



WHAT IS THE IDEAL SCENARIO FOR CIRCULAR ECONOMY TO OCCUR?

A CASE STUDY OF THE CIRCE PROJECT

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ABSTRACT

The patterns of production and consumption of the linear systems, which rely on increasing resource depletion, can no longer be sustained by the world. Hence, several initiatives and strategies oriented to more sustainable and circular goals, aiming to eliminate waste and manage the excessive extraction of resources, are being implemented. Thus, the circular economy strategy has risen as an alternative to linear systems, since it can reduce material and human footprint by introducing systemic solutions, taking into account societal needs, environmental limits and generating economic opportunities. However, turning the world into circular is not a simple task. It can be stated that there is a huge gap in circularity. In this sense, in order to bridge this gap, initiatives like, CircE project aims to generate action plans and policies in order to tackle barriers and implement solutions to increase the amount of circularity in European countries. Following this trend, the present work identified, within this project, key conditions to draw an Ideal scenario for circular economy to thrive. Therefore, in order to build up an Ideal scenario, it is necessary to identify aspects such as, barriers and opportunities which should be tackled for the development and improvement of circular economy initiatives.

Key words: sustainable development, circular economy, circular economy gap, barriers and opportunities, key conditions, ideal scenario.

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CHAPTER 1

INTRODUCTION

1.1 – Problem Introduction

“The world is in crisis”, warned Antonio Guterres, the United Nations secretary, in the beginning of 2018 (Wit et al., 2018). This crisis, to which Guterres referred, is concerning the current linear economic system, and its dreadful consequences for people’s lives and the environment. In other words, this system which is based on resource – production – consumption – discard/waste, and on economic growth, relies on increasing production, consumption and resource depletion, having apparently ignored the finitude of the natural stocks, as well as the consequences of such preliminaries, under the assumption of achieving prosperity (Jackson, 2009). Although this system has provided wealth and comfort, such benefits are distributed unequally among the world’s population, and it has come through high cost for the humanity and the planet, “ranging from social inequality, to depletion of natural resources, environmental pollution and worsening of the risks and effects of climate change” (Wit et al., 2018, P.10).

Therefore, according to the United Nations (1992), such patterns of production and consumption can no longer be sustained by the world (Berndtsson, 2015; MacArthur, 2015a). Hence, several initiatives and strategies oriented to more sustainable and circular goals, aiming to eliminate waste and manage the excessive extraction of resources, are being implemented (Wit et al., 2018). Moreover, the circular economy strategy has risen as an alternative to linear systems (MacArthur, 2015a), since it can reduce material and human footprint by introducing systemic solutions taking into account societal needs, combining political leadership, technological innovation and behavioral changes. Thus, the economy based on circularity should consider the management of the resources, and the fulfillment of people’s needs, respecting the limits of nature (Wit et al., 2018).

1.2 – Problem Definition

Although many positive reasons can be associated with the implementation of circular economy models, there is a huge gap of circular opportunities being “wasted” (Macarthur, 2017; Wit et al., 2018), 92.8 billion tons of resources enter in the global economy annually, but about 10% of this material is cycled, the rest is either incinerated, landfilled or dispersed into the environment (Wit et al., 2018). In this sense, Macarthur (2017) and European Commission (2015) have identified business opportunities that could result in 320 billion euros of investments by 2025, generating many job opportunities and reducing human footprint, if some actions were taken by the governments, industries and changes were made, such as, in policies and consumer behaviors (Ellen Macarthur Foundation, 2017).

“The transition to a circular economy is a systemic change. In addition to targeted actions affecting each phase of the value chain and key sectors, it is necessary to create the conditions under which a circular economy can flourish and resources can be mobilized.” (European Commission, 2015, p.18)

Therefore, the Circle Economy (2018), Ellen Macarthur Foundation (2017) and Heshman (2015) brings up some reasons for such gap, claiming that there are several challenges for the implementation of Circular Economy, such as the insufficient support of legislations, lack of awareness about CE and its opportunities (especially because most business were raised in a linear economy), absence or poor cooperation along the value chain and insufficient standard systems for assessing CE’s performance.

However, the creation of Circular Economy assessment tools to measure CE progress are very important for its development, for both identifying and replicating Circular Economy (EASAC policy report 30, 2016), it is not the focus of the present work. Instead, the present work aims to increase awareness regarding some aspects of CE, for instance, identifying key conditions for it to occur, as well as the road blocks for the implementation of CE initiatives, thus drawing a potential ideal scenario for CE to thrive, taking into account the context in which it is implemented. Thereby, the Commission

recognizes that EU should focus on improving consumer awareness over environmental information. Besides that, EU also claims that the Commission should promote initiatives to support CE by encouraging innovation, circular economy new business and new initiatives of consumption (European Commission, 2015).

Hence, the stakeholders of CE, including the policymakers at all levels (city, national and regional), should make efforts to improve the following areas in order to allow CE to thrive: set direction for the transition (aims and targets); remove policy barriers; facilitate cooperation and innovation along the value chain; create platforms for dialogue, cooperation; Improve awareness of CE and its opportunities (Ellen Macarthur Foundation, 2017 and Circle Economy, 2018).

Moreover, Ellen Macarthur Foundation (2017) agrees that it is important that the Commission actively engage stakeholders in the implementation of a circular economy, creating action plans, which ideally should contain goals and targets, setting strategic directions and steps to achieve them. Besides that, in order to succeed, this plan should encourage cooperation between actors in the value chain, and further support public-private partnerships, in particular through online platforms, which allows exchange of best practices among the stakeholders. (European Commission, 2015)

1.3 – Research Context

The CircE project is being undertaken by 8 partners located in different countries of Europe: *Lombardy Region, Government of Catalonia, Marshal's Office of Lower Silesia, Province of Gelderland, London Waste and Recycling Board (LWARB), Creation Development EcoEnterprises (CD2E), Sofia Municipality, Association of Municipalities and Towns of Slovenia (SOS)*. The project aims to strengthen Circular Economy (CE) in Europe, through the exchange of knowledge and experience among the partners, thus improving the range of their policy instruments to steer the economy towards CE model, also stimulating the involvement of stakeholders in CE initiatives.

Therefore, since the CircE project has been performed in several countries of Europe, it represents an already (ongoing) research sample, hence a great case to analyze the barriers and opportunities of Circular Economy from the perspective of its stakeholders.

For this reasons, the present work chose the CircE project to perform a case study, aiming to collect in-depth information regarding circular economy, based on the point of view of the 8 partner countries participants of the project, and the circular economy initiatives mapped by them. Thus, catching the public/government perspective and, also the point of view of the initiatives or “Good Practices” mapped by each one of the partners, over circular economy, its barriers and opportunities.

1.4 – Research Objective

As mentioned before, there are some points that need to be improved in order to increase the world’s circularity, especially in Europe, the focus of the present work. Thus, several authors, like Ellen Macarthur Foundation (2015, 2017) claim that it is essential to increase awareness regarding CE and its progress, providing the necessary conditions for it to occur, and improving the CE scenario. Therefore, European Commission, on its several reports, as well as, Ellen Macarthur Foundation and Circle Economy recognize that, in order to improve the possibilities of the circularity gap to be at least reduced in Europe, the CE barriers have to be tackled, named: set direction for the transition (aims and targets); remove policy barriers; facilitate cooperation and innovation along the value chain; create platforms for dialogue, cooperation; Improve awareness of CE and its opportunities (Ellen Macarthur Foundation, 2017 and Circle Economy, 2018).

Hence, the main aim of this case study research is to draw the ideal scenario for CE to thrive, according to the CircE project, identifying the criteria used to identify “Good practices” of Circular Economy; the Key Conditions for CE to thrive; as well as their Road Blocks; and finally, recognizing the existence of an Action Plan for the implementation CE.

1.5 – Research Questions

In short, in order to fulfil the objectives of the present work, the problem definition is paraphrased into a main question. Therefore, the main question of this research consists of:

**“What is the ideal scenario for Circular Economy to occur,
according to CircE Project stakeholders”**

Moreover, in order to answer this central question 4 sub-questions have been identified:

- 1** – What are the criteria used to identify “Good practices” of Circular Economy?
- 2** – What are the Key Conditions identified for CE to thrive?
- 3** – What are the Road Blocks identified?
- 4** – What is the Action Plan used for the implementation CE?

1.6 - Scientific and Societal Relevance

As mentioned before, the current linear economic system (resource – production – consumption – discard/waste), with its patterns of production and consumption can no longer be sustained by the world (Berndtsson, 2015; Ellen MacArthur Foundation, 2015). Many would argue that a different kind of prosperity is needed, one which allows human beings to develop in a more balanced way, achieving greater social cohesion, increasing their well-being and also reducing their material impact on the environment (Jackson, 2009). In other words, according to (Wit et al., 2018), MacArthur (2015a), Jackson (2009), among others, it is urgent to re-think the patterns of development conducted up to now, taking into account human welfare, without disregarding the limits of nature, its regenerative capacity, ensuring the preservation of the variety of species, the atmosphere, the soils and the oceans.

However, Raworth (2012) claims that the humanity unfortunately is not yet living within the “doughnut” - a representation of an environmentally safe and socially just space within which sustainable economic development takes place. About 900 million people still face hunger, 1.4 billion are under the poverty line, and the environmental limits had been crossed in several aspects. Thus, concerning the resource limits and the impacts generated by their depletion, Raworth (2012) illustrates how far from the planetary boundaries the humanity is, by comparing reference numbers for proposed boundaries and the current status of aspects, such as climate change, biodiversity loss, nitrogen cycle,

and so on. For instance, the volume of carbon dioxide concentrated in the atmosphere is rapidly increasing (387 million parts – almost 30 parts more than the proposed boundaries); the extinction rate is reaching the mark of 100 species per year (ten times more than the value proposed); 121 million tons of nitrogen is removed from the atmosphere per year (the reference value is 35 million tons per year); among other alarming numbers. Thereafter, Raworth (2012) agrees that it is necessary to design effective solutions, in order to allow the humanity into the “Doughnut” (Raworth, 2012). For this reason Sustainable Development proceeds being in the agenda of most countries in the world, especially in Europe, as can be seen in the *2030 Agenda for Sustainable Development*, which includes the *Sustainable Development Goals* (SDGs), the *Paris Climate Agreement* (COP21) (European Commission, 2016), and the *Emission Gap Report* (UNEP, 2017). In this sense, Circular Economy figures as a possible solution to tackle these problems mentioned above, following sustainable patterns of development (Macarthur, 2017). Moreover, circular economy meets key EU priorities, tackling climate change issues, promoting renewable energy use, generating jobs and growth, without disregarding nature limits, taking into account the social agenda and industrial innovation (Closing the Loop, European Union, 2015).

“(…) a shift in technology and investment can reduce emissions, while creating huge social, economic and environmental opportunities. (...) using policies and financial frameworks to grow green technology markets can combat climate change, reduce pollution and creates a more sustainable society. And it demonstrates why governments, industry and the financial community can and must collaborate to provide the conditions that foster and fast-track innovative solutions. This is the only way to keep the global temperature rise below 1.5 degrees and reduce the human and economic cost of pollution.” (UNEP, 2017, p.xii)

Furthermore, despite the abovementioned statements regarding the need for initiatives such as CE, both Macarthur (2017) and Wit et al. (2018), agree that the world has a long way to go to become more circular, once CE initiatives still do not cross the percentage of 10%, in comparison with the other 90% of linear initiatives. In other words, there is a huge gap of circular opportunities being wasted (Wit et al., 2018).

Hence, according to European Commission (2015), the transition to circular economy requires systemic changes, creating the conditions under which it can flourish, for instance, establishing target actions involving all its stakeholders and generating impacts along all the value chain. Therefore, in order to be able to turn the world into a more circular system, it is important to identify key conditions for it to occur, as well as the road blocks for the implementation of CE initiatives, to finally draw an ideal scenario for CE to thrive (Wit et al., 2018; Macarthur, 2017). In other words, organizations, namely, Ellen Macarthur Foundation, Circle Economy, as well as government (European Union and most of its countries) realized that the more in-depth and detached the strategies to implement CE are, the better are the chances to increase the amount of initiatives and the quality of the existent ones.

However, the current literature over the key conditions necessary for the success of circular economy is rather limited. Most of the information analyzed in the present work comes from existent reports, such as *The Circularity Gap Report* (Wit et al., 2018), *Achieving Growth Within* (Macarthur, 2017) and, *Closing the loop - An EU action plan for the Circular Economy* (European Commission, 2015). In this sense, the production of academic literature, such as the present work, are extremely relevant to provide scientific support for the implementation of CE, for instance, helping governments and business initiatives, to move forward in the identification and management of barriers and opportunities, as well as, key conditions for circular economy to thrive.

CHAPTER 2

LITERATURE REVIEW

2.1 - Limits of Growth

Almost fifty years before the pronouncement: “The world is in crisis”, made by Antonio Guterres, the United Nations secretary in 2018 (Wit et al., 2018), the well-known report of the Club of Rome, “*The Limits of Growth*” (1972), had already pointed out the gravity of the world’s situation, claiming that such trends of economic and population, based on continuous growth (and inequality) would not be supported by the world for long (Meadows et al., 1972). Thus, the crisis to which Guterres referred is concerning the current linear economic system (resource – production – consumption – discard/waste) and its patterns of behavior based on the expansion of production and consumption, consequently increasing the demand for resources (Wit et al., 2018). Therefore, the linear system has generated dreadful consequences for people’s lives and the environment, resulting in environmental pollution, and worsening the risks and effects of climate change, for instance, once it has apparently ignored the finitude of the natural stocks, as well as the consequences of such preliminaries, under the assumption of achieving prosperity, (Jackson, 2009). This system, which has been based on economic growth, although it has provided wealth and comfort, such benefits are distributed unequally among the world’s population, and it has come through high cost for the humanity and the planet (Wit et al., 2018).

Although, such current economic system in which most of the world is nowadays based on, typically associates prosperity and wellbeing with economic growth (Jackson, 2009), according to several reports, such as Millennium Ecosystem Assessment (2005), Planetary Boundaries (2009), Ecological footprint (WWF 2012) and IPCCs (2013) have pointed out the severe problems generated by the present patterns of behavior (excessive extraction and consumption of resources). Besides that, authors like Jackson (2009), Berndtsson (2015), as well as MacArthur (2015a) and several EU reports claim that this system has

been showing clear signs of failure. The humanity has been facing several crises in the past years, such as the credit crises in 2008, climate change, global poverty, ozone depletion, severe decrease of diversity, massive destruction of forests, epidemics, armed conflicts, increasing levels of pollution, natural disasters and so on. In other words, the present system based on economic growth, at least the way it is being conducted up to now, is causing lots of serious harmful consequences in order to provide benefits for a very small portion of the world's population (Jackson, 2009).

Moreover, the increasing demand for resources of developing countries, for instance, China and other emerging economies, is helping to speeding up the reduction of resources, especially the finite ones, such as, fossil fuels, metals and non-metallic minerals, and also increasing the environmental impacts, as consequence of such actions (Jackson, 2009).

"Each year humanity uses resources and ecosystem services that would require 1.5 Planet Earths to be able to keep up with and support our societies. (...) Since industrialization, human activities have however destabilized the Earth systems and natural cycles and forced the environment into a state out of balance." (Berndtsson, 2015, P.02)

Furthermore, according to the United Nations (1992), such patterns of production and consumption can no longer be sustained by the world (Berndtsson, 2015; MacArthur, 2015a). Many would argue that a different kind of prosperity is needed, one which allows human beings to develop in a more balanced way, achieving greater social cohesion, increasing their well-being and also reducing their material impact on the environment (Jackson, 2009). In other words, according to Wit et al. (2018), MacArthur (2015a), Jackson (2009), among others, it is urgent to re-think the patterns of development conducted up to now, taking into account human welfare, without disregarding the limits of nature, its regenerative capacity, ensuring the preservation of the variety of species, the atmosphere, the soils and the oceans.

"None of these resources is infinite. Each stands in a complex relationship to the web of life on earth. We may not yet know exactly where all the limits lie. But we know enough to be absolutely

sure that, in most cases, even the current level of economic activity is destroying ecological integrity and threatening ecosystem functioning, perhaps irreversibly. To ignore these natural bounds to flourishing is to condemn our descendants – and our fellow creatures – to an impoverished planet.” (Jackson, 2009, p. 45)

Therefore, according to the United Nations (1992), the current patterns of production and consumption can no longer be sustained by the world (Berndtsson, 2015).

