A thesis submitted to the Department of Environmental Sciences and Policy of Central European University in part fulfilment of the Degree of Master of Science

Transition in a time of turmoil: barriers and enablers for Hungarian SMEs' shift from the linear towards the circular economy

> Csongor Zoltán BAJNÓCZKI July, 2021 Budapest

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For the degree of Master of Science and entitled: Transition in a time of turmoil: barriers and enablers for Hungarian SMEs' shift from the linear towards the circular economy.

Month and Year of submission: July 2021.

Given Earth's depleting raw materials, decreasing biodiversity, ever-increasing greenhouse gas (GHG) emissions, and climate change, the Anthropocene has almost reached the ecosystem's tipping points from where there is no turning back, which could lead to an extinction cascade. In response to the contemporary treatment of our natural resources and its unsustainable side effects, the notion of the circular economy (CE) has gained grounds in the past decade to resolve the ecological deterioration.

While the principles of the CE have been widely known for decades, the mere 9% of global circularity demonstrates that its actual application causes headaches to experts, scientists, and policymakers as well. Hungary has been handling natural resources even worse than the rest of the European Union (EU) thus the adequate implementation of the CE is more urgent here than elsewhere. While small and medium-sized enterprises (SMEs) are often forgotten, more than 670,000 Hungarian SMEs constitute a crucial part of the economy: they produce over half of Hungary's gross domestic product and employ over 70% of all employees.

The aim of the present thesis is to explore what barriers Hungarian SMEs need to face and what enablers could support their transition towards the realm of the CE. Upon an extensive literature review to assess global trends and build a theoretical framework, in-depth structured interviews with SME managers, CE experts, and the Hungarian government are to provide cross-cutting findings among the three stakeholder groups.

This novel research evaluates what capacities and factors Hungarian SMEs need to begin their circular transitions. It explains their current state and struggles to keep up with the rest of the market that is often dominated by multinational corporations (MNCs). Most importantly, this study assesses which macro-, meso-, and micro-level elements could influence these firms at the first place to make their way towards circularity.

Keywords: Circular Economy; Circular Transition; European Union; Hungary; Sustainable Development; Barriers and Enablers; SMEs; Sustainable Business Transformation.

Acknowledgements

First and foremost, I would like to express the deepest appreciation to my thesis supervisor, Professor Dr Zoltán Illés, who were always available to meet to discuss matters related to the thesis or life beyond CEU. His unique expertise in circular economy and ever-lasting enthusiasm in the field of sustainability are at least two things that I wish to develop during my career. Besides Professor Illés, I would like to show gratitude towards the rest of the professors from the Department of Environmental Sciences and Policy I encountered during my time at CEU. Special thanks go to Professor Dr Tamara Steger for being our lifeline with the monthly meetings to help us resolve issues in and out of the classroom, Professor Dr Alan Watt for thoroughly preparing us to conduct our theses from the very beginning of the academic year, and Professor Dr Michael LaBelle for accelerating my interest about the circular economy and energy markets with the most engaging online classes possible.

Second, I would like to indicate my gratitude towards all the interviewees who accepted the invitation to take part in the present study. I would like to acknowledge the SME managers and/or owners, who not only took at least an hour out of their busy schedule to sit down with me to have a conversation but also were kind enough to show me around their factories: Mr. László Cselle, the executive officer of Mark David Hungary Műanyag Gyártó, Feldolgozó, Kerekedelmi Kft., Mr. János Hartmayer, owner and CEO of Dekorátor Stúdió Kft., Mr. Ádám Balogh, co-owner and marketing manager of Powear Gifts Kft., Mr. Ádám Horváth, administrative director of Holofon Zrt., and the owner and CEO of another plastic packaging firm who wished to remain anonymous. Besides, I would like to thank the two circular economy experts, one of whom is Dr Gábor Bartus, Secretary of the National Council for Sustainable Development¹, for having insightful conversations about the possible future of the circular economy in Hungary. Last but not least, I would like to recognize my appreciation towards the Ministry of Innovation and Technology for promptly responding to my questions about their position.

Finally, I would like to thank my family and friends, especially the ones I made at CEU for endlessly supporting one another and for helping each other's work throughout the academic year via various means. I am proud to be part of this cohort for handling this extremely unusual academic year so well.

¹ In Hungarian: Nemzeti Fenntartható Fejlődési Tanács

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List of Abbreviations

CBMs	Circular Business Models
CE	Circular Economy
CEO	Chief Executive Officer
CSR	Corporate Social Responsibility
DFS	Deposit-Refund System
EMF	Ellen Macarthur Foundation
EU	European Union
GHG	Greenhouse Gas
HDPE	High-Density Polyethylene
IS	Industrial Symbiosis
KCE	Knowledge about Circular Economy
LE	Linear Economy
MIT	Ministry for Innovation and Technology
MNCs	Multinational Corporations
NHKV	National Waste Management Coordinator and Trustee
OL	Organizational Learning
PE	Polyethylene
PET	Polyethylene Terephthalate
PP	Polypropylene
R&D	Research & Development
RE	Recycling Economy
RSC	Reverse Supply Chain
SMEs	Small and Medium-sized Enterprises
SPSS	Sustainable Product-Service System
WRI	World Resource Institute

1. Introduction

Contemporary trends of natural resource consumption since the first Industrial Revolution has had devastating effects on our environment. While issues around humans' resource management did not appear in the 18th and 19th centuries, environmental scientists have been indicating that the current consumption trends are unsustainable since the second half of the 20th century. While the 'rational action' of humans has been determined by economic criteria thus far, people will need to start taking actions based on how to best avoid ecological risks and how to make environmental profits. Spaargaren and Van Vliet (2000) underline that we need to "reconsider all the distinct lifestyle segments or sectors from an environmental management perspective" (57) in order to develop a more sustainable lifestyle. Dasgupta and Ehrlich (2013) also underline that contemporary consumption behavior has dire externalities (environmental effects), for example, in the form of climate change. In spite of environmental scientists and scholars constantly calling for people's changes in their consumption to the environmental degradation, the current state of ecological destruction demonstrate that these warnings have been mostly ignored.

The current system is characterized by the qualities of a linear economic system. In the linear economy (LE), raw materials are taken out of Earth's natural resources in order to manufacture products that consumers use and eventually throw away. This is the so-called take-make-waste economy, where the finite amount of natural resources is not considered and environmental degradation is regarded as a negative externality. Essentially, economic growth directly influences ecological destruction thus the level of economic development partly depends on natural resource input and loss of biodiversity, which consequently lead to ever-increasing level of greenhouse gas (GHG) emissions and worsening climate change. In the current LE system, the more the economy grows, the higher pressure impacts the environment.

As opposed to the LE, the principles of the circular economy (CE) could help humans reach eco-environmental decoupling, separating economic growth from ecological destruction. In a CE, the life cycle of materials and products keeps getting extended through restorative means instead of their disposal. The CE would thereby help the Anthropocene restore balance in our natural resource use and biodiversity, as well as alleviate the effects of climate change as a result of practicing less energy-intensive activities. Eventually, this would mean that economies would be able to grow without further environmental destruction, essentially decoupling the human-induced pressure on the environment from economic activities. While Krausman *et al.* (2017) argue that the world is far away from even relative decoupling, the recent surge of the CE may be able to solve the issue of eco-environmental decoupling (Rubel *et al.* 2018).

