and tools for the protection of the environment, including sanctions and punishments for detrimental actions to the environment (Ministère de la Transition Écologique, 2020).

Challenges to CE implementation

Given the limited progress when it comes to actual implementation of CE strategies as of yet, it is important to determine what factors are detrimental to the implementation and what could be done to deal with them (Ghisellini et al., 2016). This is of importance seeing how despite the numerous policies advanced by the EU institutions regarding CE evidence shows that not all member states engage in implementation, and a full transition to CE is a long-term goal (Stahel, 2014).

A main barrier in the implementation of CE is represented by the lack of consumer awareness and interest in it, where the literature reflects little level of involvement of consumers with sustainability (Borra et al., 2014). This is also reflected in the business culture, where while CE might be the topic of discussion in the environmental departments, the other parts of a company like finance or operations have little interest in adopting it to their sectors (Schneider and Hall, 2011). This lack of interest on behalf of the companies can be further influenced by the lack of consumers' interest, as companies adapt to consumers' demands.

Another factor hindering the CE implementation is represented by the huge costs the implementation entails as opposed to the low cost of the use of raw materials in line with the linear model, a factor that gives a cost advantage to the linear model against which the CE can't compete (Mont et al., 2017). This is shown to also cause low interest in engaging with the recycling of materials when the use of virgin materials is more cost effective, which can be seen in the example of plastics based on virgin materials costing way less than the organic based plastics (Preston, 2012). However, the issue that lies at the base of this problem is the availability of raw materials at such a low cost, an issue which could be dealt with by reducing the subsidization of energy provided for the production of these materials, which seem to create an artificial low cost for the materials (Stahel et al., 2016). The focus of the subsidization on the costs of implementation of CE models could also help CE practices outcompete the use of virgin materials. Focus should be put also not on the immediate costs and benefits of the CE but on the

long-term effects and results that CE practices because the CE is, as Kirchherr puts it “not a ‘quick win’, but a major long-term undertaking.” (Kirchherr et al., 2017).

Limitations and Criticism to the implementation of CE

One issue present in the CE discussion as previously shown in the beginning of the thesis is the different understandings and interpretations that stakeholders have of CE, where CE strategies are applied in different sectors according to the specific understanding they have of the concept. In fact, this issue represents a big limitation to the CE implementation as a common general framework of the concept is yet to be adopted by the stakeholders involved with the implementation.

Another big limitation that the CE presents is its complete lack of focus on its role in the social dimension and how it would affect the human stakeholders, besides the mention of the opportunity of job creations. The lack of attention on how the CE will impact social equality stands exactly opposed to the concept of sustainability defined as a “development which meets the needs of the present without compromising the ability of future generations to meet their own needs” (WCED, 1987).

The CE strategy of creating durable products can also prove to have negative effects on the environment, where, for example, the pursuit for the production of green fuel has lead to large deforestation in order to repurpose the land for the cultivation of oil palms, adding even more to the loss of biodiversity (Fitzherbert et al., 2008). CE considers the durable products the ideal ones because of how they keep the value of the product longer across the life cycle while at the same time reducing the need for mining for resource extraction thus lowering the environmental impact (Ellen MacArthur Foundation, 2013). However, since the impact that the durable products can have on the environment is not clearly understood, perhaps the principle of reuse might, in the long-term, prove more inefficient than the old system of recycling the materials of products for the raw materials. Other examples of negative impacts over the environment can be seen in the destruction of tropical forests in exchange for soy plants needed for biofuel or the dependency of the green technologies such as solar panels on rare resources, the mining of which in turn cause rising carbon emissions (Farigone et al., 2008).

Concluding Discussion

The aim of this thesis was to research the implementation of the CE in the European Union and to identify theoretical frameworks and tools that can be used to facilitate the implementation as well as identifying the barriers against it and the limitations that the CE concept entails. Based on the theory of Neo-Functionalism, it was analysed how the CE system can be implemented in various sectors and how the implementation in one sector may lead to changes in the other sectors, in line with the spill-over effect predicted by neo-functionalism. The green theory, a fully developed critical theory focused on the betterment on the environment, was of great value, as it shares common principles and goals with that of the CE concept, which as of yet is lacking a theory of its own in the IR field.

The analysis showed the role of each of the micro, macro and meso levels and their function in the CE model based on the observed actions of the stakeholders involved in the promotion and implementation of the CE. It was thus concluded that a key role is played by the European Commission, the main institution responsible for providing CE policies and legislation. NGOs centered around environmental issues such as the Ellen MacArthur Foundation also play a crucial role not only in the promotion of the CE concept but also in providing ample research on how the CE strategies can be understood and adopted.

It was observed how the CE could have a key role in helping to achieve the Paris Climate Agreement goals of keeping the temperatures from rising, where the focus of the PCA on renewable sources of energy could only accomplish half of the projected goals but where correct implementation of circular business models can fill in the gap and help with the reduction of CO2 emissions until the point of reaching zero carbon footprint.

With the focus of the CE principles on the eco design of products, waste management and better resource efficiency, it was observed that while the economic and environmental effects have been determined, little focus has been made on the impact the CE will have on social life other than in the mention of job creation. Given that CE implementation requires change of the consumer behaviour, and that the consumer ideals also influences how businesses deal with production, it is imperative that more focus should be put on the social aspect in future Action Programmes. In order to achieve a sustainable future, the environment, economics and society all

have to be adapted to a system-based thinking and only then can a circular model be fully applied. Member states across EU have started to introduce CE strategies and programmes into their agendas as the CE concept becomes more and more popular in the European federation. With the spill-over predicted by the integration theory, it is a matter of time before other member states start implementing their own CE practices. However, in the case of the poorer member states, which already face problems in terms of recycling rates, help and support is needed in order for a transition to be achievable, as well as means of ensuring that said transaction is being pursued, and in this respect specific international institutions created with the sole focus on CE implementation would be the missing key that EU needs for a complete transformation of its economy that goes in line with nature and not against it.

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