2.2 - Moving towards a Sustainable Development

It is becoming increasingly more evident that the world might be reaching its limit, therefore it is urgent the need to re-evaluate the behaviors regarding the present linear economic system (Jackson, 2009). In this sense, it seems essential to address such challenges considering sustainable ways of development, since sustainable development (SD) describes the development which takes into account social, environmental and economic aspects (United Nations, 2015; UNEP, 2017; European Union, 2017).

Thus, according to Moldan et al. (2011), the term “Sustainable Development” was initially established in the 1980’s for several institutions, such as IUCN, UNEP and WWF, claiming that in order to be sustainable the development should be thought globally, considering environmental, social and economic aspects, meeting people’s needs in the present without disregarding the possibility of meeting them in the future generations. Therefore, Sustainable Development, according to the Brundtland Report (1987), consists of the achievement of the needs of the current generation without harming the needs of the future generations. Moreover, the Rio Declaration (1992) – reaffirmed in the subsequent revaluations Rio+10 and Rio+20 - and the Lisbon Treaty (2010), also states that human beings are the main concern of sustainable development, and they should have access to healthy and productive lives, living in harmony with nature. These conceptualizations put the achievement of human being’s necessities at first but recognize that it can only be reached if nature and its limits are respected. However the limits for present consumption were not established in none of those documents, hence the notion of resources finitude is an essential point to be considered (Moldan et al., 2011)

In this sense, in an attempt to draw such limits, Raworth (2012) brings up a doughnut shape framework “which represents an environmentally safe and socially just space for humanity to thrive, and sustainable economic development takes place.” (Raworth, 2012)

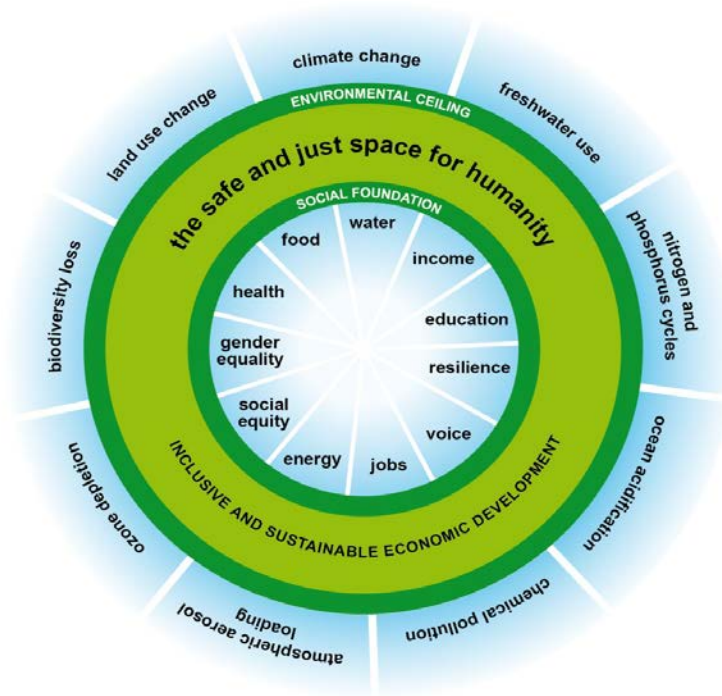


Figure 01: Doughnut shape framework. Source: Raworth, 2012, p. 04.

However, according to Raworth (2012), the humanity unfortunately is not yet living within the “Doughnut”, once about 900 million people still face hunger, 1.4 billion are under the poverty line, and the environmental limits had been crossed in several aspects. Thus, concerning the resource limits and the impacts generated by their excessive usage and depletion, in order to illustrate how far from the planetary boundaries the humanity is, this author brings up the comparison between the reference numbers for proposed boundaries and the current status of aspects, such as climate change, biodiversity loss, nitrogen cycle, and so on. For instance, the volume of carbon dioxide concentrated in the atmosphere is rapidly increasing (387 million parts – almost 30 parts more than the proposed boundaries); the extinction rate is reaching the mark of 100 species per year (ten times more than the value proposed); 121 million tons of nitrogen is removed from the atmosphere per year (the reference value is 35 million tons per year); among other

alarming numbers. Thereafter, Raworth (2012) findings reaffirmed the previously mentioned concerns, the world usage of resources are way over the line, being necessary to design effective solutions, for instance, policies to solve inequality and environmental issues, in order to allow the humanity into the “Doughnut” (Raworth, 2012).

For this reason Sustainable Development proceeds being in the agenda of most countries in the world, especially in Europe, as can be seen in the *2030 Agenda for Sustainable Development*, which includes the *Sustainable Development Goals* (SDGs), the *Paris Climate Agreement* (COP21) (European Commission, 2016), and the *Emission Gap Report* (UNEP, 2017).

“(…) a shift in technology and investment can reduce emissions, while creating huge social, economic and environmental opportunities. (...) using policies and financial frameworks to grow green technology markets can combat climate change, reduce pollution and creates a more sustainable society. And it demonstrates why governments, industry and the financial community can and must collaborate to provide the conditions that foster and fast-track innovative solutions. This is the only way to keep the global temperature rise below 1.5 degrees and reduce the human and economic cost of pollution.” (UNEP, 2017, p.xii)

In this sense, circular economy figures as a possible solution to tackle these problems mentioned above, following more sustainable patterns of development, aiming to implement more concrete action plans (Macarthur, 2017).

2.3 - Circular Economy

According to Macarthur (2015a) several problems related to the current linear economic system and, its patterns of production and consumption, are in the core of the crisis which the planet faces. Besides that, Berndtsson (2015) points out that, once social, economic and environmental aspects are all connected, it is necessary to find a way to tackle those problems through a more holistic oriented system, in order to generate long-term, more effective impacts.

The current economy can be largely described as linear: virgin materials are taken from nature, used to make products, which are then used and eventually disposed of. This model gives rise to chronically high levels of waste and creates dependence between economic development and inputs of new virgin materials. In a world of finite resources, this model cannot work in the long run and there are indications that it is reaching its limits. In contrast, a circular economy is an economic and industrial model that is restorative by intent and design. Taking a new systemic perspective, it replaces the concept of waste with the one of restoration and aims to decouple economic growth from the use of virgin resources. (Macarthur, 2015a, p.07)

Therefore, one possibility to implement a more holistic system, which might allow the humanity into the “Doughnut” (Raworth, 2012), is to follow sustainable principles, including: rely on solar energy, biodiversity, chemical/nutrient cycling (Berndtsson, 2015). In other words, making a broader reading of the perception of Berndtsson (2015), taking into account the concept of circular economy used by Macarthur (2015a), Heshmati (201) and Wit et al. (2018), mimicking nature, following sustainable patterns of behavior, which do not include waste, rely on renewable sources of energy and people meet their needs without degrading the environment. Hence, the circular economy strategy has risen as an alternative which can be considered a way through which sustainable development might be reached (Heshmati, 2017).

“Circular economy (CE) is a sustainable development strategy that is being proposed to tackle urgent problems of environmental degradation and resource scarcity. CE’s 3R principles are to reduce, reuse and recycle materials. The principles account for a circular system where all materials are recycled, all energy is derived from renewables; activities support and rebuild the ecosystem and support human health and a healthy society and resources are used to generate value.” (Heshmati, 2017, p.01)

However, other sources, like the Wit et al. (2018), recognizes that in order to pursue a Circular Economy model, it is necessary to go beyond the “3R principles”, thus proposing, among other aspects, a more detached way to promote efficient use of resources. In this sense, the concept of circular economy used in the present work is based on that one

stated by Macarthur (2015a), and in the common requirements identified by Wit et al. (2018).

“(...) **circular economy** is an economic and industrial model that is restorative by intent and design. Taking a new systemic perspective, it replaces the concept of waste with the one of restoration and aims to decouple economic growth from the use of virgin resources. (...) The successful implementation of circular models depends on the combined leveraging of four key building blocks: Rethinking **product design** facilitates the recovery of components and materials; innovative **business models** enable changes of incentives and the collection of products; new **reverse logistics** need to be put in place, recovering products back from consumers or users and into the supply chain, and treatment methods need to be improved; a number of **system conditions** can help businesses to make the transition, such as education, policy frameworks, collaboration platforms or metrics.” (Macarthur, 2015a, p. 07)

Moreover, according to Macarthur (2015a), CE is composed by two kinds of cycles: **biological** (non-toxic materials return to the biosphere, after being used in different applications) and **technical** (products, components and materials return to the market, through maintenance, reuse, refurbishment, remanufacture and recycling).

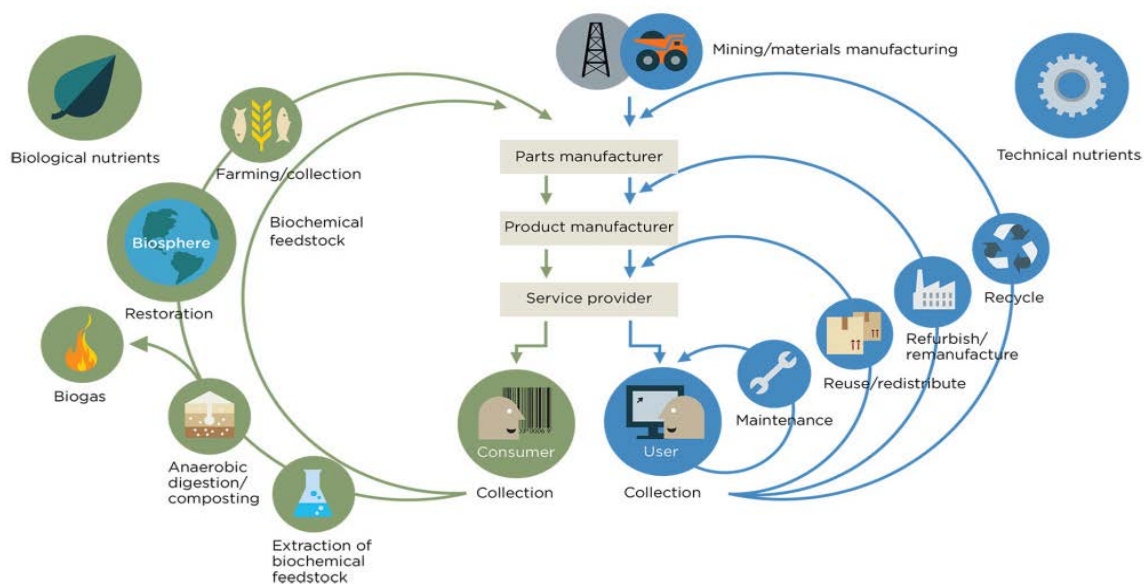


Figure.02: Circular Economy Biological and Technical Cycles. Source: Macarthur, 2015a, p.08.

Thereby, Wit et al. (2018) made an effort to identify 7 key elements or common requirements, among over 20 organizations, to be fulfilled, in order to become circular: 1 - Prioritize Regenerative Resources (renewable, reusable, non-toxic resources); 2 - Preserve and Extend What is Already Made (maintain, repair and upgrade resources - maximize lifetime, second life, take-back strategies); 3 - Use Waste as a Resource (recover waste for reuse and recycling); 4 - Rethink the Business Model (create new opportunities between products and services); 5 - Design For the Future (employ the right materials extending their lifetime); 6 - Incorporate Digital Technology (optimize resource use and connections between supply-chain actors through digital, online platforms and technologies); 7 - Collaborate to Create Joint Value (cooperation among stakeholders, throughout the supply chain, within organizations and with the public sector) (Wit et al., 2018). Thus, in order to develop CE, it is necessary achieve some or all of the requirements above. In this sense, as ca be seen in waste management and circular economy strategies, such as the *Strategy for a Waste-Free Ontario* (2017), in order to reduce or eliminate the amount of waste that goes to landfills, moving toward a more sustainable model, it is essential to make more efficient use of resources, better design of products, increase the awareness over CE, improving the responsibility and collaboration among the stakeholders (consumers, producers and public parts). See the chart below:

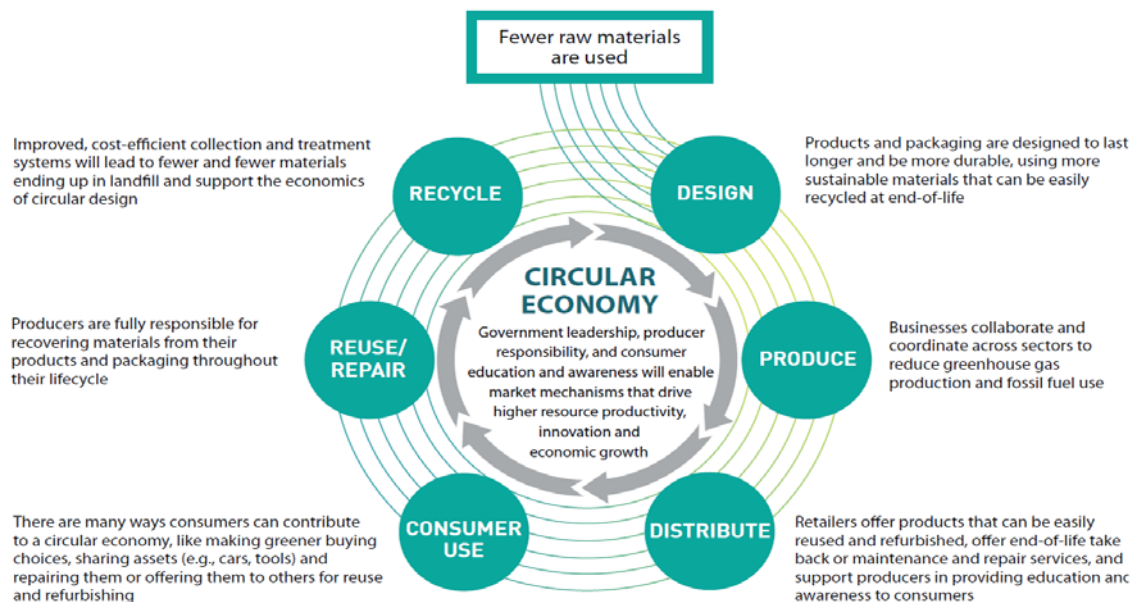


Figure.03: Circular Economy – Material flow. Source:

https://files.ontario.ca/finalstrategywastefreeont_eng_aoda1_final-s.pdf . Accessed in March, 2018.

Moreover, regarding the origins of the concept of Circular Economy, according to Wit et al. (2018), the idea of CE has been gaining space since the 1970's, starting from the following concepts: Cradle to Cradle, Blue Economy, Performance Economy, Industrial Ecology or Industrial Symbiosis and Biomimicry, which all somehow include the limits of nature, in possible solutions for the environmental, social and economic crises. Therefore, the paradigms involving CE includes waste-free, regeneration, and in general, implementation of new business models, such as shifting from buying products to buying services, and also going beyond the effective use of resources, including change of solutions, for instance, to reduce emissions, instead of creating more efficient cars, implement new transportation systems (Wit et al., 2018).

Lately, CE has gained more visibility, due to the engagement of the European Commission (Hobson, 2016), and also due to the efforts of the Ellen Macarthur Foundation, created in 2010, in order to promote Circular Economy all over the world (Macarthur, 2015a; CIRAI, 2015). Besides that, Macarthur (2015a), Berndtsson (2015), Heshmati (2017) present many benefits for the implementation of a Circular Economy system, once it proposes several opportunities, including employments and innovated ways of economic growth – disconnected from material extraction - based on more sustainable patterns of behavior, and respecting the cycles of nature.

According to the European Commission (2015) on its report, *Closing the Loop*, the need to support a transition to a more Circular Economy, consists in keeping the value of the resources within the economy, minimizing or eliminating waste, in order to “develop a sustainable, low carbon, resource efficient and competitive economy” (European Commission, 2015). Besides that, Circular Economy can reduce human footprint in higher level than of those ones proposed by the *Paris Agreement*, by introducing systemic solutions taking into account societal needs, combining political leadership, technological innovation and behavioral changes, thus also tackling most of the *Sustainable Development Goals* (Wit et al., 2018). Moreover, CE is an attractive model because it

offers innovative solutions to promote economic growth by reducing environmental impacts, for instance, greenhouse gas emission and depletion of resources, generating business and job opportunities, improving also social aspects, such as, human health (Macarthur, 2017). For a better idea of how circular economy is seen to impact positively social, economic and environmental aspects, see the graph below, which show the comparison between the current development scenario (linear model), in blue, and the Circular Scenario, in red. The numbers are related to a possible future scenario in the year of 2050, draw by Macarthur (2017).