Overall, the global environmental problem is that when the rules of capitalism were established, the economic allocation mechanism that prevails in the world today and has gradually developed from the 18th century onwards, the total stock of natural resources was abundant. Thereby, the rules of capitalism did not have to formulate sub-rules for the scarcity of natural resources, because humans consumed a relatively small amount of natural resources. However, this relationship changed in the second half of the 20th century, since when humans have started consuming more and more with ever-growing people inhabiting the Earth. While humans' consumption of natural resources was a marginality before, it has become more and more evident that the quantity consumed per year per person has been growing and is unsustainable.

Production and consumption are putting increasing pressure on our Earth's resources and natural environment. Sustainable growth can be achieved in the long run by the circular economy model. Until now, the economy has operated mainly on the basis of the "take-make-waste" linear model, in which our resources reach the end of their lives. As opposed to this, the circular approach requires a new attitude from all actors in society. It requires significant changes in the economy, in the design of products, in the production process, and in the consumer attitude.

The foremost challenge is to overcome initial obstacles that often deter businesses, especially small and medium enterprises (SMEs). Even though SMEs make up over 90% of business and comprise more than 50% of workforce worldwide (World Bank 2020), they are in a difficult position when it comes to implementing the principles of the CE. First, SMEs do not have the much-needed financial capital to tackle upfront costs that multinational corporations (MNCs) have, giving MNCs the opportunity to control local-value chains thus making it even more difficult for SMEs to keep up. As a result of less capital, SMEs also have less capacities to spend on research and development (R&D), which leads to the second point. Considering that even designers in the field of the CE tend to find it difficult to fully grasp the holistic system of the CE, SMEs often lack technical capacities. SMEs operating on surviving levels are forced to refrain from additional costs other than what is required to keep themselves afloat. It is especially difficult to convince small

business when they assume that investing in pollution prevention, waste management, and energyefficient practices does not return the upfront costs (Singh *et al.* 2018; Bajnóczki 2020).

Since our world is currently less than 9% circular (Circle Economy 2021), each country has a lot of work to do towards the CE. Especially Hungary, the only EU country with a decline in resource productivity between 2010 and 2018 (Bartus 2020). In Hungary, MNCs are generally supported, despite the fact that there are anti-MNC slogans, but there is a very strong corporate support in real domestic economic policy.

The matter of Hungarian SMEs related to the CE have been studied by others (Tóthné *et al.* 2017; Kis-Orloczki 2019), but neither studies reflect on the factors that could possible prevent or accelerate firms' circular transition. Besides these studies, Uvarova *et al.* (2020) include Western Transdanubia² of Hungary in their research to compare SMEs' transition between six EU countries, but the research focuses on rural, agricultural SMEs in the country's most western area. The methodology of the case study involves various stakeholders (SME representatives, policymakers, researchers, and business associations), and does not specify the ratio of human subjects. Thereby, it is uncertain how much one stakeholder group influences the overall conclusions of the study. Nevertheless, Uvarova *et al.* (2020) find that Hungarian rural SMEs from Western Transdanubia face the lack of innovation culture and the lack of overall support (coordination and consulting; introduction of innovation and new circular models; inconsistency of support programmes). Upon discovering this research gap, this novel study seeks to find out what barriers Hungarian SMEs need to face and what drivers could support their transition towards the CE.

1.1 Research aim and objectives

The thesis project aims to find out the barriers holding back and the enabling causes supporting Hungarian SMEs' transition from the LE to the CE, based on the following objectives:

- Explore widespread macro-, meso-, and micro-level factors that either prevent or support SMEs' circular transition.
- Identify areas where the interviewed Hungarian SMEs already practice circular activities.

² In Hungarian: Nyugat-Dunántúl.

• Critically analyze the input received by the interviewees to find synergies between the various stakeholder groups.

1.2 Research questions

The following queries intend to the keep the researcher's focus on the above-mentioned research aim and objectives in order to deliver key contributions that can help bring the circular transition of SMEs closer.

- What should the Hungarian government's role be in supporting its SMEs' business transformation now that state officials have publicly set the country on this sustainable economic model?
- What are the external factors from the other side of the border that can have an effect on Hungary's circular transition?
- How could SMEs influence the supply chains, that are stuck in a linear production mode, to green their networks?
- What could SMEs and managers do on firm level to make their activities more circular?
- How is SMEs' state of circularity?

1.3 Outline of the thesis

The thesis is arranged in five chapters as follows:

Chapter 1 briefly presents the issues around the contemporary economic structure that is on collision course with Earth's ecosystems, and how the application of the CE would help humans reverse the current ecological situation and reach eco-environmental decoupling. In addition, the aim, objectives, and research questions of the present thesis corresponds to study the factors that either hold back or support Hungarian SMEs' circular transition.

Chapter 2 seeks to highlight the anthropogenic misuse of natural resources, loss of biodiversity, rising level of GHG, and the dire effects of climate change as a result of the contemporary practice of the LE. Upon introducing the human-induced consequences of our ecosystem, the study distinguishes between the LE, the recycling economy (RE), and the CE. This section is especially important, because people often confuse the CE with the RE and treat the CE as the RE just with a new label. However, this section of the literature review sheds light on the

underlying and holistic differences between the two economic models. Afterwards, the main characteristics of the CE are presented in more detail. Following, the next two parts of the literature review is to understand and to illustrate the global trends of what aspects SMEs experience on their road towards the CE. Thereby, the second part of the literature review assesses the overarching literature on the barriers that hinder SMEs' circular transition. Last but not least, the third part of the chapter presents and evaluates the factors that push SMEs towards the realm of the CE.

Chapter 3 introduces and explains why the application of a multi-method qualitative research method is favorable in case of the present topic. The first section of the chapter describes how the extensive literature review is valuable to the researcher in order to gain a comprehensive understanding of global trends of the studied context to develop a theoretical framework, which is especially beneficial leading into the other methodology. The second part outlines how the research benefits from the structured, open-ended, in-depth interviews with SME managers, CE experts, and the government, and why this method is an appropriate method considering the study aim and objectives. In the end, the limitations of the research are recognized and how the researcher aims to address them.

Chapter 4 demonstrates a comprehensive analysis of the findings from the interviews in three sections in order to answer to the posed research questions. The first section provides background of the assessed companies in order to familiarize the reader with each SME. The second part explains how some of the activities of the interviewed firms are already circular even though they were not deliberate actions at the first place as most SME managers do not know what the CE is; in addition, the concerns of the head of the firms why reaching the circular supply chain seems technically impossible at the moment is discussed. The third and final segment of the chapter assesses the factors that SMEs and CE experts perceive to be the main obstacles or drivers behind firms' circular transition; besides, the position of the government is also considered in relevant matters.

Chapter 5 summarizes the main takeaways and reflects on them to suggest how Hungarian SMEs could best transition towards the realm of the CE.

2. Literature review

2.1 Circular economy to alleviate ecological problems

2.1.1 Current state of resource depletion, greenhouse gas emissions, waste management, and decreasing biodiversity

The Club of Rome has been determined to highlight the convergence of environmental degradation and economic growth since the publication of *Limits to Growth* (Meadows *et al.* 1972). While the book was written almost half a century ago, its core messages still stand today: the contemporary population growth and present rate of economics are not sustainable much beyond 2100. The research team tested five core indicators, namely, planet-population increase, agricultural production, nonrenewable resource depletion, industrial output, and pollution generation, to determine how their interactions pave the potential outlook for humanity's future. The data points of these variants resulted a dire stance of the publication: Earth's limited carrying capacity and the continued worldwide growth are on collision course with one another. Thereby, our common habitat would become uninhabitable in the next century if these variants would not decrease (Meadows *et al.* 1972).