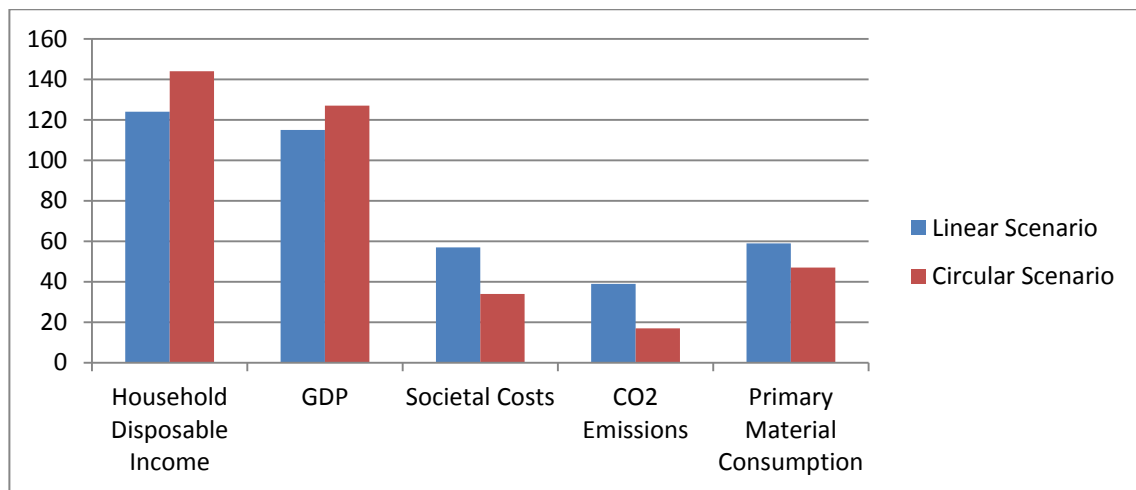


Table. 01: Comparison between linear and circular economy. Source: Created by the author, based on Macarthur, 2017, p.20.

As can be seen the future scenario driven by circular economy presents much better numbers, in all aspects analyzed. Moreover, many agree, for instance, *Ellen Macarthur Foundation, Club of Rome, Cambridge Econometrics & BIO Intelligence Service, The Waste and Resources Action Programme (WRAP)*, and so on, that Circular Economy will boost the EU's competitiveness by promoting more efficient patterns of production and consumption, supporting innovation and, creating new business and job opportunities, while preventing resource scarcity, and volatility of prices (Macarthur, 2017). At the same time, according to EU (2015), CE lowers carbon dioxide emissions levels, favoring energy saving and preventing the irreversible depletion of resources or its exhaustive use. Thus, as can be seen, the chart bellow compares the current linear system with circular

economy, which foments GDP increase and CO2 emission decrease, reducing the costs of resources as well:

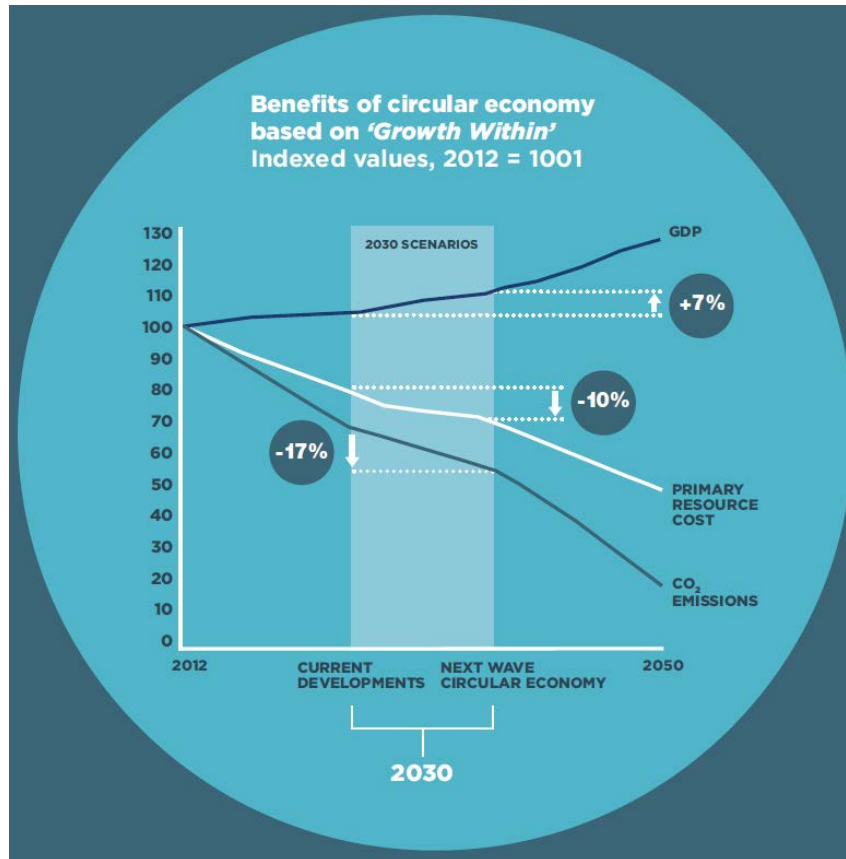


Chart. 01: Benefits of circular economy. Source: Macarthur, p.17

Therefore, circular economy meets key EU priorities, encouraging sustainable development, tackling climate change, promoting renewable energy use, generating jobs and growth, without disregarding nature limits, and taking into account the social agenda and industrial innovation (European Union, 2015).

2.4 - Circular Economy Gap – How to overcome barriers

As previously mentioned, many positive reasons can be associated with the implementation of CE model. Besides that, the number of CE initiatives has been growing in recent years (Macarthur, 2017). According to Macarthur (2017), the main categories which present more circular economy initiatives consist of: car remanufacturing; online

grocery shopping; organic farming and waste processing; recycling of buildings; use of aluminium in cars; electric vehicles; car, house and office sharing.

However, despite the increasing amount of CE initiatives, they still do not cross the percentage of 10%, in comparison with the other 90% of linear initiatives (Macarthur, 2017). Thus, it can be stated that there is a huge gap of circularity, meaning that many job and economic opportunities are being wasted (Wit et al., 2018). In this sense, both Macarthur (2017) and Wit et al. (2018), agree on the idea that the world has a long way to go to become more circular. From the 92.8 billion tons of resources that enter in the global economy annually, only about 10% is cycled, the rest is either incinerated, landfilled or dispersed into the environment (Wit et al., 2018).

Besides that, both Ellen Macarthur Foundation (2017) and European Commission (2015) have identified business opportunities that could result in 320 billion euros of investment by 2025, if some actions were taken by the industries and changes were made, such as, in policies (Macarthur, 2017). In this sense, Heshmati (2017) and Macarthur (2017) claim that there are several challenges for the implementation of CE, such as the insufficient support of legislations, poor economic incentives, lack of awareness about CE and its opportunities (especially because most business were raised in a linear economy) and absence of standard systems for assessing CE's performance.

Although several reports of the main organizations concerning circular economy in Europe, for instance, *European Commission, Ellen Macarthur Foundation and Circle Economy* recognize the importance of developing system to measuring the progress of CE, it is still a challenge for most of the organizations related to circular economy. Hence, the European Commission (2015) identifies that there are very relevant tools and data available which could be used to assess CE, it also recognizes the necessity of improvement of such tools to measure CE performance and its progress, and also, going beyond them (EASAC policy report 30, 2016). Wherefore, the creation of effective tools for monitoring CE progress is still an ongoing process (European Commission, 2015), and for this reason, it is not the focus of the present work. Instead, it is focused on tackling the barriers for CE development identified by most initiatives and reports. In other words, in

order to draw a potential ideal scenario for CE to thrive, it is necessary to identify key conditions for it to occur, as well as the road blocks for the implementation of CE initiatives (Wit et al., 2018; Macarthur, 2017).

“The transition to a circular economy is a systemic change. In addition to targeted actions affecting each phase of the value chain and key sectors, it is necessary to create the conditions under which a circular economy can flourish and resources can be mobilised.” (European Commission, 2015, p.18)

In this sense, both Wit et al. (2018) and Macarthur (2017) agree that the stakeholders of CE, including, business initiatives and policymakers at all levels (city, national and regional), should make efforts to improve the following areas in order to allow CE to thrive:

- 1- set direction for the transition (aims and targets),
- 2- remove policy barriers,
- 3- facilitate cooperation and innovation along the value chain,
- 4- create platforms for dialogue and cooperation,
- 5- Improve awareness of CE and its opportunities.

Moreover, the European Commission report (2015), *Closing the loop - An EU action plan for the Circular Economy*, presents several steps that should be implemented in order to achieve such scenario. Thereby, the Commission recognizes that EU should focus on improving business and consumer behavior and awareness over circular economy and environmental aspects, such as, by ensuring better enforcement of the rules, and increasing the efficiency of (voluntary) EU Ecolabels, to make green claims more trustworthy, for instance, identifying environmental impacts. Besides that, EU also claims that the Commission should promote initiatives to support CE by, on the one hand implementing testing programs to avoid “planned obsolescence” and, on the other hand, making use of existing programs, such as, Horizon 2020 and Cohesion Policy to encourage innovation, circular economy new business and new initiatives of consumption. Moreover,

the role played by the policies over the use of second hand and recycled materials, hence their demand, is also essential, once the governments could require a percentage of usage of such materials by industries and economic actors. Furthermore, beforehand the creating of EU-wide standards and good waste management plans have to be put into practice to allow the access to such resources and guarantee their quality (European Commission, 2015). In other words,

“A combination of advanced technology, skills, management, finances, policy and governance is required to develop the CE strategy and to update production facilities and equipment. (...)Public incentive programs for finance, technology, regulatory and administrative support are required to support enterprises so that they can access financial and tax incentives and engage in innovative activities so as to be able to develop and implement environmental friendly technologies and solutions.” (Heshmati, 2017, P.19)

In addition, the European Commission (2015) also claims that, support of research and innovation, as well as education and training, are essential for the transition to a circular economy, once it requires qualified workforce with specific and sometimes new skills, and also new technologies to deal with the new challenges proposed by this system.

2.5 - The Role of Circular Economy Stakeholders

Although governments, business and consumers are all related, it is likewise important to cast a glance into consumers. Apart from all the policies and business initiatives, the role played by the consumer is also important for the development of circular economy, although the choices made by consumers can help support or hamper CE initiatives, it is important to point out that the possibility of influence of consumers is somehow limited by the scope of possibilities offered to them (Nita, et al., 2017). In this sense, these choices are established by the information to which consumers have access, which can be reinforced by policies and rules, for instance, or through labels and environmental claims. However, EU consumers often find it challenging to distinguish products and to trust the information disposed. Besides that, the range and prices of existing products, and the regulatory framework, such as payment of taxes in case of no separation of the garbage,

are also important aspects to help shape consumer's behavior (European Commission, 2015). Summing up, businesses stakeholders, with their products/services and the information offered, as well as the government parts, play very important roles in steering consumer's choices (Bulkeley at al., 2005).

Thereby, the Commission recognizes that EU should focus on improving both consumer and business awareness over environmental information, circular products and services, namely, guaranteeing the efficiency of Ecolabels, making more environmental efficient rules and also ensuring better enforcement of them; apart from encouraging innovation, circular economy new business and new initiatives of consumption. Moreover, governments can play a very important role on the demand of second hand materials by settling obligatory percentages of usage of such materials (European Commission, 2015). In addition to steering public participation through the enforcement of rules, governments can also formulate policies, such as waste management, in a more effective way by stimulating public participation, while developing bottom-up decision-making processes, in which policies are constructed together with the participation of the public (Bulkeley at al., 2005).

Besides that, it is important to add that, the decision-making process is part of an intricate system, influenced by both rational and irrational aspects, thus, it can be said that, it is not a linear, rational and technical one. Thereby, according to Bulkeley at al. (2005), the implementation and development of sustainable development and circular economy, as well as, of specific technologies are not simply technical or economic processes, they are influenced by social, economic, cultural and political aspects. Besides that, the barriers faced during these decision-making processes are part of it, not hindrances that appear after to hamper its implementation.

"These perspectives provide several insights into the policy-making process, but two are particularly pertinent in relation to the 'barriers' metaphor. First, policy formulation in the form of legislation and official guidance is not a simply technical process internal to a closed community of government institutions. Rather it takes shape in a political, social and cultural context in which

the range of options for policy is already circumscribed by existing commitments, policy priorities, assumptions and relations of power that extend well beyond government, not only into the economic interests of business but also into the power of the collective expectations and values of wider society. In this view, 'barriers' do not spring upon a pre-determined policy, but rather the challenges, disjunctions and absences are already written into the process of policy through its conception." (Bulkeley et al., 2005, p.14)

Finally, Macarthur (2017) and Bulkeley (2005) agree that a more holistic approach is needed for the implementation of initiatives such as circular economy. Therefore, the engagement of stakeholders, forming networks involving institutions, businesses and governments is essential for the creating of action plans, which ideally should contain goals and targets, setting strategic directions and steps to achieve them. Besides that, in order to succeed, this plan should encourage cooperation between actors in the value chain, and further support public-private partnerships, in particular through online platforms, which allows exchange of best practices among the stakeholders. (European Commission, 2015)

2.6 - Limits of Circularity

However, improve the engagement of stakeholders, as well as increasing their awareness over circular economy are not the only road blocks faced by the governments or standing in the way of circularity. There are other relevant points to be considered concerning the actual possibility of the world or even of the EU countries, to become fully circular. For instance, Wit et al. (2018) claim that it is not yet possible to bridge the circular gap (achieving the remaining 90% of circularity), at least not in a short run, due to the current economic trends, worldwide socio-economic inequalities, availability of resources, and insufficient technology and technical abilities to fully use the materials, in quantity and quality terms. Besides that, there are practicalities, such as, accumulation of stocks and still availability of some materials which also stand in the way of the circularity (Wit et al., 2018).

“We are still building up our stock of rare materials, mostly rare earth metals, required for the more innovative and sophisticated products we use; emerging and developing economies are still accumulating their stock of built environment assets and infrastructure, and should be enabled to continue doing so; our technical capabilities are insufficient to fully close the loop and in many recycling processes there are still losses in material quality and quantity; finally, some materials, including certain minerals like the Feldspar group, may be available in such abundance, especially in particular geographies, that we can continue exchanging them with the lithosphere without major implications for the immediate ecosystems which they support.” (Wit et al., 2018, p.24)

Therefore, it is not possible, at this historical moment, for the world to become totally circular, with the existent technology, knowledge and awareness held by business and consumers, and also the limits faced by the governments. Hence, Wit et al. (2018) recognize that developing a circular economy system is a necessary process for the world’s population to continue to thrive over the new assumptions of this system, what the Ellen Macarthur Foundation (2017) called “*Achieving Growth Within*”, instead of the old patterns of behavior concerning the linear economy. Therefore, in order to bridge the circularity gap, very different approaches to achieve the societal needs to be implemented, considering systematic reduction of (raw) resource extraction. This process has already began, as can be seen in initiatives, such as car-sharing, sustainable management of waste, among others, proving that practical steps from government, business and consumers perspective are in motion (Wit et al., 2018). Hence, the role played by governments is proven to be essential to steers stakeholder’s behavior towards circular economy.

2.7 – The limits of the literature

As previously mentioned, according to Wit et al. (2018), the idea of CE has been gaining space since the 1970’s, related to the concepts, such as Cradle to Cradle, Blue Economy, Industrial Ecology Biomimicry, and so on. Lately, CE visibility has increased owing to the engagement of the European Commission (Hobson, 2016), and also the efforts of the Ellen Macarthur Foundation (Macarthur, 2015; CIRAIG, 2015). Although the concept of circular economy is not exactly new, presenting a considerable amount of literature, it has several

aspects that are still being built, for instance, the lack of specific metrics to measure circular economy performance and progress. Thus, despite the availability of tools and data which can be used, at some extent, to assess CE, they need to be improved and go beyond in order to assess CE (EASAC policy report 30, 2016). This lack of specific CE metrics was also recognized by the CircE project as a necessary aspect to be tackled in order to circular economy to thrive. Wherefore, the creation of effective tools for monitoring CE progress is still an ongoing process (European Commission, 2015), and for this reason, it was not further elaborated in the present work.

Besides that, as circular economy actions plans, barriers and opportunities are relatively new topics, thus the existent literature has not yet gone that far or presented these aspects in a detached way. Although, circular economy actions plans, barriers and opportunities are being currently developed in many projects all over EU, namely, CircE project, the literature over the implementation and development of circular economy is not yet very comprehensive, so the present work relied mostly on the existent reports, such as, Macarthur (2015a, 2015b, 2017), CIRAIG (2015), Wit el al. (2018), (European Commission, 2015) which are very resourceful but do not present the desired in-depth analysis over the topic.

CHAPTER 3

CONCEPTUAL FRAMEWORK

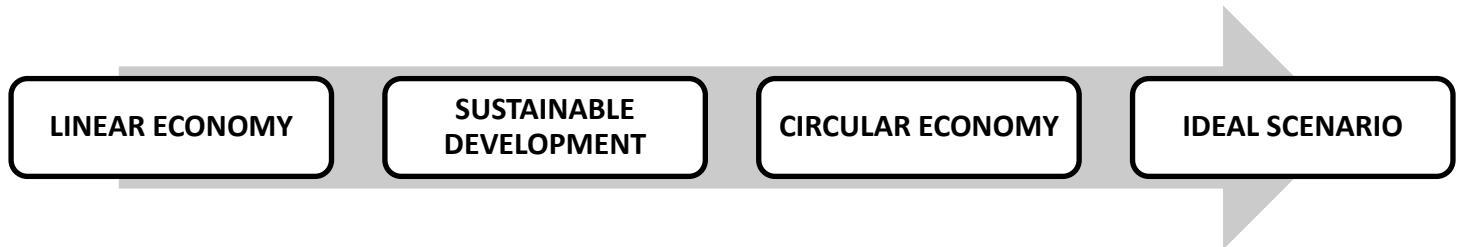


Figure.04: Overview of thesis structure. Source: created by the author, based on the literature review (2018).

The conceptual framework, according to Wisker (2008), consists of the theoretical perspective that supports the research, including the main ideas, arguments and concepts used and evidences of the analyzed literature. Therefore, the present work starts from the discussion of the viability of the current **linear system**, from the perspective of authors that defend the need to progressing to a **sustainable development**. Thus, the concept of **linear economy** is briefly introduced within the **sustainable development** and **circular economy literature** (mentioned afterwards), as a system that should be overcome, consisting of resource – production – consumption – discard/waste system, in which the patterns of behavior are based on the expansion of production and consumption, consequently increasing the demand for resources (Wit et al., 2018). Moreover, the **sustainable development** concept used in the present work, comprises with the achievement of human being's necessities at first, though recognizing that it can only be reached if nature and its limits are respected. The main sources regarding this concept introduced in the present work included: Brundtland Report (1987); Jackson (2009); Moldan et al. (2011); United Nations (2015); UNEP (2017); European Union (2017). Thereafter, the present work brings the argument, that in order to move forward in the direction of **sustainable development**, it is necessary to establish more detached ways to reach it, by designing more practical and effective solutions.

Thus, **circular economy** figures as way to tackle the problems resulting from **linear economy**, hence, following sustainable patterns of development, aiming to implement

more concrete action plans (Macarthur, 2017). In other words, it consists of an economic and industrial system intentionally regenerative, in which waste becomes resource, through changes in product design, business models and, reverse logistic. Hence, a set of conditions are necessary to make the transition to circularity (Macarthur, 2015a). Accordingly, the literature regarding **circular economy** used in the present work, included Heshmati (2015), European Commission (2015), Macarthur (2015a; 2017), Wit et al. (2018).

Finally, the transition to circular economy is not a straightforward and simple process. Hence, the existence of a huge gap of circularity (90% of the resources in the world that enter the production chain are wasted) (Wit et al., 2018), provides the rationale from present work, namely the necessity to identify what has been preventing circular economy to develop. Thus, in order to fill in this gap, it is necessary to tackle the barriers which prevent the world to improve circular initiatives, by developing a series of measures, namely: set aims and targets for the transition, remove policy barriers, facilitate cooperation and innovation along the value chain, create platforms for dialogue and cooperation, improve awareness of CE and its opportunities (Macarthur, 2017). Thus, taking a more government oriented approach, the present work aims to identify key conditions for circular economy to occur, which are part of the process of drawing an **Ideal Scenario** for **circular economy** to thrive, which represents the desired outcome of this research. Therefore, the chart below aim to illustrate the (initial) **Ideal Scenario** built upon the literature reviewed in the present work.

IDEAL SCENARIO

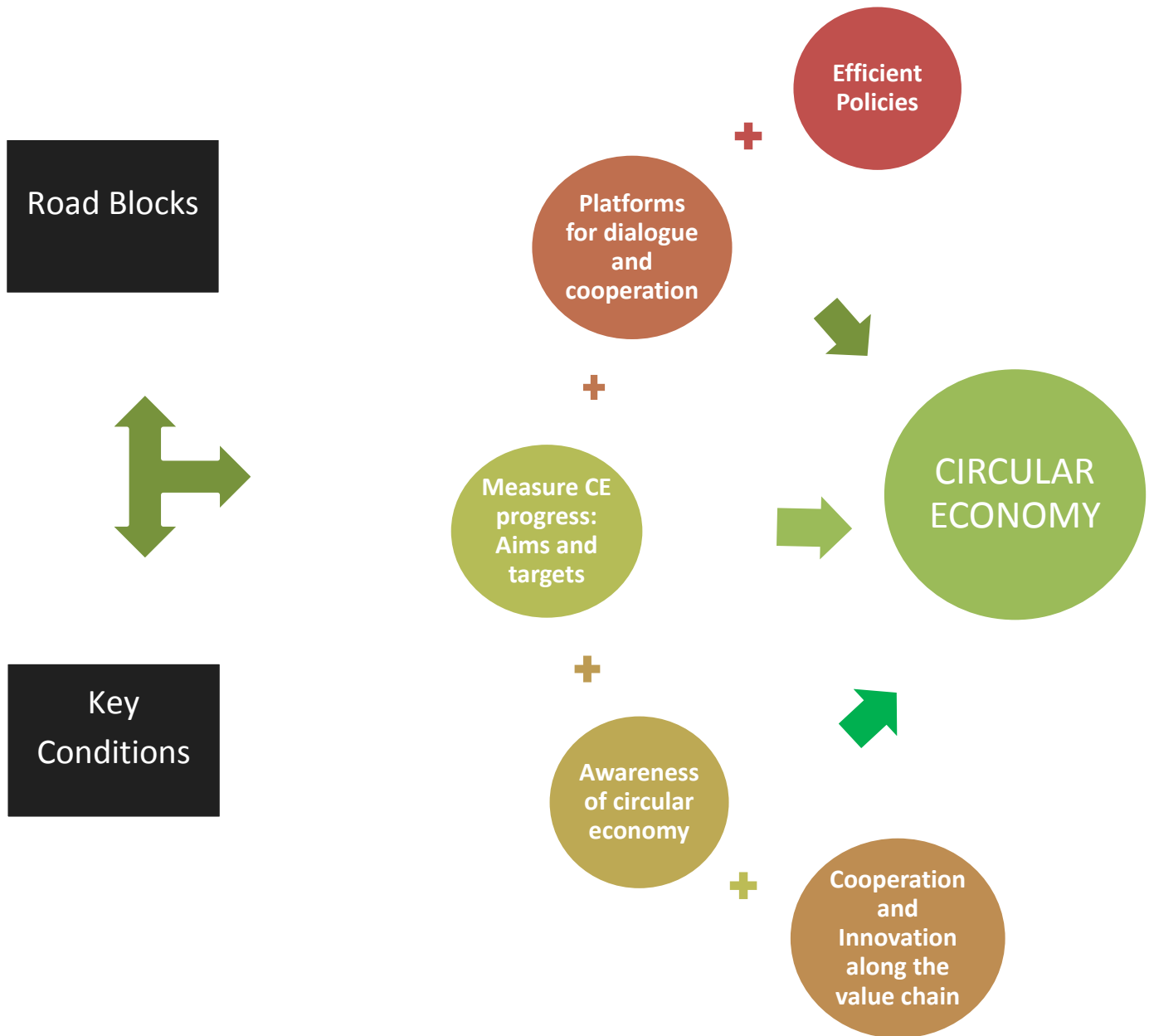


Figure 05: Ideal Scenario. Source: Author, based on Heshmati (2015), European Commission (2015), Macarthur (2015a; 2017), Wit et al. (2018).

CHAPTER 4

RESEARCH DESIGN

4.1 - Elements of the Research Process

The present work, regarding its methodological approach, consists of a case study, once it aims to perform an in-depth exploration of a selected relevant case. In this sense, according to Wisker (2008), case study can be:

“(...) a research strategy based on empirical research that focuses on the particular context and, involves using a variety of data collection. (...) you do not select a large number of cases, because they tend to repeat. Instead, if you can perceive patterns, select a case from each of major trends or patterns that emerges when scrutinizing your data, and flesh out the case study with details.”
(Wisker, 2008, p.2016)

Hence, once the methodology approach of the present research influences directly its design, it can be said, from the methodological perspective, that its approach is considered qualitative, especially regarding that the present work consists of a case study. Thereby, methodology figures the rationale and the philosophical assumptions underlying a particular study, rather than a collection of methods, and the qualitative research is carried out when we wish to understand meanings, interpretations, and/or to look at, describe and understand ideas, beliefs and values (Wisker, 2008). Moreover, several authors consider useful to separate the social research methodology between qualitative and quantitative, once such classification helps identifying the different methods to be applied in the research. In this sense, the distinction between qualitative and quantitative goes beyond the possibility of measurement or quantification of data, involving the role played by theory in the research, its epistemological and ontological orientation (Bryman, 2012). See below the table:

EPISTEMOLOGY	Constructivism
THEORETICAL PERSPECTIVE	Post-positivist
RESEARCH APPROACH	Inductive
RESEARCH METHODOLOGY	Case Study
TIMEFRAME	Cross Sectional

Table.02: The elements of the research process (based on Jackson, et al., 2016)

Therefore, taking into account the present work, as ontology consists of how the author experiences and perceives the world, thus its sense of self in the world can be considered **Constructivist**, once this author believes that the world can be perceived differently by the subjects (Wisker, 2008). Regarding, its Epistemology, the construction, interpretation and representation of knowledge in the world, this work is considered **Constructionist**, which means that human beings construct knowledge and meaning from experience and from relationships between things, people, events. As far as concerns the relationship established with theory in this work, the research approach used was the **Inductive** one (it may be possible to construct generalizations, relationships and even theories from the data collected) (Jackson, et al., 2016). Regarding, its theoretical perspective, this research is **Post-positivist**, since it can be said that it is concerned with the possibility of generating theory, using small samples and, producing qualitative data (Wisker, 2008). Lastly, in what refers to its timeframe, this work consists of a **Cross-sectional study**, once the data is collected at one point in time, mostly due to time and resources constraints (Jackson, et al., 2016).

4.2 - Choice of the Case to be studied

Several authors claim that there are few challenges for the implementation of Circular Economy (CE), such as the insufficient support of legislations, poor economic incentives, lack of awareness about CE and absence of standard systems for assessing CE's performance (Heshman, 2015; Ellen Macarthur Foundation, 2017; Circle Economy Report, 2018). Therefore, as the main focus of the present work is to research these challenges for the development of CE initiatives, the present work aims to perform an in-depth analysis of a relevant case of circular economy to further understand the topic, and in conclusion drawing an Ideal Scenario for its development. Thus, the CircE project was chosen to be analyzed, once it is an ongoing project which aims to tackle these challenges from the perspective of EU countries. Hence, the CircE project represents an interesting case study for the purpose of the present work, since it aims to strengthen Circular Economy (CE) in Europe, through the exchange of knowledge and experience among the partners, thereby improving the range of their policy instruments to steer the economy towards CE model, also stimulating the involvement of stakeholders in CE initiatives.

4.3 – Difficulties to access the data

Furthermore, concerning the choice of CircE project as a case study, once it consists of an ongoing project (started in 2017 and finalizes its activities in 2021), it has a lot of unfinished work, lack of information and reports and, above all, it was not very open to release the data collected so far, because the partners have not yet come to final conclusions, hence have not yet published them officially. Thus, it was stated that disclosing such information could incur in several ethical problems, especially due to the amount of countries and stakeholders involved in the project. While choosing CircE project as a case study, the present work did not predicted such troubles, once it was believed that an EU ongoing project would be more open to initiatives alike, that are also trying to move forward in the investigation of aspects related to the implementation of circular economy. Although the CircE partners were open to dialogue, even inviting the researcher of the present work for some of their activities, the official request to access

the data and stakeholders incurred in an extent ethical discussion among them, and a long negotiation process by the researcher part, in order to proceed with the interviews and to access the data as well. Therefore, the CircE partners agreed to participate on the interviews, and to provide the data until certain extent (limited to the information and reports available in the CircE website), not allowing the access of certain documents, neither to contact directly the stakeholders or good practices mapped by them. These roadblocks ended up delaying the research process, resulting in several issues, such as the removal of surveys of the present work, once the surveys meant to catch the stakeholders (good practices/circular economy initiatives) mapped by the CircE project and, the researcher was not allowed to contact them directly.

In this sense, once the present work intended to use surveys as a method, implementing the triangulation process, it was important to describe this method above, despite the fact that was not possible to proceed with this way of data collection. Thus, the data collection focused on the semi-structured interviews and reports and document analysis. In other words, due to time constraint and limitations of data access, it was not possible to collect the desired amount of data to further investigate all 8 partners involved in the CircE project, since not all documents and information were available and not all the 8 partners could participate on the interviews.

4.4 - Data Collection Methods

As previously mentioned, the present work consists of a case study, hence its general methodological approach is qualitative (Wisker, 2008). Initially, the present work intended to use both qualitative and quantitative methods for data collection, However, due to the limitations described above, the methods used consisted of Semi-structured Interviews and Report and Document Analysis. Although it was not possible to proceed with the surveys, as it was the intention of the present work, it is important to describe this method as well.

Moreover, the collection of qualitative data, through semi-structured interviews was performed. Hence, semi-structured interviews, in which the collection of primary data is

realized, consists of series of questions that allows some divergence, and broader answers developed by the interviewees (Wisker, 2008), were conducted with the representatives of the 8 partner members of the CircE project, to gather in-depth information over Circular Economy. As it consists of a case study, and the CircE project is composed of 8 partners of 8 European countries, providing a good sample of circular economy analysis, the choice of realizing interviews with all of them, as well as performing surveys with the initiatives of circular economy (“Good Practices”) mapped by them was relevant for the present work. However, as mentioned before due to the limits of data collection faced in this research process it was possible to access only 5 of the 8 CircE project partners, namely, Italy partner, Spain partner, Poland partner, Bulgaria partner and Netherlands partner. Finally, in addition to that, secondary data was also assessed through the analysis of the documents and reports regarding circular economy and the CircE project. See below the chart describing the methods of data collection used in the present work.

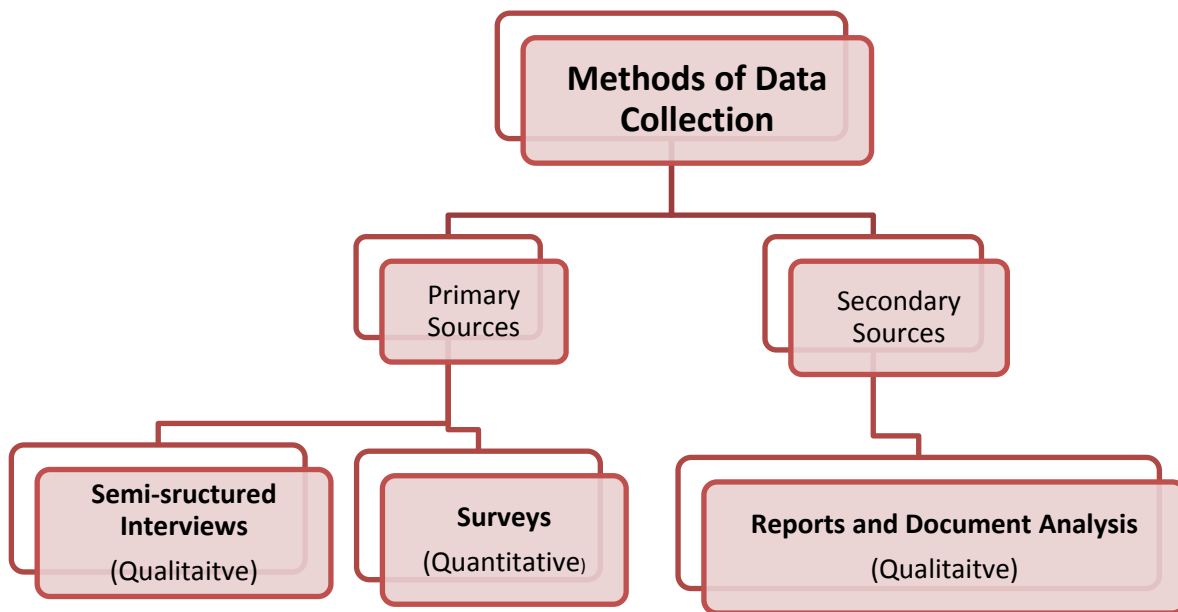


Figure.06: Methods of data collection created by the author. Information source: Wisker, 2008; Bryman, 2012.