50 years forward, the ecological imbalance has only worsened. The debunking of the environmental Kuznets curve verified that environmental degradation is deeply embedded in economic growth, making these two variables seemingly inseparable (Stern *et al.* 1996). What makes the current global consumer trends even more worrying is that the "material use in a group of major emerging economies... has grown at an accelerated pace in the twenty-first century" (Krausman *et al.* 2017, 658); this further stipulates that the more developed a country wants to become, the more materials they use under contemporary methods. It also means that consumption will keep exponentially growing as more countries aim to escape poverty and hunger.

Krausman *et el.* (2017) and Oberle *et al.* (2019) reaffirm that populations' increasing demand of resources has become unsustainable, leading the world to consume materials as we will have had three planet Earths by 2030 (Sustainable Development Goals 2021). However, the rate of consumption differs between countries. The report published by the international non-governmental organization, Global Footprint Network, highlights that citizens of the world collectively use up more resources than Earth can reproduce in time. At the current rate of

consumption, we would need about 1.75 planet Earths to absorb our externalities. *Figure 1* below from the Global Footprint Network's National Footprint Accounts (2019) demonstrates the broad divergence between countries. From the figure below, there is a causal link between the more industrialized a country is, the higher rate it overconsumes the natural resources than their reproduction rate. While the populations of the United States, Luxembourg, or Qatar consume as if they had more than five planet Earths, populations from other countries such as India and most African countries consume within sustainable extents.

However, people's consumption in a country is not by choice. What is worrying from these numbers is that while Indian people's ecological footprint would only require 0.6 Earths thereby using less resources than what is available to exploit, the country urgently needs economic growth and development, which entails improved education, health, and job opportunities along with better infrastructure; if these are not properly planned and implemented, then the country is set on a course similar to those in Europe and North-America (Vyawahare 2017). This holds true in the case of other currently developing countries.

Country Overshoot Days 2021



(Source: Global Footprint Network, and Earth Overshoot Day 2021)

Overconsumption is not just problematic from the angle of diminishing resources, but the current economic development practices are also energy intensive and mainly run on fossil fuels. As a result of humans depleting the finite resources of Earth, climate change and its effects have been exponentially increasing (Oberle *et al.* 2019). Leahy (2018) also underlines that overconsumption is causally linked to worsening the effects of climate change due to the increasing amount of GHG emissions.

Overconsuming our resources and overpopulating Earth logically entails decreasing the space available for biodiversity. Continuous demand for more materials to please the increasing population on our planet naturally means the loss of biodiversity. The never-ending quest for more resources to produce more products to increasing demand from the growing populations leave no other choice for the diminishment of our biodiversity. The World Resource Institute (WRI) reports (2019) that 12 million hectares of tropics tree cover was lost in 2018, the main concern of this was the eradication of a rainforest of 3.6 million hectares, which is equivalent to the size of Belgium. WRI shows great concern especially regarding the loss of primary tropical rainforests, which can store more carbon than other forests (Berenguer *et al.* 2014) and are irreplaceable when it comes to sustaining tropical biodiversity (Gibson *et al.* 2011).

2.1.2 Linear vs recycling vs circular economies

The contemporary LE is unsustainable considering Earth's finite resources and limited carrying capacity, as well as climate change. The increasing production entails extracting more resources from the environment followed by creating more waste back into the environment, essentially neglecting social, economic, and environmental consequences. The world has been following this approach, where humans *take* out Earth's finite resources to *make* products that consumers then *use* and eventually *waste* away; this is the so-called take-make-use-waste scheme. As opposed to this, the CE is a closed loop where nothing is wasted, because the life cycle of products and materials keeps getting extended upon disposal through restorative means (Bajnóczki 2020).

From afar, the RE seems to offer a viable solution to the problems created by the LE; nevertheless, it pursues business-as-usual practices as well. The RE seeks to take care of the waste generated, while the CE aims at designing waste out at the first place. The distinction between recycling and circular economies is a bit difficult to assert, especially because recycling is part of

CE. However, recycling is the least-desirable activity in CE, because other manners such as reuse, repair, refurbish, remanufacture, etc. keep the embedded labor and energy of resources at a much higher value (EMF 2020). The RE downgrades the value of materials, while the CE is a restorative approach to avoid loss of value, labor, and energy. Additionally, recycling is also the most energy-intensive pursuit in the CE (Bajnóczki 2020). In sum, *Figure 2* below illustrates how differently materials and products move within the various economic models.



Figure 2 – The distinction between the linear, recycling, and circular economies (Source: Meilani 2019)

It is clear that the currently dominant LE, where humans take materials out of Earth's finite resources to make products that consumers use and eventually throw away, as well as the RE is unsustainable. In contrast, nothing is wasted in a CE. There is a closed cycle, where resources are in continuous use in its biological and technical cycles. In the biological cycle, biodegradable products and organic materials are restored in the natural systems and subsequently regenerated to provide renewable energy sources through activities such as anaerobic digestion or composting. The technical cycle preserves much of the embedded value and energy of products by keeping them in use through activities such as repair, reuse, refurbish, etc. (Rubel *et al.* 2018). Ultimately, the life cycle of materials keeps getting extended (Bajnóczki 2020).

In short, the CE offers promising methods against overconsuming Earth's finite resources, while promoting renewable energy use. Supposedly, it also resolves issues related to decoupling,

and makes economic growth possible without devastating the ecosystems. Nevertheless, even the CE has to consider the Jevons paradox (Jevon 1865) in order to avoid the CE rebound effect (Zink and Geyer 2017) to make the economic order worthy for business buy-in.

2.1.3 Characteristics and opportunities of the circular economy

Even though there have been over 100 definitions of the CE, they universally fall into two groups: definitions on the use of raw materials, and definitions on system change (EMF 2020). The former, generally speaking, follows the *reduce, reuse, and recycle*, the so-called *3-R approach* as 1) to *reduce* the use of Earth's finite materials, resources; 2) to *reuse* products through extending their life-cycles by activities such as repair, refurbish, remanufacture, etc.; and 3) to *recycle* the raw materials. Regarding focus on system change, the Ellen Macarthur Foundation defines the CE by three steps: the approach seeks to 1) "design out waste and pollution" by 2) "keeping materials and products in use" in order 3) to "regenerate natural systems" (EMF 2020; Bajnóczki 2020).

Figure 3 below illustrates the CE framework with the butterfly diagram created by the EMF: the biological (left) and the technical (right) cycles. The technical cycle is the management of Earth's finite raw materials and resources. The main principle here is that activities on the smaller, inner loops are preferable to activities on the larger, outer loops, because the smaller the loop, the more labor, energy, and material are preserved. The biological cycle is where food waste and biologically-based materials are returned to the natural cycles to regenerate them in order to have renewable resources provided available. Activities on the biological cycle include composting or anaerobic digestion to produce biogas (Bajnóczki 2020).

CIRCULAR ECONOMY - an industrial system that is restorative by design



Figure 3 – The butterfly diagram of the CE (Source: EMF 2020)

Besides designing waste out, CE also offers climate change relieving elements. A case study from Recology's³ website (2020) claims that the application of 800 tons of Recology compost is comparable to neutralizing 90 cars' annual carbon emission. Thus, besides offering a solution to increase the soil's water capacity and regenerate its health and improve air quality, composting even helps alleviate climate change, and that is just the biological cycle. In addition, a well-functioning technical cycle in the CE would mean creating less products due to having energy-conserving approaches (reuse, repair, remanufacture, etc.) practices over their disposal and having more products created. As mentioned above, these methods are more energy-efficient than having new items created or recycling, thus less fossil fuel would be burned to create energy (Bajnóczki 2020).