Moreover, in view of the research methods selected for data collection, in order to respond its main research question: **“What is the ideal scenario for Circular Economy to**

occur, according to the CircE Project stakeholders?”, the following table presents the separation of the methods that are going to be used to answer the 4 sub-questions, which support the response of the main research question.

RESEARCH QUESTIONS	REPORTS AND DOCUMENT ANALYSIS	SEMI-STRUCTURED INTERVIEWS	SURVEYS
1 - What are the criteria used to identify “Good practices” of Circular Economy?	x	x	-----
2 - What are the Key Conditions identified for CE to thrive?	x	x	x
3 - What are the Road Blocks identified?	x	x	x
4 - What is the Action Plan used for the implementation CE?	-----	x	-----

Table.03: Research methods according to the research questions. Source: created by the author.

4.4.1 - Reports and Document Analysis

The present work has chosen among its research methods the documentary analysis. Once it consists of:

“(…) the analysis of documents, both primary and secondary sources (primary sources are those produced at the time, and by the originator; secondary sources are works about the sources, about the time or the originator, written from the perspective of an analyst, a critic, someone commenting on the source rather than being the source).” (Wisker, 2008, p.253)

Therefore, this method was selected because the CircE project consists of an European Union initiative, in current process of development, in the context of boosting circular in the EU, and eventually in the world, by ruling as a successful example. In this sense, the

CircE project formulated several documents such as its CE tool, central for the project, created to identify circular economy “Good Practices”, barriers, opportunities, and so on. Thus, in order to further understand the CircE project, how it works and how they organize their data, it is important to analyze this tool. Besides that, the reports generated by the CircE project, along its ongoing performance, supports the comprehension of the development of the project, and of circular economy in those locations, according to the perspective of the 8 participant partners as well. Moreover, the reports produced by the following organizations: Circle Economy, Ellen Macarthur Foundation and European Commission, concerning circular economy in EU, were also assessed, once they provide very relevant data for the analysis of circular economy progress in Europe, supporting the appreciation of the current case study.

However, these documents did not provide all the information necessary to fulfill the final aim of the present work, the creation of an ideal scenario for circular economy to thrive, taking into account the CircE project perspective. Accordingly, although these documents were used as basis for the comprehension of the other data collected in this dissertation, with the interviews and surveys, and the literature reviewed as well, it was also necessary to collect further data - which could not be assessed by simple analyzing these documents. In this sense, in order to capture the point of view of those ones responsible for the development of the CircE project, as well as the circular economy initiatives mapped by them, other methods were also selected, meaning semi-structured interviews and surveys, respectively.

4.4.2 - Semi-structured Interviews

As the present work consists of a case study of the CircE project, interviews were chosen as a method to collect in-depth information regarding circular economy, from the perspective of representatives of such project. The choice for semi-structured interviews was due to the allowance of such method to certain freedom of conversation and divergence between the interviewer and the interviewee, enabling unexpected information to appear in the course of the interview. At the same time, this method also allows the comparison of responses (Wisker, 2008).

The CircE project is composed by 8 partners of 8 different locations: *Lombardy Region, Government of Catalonia, Marshal's Office of Lower Silesia, Province of Gelderland, London Waste and Recycling Board (LWARB), Creation Development EcoEnterprises (CD2E), Sofia Municipality, Association of Municipalities and Towns of Slovenia (SOS)*. In this sense, one representative of the CircE project of each one of the 8 locations was selected to participate in the interview, in order to catch the public/government perspective over circular economy, its barriers and opportunities.

However, since it was not possible to be physically present in every one of these locations, Skype meetings were realized with each one of the representatives. These interviews were scheduled through e-mails, which explained the content of the present research, and why their participation was essential for the enrichment of this dissertation. The appropriate ethical measures were taken, by sending an e-mail to the participants containing an “ethical consent form” that should be signed by both parts participating in the interview.

4.4.3 - Survey

As mentioned before, it was not possible to access the stakeholders to which the surveys would be applied, due to ethical limitations imposed by the CircE project. Although the present work faced this limitation, it was design to collect such data. Therefore, it was important to describe the process of creation of the tool, even though it was not possible to collect the intended data.

Thus, despite most commonly being used in quantitative researches, aiming to achieve large number of responses, surveys can also be used in qualitative researches with a post-positivist approach, such as the present work, which seeks to develop theory, instead of testing it. Thereby, these questionnaires can have an open-ended structure, and be answered by fewer people, looking for richness of information, not statistical significance (Wisker, 2008). Therefore, surveys were also chosen as a research method to enrich the present work, by collecting a variety of information from the perspective of the Good practices (CE initiatives) mapped by the CircE project.

4.5 - Ethichs

Research ethics means conducting the research, taking into account moral principles, going further the simple adoption of appropriate methodological approach, but conducting it in a responsible way. Thus, the relationships establish in the course of the research and for its purpose should be protected guaranteeing certain principles, such as the rights of research participants (Jackson et al., 2016)

Therefore, there are some important principles that have to be taken into account when performing a research, including: **informed consent** (provide enough information for the individuals, so that they can decide whether participate or not); **self-determination** (individuals can decide to participate or refuse, without facing consequences); **minimization of harm** (researchers should not cause harm or put the participants in danger); **Anonymity** (protection of the identity of the participants); **Confidentiality** (assure confidentiality of the data); **justice** (safeguard of the population researched, making sure that they are not exploited) (Hennink, et al., 2011). In other words,

“You need to explain carefully to anyone you intend to interview, exactly what will you do with the interview material. (...) It is assumed that what is said in an interview is ‘on the record’, but some participants may choose to remain anonymous or to vet the script of the interview before you use it. This is something that should be offered to them – agree to send the transcript to them before you use it.” (Wisker, 2008, p.195)

Moreover, due to its qualitative nature, the present work is even more concerned about such recommendations, once perceptions, beliefs and opinions of the participants are its focus, therefore the present work ensured that the ethical aspects were respected accordingly. In this sense, as mentioned before, the appropriate measures were carefully applied with each one of participants of the interviews and surveys, for instance, informed consent, voluntary participation and anonymity, guaranteeing the respect of participants, as well as the data collected.

4.6 – Conclusion

In spite of the challenges faced during this dissertation, the literature was enough to cover the topics researched, and even provided a good background for the data analysis. Besides that, it was possible to collect enough data to make an in-depth analysis of the CircE project, building a thoroughly overview of what the project has done so far. Hence, all the information and knowledge gathered, regardless of the drawbacks, allowed the goal of the present work to be reached, namely the drawing of an Ideal Scenario for circular economy to thrive.

CHAPTER 5

RESULTS AND ANALYSIS

5.1 - Introduction

As previously mentioned, as the present work has a more government oriented approach, it consisted of a case study of the CircE project, being its main goal to verify the Barriers which prevent the circularity gap to be bridged and also, to propose possible solutions, to finally draw an ideal scenario for circular economy to flourish. Hence, common grounds and strategies for the implementation of circular economy within the CircE project were identified.

In this sense, a general overview of the project with an in-depth analysis was performed, in order to answer the central question identified in the present work, “What is the ideal scenario for Circular Economy to occur, according to CircE Project stakeholders”, and its 4 sub-questions.

- 1 – What are the criteria used to identify “Good practices” of Circular Economy?
- 2 – What are the Key Conditions identified for CE to thrive?
- 3 – What are the Road Blocks identified?
- 4 – What is the Action Plan used for the implementation CE?

The questions above were covered in the general overview of the CircE project, while an initial review of the data collected was performed, followed by a more detached analysis of the data, containing a further investigation of common grounds and strategies for the implementation and development of circular economy. This data was assessed through analysis of CircE reports and the interviews provided by the project partners.

Moreover, for analysis purpose, the CircE project partners were classified according to the country which they represent, namely, UK partner, Italy partner, Netherlands partner, Poland partner, Bulgaria partner, Spain partner, France partner and Slovenia partner.

Thus, 5 interviews were realized and the CircE reports of the 8 CircE partners were analyzed.

5.2 – Interview Schedule

CircE Partner	Date of Interview
Italy partner	04/05/2018
Poland partner	14/05/2018
Netherlands partner	17/05/2018
Bulgaria partner	22/05/2018
Spain partner	23/05/2018

Table 04: Interview schedules. Source: author.

5.3 – CircE Project – A General Overview

Interreg is a European Union project that supports regional and local governments in the development of better policies, helping the regions to reach their full potential, improving social, economic and environmental aspects (European Union, 2018). As part of INTERREG, CircE project is an initiative created to support the development of circular economy in Europe, by improving the efficiency of their policy instruments. The CircE project is being undertaken by 8 regional and local partners located in different countries of Europe: *Lombardy Region, Government of Catalonia, Marshal's Office of Lower Silesia, Province of Gelderland, London Waste and Recycling Board (LWARB), Creation Development EcoEnterprises (CD2E), Sofia Municipality, Association of Municipalities and Towns of Slovenia (SOS)*. The project, which started in 2017 and will finish in 2021, aims to strengthen Circular Economy (CE) in Europe, through the exchange of knowledge and experience among the partners, thus improving the range of their policy instruments to

steer the economy towards CE model, also stimulating the involvement of stakeholders in CE initiatives.

Hence, as CircE is an ongoing project, there are some steps that have already been taken and others that are still in the process of development. For instance, their first stage was the creation of the “CircE Tool”, identified as the common methodology of the project, which consists of the main aspects of circular economy that needed to be tackled and the referent data that will be collected by each one of the project partners, accordingly. Thus, this data generated a table containing aspects such as, Opportunities, Barriers, Good Practices, Policies, Focus Sectors, and so on. This tool is extremely important for the project and, it was created to map circular economy scenario in the locals and regions focus of the project. Another important instrument created to collected data was a questionnaire to be answered by both the mapped stakeholders and the representatives of the regions and locals involved in the CircE project. Moreover, at the end of each stage, a report will be produced by each one of the partners, showing the results and impressions achieved so far.

These instruments are part of the so called mapping stage, and it is essential for the project, once the identification of actors (Stakeholders), Good Practices, Barriers, Opportunities and, cross-cutting projects is important to increase the knowledge of the regional contexts regarding circular economy and also the comprehension of how ready is the region to develop circular economy, as well as what needs to be addressed.

Thereon, after the mapping stage (the current stage), in which opportunities and barriers of circular economy were identified, every partner will create an action plan, according to their particular contexts to tackle these issues. Besides that, this information will support the development or improvement of policies regarding circular economy. Finally, the action plan, together with the policy support will provide suitable instruments for circular economy to thrive in their regions.

5.3.1 – Focus Sectors

The division of circular economy initiatives in sectors is a common strategy to simplify and optimize the work with CE, especially from a macro perspective, such as, governments.

Every type of CE initiative has specific features and, requires a set of actions to addresses them. Thus, grouping these initiatives in sectors is a way to simplify and organize them, facilitating the process of identification of initiatives itself and also the implementation of solutions accordingly.

“There are so many possibilities of CE initiatives and regarding technical specifications, so grouping them helps guiding and, eases the work.” (Italy Partner, 2018)

As part of the CircE Tool, the project selected sectors of interest that are relevant for all the regions involved in the project regarding circular economy. Thus, the FOCUS SECTORS consist of: Built environment; Plastics; Food waste; Textile; WEEE-strategic metals; Tourism; Biomass; Raw materials. Afterwards, the partners gather in groups according to the sectors selected to share specific knowledge, difficulties and experiences from their focus sectors. These sectors were chosen based on criteria of economic interest and potential opportunities to develop circular economy in every one of the project partners. Nevertheless, it is important to note that each partner is researching their area of interest, choosing about 3 sectors (not all the 8 sectors). In other words, every partner selected among the sectors those ones that are more relevant for their region, thus more likely to develop circular economy. Therefore, among all the 8 CircE partners, Built Environment was the most common sector, being chosen for most of them - 5 of the partners, in addition to 1 partner which identified the Raw material as a sector, but also related to the Built Environment. The second most identified sector was Textile (5 partners), followed by Food Waste, Plastic and Tourism. The remaining sectors, WEEE-strategic metals; Biomass; Raw materials appeared less frequently among the CircE partners.

Moreover, in order to identify such sectors the partners engaged in some activities, namely, the selection of the sectors which would provide the best source of information, for instance for the identification of Good practices and Opportunities of circular economy

in the region; as CircE project assumes that circular economy is frequently connected with innovation, the project collected information regarding the Smart Specialization Strategy (S3), in order to interpret this data from the circular economy perspective; besides that, other data was collected regarding the chosen sectors in each region, namely, number of employees and companies in the region, Gross Value Added, resource productivity, volume of waste generated, share of waste reused/remanufactured, recycled, incinerated, and landfilled, energy Consumption, and so on.

Furthermore, recognition of elements or indicators to identify circular economy sectors, also provided information for the identification of CE initiatives or Good Practices.

5.4 – What are the criteria used to identify “Good practices” of Circular Economy?

The concept of Good Practices created by the CircE project is central for the project, even though it differs a bit among the partners. Thus, Good Practices consists of circular economy initiatives identified by every one of the regions, regarding the focus sectors selected by each partner, concerning educational (universities, organizations and initiatives which promote CE), policies (related to waste management or CE oriented) and, technical (for instance, innovation, use of waste as resource, services instead of products, and so on) aspects.

Moreover, the TOOLKIT FOR POLICYMAKERS (Macarthur, 2015) in which the methodology of the CircE project was based, provided the framework of technical aspects of circular economy that also guided the identification of Good Practices, namely: Regenerate (shift to renewable materials and energy), Share (keep product loop - maximize utilization of product by sharing with different users), Optimise (increase performance and efficiency of a product and process of manufacturing), Loop (keep components and materials in a closed loop), Virtualize (dematerialization, for instance, of the manufacturing and logistic processes), Exchange (new products, services and technologies, renewable materials) (Macarthur, 2015). Therefore, the initiatives that performed one or some of these behaviors could be mapped as Good Practices of circular economy. Such features, commonly found in innovative practices, together with aspects related with new business

models (oriented to circularity or sustainability), as well as educational, policies, technological initiatives and, information regarding waste (generation, recycling and, so on) were also used as indicators of CE. Besides that, as previously mentioned, Circe project recognizes that very often CE is related to innovation, hence Smart Specialization initiatives also helped identify Good Practices.

“(…) we decided to collect data to from the specialization strategy that we are running in our region, we are still collecting data, macroeconomic data, concerning the chosen sector, for instance, building environmental and textile, based on the amount of waste produced and recycled in the region for the sector of interest. Then, we decided to produce a map of actors and stakeholders, I mean the companies and institutions, which are running circular economy activities, in terms of production or research, and also the organizations which have interest in circular economy or the potential to develop circular economy.” (Italy partner, 2018)

Although the core aspects for identification of CE initiatives is the same, each one of the 8 reports analyzed presents some level of difference regarding the point of view of Good Practices, which are based on the context of the region and also depending on the availability of data. For instance, some regions have more awareness of the circular economy concept, hence more initiatives to be mapped, while others faced more difficulty to identify such initiatives due to the lack of awareness. Therefore, the mapping of Good Practices was smoother and more straightforward in the regions where the awareness of CE is higher, namely, Spain Partner, Italy Partner and Netherlands Partner. Hence, the identification of Good Practices was performed through searching for initiatives on the internet, establishing direct contact with them or through umbrella organization, clusters, educational institutions or representative organizations of the sectors, for instance. On the other hand, the partner regions where the CE awareness is lower, the process of identification of Good Practices faced more challenges, namely Poland Partner and Bulgaria Partner. Thus, these last partners had to dig a little deeper to find the CE initiatives, using strategies like, researching Smart Specialization reports and initiatives, contacting several sources of data to find indicators of CE, such as, environmental organs, statistical institutes, water and waste management organizations. Accordingly, the Good

Practices were identified from the analysis of reports and data related to waste management and Smart Specialization.

The mapping of Good Practices is realized within the identification of Focus Sectors, throwing light on the currently situation of circular economy in the region, hence what are the achievements reached so far and, what are the impediments for the development of circular economy.

5.5 – What are the Road Blocks identified? (Opportunities and Barriers)

The CircE project is currently in the phase of assessing the data regarding the Barriers, hence the Road Blocks were mostly identified from the data concerning Opportunities mapped by the CircE project and, through some of the partners's previous impressions of what they believe could be identified as Barriers for circular economy. Furthermore, although the CircE project separates Opportunities and Barriers, their core is the same, once Opportunities arise where Barriers can be overcome.

Moreover, Opportunities, Good Practices and the Barriers are strongly related in the CircE project and these concepts can sometimes overlap. Thus, while identifying the existent Good Practices, the CircE partners recognized where there was room for improvement, regarding the development of circular economy. Afterwards, while mapping Opportunities, the Barriers to achieve them were also recognized.

“Then, the last step of this tool (CircE tool) is the barriers's identification, through our stakeholders, then we could link the barriers with the opportunities mapped.” (Italy partner, 2018)

Hence, some of Opportunities/Barriers which were identified so far, consisted of high prices of circular resources, such as recycled textile and, insufficient technology, in comparison with linear (raw) ones (Netherlands Partner); in addition, business can be reluctant to changes, fearing the possible losses, especially regarding the necessary investments to the circular transition (Poland Partner).

“It is an initial cost problem, because it is not profitable to business right now. So, we try to show them examples that it works. It is good to involve circular economy and politics. For example we are doing a conference on 21st May evolving circular economy in our region. We tried to show examples of some companies are using the concept of circular economy, and it is working, they are making money with it.” (Poland partner, 2018)

As most partners agree that business and consumer awareness can be a substantial Road Block to the development of CE, hence, behavior change towards circularity represent a challenge to be tackled. Accordingly, the Spain partner and the Polish partner presented some examples of events (seminars, meetings) that are being promoted with this purpose, to deal with the lack of awareness and fear of failure of the business initiatives in the region. For instance, in these events, successful CE business presents their positive results, helping to expand CE knowledge and, also stimulating cooperation and networks among stakeholders.

Furthermore, although the identified Opportunities and Barriers can present some differences among the partners, it is important here to point out the common aspects mapped by them, namely: need to improve waste management policies; use waste as resource; improve CE awareness; increasing training and education (improve CE skills and developing research in the field); Development of metrics to measure CE performance and progress; Creation of platforms to promote communication among business and also consumers (share of knowledge and, data regarding waste/resource procurement); stimulate networks and cooperation among stakeholders; Creation of Policies, action plans and guidelines to steer both consumer and businesses behaviors into CE direction; Support industries, entrepreneurship, start-ups (technology and innovation); Local Production (avoid importation, reducing footprint); Cleaner and greener resources and resource efficiency (Such as, zero emission, electric vehicles, biogas, biomass, using waste as resource and, so on).

For instance, the Netherlands partner pointed out some road blocks encountered and suggested some strategies to deal with them.

“For example: textiles – virgin material, the consumers are not ready for recycled material products, it is too expensive to recycle process, they rather by cheaper products. It is not easy to change consumer behaviour. A solution for textile could be refund money when bring back the products. It is necessary to promote campaigns, so recycled clothes becomes more popular. It is also important to reduce prices of recycling textile – needs more breakthrough technology. Building industry requires very long investment, such as, a pay-back system.” (Netherlands partner, 2018)

Moreover, coping with the Opportunities/Barriers mapped up to now will require a lot of investment, especially, in financial and knowledge terms, demanding the involvement of several stakeholders, namely governments (through action plans and policies), business (changing behavior and other technical aspects) and consumers (changing consumption and discard patterns). Therefore, these possible solutions, identified from the Opportunities/Barriers, will guide the creation and improvement of CE oriented policies, for instance, improving waste management, creating laws that reinforce the use of a percentage of waste in the new products (such as, in the plastic or building materials sectors) and, tax reduction for CE business, penalties for waste production, and so on. The governments can also promote the necessary actions to be taken, namely, promoting events to increase CE awareness, cooperation and network, supporting education and training organizations, among others strategies which represent key conditions to allow CE to thrive in the regions, accordingly.

5.6 - What are the Key Conditions identified for CE to thrive?

The Key Conditions for CE to thrive consists of the Opportunities identified in the CircE project, described above. In other words, the concept of Key Conditions was created in the present work, based on the CircE concepts of Good Practices, Opportunities and Barriers. As mentioned before, these aspects are strongly connected, being able to provide valuable information about each other in the mapping process.

Hence, the Key Conditions recognized among all the CircE partners were: good consumers and business awareness and behaviors oriented towards CE, such as, promotion of CE events involving several stakeholders; waste management policies and strategies in order

to make feasible the availability of secondary resources; policies to reinforce CE aspects (for instance, tax reduction for CE businesses); training and educational regarding circular economy, in order to both qualify human resources to tackle the new demands and, to develop scientific researches in the field; good communication, cooperation and networks among stakeholders (information sharing, CE awareness, disclosure of CE business, demand/offer systems, and so on); investment in new technology and innovation (new products, business, more efficient use of resources, recycling); and also specific metrics to measure circular economy progress (although, CircE recognizes as essential, the project does not aim to generate such measures).

For instance, some of the strategies or Key Conditions implemented by the Spain partner consists of:

“Meetings with the stakeholders (4 so far); posting reports and other information in CircE website; establish collaborations and network for CE; training and increase awareness of CE, collaborate with specific public authorities; Market Place (events where business can show themselves and, people can go to look for products and services); organize events to increase awareness and share knowledge, such as, Mapping Week (international initiative to map CE initiatives).” (Spain partner, 2018)

Therefore, the Key Conditions include the most important aspects for the development of CE, identified throughout the mapped sectors, which aim to improve the awareness of CE, the availability of secondary material (waste as resource), involving universities and other educational institutions to capacitate manpower to CE demands, as well as developing sustainable innovation and technology, besides promoting cooperation and networks among the stakeholders, through events, projects and platforms. Hence, the Key Conditions serve as guideline for governmental organizations to improve and implement CE initiatives, containing the necessary actions to be taken, accordingly and, forming an Ideal Scenario for CE to move forward.

5.7 - What is the Action Plan used for the implementation CE?

The CircE project partners, in their mapping stage described above, identified essential actions that have to be implemented in order to achieve successful development of circular economy. Hence, all the project partners interviewed recognized the need of an action plan for circular economy. However, from the 5 project partner interviewed (Spain, Netherlands, Poland, Italy and Bulgaria), only the Netherlands partner claimed the existence of an action plan specific for circular economy, which still needs to be improved.

“Although we have an action plan, there is still need to improve the existent policies and public initiatives, to increase the amount of waste recycled and its use in building materials, for instance. The implementation of circular economy is a long term process and the creation of small and big projects and initiatives are necessary to scale up the development of CE in the local, regional and national levels.” (Netherlands partner, 2018)

Thus, the mapping of Good Practices, Opportunities and Barriers in the CircE project will provide the essential information to guide the design of the action plans in the regions. For instance, the success of CE can only be achieved with raise of awareness of CE and, with engagement of the stakeholders, especially business and government ones. In other words, all the Opportunities and Barriers identified have to be gather in a document (action plan), to provide common initiatives which must be tackled, in each sector, aiming the increasing and improvement of circular economy in accordance with the regions.

Therefore, the desired outcomes of the CircE project, necessary for CE to thrive consists of the development of action plans, unifying the strategies, in coherence with each place where CE is implemented, besides the creation and advance of policies to support and reinforce the actions to put CE forward and change business and consumer behaviors. In other words, CircE project aims to bridge the existent gap of circularity by implementing a set of strategies, identify as key conditions for the success of CE.

5.8 – How to bridge the gap

In face of the circularity gap, CircE project was created aiming to map the existent initiatives and, to identify the challenges faced by them, to finally create consistent policies and action plans for better implementation and development of circular economy in the regions participants of the project, with scale-up potential to spread these ideas to other regions.

Hence, using CircE project as a case study, the main aim of the present work is to verify these barriers which prevent the circularity gap to be bridged, presenting possible solutions, in order to draw an ideal scenario for circular economy to thrive.

Therefore, in order to bridge the gap of circularity, the governments play an essential role which ranges from mapping good practices (existent circular economy initiatives), to identifying key conditions for CE to occur, as well as the road blocks for the implementation of CE initiatives (Wit et al., 2018; Macarthur, 2017). Thus, the identification of such aspects and the implementation of strategies to tackle them, require the accomplishment of several steps (which may or may not follow an order), which were congruently recognized by Wit et al. (2018) and Macarthur, (2017) and also in the CircE project. Thus, both the Wit et al. (2018) and Macarthur, (2017) reports and, the CircE project present a guide of actions to be followed by governments to create an action plan for the implementation and development of circular economy. Accordingly, taking into account the local or region or country in context, the first steps consisted of identification of relevant sectors, which were chosen based on the criteria of economic interest and potential opportunities to develop circular economy, followed by a mapping stage, in which the existent initiatives (Good Practices), Opportunities and roadblocks (Barriers), separated by sectors, were identified. Hence, the mapping of Good Practices gave a general idea of what has been done so far in terms of CE initiatives, also providing information regarding the potential Opportunities and the Barriers as well. Summing up, these first steps are composed by a data collection process, in which the current situation of circular economy in that context is unveiled, as well as the recognition of the next steps to be taken.

In this sense, in order increase and improve CE the steps recognized by the present work, are necessary to be taken, as Key Conditions for CE to occur. These key conditions are based on the Opportunities and Barriers commonly identified within the CircE project. Thus, these steps consist of:

- **Waste management** (improve policies, strategies and, public awareness for the separation of the waste);
- **Use of waste as resource** (re-use, recycling, introduction of percentage of secondary raw material in products);
- **Improve CE awareness** from business and consumers (CE opportunities, strategies and, changing consumer behavior, through campaigns, meetings, seminars);
- **Training and Education** (varying from high education and scientific research to training for the execution of tasks demanded by circular economy businesses);
- Development of **metrics** to measure CE performance and progress;
- Creation of **platforms to promote communication** among business and also consumers (share of knowledge and access to information and data regarding waste/resource procurement, offer and demand);
- Promotion of strategies to stimulate **networks** and **cooperation** among stakeholders – businesses, consumers and governmental organizations;
- **Policies, action plans and guidelines** to steer both consumer and businesses behaviors into CE direction (For example: tax reduction for CE companies);
- **Support industries, entrepreneurship, start-ups** (development of CE initiatives new business models, products and services and, of **technology and innovation**);
- **Local Production** (avoid importation, prioritizing local initiatives, reducing footprint);
- **Cleaner and greener resources and resource efficiency** (zero emission, electric vehicles, biomass, bioproducts, natural fibres, composting, waste as resource).

Furthermore, it is important to state that those steps can overlap and, very often happen simultaneously (CircE project, 2018). Moreover, the success of circular economy requires

the gathered efforts of their stakeholders, especially policymakers at all levels (city, national and regional), helping to support business initiatives, educational organizations, innovations and technologies, as well as, to steer business and consumer behaviors towards circularity, in order to improve the previously mentioned areas, allowing CE to thrive (CircE project, 2018; Wit et al., 2018; Macarthur, 2017).

Hence, the increase of CE initiatives will demand specialized labor, as well as, allow the raise of more sustainable ways of economic growth – disconnected from material extraction - based on more sustainable patterns of behavior, and respecting the cycles of nature (Macarthur, 2015a; Berndtsson, 2015, Heshmati, 2017). Therefore, both Macarthur (2017) and European Commission (2015) have identified business opportunities that could result in 320 billion euros of investment by 2025, if some actions were taken by the government, business and, industries and changes were made, such as, in policies (Macarthur, 2017). Furthermore, by providing the necessary conditions for CE to thrive, such as, supporting education and training, local production, use of waste as resource, creation of new business plans, and so on, in other words, by tackling the aspects proposed on the Ideal Scenario, the governments will unlock several potential opportunities, including the generation of new jobs and business (Macarthur, 2015a; Berndtsson, 2015, Heshmati, 2017).

Besides that, Circular Economy can reduce human footprint in higher level than of those ones proposed by the *Paris Agreement*, by introducing systemic solutions taking into account societal needs, combining political leadership, technological innovation and behavioral changes.

In this sense, the implementation of an Ideal Scenario will support CE development, tackle social, economic and environmental aspects through a more holistic oriented system, namely circular economy, will generate long-term, more effective impacts (Berndtsson, 2015), allowing the humanity into the “Doughnut” (Raworth, 2012).

Thus, CE is an attractive system because tackles most of the *Sustainable Development Goals* (Wit et al., 2018), offering innovative solutions to promote economic growth by reducing environmental impacts, for instance, greenhouse gas emission and depletion of

resources, generating business and job opportunities, improving also social aspects, such as, human health (Macarthur, 2017).

5.9 – Ideal Scenario – Research Outcome

The CircE project case study provided very valuable set of data, in order to verify the Barriers (Road Blocks) and the proposed solutions (Opportunities), to finally recognize the Key Conditions for CE to occur. This information enabled the drawing of an ideal scenario to be implemented by the according governments for circular economy to flourish, as the outcome of the present work.

Thus, the analysis of the data researched from the CircE allowed to respond the 4 sub-questions of the present work, supporting the answer of the main research question, by providing enough information to move forward from the “Ideal Scenario” proposed initially, built upon the literature review in the Conceptual Framework, to the “Ideal Scenario - Research outcome”.

The “initial Ideal Scenario”, previously presented in the conceptual framework, indicated the basis to draw the “Ideal Scenario”. However, once it was based only on the literature reviewed, it contained an inceptive (and limited) overview of the conditions for CE to flourish. Therefore, after the analysis of the data collected from the CircE project, this scenario could be drawn more thoroughly, since this data provided more detached information over circular economy, from the perspective of government stakeholders who are dealing directly with CE mapping and implementation of solutions, accordingly. The Ideal Scenario, though, should contain the Opportunities and Barriers mentioned above, as well as the Key Conditions, which are necessary to be tackled in order to CE to thrive. Finally, see below the “Ideal Scenario”- Research Outcome of the present work:



Figure 07: Ideal Scenario – Research Outcome. Source: Author , based on CircE project (2018).

CHAPTER 6

CONCLUSION AND RECOMMENDATIONS

6.1 – Conclusions

Circular economy as a sustainable production and consumption system can be considered a viable alternative to the current linear system and its dreadful impacts to human life and to the environment. For instance, it can provide the necessary means for human survival, offering several economic opportunities (such as new jobs and business opportunities), as well as mitigating climate change effects, through the reduction of waste and more efficient use of resources.

However, although the benefits of implementing circular economy are well-known, CE is not yet widely spread around the world, since there is a 90% gap in the circularity of resources (only about 10% of the resources that enter the production system, come back to it in a circular way, for example, through reverse logistic, recycling, re-using, and so on). Therefore, more effective solutions should be put in practice to achieve higher levels of circularity, including the creation and reinforcement of better policies regarding CE and also the design of action plans for its implementation. For this reason, projects related to circular economy have been taking place all over the world, for instance, aiming to map the current situation of circular economy, providing information of what has already been done and what is yet to be accomplished.

Hence, the present work, following this trend, performed a case study of a circular economy project, namely, CircE project, an European Union initiative, which consisted of a valuable source of knowledge regarding circular economy and, over its good practices, opportunities and barriers, addressing the creation of more effective policies and action plans, in order to increase the amount of CE initiatives and to improve the necessary conditions for it to flourish.

In this sense, the present work answered the 4 research questions proposed initially:

- 1 – What are the criteria used to identify “Good practices” of Circular Economy?
- 2 – What are the Key Conditions identified for CE to thrive?

3 – What are the Road Blocks identified?

4 – What is the Action Plan used for the implementation CE?

Furthermore, the data collected in the present work, regarding the CircE project provided the necessary information to draw an Ideal Scenario for CE to thrive. Thus, identifying the criteria used to identify Good Practices, which consisted of circular economy initiatives and, were recognized from indicators of circularity, such as waste management and innovation aspects. Besides that, the process of mapping them provided information over the current scenario of CE in regions researched, as well as the aspects which needs improvement, such as awareness of CE, use of waste as resource, policies CE oriented, education and training, and so on. Hence, the Road Blocks/Barriers, Opportunities and key conditions for CE to thrive were identified in the present work, as limits that should be overcome through the according strategies and, should be implemented by the governments. As a result of the analysis of the data collected this research draw the Ideal Scenario – Research Outcome, which contains key conditions for CE success.