³ Recology is an integrated resource recovery company based in San Francisco, California that, among other activities, sells compost (made from the city's food waste and biologically-based materials) to local wineries and farmers to use instead of chemicals and fertilizers.

Nevertheless, the caveat of for-profit corporations applying circular practices is how to keep consumers engaged and profits increasing simultaneously, while also bearing in mind the Jevons paradox. In 1865, William Stanley Jevons, English economist and logician, called attention to increasing demand and consumption of coal even though the efficiency of resource use improved. His theory has been coined the *Jevons paradox* in his book of *The Coal Question*, where he tries to make sense why the efficient use of coal is not equivalent to diminished resource use, as he finds that "[t]he very contrary is the truth" (Jevons 1865, 61). Below in Figure 4, a cartoon prepared by Sketchplanations precisely translates Jevons' conclusion to the case of efficient fuel use. Although Jevons was the first person to call attention to the rebound effect, most scholars credit Khazzoom-Brookes postulate for the re-emergence of the term in the contemporary research literature (Saunders 1992). Daniel Khazoom and Leonard Brookes assumed that increased energy efficiency paradoxically leads to increased energy consumption in three ways: 1) increased energy efficiency lowers the cost of energy; 2) increased energy efficiency increases the performance of the economy; and 3) increased efficiency of any resource multiplies the use of related technology, services, and products that were previously restrained by it (Khazoom 1980; Khazoom 1987; Khazoom 1989).



Figure 4 – Jevons paradox (Source: Sketchplanations 2021)

Fast forward to the 21st century, the rebound effect of resource consumption has not changed. While purchasing eco-friendly and fuel-efficient products could be a step forward, the resource and energy savings gained, for example, at the use of fuel-efficient cars is lost due the increasing number of cars, trips, and vehicle-related activities. Thereby, these so-called eco-friendly solutions "overlook how increases in efficiency are in many cases offset by increases in consumption" (Stuart 2020, 199; York *et al.* 2011; York and McGee 2016).

As it seems that capitalism, one of the culprits behind environmental degradation, is here to stay, the CE offers solutions to keep stakeholders profitable while making their businesses environmentally sustainable. While technological transition needs to be cost-effective to keep companies profitable and to have business buy-in, scholars highlight that consumers tend to select sustainable products (Min Kong and Ko 2017; Bangsa and Schlegelmilch 2020). This means that corporations need to push toward green practices to keep their consumers and to lure them from rival businesses. Additionally, large corporations have the financial capital to initiate the transition in time. It is, however, important that firms embrace genuine circular practices and do not utilize greenwashing techniques to mislead customers and get away with further ecological degradation. Nonetheless, widespread corporate social responsibility (CSR) and accountability mechanism in a system of checks and balances are still lacking to prevent greenwashing.

2.2 Barriers and enablers for SMEs' circular transition

The road towards the realm of the CE does, however, pose a set of obstacles. The foremost challenge is to overcome initial obstacles that often deter businesses, especially SMEs. Even though SMEs make up over 90% of business and comprise more than 50% of workforce worldwide (World Bank 2020), the literature underlines both financial and non-financial challenges (Rizos *et al.* 2015, Rizos *et al.* 2016). First, SMEs do not have the much-needed financial capital to tackle upfront costs that MNCs have, giving MNCs the opportunity to control local-value chains, thus making it even more difficult for SMEs to keep up. As a result of less capital, SMEs also have less capacities to spend on R&D, which leads to the second point. Considering the even designers in the field of CE tend to find it difficult to fully grasp the holistic system of CE, SMEs also lack technical capacities (Rizos *et al.* 2016). SMEs operating on surviving levels are forced to refrain from additional costs other than what is required to keep themselves afloat. It is especially difficult to convince small business when they assume that investing in pollution prevention, waste

management, and energy-efficient practices does not return the upfront costs (Singh *et al.* 2018; Bajnóczki 2020).

In the following literature review on barriers and enablers, only studies *solely* focusing on barriers and enablers of SMEs' circular transition are involved. There are numerous studies (Kumar *et al.* 2019; Masi *et al.* 2018; Pieroni *et al.* 2020; Bilal *et al.* 2020; Urbinati *et al.* 2021; Jaeger and Upadhyay 2020; Huang *et al.* 2021; Guldmann and Huulgaard 2020; Lee 2018; Zhu *et al.* 2010) that simultaneously analyzes the circular transition of both SMEs and MNCs, therefore the takeaways are mixed between the two types of entities and the papers do not indicate separately and distinct the different kinds of barriers and enablers that the two different business models may face during their transition. In addition, there are other studies (Silva *et al.* 2019; Abdul-Hamid *et al.* 2020; De Mattos *et al.* 2018) from which the type of firm cannot be found out thereby these studies are also excluded.

Overall, the findings imply that different businesses face different barriers in the transition to circularity thus a fine-grained methodology is preferred rather than a one-size-fits-all approach. Besides, barriers can also be intertwined with one another. Upon assessing the findings from the literature, the barriers and enablers are grouped into three segments: macro-, meso-, and micro-level barriers and enablers; grouping the elements that either facilitate or prevent SMEs' transition into these three areas is applied by other studies, for instance by Scipioni *et al.* (2021) as can be seen below in *Figure 5*. For macro-level elements, the regulatory environment, market forces, social and cultural atmosphere in which SMEs operate are considered. In case of the meso-level, the supply chain is found to have either a positive or negative impact on firms' circular transition. Last but not least, beneficial or disadvantageous factors towards the CE are considered as micro-level elements. Thereby, the remaining sections of the chapter are divided with this theoretical framework to illustrate the findings in a transparent manner. In addition, the chapter distinguishes barriers (sections 2.2.1, 2.2.2, and 2.2.3) from enablers (sections 2.3.1, 2.3.2, and 2.3.3). For an overview of the findings, see Appendix A – Summary table of literature review findings at the very end of the study.



Figure 5 – CBM-oriented OL contextual elements and processes (Source: Scipioni et al. 2021)

2.2.1 Macro-level barriers

2.2.1.1 Inadequate regulatory environment

In order to resolve the matter behind SMEs' inadequate internal capacities, Ormazabal *et al.* (2018) assert that stakeholders find that inadequate support from public institutions is one of the most influential barriers. The assessment of a Danish municipal waste management company collecting and managing household waste reveals that the current regulation of the waste sector does not sufficiently support a transition to the CE. Except for the case of cardboard, there is not monetary incentive not to direct waste away from incineration and to apply circular practices on household waste instead (Zacho *et al.* 2018). Similarly, Ruggieri *et al.* (2016) also finds that fragmented regulation hampers the transition of an Italian olive oil producer SME.

While the assessment of rural SMEs from six EU countries reveal various factors from each country, Uvarova *et al.* (2020) find the overarching barrier for SMEs is the lack of the appropriate environment and support measures to successfully introduce and implement circular business models (CBMs). The authors add that SMEs are deterred from attempting to change their course of business due to their uncertain financial situation and lack of resources; however, feeling

discouraged could be improved and overcome by having a stable exogenous environment supporting them on their journey to shift their activities.

Obstructing laws and regulations can cause a chain reaction of problems for the proper implementation of circular activities. A case study on 13 manufacturing Australian SMEs demonstrates that lack of governmental support in regards of tight legislation, advice of selecting adequate tools and approaches for the transition, or stringency of regulations limit firms' innovation (Caldera *et al.* 2019). The unaccommodating role of public policies in the Netherlands hinders food processing SME managers to rethink their business models, because ambiguous circumstances also result technological and market barriers (Jochems 2019). Besides lack of support from the supply and demand network and of capital, EU SMEs perceive the lack of government support, effective legislation and support of local authorities, as a significant barrier (Rizos *et al.* 2016).