Accordingly, the Ideal Scenario designed in the present work rely on a set of overlapping steps that should be taken (very often) simultaneously, counting on the gathered efforts of the stakeholders, especially business initiatives and policymakers. Thus, the steps consist of improvement of waste management policies and strategies (to allow the availability and better use of resources); use of waste as resource (re-use, recycling, introduction of percentage of secondary raw material in products; increase of CE awareness from business and consumers (over opportunities, strategies and steering behaviors); training and education (development of scientific research and skills to comply with CE demands); development of metrics to measure CE performance and progress (although recognized as important, it was not the focus of CircE project); creation of platforms to promote communication among business and also consumers (share of knowledge and access to information and data regarding waste/resource procurement, offer and demand); stimulate networks and cooperation among stakeholders – businesses, consumers and governmental organizations; policies, action plans and guidelines to steer both consumer and businesses behaviors into CE direction (such as,

separation of waste to be collected, refurbish, recycling and re-use); support industries, entrepreneurships, start-ups (CE initiatives, new business models, products and services and, technology and innovation); local Production (new businesses, avoid importing, use local resources, reduce footprint); cleaner and greener resources and resource efficiency (for instance, biomass, use of waste as resource). Summarizing, the implementation of the steps contained in the Ideal Scenario should provide strategies to be supported by governments and, which would provide the key conditions for circular economy to thrive. Moreover, regarding the action plans, they were not identified in the present work, once the CircE partners claimed that they will be the outcome of the project, hence, they have not yet been produced.

6.2 – Limits of this research and Recommendations

The main goal of the present work was to create a practical and useful guide for the implementation of aspects that support circular economy to move forward from the perspective of government strategies. Hence, the analysis of the CircE project meant to provide valuable data to do so. However, as seen before, it was not possible to gather all the desired information. Besides that, as CircE desired outcomes of the project are better policies (CE oriented) and CE action plans, it would be resourceful to look into the existent policies related to the topic, in the regions researched and, also check the existent action plans, in order to compare the mapped opportunities with the gaps in these documents. Although most of the CircE partner regions do not contain action plans, aiming to create them by the end of the project, assessing the policies would provide very useful data. Hence, the analysis of such documents, for instance, all policies related to waste management, circular economy and any other related fields, such as sustainable strategies and smart specialization, could provide valuable insights over circular economy and the existent limitations. Nevertheless, it was not possible to make an in-depth review of them, due to time constraints and the volume of documents that should be assessed. Thus, the amount work that this analysis would require was not consistent with the schedule of the present research.

REFERENCES

Berndtsson, M. (2015). Circular Economy and Sustainable Development (Master's thesis).

Raworth, K., 2012. A safe and just space for humanity: can we live within the doughnut. *Oxfam Policy and Practice: Climate Change and Resilience*, 8(1), pp.1-26.

Blok, K., Afanador, A., van Vuuren, D., Berg, T., Breyer, C., Edelenbosch, O., Gardiner, A., Harvey, D., Kumar, A., Schaeffer, R. and Smith, P. (2017). The Emissions Gap Report 2017–Chapter 4–Appendix B. In *The Emissions Gap Report 2017: A UN Environment Synthesis Report*. United Nations Environment Programme.

Brundtland, G.H. (1987). *Report of the World Commission on environment and development: "our common future."*. United Nations.

Bryman, A. (2012). *Social Research Methods*. OXFORD University Press. pp 3-77; 380-395

Bulkeley, H., Watson, M., Hudson, R. and Weaver, P. (2005). Governing municipal waste: towards a new analytical framework. *Journal of Environmental Policy and Planning*, 7(1), pp.1-23.

Damen, M.A. (2012). *A resources passport for a circular economy* (Master's thesis).

EASAC (2016). Indicators for a circular economy. *German National Academy of Sciences Leopoldina*.

Eurostat (2009). *Sustainable Development in the European Union: Monitoring Report of the EU Sustainable Development Strategy*. Publications office of the European Union.

Beaulieu, L. (2015). *Circular Economy: a critical literature review of concepts*. Centre interuniversitaire de recherche sur le cycle de vie des produits, procédés et services.

EU Commission (2015). Closing the loop–An EU action plan for the Circular Economy. *Communication from the Commission to the European Parliament, the Council, the European Economic and Social Committee and the Committee of the Regions*. Brussels: COM.

EU commission (2016). Communication from the Commission to the European Parliament, the Council, the European Economic and Social Committee and the Committee of the Regions–A European Agenda for the collaborative economy. *Brussel*, 2, p.2016.

European Union (2018). What is Interreg Europe?. Source: <https://www.interregeurope.eu/about-us/what-is-interreg-europe/> . Accessed in May, 2018.

Figge, F., Givry, P., Canning, L., Franklin-Johnson, E. and Thorpe, A. (2017). Eco-efficiency of Virgin Resources: A Measure at the Interface Between Micro and Macro Levels. *Ecological Economics*, 138, pp.12-21.

Franklin-Johnson, E., Figge, F. and Canning, L. (2016). Resource duration as a managerial indicator for Circular Economy performance. *Journal of Cleaner Production*, 133, pp.589-598.

Hennink M., Hutter I., Bailey A. (2011). *Qualitative Research Methods* 08-77.

Heshmati, A. (2017). A Review of the Circular Economy and its Implementation. *International Journal of Green Economics*, 11(3-4), pp.251-288.

Hobson, K. and Lynch, N. (2016). Diversifying and de-growing the circular economy: Radical social transformation in a resource-scarce world. *Futures*, 82, pp.15-25.

Jackson, D., McDowall, A., Mackenzie-Davey, K., Whiting, R. (2016). *Principles Applied of Research Methods*. SAGE Publications. pp.04-210.

Jackson, T. (2009). *Prosperity without growth: Economics for a finite planet*. Routledge.

Lee, P., Sims, E., Bertham, O., Symington, H., Bell, N., Pfaltzgraff, L., Sjögren, P., Wilts, C.H. and O'Brien, M. (2017). Towards a circular economy: waste management in the EU; study.

MacArthur, E. (2015a). Circularity indicators: An Approach to Measuring Circularity. *Methodology*. Publication of Ellen Macarthur Foundation.

MacArthur, E. (2015b). Delivering the Circular Economy – A Toolkit for Policymakers. Publication of Ellen Macarthur Foundation.

MacArthur, E. (2017). Achieving “Growth Within”. Publication of Ellen Macarthur Foundation and Sun Institute Environment and Sustainability.

Meadows, D.H., Meadows, D.L., Randers, J. and Behrens, W.W. (1972). The limits to growth. *New York*, 102, p.27.

Moldan, B., Janoušková, S. and Hák, T., 2012. How to understand and measure environmental sustainability: Indicators and targets. *Ecological Indicators*, 17, pp.4-13.

Nita, V., Castellani, V. and Sala, S. (2017). Consumer's behaviour in assessing environmental impact of consumption.

Ontario (2017). Strategy for a Waste-Free Ontario: Building the Circular Economy. Source: https://files.ontario.ca/finalstrategywastefreeont_eng_aoda1_final-s.pdf . Accessed in March, 2018.

Raworth, K. (2012). A safe and just space for humanity: can we live within the doughnut. *Oxfam Policy and Practice: Climate Change and Resilience*, 8(1), pp.1-26.

Resolution, A. (2015). RES/70/1. Transforming our world: the 2030 agenda for sustainable development. *Seventieth United Nations General Assembly, New York*, 25.

Robinson, J. (2004). Squaring the circle? Some thoughts on the idea of sustainable development. *Ecological economics*, 48(4), pp.369-384.

Unite, A.G.N. (2015). Transforming our world: the 2030 Agenda for Sustainable Development.

United Nations. General Assembly (2015). Resolution adopted by the General Assembly on 25 September 2015. *Washington: United Nations*.

Unite, A.G.N. (2015). Transforming our world: the 2030 Agenda for Sustainable Development.

United Nations. General Assembly (2015). Resolution adopted by the General Assembly on 25 September 2015. *Washington: United Nations*.

Waas, T., Hugé, J., Block, T., Wright, T., Benitez-Capistros, F. and Verbruggen, A. (2014). Sustainability assessment and indicators: Tools in a decision-making strategy for sustainable development. *Sustainability*, 6(9), pp.5512-5534.

Wit, M., Hoogzaad, J., Ramkumar, S., Friedl, H., Douma, A. (2018). *The Circularity Gap Report: An analysis of the circular state of the global economy*. Publication of Circle Economy.

Wisker, G. (2008). *The postgraduate research handbook: Succeed with your MA, MPhil, EdD and PhD*. Palgrave Macmillan.

CARDIFF SCHOOL OF GEOGRAPHY AND PLANNING

Ethical Approval Form

Student Projects (Undergraduate & Taught Masters)

In the case of dissertations it is the responsibility of the student to complete the form, duly signed by their supervisor, and secure ethical approval prior to any fieldwork commencing. A copy of the form should be included with their final dissertation.

Title of Project: "What is the ideal scenario for circular economy to occur? A case study of the CircE project"

Name of Student(s): Hanna Fux

Name of Supervisor/Module Leader: Richard Cowell

Degree Programme and Level: MSc European Spatial Planning and Environmental Policy- PLANET Europe Programme

Date: 02/04/2018

Recruitment Procedures:

		Yes	No	N/A
1	Does your project include children under 16 years of age?		√	
2	Does your project include people with learning or communication difficulties?		√	
3	Does your project include people in custody?		√	
4	Is your project likely to include people involved in illegal activities?		√	

5	Does project involve people belonging to a vulnerable group, other than those listed above?		√	
6	Does your project include people who are, or are likely to become your clients or clients of the department in which you work?		√	
7	Does your project include people for whom English / Welsh is not their first language?	√		

Consent Procedures:

		Yes	No	N/A
8	Will you tell participants that their participation is voluntary?	√		
9	Will you obtain written consent for participation?	√		
10	If the research is observational, will you ask participants for their consent to being observed?	√		
11	Will you tell participants that they may withdraw from the research at any time and for any reasons?	√		
12	Will you give potential participants a significant period of time to consider participation?	√		

Possible Harm to Participants:

		Yes	No	N/A

13	Is there any realistic risk of any participants experiencing either physical or psychological distress or discomfort?		✓	
14	Is there any realistic risk of any participants experiencing a detriment to their interests as a result of participation?		✓	

If there are any risks to the participants you must explain in the box on page 4 how you intend to minimise these risks

Data Protection:

		Yes	No	N/A
15	Will any non-anonymised and/or personalised data be generated and/or stored?		✓	
16	Will you have access to documents containing sensitive ¹ data about living individuals? If "Yes" will you gain the consent of the individuals concerned?	✓		

If there are any other potential ethical issues that you think the Committee should consider please explain them in the box on page 4. It is your obligation to bring to the attention of the Committee any ethical issues not covered on this form.

¹ Sensitive data are *inter alia* data that relates to racial or ethnic origin, political opinions, religious beliefs, trade union membership, physical or mental health, sexual life, actual and alleged offences.

Supervisor's declaration

As the supervisor for this student project, I confirm that I believe that all research ethical issues have been dealt with in accordance with University policy and the research ethics guidelines of the relevant professional organisation.

Date: 2nd April 2018 Name: Richard Cowell Signature:

A handwritten signature in black ink, appearing to read 'Richard Cowell', written over a horizontal line.

ANNEXES

ANNEX I – SEMI-STRUCTURED INTERVIEW QUESTIONS

- 1- Explain the criteria used to create CirCe tool?
- 2- What are the stakeholders identified in your region?
- 3- Clarify how Circular Economy initiatives are classified as “Good Practices”?
- 4- List the main barriers faced by the stakeholders for the implementation and development of CE initiatives and the possible solutions to overcome them.
- 5- How would you classify the stakeholders’s awareness of Circular Economy?

☐

Excellent

☐

Good

☐

Low

☐

Non-existent

- 6- Describe the existent initiatives to increase awareness over CE and what can be done to improve this scenario?
- 7- Explain how the existent policies or public initiatives support the development of CE and how can they be improved?
- 8- How do you identify the roles of partnerships and coalitions among stakeholders for the development of CE?
- 9- Does your region have a CE action plan or elaborate any kind of annual report? (If yes, elaborate).

ANNEX II – SURVEY QUESTIONS

- 1- Do you consider your business a circular economy initiative?

☐

Yes

☐

No

2- Mark among the following actions those ones you believe are related to your business:

- ☐ Prioritize Regenerative Resources (renewable, reusable, non-toxic)
- ☐ Preserve and Extend What is Already Made (maintain, repair and maximize lifetime)
- ☐ Use Waste as a Resource (reuse and recycling)
- ☐ Rethink the Business Model
- ☐ Design For the Future (systemic perspective, right materials, extended lifetime).
- ☐ Incorporate Digital Technology (platforms and technologies to optimize resource use and connections between supply-chain actors)
- ☐ Collaborate to Create Joint Value (cooperation among stakeholders: supply chain, organizations, public sector).
- ☐ Other (please specify)

3. What are the main barriers faced by your business?

- ☐ Low profit/Few sales
- ☐ High Expenses (resulting in high prices)
- ☐ Little knowledge/demand of the products and/or services by consumers
- ☐ Poor or non-existent support of legislation
- ☐ Poor or non-existent public initiatives
- ☐ Lack or lean communication among the stakeholders
- ☐ Lack or lean partnerships/collaboration among the stakeholders
- ☐ Other (please specify)

4. Do you believe that there is enough awareness of the concept of circular economy and its implementation?

☐

Yes

☐

No

5. Please elaborate, how can your business improve this awareness?

6. Mark your stakeholders:

☐

Costumers

☐

Government

☐

Resource suppliers

☐

Business partners

☐

Waste collection/treatment companies

☐

Transportation companies

☐

Other (please specify)

7. What kind of relationship does your business have with its stakeholders? (Mark one or more).

☐

Only commercial (buying and selling)

☐

Exchange of experiences and information

☐

Receive or make donations

☐

Partnership or coalition

- ☐ Work together throughout the supply chain (resources exchange or commercialization)
- ☐ Access to information
- ☐ Share information
- ☐ Other (please specify)

8. How the relationships established between your business and its stakeholders help to improve the results obtained by your business.

ANNEX III – CIRCE REPORTS

[Opportunities Report](#)

[Italy Report](#)

[Spain Report](#)

[Poland Report](#)

[Netherlands Report](#)

[UK Report](#)

[France Report](#)

[Bulgaria Report](#)

[Slovenia Report](#)

ANNEX V – TRANSCRIPTION OF INTERVIEWS

Interview 1 – Poland Partner:

Interviewer: So I would like just to confirm the name of your organization, please?

Interviewee: It's Marshal's office.

Interviewer: And can you please explain to me the criteria used to create the CircE tool?

Interviewee: Ok, yes. It was created by the partners, not us.

So, we didn't get any input into creating CircE Tool.

Interviewer: Okay, good! But do you have your own version of the tool or everyone has the same?

Interviewee: Everyone has the same, we just put our information in it.

Interviewer: Okay. What were the stakeholders identified identified in the lower Silesian?

Interviewee: Hum, you mean their names ?

Interviewer: No, I mean, are they business, government partners, consumers? What are the main stakeholders you identified for circular economy in Lower Silesia?

Interviewee: You can choose among the stakeholders: industry, innovation, education and training. And it's best if you have stakeholders of every group, but in our region most of our stakeholders are from education and training.

Interviewer: Can you please send me the tool later?

Interviewee: I don't think I can send you the tool. But I can send to you the link to Ellen Macarthur report. There is a similar tool there. I think we based our tool in their work. I can send the link to you.

Interviewer: Ok, because I would like to check the information specific about the partners. Because the other partner made it available but it's okay if you can't you can't.

But If you could discuss with your colleagues and see if you can share it, it would be nice.

Interviewee: ok!

Interviewer: Can you, please clarify how circular economy initiatives are classified as good practice in the tool?

Interviewee: You mean good practice in our region, the criteria? So, we basically mapped anything that we classified as economy. Because in our region there is not much going on. So, it is hard to find anything right now. That's how we used the criteria.

Interviewer: Because that's something new here, right?

Interviewee: Exactly! It's a new concept. And people are not familiar with it.

Sometimes they don't even know that circular economy exists or that they are working with circular economy.

Interviewer: There is another question down below, asking about the stakeholders awareness so we you could classify as excellent, good, low or non-existent.

Interviewee: I would you classify between good and low.

Because there was a similar question in the questionnaire and some of them chose good and some low.

Interviewer: Could you please, list the main barriers faced by the stakeholders for implementation and development of circular economy initiatives and also the possible solutions to overcome or overcome them?

Interviewee: The main barrier is economic. When you change something in the company it involves putting money in it, so they (the business) don't want to change that. It is an initial cost problem, because it is not profitable to business right now. So, we try to show them examples that it works. It is good to involve circular economy and politics. For example we are doing a conference on 21st May evolving circular economy in our region. We tried to show examples of some companies are using the concept of circular economy, and it is working, they are making money with it. Another example of barrier in our region is that there is no policy regarding circular economy in the country (Poland) nor in the region, so the entrepreneur don't feel like improving anything right now.

Interviewer: Can you describe existent initiatives to increase awareness oversupply economy?