As opposed to the above literature, Roosendaal (2018) finds regulatory barriers as the least pressing group of obstacles standing in front of Dutch textile SMEs' circular transition. Nevertheless, the study finds that obstructing laws and regulations enforce all other challenges altogether, instead of acting as a singular barrier, thereby hindering the creation of an enabling environment, in which entities could experiment and implement their circular initiatives without worrying about other, more-pressing barriers.

2.2.1.2 Insufficient customer interest

Behind the high cost being the main obstacle for Dutch SMEs in the textile industry, Roosendaal (2018) argues that entities face the issue of cultural barriers, namely the lacking consumer interest and awareness in circular products. However, this is mostly due to the higher prices of sustainable products, which is supported by other studies (Planning 2015; Ormazabal *et al.* 2018). Interviewees of the study repeatedly state that they cannot do much against the fact that consumers are not willing to pay more for more environmental-friendly products; products with circular elements are more expensive thereby unaccepted by customers (Roosendaal 2018). Cantú *et al.* (2021) report the same finding from Mexico, where consumer behavior is one of the main barriers standing in the way of SMEs attempting to transition towards circular solutions (Cantú *et al.* 2021). Mexican SMEs assert that consumers are deterred from purchasing sustainable/green products due to their higher costs. Assessing the literature on EU SMEs, Piciu (2016) also puts forward that attraction factors such as consumer demand is a make-or-break element whether SMEs even try to step their foot on the path towards circularity. Until there is no demand for more sustainable products, SMEs are not incentivized to change the course of their production line.

Rizos *et al.* (2016) suggest that SMEs need to create a business case to incentivize customers opting out from unsustainable products and choosing green products and/or services, because the majority of the people cannot afford the higher prices entailed by purchasing circular products. In line with earlier studies reporting on customer resistance (lack of consumer interest/non-acceptance of CBMs) (Planning 2015; Ormazabal *et al.* 2018; and De Jesus and Mendonça 2018), market barriers are considered posing important obstacles for all types of CBMs in a Dutch case study (Vermunt *et al.* 2019).

2.2.1.3 Complex administrative procedure

Garrido-Prada *et al.* (2021) find that administrative burden (complex administration, legal procedures, and regulation) decreases EU SMEs' likelihood of implementing circular activities. Similarly, García-Quevedo *et al.* (2020) find the matter of regulation obstacle (complex administrative procedures and costs of meeting regulations or standards) is considered a barrier for SMEs in the EU. Nevertheless, the authors assert that the regulation obstacle is a matter of perception by underlining that "SMEs engaging in CE activities are more likely to identify regulatory obstacles than those that do not engage in such activities" (2460).

Romanian SMEs also face difficulties to comply with industry regulations and standards and complex administrative legal procedures, which often deter businesses to make their activities more sustainable and circular (Ghanta and Matei 2018). Heads of more than 250 Italian SMEs also consider the complex bureaucratic burden on firms in terms applying sustainability regulations as a barrier behind their efforts (Mura *et al.* 2020).

A survey analysis of over 10,000 EU SMEs distinguishes barriers perceived between SMEs already involved in circular activities (in-going) and entities that have not even attempted to transition (no-going) (Garcés-Ayerbe *et al.* 2019). In terms of the in-going enterprises, complex administrative and legal procedures is found to be the main barrier for almost one-third of them. However, the research also sheds light that once this barrier is resolved, entities tend to face further barriers. Thereby, there is a sequence of facing barriers when enterprises begin shifting their activities towards sustainability and circularity. SMEs already involved in CE have to tackle

complexity of administrative and legal procedures – this is a barrier that came up most frequently in the survey analysis. Once the issue of administrative burden is resolved, SMEs need to tackle the cost of meeting regulations and standards, followed by inadequate human resources. Upon overcoming these three initial barriers, enterprises experience difficulties to access financial resources and technological expertise to implement CE activities.

2.2.2 Meso-level barriers

2.2.2.1 Supply chain stuck in linearity

Vermunt *et al.* (2019) assert that supply chain barriers are deemed to be significant for three Dutch CBMs with the exception of product-as-a-service business models. Considering how the other models rely on external partners in the supply chain for materials and products, it has been expected for these businesses to have difficulties with redesigning their supply chains in accordance with the principles of the CE. Three UK-based SMEs in the fashion and textile industry also express their difficulties around sourcing sustainable materials (Ballie and Woods 2018). More specifically, one of the interviewees suggest that there is a limited amount of sustainable fabrics available on the market.

SMEs located in the upstream of supply chain facing technological challenges is a reoccurring theme in the literature. Garcia Martin (2016)'s study on Italian SMEs in the fashion industry reveals that enterprises in the reverse supply chain (RSC) have to overcome uncertainties in regards of supply and resource. As these companies rely on customers passing on their used products to them, companies do not have a stable income of resources to produce new products out of them.

Rizos *et al.* (2016) report that over half of the surveyed and interviewed EU SMEs from their research find the lack of support from the supply and demand network as the main barrier. They state that they are helpless in the linear production mode with the absence of 'green' suppliers for respective products; the reluctance towards circularity of other actors in the supply chain leaves them incapable to implement changes on the firm level. As a result of the rest of the supply and demand networks' unwillingness to implement circular practices, they are stuck in the current production mode. Additionally, competitor resistance due to invested interest to retain the linear production mode was another significant finding in the case of product life extension and resource recovery CBMs (Vermunt *et al.* 2019).

2.2.2.2 Lack of cooperation

Hernandez (2019) finds that Colombian SMEs in the manufacturing industry face issues in regards of having to make difficult agreements with their clients and suppliers. Furthermore, the author reports that the unfair competition (smuggling or tax problems) in the country does not allow trust to be formed between the actors of the supply chain, thus cooperation is challenging to establish between entities.

Hernandez (2019)'s finding is confirmed in Europe by a case study on eight Finnish SMEs from various industries revealing the main barrier behind the transition is the difficulty to establish cooperation and dialogue with other key actors in the value supply chain and the other entities functioning in the circular bio-economy network (D'Amato *et al.* 2020). Patricio *et al.* (2018) also report lack of trust as an obstacle to engage in industrial symbiosis (IS) partnerships in Sweden.

2.2.3 Micro-level barriers

When it comes to barriers on firm level, it is important to keep in mind that there are several factors distinguishing the barriers that SMEs may face. For example, García-Quevedo *et al.* (2020) assert that SMEs engaged in disruptive innovation, redesigning goods and services to minimize the use of materials, are likely to face and regard several barriers (human resources; expertise; finance; administrative procedures; cost meeting regulations) important; whereas, firms focusing on 'simpler' and singular activities such as minimizing waste or transitioning to renewable energy use are likely to 'only' come across obstacles related to administrative procedures and regulations.

Furthermore, García-Quevedo et al. (2020) distinguish between revealed (difficulties with the implementation of CE principles, such as regulatory obstacles and the lack of human resources) and *deterrent barriers* (insurmountable obstacles, such as the lack of expertise in new technologies and the capability to change the mindset).