Interviewee: As I said, the conference and other projects regarding food waste, for example. Some company are like recycling, also companies that are trying to raise awareness of people like on their website they put some information or for example do a company about recycling and giving economy awards for example. It was the first one was last year. There is also a food bank that a working all over the country.

Interviewer: You said though there are no policies.

So explain the existing policies are public initiatives to develop support of CE initiatives and how can they be improved?

Interviewee: There is a special team for circular economy established by the minister of entrepreneurship and technology and they are working on a roadmap for circular economy in our country. So right now there is not accomplished yet.

Interviewer: But it is not specific from regional level it is from a national level.

Interviewer: How do you identify the roles of partnership, coalitions among the stakeholders for the development of a circular economy?

Interviewee: For now, there was only one time that we took our stakeholders in a CircE meeting, so they presented their business and talked with other stakeholders.

So in our case it is just starting right now.

It is important for our stakeholders to know what's going on in other regions but we could only take three of them. It is a problem to involve more people.

Interviewer: I think this partnership and coalitions are not happening because the problem of awareness of circular economy. Is that it?

Interviewee: I think the most important thing is to show that it's working and it's profitable. So another problem in our region is that the our stakeholders don't want to share information with each other and they don't want to collaborate with each other because they are scared of competition or something.

Interviewer: Do you have an action plan as a region?

Do you have an action plan to a circular economy or some annual report?

Interviewee: No, we don't have anything like that. But we would improve regional strategy to input circular economy on it.

Interviewer: Thank you! Would you like to add anything?

Interviewee: I can't think of anything. If I remember anything, I can send you an e-mail.

Interview 2 – Italy Partner:

Interviewer: Explain the criteria used to create CircE tool?

Interviewee: The criteria were defined before the starting of CircE project in project that we are running in our region, but we decided to take this kind of methodology and adapt it to this project (CircE), in particular making it proper to work with policies and with social, economic aspects, issues connected to innovation . Because our project is more oriented to policies and our first task is to steer the policy instrument that we chose towards circular economy. So we decided to collect data to from the specialization strategy that we are running in our region, we are still collecting data, macroeconomic data, concerning the chosen sector, for instance, building environmental, textile, based on the amount of waste produced and recycled in the region for the sector of interest. Then, we decided to produce a map of actors and stakeholders, I mean the companies and institutions, which are running circular economy activities, in terms of production or research, and also the organizations which have interest in circular economy or the potential or interest to develop circular economy. So we have a section on the tool directed to actions, so “Good Practices” and projects, which we mapped those initiatives regarding the chosen sector in our region. So we mapped over 70 initiatives, for instance European 2020 projects, Interreg projects, also “Good Practices” from industry, for instance, technology applied in specific processes in a company, or “Good Practices” in terms of management or in terms of social behaviour as well. So I could say we collected quite a good variety of practices and, with all this data collected, if you fill in the tool in a correct way, it is possible to produce a very resourceful analysis.

Then we have the “Opportunities”, it is kind of a gap in circularity in the chosen sector, we use to identify these gaps. For example, if the region, one of the partners can not identify “Good Practices”, we suppose that it is a gap of circularity and you could develop these opportunities, based on the “Good Practices” of other regions.

Then, the last step of this tool is the barriers identification, through our stakeholders, then we could link the barriers with the opportunities mapped.

Besides that, we also have a questionnaire, quite complex, with 100 questions, produced by the Catalan partner, designed to identify the barriers of and the scenario of every region concerning barriers per sector.

Interviewer: Sorry to interrupt, the people who have to fill in this questionnaire, were the representative of the regions or the business (“Good Practices”)?

Interviewee: No, this questionnaire with 100 questions was made for the stakeholders, and then there is the other questionnaire made for the partners to summarize all the data collected from the questionnaires filled by the companies.

Interviewer: Is this CircE tool the same for all the partners?

Interviewee: The tool basis is the same, one for each partner. But every partner enter their own input. Then we will join the information in a kind of overall tool.

European 2020 project – social aspects, innovative and economy project – policy instrument towards CE, collect data specialization data on the macroeconomic data, map the actors and companies and institutes running CE activities, have the potential to be CE, future business development. Exception “Good practices” – technologies of CE, terms of management, social aspects, 70 or 80 projects, Interreg projects – allow to produce analysis – find relationship among these:

- Opportunities – identifying the gaps, cross regional
- Barriers – through stakeholders – establish link, specific
- Questionnaire – 100 questions, identify the barriers of every region for the stakeholders and another for the region representatives (summary of the questionnaire filled by the companies).

Interviewer: What are the stakeholders identified in your region?

Interviewee: Concerning our region, our main stakeholders concern building companies, an association cluster of these companies, an upper level, overview of the sector in the region, not direct contact with the companies in the market. Another stakeholder is a magazine, working with circular initiatives, and also the municipality of Milan, working in many fronts, especially in food waste.

Interviewer: Clarify how Circular Economy initiatives are classified as “Good Practices”?

Interviewee: You can see in the CircE tool that there are different adjectives used to classify the Good practices. They can be concerning many sectors, such as production, manufacture, technology, but also related to good behaviour, good policy, education

programs produced by schools, wider focus to reach social and economic, and environmental aspects – the definition is wider. We try to qualify “Good Practices” taking into account the level of development, how the “Good Practice” is used in the market, so it is an indicator of technological innovations level. It can be just an idea, design, or “Good Practices” that are already producing results in the area, in the real market.

Interviewer: List the main barriers faced by the stakeholders for the implementation and development of CE initiatives and the possible solutions to overcome them.

Interviewee: It’s hard to answer this question because we are following 8 sectors, so there are huge amount of opportunities, different barriers and, they are too technical and too specific. Currently it is not defined yet.

Interviewer: These initiatives that you mapped, the “Good Practices” they classify themselves as circular economy or you (the partners) during the mapping classify them as circular economy?

Interviewee: We settle the together with the stakeholders, so I could say that the stakeholders were aware of what they should put in the tool, of course we checked the tool afterwards, also our consultant check the “Good Practices” if there was good clarity from the part of the stakeholders. So there was a pre-judgement of the stakeholders and the regional colleagues, then a second control from our partner.

Interviewer: How would you classify the stakeholders’s awareness of Circular Economy?

Interviewee: Excellent

Interviewer: Describe the existent initiatives to increase awareness over CE and what can be done to improve this scenario?

Interviewee: Because the concept is been dealt since 1990’s, policies and initiatives – lots of companies, universities, organizations, general speaking – overall need of what needs to be done to apply CE – social, economic, innovation needs to implementing CE. Level of implementation – implement a lot, stricter manner of implementation of CE, work more, changes. But maybe what is not clear is the overall understanding of the changes that need to be done to really apply circular economy seriously. In terms of recovering materials, reducing amount of waste this concepts are very clear in our region among our

stakeholders. Perhaps, what is not clear is what the most innovative social and economic changes needed for the real application of circular economy, as defined by Ellen Macarthur Foundation. The level of implementation, although we have implemented a lot of CE, but maybe it need to be more strict, so stronger initiatives to implement CE in more strict way.

Interviewer: Explain how the existent policies or public initiatives support the development of CE and how can they be improved?

Interviewee: Work to make coherent – common future scenarios, avoid diverse directions – There are many stakeholders, so it is necessary to focus, by creating common rules, or strategy, to more easily steer results, making them more effective.

Interviewer: How do you identify the roles of partnerships and coalitions among stakeholders for the development of CE?

Interviewee: It is important for them to share knowledge, find new ways to collaborate, share solutions, market, creating new business connections, they can also create aims right subjects to steering decisions towards CE directs, becoming stronger to support new ideas and steers policies.

Interviewer: Does your region have a CE action plan or elaborate any kind of annual report? (If yes, elaborate).

Interviewee: No, we don't. Lots initiatives, but not plans nor reports. Only a waste management plan, not specific regarding CE.

Interview 3 – Bulgaria Partner:

Interviewer: Explain the criteria used to create CirCe tool?

Interviewee: The creation of the tool was part of the Leader partner's activities

Interviewer: What are the stakeholders identified in your region?

Interviewee: Municipal Enterprises, Universities, Companies

Interviewer: Clarify how Circular Economy initiatives are classified as "Good Practices"?

Interviewee: Despite the information deficit in the waste management sector related to the availability of public actual data by subsectors, regions etc., the project team managed

to identify suitable and reliable sources of information. The use of verified and comparable data is key to develop reference knowledge that can be used to implement the selected sectoral analysis and to define good practices for a circular economy on the territory of Sofia Municipality. Several expert meetings were held to discuss and analyse both the possible sources of information needed for the project and the reliability and comparability of the available data. The data from the National Statistical Institute, the Environment Executive Agency, the Regional Inspectorate of Environment and Water Sofia, the Ministry of Environment and Waters were also analysed. Detailed analysis were conducted and initiated discussion of potential areas of interaction. Because of the established information flows and the stakeholders thus defined, many discussions and an extensive final workshop with business representatives took place on the territory of Sofia Municipality, dealing with waste management issues. Representatives attended the meeting were from Waste Recovery Organizations; Sofiyska voda JSC; Municipal enterprise for waste treatment - Sofia; Consultancy entities working in the field of waste management; Academic community or 34 participants total. The stakeholders helped a lot during the process of good practice suggestions on the meeting and in the discussion panel and conducted constructive dialogue before and after the workshop. The good practices identified so far falls within the scope of both smart specialization and waste management sectors and serve as a basis for cross-sectorial and cross-regional analysis.

Interviewer: List the main barriers faced by the stakeholders for the implementation and development of CE initiatives and the possible solutions to overcome them.

Interviewee: Economics; not profitable for businesses even if other barriers are overcome; capital intensive and/or uncertain payback times; market failures - Externalities (true costs) not fully reflected in market prices; social factors; custom and habit: ingrained patterns of behaviour by consumers and businesses; capabilities and skills lacking either in-house or in the market at reasonable cost.

Interviewer: How would you classify the stakeholders's awareness of Circular Economy?

Interviewee: Good

Interviewer: Describe the existent initiatives to increase awareness over CE and what can be done to improve this scenario?

Interviewee: We are thinking of different types of activities towards the citizens and the business regarding the CE, but everything is in its initial stage, for now.

Interviewer: Explain how the existent policies or public initiatives support the development of CE and how can they be improved?

Interviewee: Currently in the Bulgarian legislation, the circular economy is not included. Bulgarian Ministry of environment and water will develop the national legislation toward the circular economy after the package approval by EC. Then Sofia Municipality will start to improve its own policies and initiatives in the field of the CE.

Interviewer: How do you identify the roles of partnerships and coalitions among stakeholders for the development of CE?

Interviewee: Depends on their sectoral interest and the desire to work with the Municipality.

Interviewer: Does your region have a CE action plan or elaborate any kind of annual report? (If yes, elaborate).

Interviewee: Sofia Municipality does not have such a plan. A similar will be develop as a result of the project.

Interview 4 – Netherlands Partner:

Interviewer: Explain the criteria used to create CirCe tool?

Interviewee: The criteria used is specified within the framework of the project.

Interviewer: What are the stakeholders identified in your region?

Interviewee: The Netherlands partner focus on 3 sector: textile, biomass, building and construction. Each sector has its stakeholders, but mostly we contact organizations that represent the businesses (umbrella organizations), which encourage circular economy, mechanical and chemical recycling. Thus, building and construction: innovation. Biomass: carton and paper, knowledge – innovation involving circular economy – Kcpn. Textile:

second hand, donation (such as, collecting bins) and, clothes recycling. Also invite people from other regions, such as, organization representatives.

Interviewer: Clarify how Circular Economy initiatives are classified as “Good Practices”?

Interviewee: Good Practices consists of business mode (based on CE), efficiency raw material – how they are dealt in production process, as well as, examples of circular economy or sustainable practices – to incentive other firms, in order to scale up.

Interviewer: List the main barriers faced by the stakeholders for the implementation and development of CE initiatives and the possible solutions to overcome them.

Interviewee: For example: textiles – virgin material, the consumers are not ready for recycled material products, it is too expensive to recycle process, they rather by cheaper products. It is not easy to change consumer behaviour. A solution for textile could be refund money when bring back the products. It is necessary to promote campaigns, so recycled clothes becomes more popular. It is also important to reduce prices of recycling textile – needs more breakthrough technology. Building industry requires very long investment, such as, a pay back system – materials can be used after 30 years. This sector is very traditional, it is difficult to implement new ideas and technologies. However, 80 or 90% of the building materials (which come from demolition, for instance) are being recycled, down cycling – reuse to construct new buildings – they are better used horizontally. Biomass – hemp used for new fabrics, to produce other materials – add value instead of creating energy, can be resource for chemical industry. Barriers regarding regulation: not allowed to transport waste cross board or bring waste inside the country. It is also not hard to use the waste within the country as well. Another innovative application of biomass is use alternative materials to produce paper, such as, grass. Another important aspect is to improve awareness of the producers, they don't treat waste was resource.

Interviewer: How would you classify the stakeholders's awareness of Circular Economy?
Good.

Interviewer: Describe the existent initiatives to increase awareness over CE and what can be done to improve this scenario?

Interviewee: There is a policy plan focused on 3 aspects: green procurements, e.g.: construct roads do in more CE way; increase awareness among SMEs, promoting campaigns and programs for dissemination of knowledge; new innovative green resources, protein, fibres, from manure green energy, financing these plants for producing energy, and other nutrients.

Interviewer: Explain how the existent policies or public initiatives support the development of CE and how can they be improved?

Interviewee: Although we have an action plan, there is still need to improve the existent policies and public initiatives, to increase the amount of waste recycled and used in building materials, for instance. The implementation of circular economy is a long term process and the creation of small and big projects and initiatives are necessary to scale up the development of CE in the local, regional and national levels. It is also important to focus on 2 or 3 sectors to go deeper, such as building materials, sector that can contribute most to achieve CE goals.

Interviewer: How do you identify the roles of partnerships and coalitions among stakeholders for the development of CE?

Interviewee: Mainly governments are making movement towards CE, private sector is not, and the government can help change this situation, by exploring new possibilities and proposing initiatives.

Interviewer: Does your region have a CE action plan or elaborate any kind of annual report? (If yes, elaborate).

Interviewee: It has an action plan.

Interview 5 – Spain Partner:

Interviewer: Explain the criteria used to create CirCe tool?

Interviewee: It was created with the partners, as result of discussion over opportunities and barriers, based on Ellen Macarthur Foundation Policy Toolkit.

Interviewer: What are the stakeholders identified in your region?

Interviewee: We are in contact with mainly umbrella organization, business cluster, or organizations above business, instead of single business, once they have more strategic views. Besides, we are a department of environment, so we do not have direct contact with the companies, but with the organization that represent them.

Interviewer: Clarify how Circular Economy initiatives are classified as “Good Practices”?

Interviewee: The identification of good practices consisted of benchmarking in the region of Catalonia, screening experiences that showed successful, searching in the web, making interviews.

Interviewer: List the main barriers faced by the stakeholders for the implementation and development of CE initiatives and the possible solutions to overcome them.

Interviewee: Can not yet be disclosed.

Interviewer: How would you classify the stakeholders’s awareness of Circular Economy?

Interviewee: Can not tell yet.

Interviewer: Describe the existent initiatives to increase awareness over CE and what can be done to improve this scenario?

Interviewee: Policy tools, is the action plan. We have a strategy of CE, observatory, Circular Catalonia, we promote meetings with the stakeholders, 4 so far, reports and documents in CircE website, sharing ideas of what can be improve and, promoting collaborations and network for CE. There is also collaboration with specific public authorities. It is also necessary to improve educational and training, in order to increase awareness of CE. We also promote and participate on events, such as, “Market Place”, where business initiatives can show themselves and, the interested parts can go to check the new opportunities; we also organized the Mapping Week (international initiative, taken at local level); in addition, we participate in plenty of events to increase awareness. Moreover, local authorities are collaborating for the creation of a CE guide, which will contain different ways of local authority to implement CE initiatives – common methodology. There are lots of hubs of local authorities to collaborate with business, as well. The regional government also works with different levels, such as, industrial stakeholders and local authorities.

Interviewer: Explain how the existent policies or public initiatives support the development of CE and how can they be improved? (see above)

Interviewer: How do you identify the roles of partnerships and coalitions among stakeholders for the development of CE?

Interviewee: Stakeholder meetings and working with clusters and other coalitions, promote good knowledge of what can be done. (see above)

Interviewer: Does your region have a CE action plan or elaborate any kind of annual report? (If yes, elaborate).

Interviewee: The reports produced in CircE depend on the schedule, so the interregional barrier report will be finished in 2019. And the action plan is the outcome of CircE project.