2.2.3.1 Lack of financial capacities

Binek and Al-Muhannadi (2020) find that the main barrier comes from the very definition of SMEs: their limited budgets and resources entail a risk-averse behavior. Understandably, the inadequate resources discourage enterprises to invest time, energy, and financial resources into an area that they do not necessarily have the proper knowledge about. However, the authors contribute the linear supply and demand chain, as well as the lack of knowledge about circular practices, to the government failing to establish the necessary space and capacities for SMEs' transition. Garrido-Prada *et al.* (2021) find that firms tend to invest in the CE principles after having received government grants, bank loans, and green loans as opposed to firms which did not receive funds from any of these resources. This also points to the importance of direct support for SMEs' transition to a CE and underlines the importance of SMEs' financial barriers when implementing CE activities (Garrido-Prada *et al.* 2021).

In another case, even if there is a willingness from the side of SMEs, lack of financial capital, time, and short-term vision further discourage them from prioritizing circular solutions (Ormazabal *et al.* 2018). This, however, may be explained by the assumption that SMEs' lack of resources makes them unaware of the possible benefits of applying circularity to their activities (Ormazabal *et al.* 2016).

A Sustainable Product-Service System (SPSS) decision-making matrix approach assessing barriers and enablers for manufacturing SMEs transiting from the LE to the CE identifies 44-44 factors standing in the way of the transition and overcoming difficulties (de Jesus Pacheco *et al.* 2019). In regards of the barriers, the primary factor was the lack of financial resources to make circularity happen.

In regards of 'hard' barriers, such as financial or technological factors, they also stand in the way advancing the transition. However, even if the CE technology advancements are feasible, economic and market barriers may limit the actual implementation and expansion of circular practices (De Jesus and Mendonça 2018). Simultaneously, Vermunt *et al.* (2019) find that product-as-a-service CBMs mostly encountered internal 'hard' barriers, for example, organizational and financial obstacles, due to the retention of ownership over the product(s), which entails high upfront costs.

Once the barrier of complex administrative burden is resolved, EU SMEs already involved in circular activities tend to face the cost of meeting regulations and standards (Garcés-Ayerbe *et al.* 2019). Other overarching survey analyses on EU SMEs further stipulate the financial difficulties many enterprises face. Rizos *et al.* (2016) highlight that most EU SMEs repeatedly struggle with lack of capital. In their sample, lack of capital refers to lack of initial capital, lack of financial opportunities or alternatives to private funds, and traditional bank funding; under this terminology, lack of time and human resources are also assumed. Within this category, firms often find the unaccommodating role of bank funding, making it difficult to attract external investment into their activities. In addition, banks seem to be inflexible around SMEs' occasional difficulties with repayment delays. The situation is further stipulated by bankers having difficulties to understand the business case of circular products, especially because of their scarcity on the market.

Demirel and Danisman (2019) also uses the Flash EuroBarometer 441 survey results to conduct their study on EU SMEs. The authors find that a high investment cost of more than 10% of their revenues is required for SMEs to experience the transition of their activities to the realm of CE economically profitable. This, however, is an exceptionally high investment cost, especially in the case of SMEs (Demirel and Danisman 2019).

In analyzing over 2,000 EU SMEs coming from various industries, Ghisetti and Montresor (2020) find the inadequate constant financial resources as the main barrier behind their incompetent transition. This is obviously due to facing higher financial burdens than MNCs. The study is in accordance with the *pecking order theory* of finance studies (Myers and Majluf 1984), namely that enterprises should primarily rely on self-financing, then moving onto debt-financing after having experienced the debt channel. However, the authors find that public funds from the government come into the middle of the scheme, highlighting the fundamental role policymakers should play in assisting SMEs with their circular transition. Overall, financial capabilities appear as a main barrier for many EU SMEs.

Moving from supranational to national findings, Oncioiu *et al.* (2018) find that almost twothirds of SME managers surveyed in Romania face financial problems, labor shortages, as well as legal barriers, in spite of making an honest effort towards circularity. The matter of financial problems should not come as a surprise, considering that most Romanian SMEs fund their activities towards circularity from their own pockets or from loans from close friends, while only approximately 10-10% of the surveyed SMEs was able to rely on financial support from the government or from international institutions such as the EU, the European Bank for Reconstruction and Development, or the International Monetary Fund.

Similar to the experiences of Romanian SME managers, businesses in other parts of Europe face the same challenge. Almost half the interviewees from a Finnish case study also regard the lack of capital and financial resources as a barrier (D'Amato *et al.* 2020). When asked to name their five biggest barriers in transitioning their activities from linear to circular, Roosendaal (2018) finds that the high costs for producing/selling circular products is the main barrier for Dutch SMEs

in the textile industry. The author contributes this obstacle to underlying "technical and cultural barriers creating a chain reaction that forms the eventual problem stopping a transition to CE" (38).

On the other side of the world, Caldera *et al.* (2019) find the lack of financial resources posing as the main barrier behind the difficulty of 13 Australian SMEs' circular transition. According to the interviewees of the study, this challenge can arise from areas such as large capital cost, uncertainty when upfront investment would return, and possibly diminishing sales due to having sustainably products generally being more expensive. Essentially, the financial risks result other upcoming issues, such as lack of time and knowledge, impeding the transition. Their study is supported by Kaufman *et al.* (2020) who put their thesis forward relying on sources from authorities and specialists of the field. Australian policymakers and industry experts argue that SMEs primarily have to face economic barriers, given that SMEs often lack time and are driven by cost; thereby, they have neither capacity to explore and assess nor capital for investments, while financial funds are difficult to access.

2.2.3.2 Inadequate managerial mindset

Inadequate monetary capital is worsened by the lack of internal competencies, including managerial and sustainability and design of SPSS, as well as inadequate instruments to support the transition from LE to CE (de Jesus Pacheco *et al.* 2019). A survey carried out in Navarra and the Basque Country, Spain of nearly 100 SMEs reveals that stakeholders doubt whether the CE can increase enterprises' profitability and improve their sustainability and competitiveness in the market thus they are not necessarily convinced to invest into material and/or technological developments to move their supply chains towards circularity (Ormazabal *et al.* 2018). Elsewhere in Europe, managerial mindset of a Danish municipal waste management company also needs to change towards a focus on circular principles to overcome the inadequate institutional environment (Zacho *et al.* 2018).

The study on more than 250 Italian SMEs from various industries yield the perception of treating sustainable and circular principles as a cost rather than an investment is what holds back most enterprises (Mura *et al.* 2020). This is in line with the findings of Sharma *et al.* (2020)'s study on Indian SME managers, who believe that investing in CE cost more than the expected profits. Reflecting on EU SMEs, Piciu (2016) also adds that heads of SMEs treating the high cost

entailed with the transition towards circularity as a deterrent cost rather than an investment discourages them from attempting to change their activities altogether.

2.2.3.3 Incompetent technical skills and knowledge

Guillard *et al.* (2018) put forward that packaging EU SMEs' lack of resources (knowledge; tool; and networking contacts) hinder their transition towards circularity. Another case study on EU SMEs regards the lack of knowledge as a barrier for SMEs. Indeed, while MNCs have the vast amount of financial capital to invest into R&D to pursue and develop newer technologies, SMEs often have to rely on technologies that are available and accessible in the market (Piciu 2016).

Besides the high costs of circular products entailing lacking consumer awareness and interest, Roosendaal (2018) finds technical barriers behind Dutch textile SMEs' transition problems. Even though technical barriers are not found to be the most-pressing issues in his study, the author argues that they are a "major cause of a chain reaction" (40), which generates other issues; for example, the higher cost of circular than linear products result consumer dissatisfaction and disinterest, two of the barriers named to be the most significant in his study. In another case study on Dutch CBMs, technological challenge is the key obstacle for both resource recovery and circular supply entities as a result of experiencing difficulties with recycling and moving production processes toward circularity (Vermunt *et al.* 2019).

Other case studies focusing on European businesses has similar remarks. Ghența and Matei (2018) conclude that most SMEs in Romania regard the lack of human resources and the lack of expertise in the implementation of circular economy activities as the main barriers. García-Quevedo *et al.* (2020) find that the lack of human resources—that is, the lack of technical skills—represents a major challenge when seeking to identify and implement new circular business models. Upon the assessment of four Swedish mushroom producing SMEs in regards of their potential participation in IS, Patricio *et al.* (2018) find the lack of knowledge as one of the main factors hindering their involvement in the CE; two of the companies did not even regard leftover mushroom as a raw material for creating another product nor consider of exchanging it with other enterprises. In regards of the beer producing companies in the same study, the lack of enterprises' knowledge is found to be the main barrier; interviewees of the study report their companies' inability of how to treat waste yeast generated from their primary activities thus they simply

dispose the byproduct through the sewage system, making the company's production linear from this end.

2.2.3.4 Short-term vision

Behind the lack of technical knowledge, both the mushroom and beer producing companies of the Swedish study assert time constraints as one of their main barriers (Patricio *et al.* 2018). Considering that these entities need to focus on their core business activities, they all face time limitations to engage in studying the potentials in CE.

2.2.4 Macro-level enablers

2.2.4.1 Supportive regulatory environment

In response to SMEs' inadequate internal capacities, Ormazabal *et al.* (2018) propose the implementation of incentivizing policy instruments that support and reward SMEs for implementing CE principles in their activities. When it comes to the utilization of the policies themselves, the authors distinguish between *hard* and *human-based barriers*. Hard barriers (lack of financial resources; outdated technology; inadequate information systems; etc.) can be resolved by financial stimulation and technological advancement, but human barriers (company leadership: lack of knowledge and/or interest in CE; lack of customer interest in the environment; etc.) require different strategies to address. As a result of SMEs being discouraged to invest their already limited resources into exploring the realm of the CE, Binek and Al-Muhannadi (2020) also highlight that support from government policies and powerful market players could assist entities to learn more about the market advantages CE has to offer.

Focusing on ecological innovation to accelerate the transition towards CE, De Jesus and Mendonça (2018) assess drivers and barriers of the transition by looking at a corpus of articles from Web of Science and Scopus, as well as examples from gray literature. The authors conclude that 'soft' factors (social, regulatory, or institutional) are the primarily drivers behind the transition towards CE; thereby, an overwhelming strategic roadmap is a must in order to prevent any kind ambiguity and mismatch in the transition process. Beyond creating the adequate and broad institutional environment in the markets, public policies, and social practices, the authors contribute that increasing R&D and social awareness are further roles of the governments.

Considering that the literature is overwhelming on the crucial role of the necessary regulatory environment, the section is broken down into continents to have a better overview of the findings.

2.2.4.1.1 Europe

Zamfir *et al.* (2017) reconfirm the vast amount of literature that the key predictor whether SMEs have started applying CE practices is the country they are located in. The majority of the SMEs from countries, where governments have started making an effort towards circularity, face barriers beyond the enabling government such as the sector of activity. In regards of SMEs from Hungary, Slovakia, Romania, Bulgaria, and Poland, where the CE-uptake of the governments is low, they have the lowest share of enterprises undertaking the implementation of the CE principles (60%). The survey analysis by Zamfir *et al.* (2017) details that enterprises from these countries do not report significant predictors for making decisions on CE-related matter.

In a survey analysis on EU SMEs, Ghisetti and Montresor (2020) argue that the obvious solution is to have a stable funding behind their activities. The authors reckon that policymakers should pay attention to SMEs' financial obstacles and to market failures when developing new policies that could help these smaller enterprises flourish in the realm of the CE. While the study is in line with the *pecking order theory* of finance (Myers and Majluf 1984), meaning that self-financing should be prioritized over debt-financing, public funds from the governments also play a crucial in aiding entities, which essentially underlines the key role of policymakers and the government itself.

In response to the high investment cost (over 10% of SMEs' revenue) to have the circular transition producing economic growth, Demirel and Danisman (2019) propose policy interventions in the form of demand (e.g. environmental standards, taxes, and targets to shift consumer preferences) and supply (e.g. tax credits, grants, and loans to support eco R&D). The authors assert the current EU- and domestic-level legislation and policies do not support firm growth and fall short on creating the enabling environment for SMEs' circular transition. A survey analysis also assessing EU SMEs finds that, in regards of no-going SMEs (entities that have not even attempted to transition), the most often mentioned barrier is having no clear idea about cost benefits or improved work (Garcés-Ayerbe *et al.* 2019). Economic barriers holding back SMEs from investing is an oft-cited challenge by other studies. The solution to this particular problem is
to have an encouraging environment, where the government and policymakers incentivize SMEs to initiate shifting their activities towards circularity by tax breaks, subsidies, etc. Thereby, Garcés-Ayerbe *et al.* (2019) reaffirm that regulations should be improved to encourage enterprises to rethink and redesign their activities and make them more sustainable.

Katz-Gerro and López (2019) also find that the role of government policy should be the main driver behind the transition to incentivize EU SMEs and to have them realize the potentials of applying circular principles to their activities. Government and public institution intervention acting as a catalyst behind entities engaging in IS is found as the second most important driver by Prieto-Sandoval *et al.* (2018). Once again, the role of the government is to create the necessary conditions and capabilities for enterprises to initiate making their activities more circular; in this case, this task entails "reconditioning of existing parks or building new ones" (Prieto-Sandoval *et al.* 2018, 1531).

Besides the above EU level survey analyses, specific country studies yield the crucial role of the government in assisting smaller firms. In order to resolve the obstructive legislative environment, in which a Danish municipal waste management company operates, Zacho *et al.* (2018) put forward that a supportive institutional setting could incentivize the market players for the better management of materials and resources. Other than saving on paying less taxes due to the collection of products and materials instead of their incineration, further economic value creation potentials are low for circular activities.

Considering that food processing SMEs work with products for human consumption, SMEs in the Netherlands are prone to stringent food safety laws. Jochems (2019) concludes that adequate regulatory interventions could overcome barriers that have been nested and could cause chain reactions of CE.

The survey assessment of cross-industry Austrian SMEs reveals that policymakers can push enterprises through improved-performance analysis by incentivizing them towards resource efficiency, sustainability, and differentiation from other players in the market (Holzer *et al.* 2021). Within these key indicators, SME representatives consider resource efficiency as a key driver behind their activities, which can essentially help them reduce costs and make them more profitable.

Due to Romanian SMEs experiencing the lack of human resources and expertise to implement circular principles, Ghanta and Matei (2018) find the role of domestic government

policy creating the necessary environment for SMEs to transition their activities towards circularity in terms of training of workers and supporting for development of knowledge, as well as reducing the degree of bureaucracy to ease compliance with national directives. Another study from Romania confirms that SME managers in the country believe that a national CE strategy could help them make a lot of progress in this regard, underlining that "a fiscal, legal or organizational framework coupled with additional governmental actions to promote the principles of the circular economy would contribute to the successful implementation of the circular economy" (Oncioiu *et al.* 2018, 11).

The case study on Finnish SMEs reveal that customer and regulation demands could be driving forces towards circularity, because new solutions and more sustainable alternatives will be requested by these actors. With one of the interviewees exemplifying this with the case of plastic bags, consumer preferences and legislation strains force market players to innovate their business strategies to stay in business by pleasing the demand of the market with their innovative supply while abiding the domestic policies and legislation (D'Amato *et al.* 2020). In addition to governmental guidelines setting the circular direction, the interviewees consider that the government should step in and assist the enterprises with adequate private money flowing into the Finnish economy.

The role of the government is underlined in another Northern European country. Swedish manufacturing SMEs already involved in CE overwhelmingly state that there is a need for an overarching policy framework to increase resource efficiency and to promote reuse within the economy (Milios 2021). Firms would like to see the leading role of the government in 1) increasing provision and access to information for business and public alike thus reuse could become more widespread and accessible, while transparency would ensure growing trust between stakeholders; 2) setting up a national framework to incentivize businesses; and 3) introducing encouraging policies to the consumers to prioritize circular practices over linear manners. The authors believe that these policies can be bundled up together to push and pull businesses and the public towards ecological behavior.

Ormazabal *et al.* (2016)'s study on 17 SMEs from the Basque Country demonstrates SMEs' awareness of environmental issues, however, they do not perceive causation between their activities' environmental impacts and the sustainability and success of their businesses. Nevertheless, the authors find the role of domestic governmental policies crucial to incentivize

them towards more sustainable and circular solutions. In another Southern European country, an Italian case study on 254 SMEs demonstrate that encouraging policies towards sustainability (e.g. tax credits, financing, subsidies), especially having accessible financial resources, could incentivize entities to rethink and redesign their activities (Mura *et al.* 2020).

2.2.4.1.2 Latin America

On the other side of the Atlantic, Torres-Guevara *et al.* (2021) claim that a fertile ecosystem is a must for implementing circularity in the construction sector in Colombia. The authors assert that the regulation and policies could act as discouraging and encouraging factors for both the consumers and producers by eliminating political CE obstacles. The case study on the Colombian SME in the construction demonstrate how the country's development of a CE strategy has been pushing the company towards more sustainable practices. Hernandez (2019) argues that design policies and taxes could also start pushing Colombian SMEs towards the application of CE principles.

On the other side of the border, Fernández-Viñé *et al.* (2010) find that government intervention in the form of economic taxes and legal requirements could drive Venezuelan SMEs to commence practicing eco-efficient behavior. However, the authors distinguish that when it comes to the government incentivizing firms, enforcement mechanism is more useful than the bare knowledge of regulations. Exporting products to countries with strict environmental standards could encourage companies to change the current production line; however, Venezuelan entities rarely export products, and the government neither sets nor reinforces progressive environmental benchmarks.

Cantú *et al.* (2021) assert that legislation could boost the external environment around SMEs' transition to push consumers towards choosing sustainable products. The Mexican case study reveals that consumers tend not to choose greener products due to their higher prices thus implementing taxation on non-green products could act as a catalyst; thereby, consumers have no reasons not to choose the greener and less expensive products. Overall, the role of the government is to create to necessary exogenous environment and conditions in which SMEs can flourish towards circularity.

2.2.4.1.3 Asia

On another continent, Susanty *et al.* (2020) also argue that the government needs to create the necessary conditions for Indonesian SMEs to overcome obstacles. The authors suggest that the government and policymakers should 1) promote environmental-oriented supply chain cooperation practices for companies to uptake the CE principles; 2) embrace the leading firms of the transition and exemplify them as champions to other SMEs; and 3) establish a quality standard or a certification system to support enterprises for reusing and remanufacturing products.

Even though innovation is found to be the main enabler for Chinese SMEs' transition, the lack of government support can only be addressed with the opposite. Thereby, Min et al. (2021) argue that companies could only start their transition in an environment where government policies, such as tax reduction, subsidies, and compensation, boost enterprises. The profit-oriented mode of the economies and markets does not allow Chinese SMEs to try to break out of the LE and experiment with circular practices. Li and Zeng (2018) put forward that while environmental regulations in China are varying, the government sets regulations and policies to control their externalities since environmental problems from SMEs have started arising. Initially, the government motivated SMEs toward economic progress at any cost, however, the contemporary resource scarcity and the rising costs of natural resources are economically problematic to both the government and small firms. Thereby, the application of a CE legislation and policy on the federal level is expected to act as a lever to promote the greening of SMEs. In Taiwan, where SMEs comprise 97% of the economy's businesses, Wu et al. (2020) pronounce endogenous social capabilities, network-based collective bricolages, and institutional support driving the transition upon investigating the plastic waste industry. In many cases, developed countries outsource their production to developing countries due to having lax environmental legislation and acts in place; thereby, companies in developing countries are not incentivized to redesign their activities. However, the case study of Taiwan by Wu et al. (2021) demonstrate it otherwise. An interviewee reveals that the stricter environmental regulations were requested by firms in the textile industry, because their international demand networks were pushing them to apply more sustainable practices.

A study on EU-Japan collaboration opportunities primarily focusing on SMEs assert that the size and geographical condition of Japan will enhance the adoption of the CE in the country (Yolin 2015). Considering the small size of the country and its level of development, Japan may run out of space in the near future to store its waste. While incineration is a commonly used solution to take care of disposed materials in Japan, the risk for health and environment entailed by waste incineration has been a trending theme in the country. In addition to the decreasing availability of landfill sites being the primary concern, resource scarcity further incentivizes the government to find alternative methods for waste treatment, because the sake of economy also depends on better material usage. Considering that the adoption of the CE can solve both matters, Yolin (2015) concludes that governmental support is the main driver behind the transition.

It is especially difficult to convince small business when they assume that investing in pollution prevention, waste management, and energy-efficient practices does not return the upfront costs. In order to effectively tackle this matter, Singh *et al.* (2018) suggest that the government should encourage Indian businesses by involving them in green initiatives to build strong environment consciousness. Thereby, the culture towards environmentally beneficial practices on the firm level can enhance a bottom-up transition of the supply chain. Besides pushing them from the ground level, Singh *et al.* (2018) propose that governments should also "provide green economic subsidies, tax benefits, soft loans and subsidized materials to boost intention and action towards sustainable waste management practices" (319). In accordance with Singh *et al.* (2018), Sharma *et al.* (2020) suggest the urgent implementation of incentivizing (both monetary and nonmonetary) domestic policies to convince Indian SME managers about the implementation of circular practices.

Besides developing knowledge about circular economy (KCE), Moktadir *et al.* (2018) find that government support and legislation influence Bangladeshi SMEs more than it does large-scale companies, because smaller entities need more aid from the government for the adequate implementation of circular practices. First, SMEs lack capital, which is the primary reason of how they can benefit from financial aid provide by the governmental. Second, the authors assert that legislation can also push companies to adopt more sustainable practices; otherwise, they are not essentially motivated to move out from the contemporary mode of production.

2.2.4.1.4 Africa

In addition to collaborating with MNCs and other actors in their supply chain, Mishra *et al.* (2019) establish the facilitating role of the government to create the necessary conditions to push the transition from linear to circular. Considering that electricity is very cheap in North

Africa, replacing traditional to renewable energy sources often deter companies from even attempting to get their energy from a clean energy source because of the long payback period, which is usually more than three years. However, an interviewee from a North African manufacturing firm challenged the government to help the firm with additional financial support reasoning for eco-efficiency and was able to secure additional funds to help the firm move towards the 3-R business model.

2.2.4.1.5 EU policies and directives

Reflecting on the absence of domestic support, Uvarova *et al.* (2020) assert that strategic EU objectives and support directions of EU structural funds could catalyze rural SMEs from six countries to redesign their business models towards circularity. Similar to Uvarova *et al.* (2020), Binek and Al-Muhannadi (2020) propose that SMEs should try to access EU funds and support, in case the domestic government does not offer beneficial solutions for their transition. The authors conclude that the faster SMEs find a sustainable and circular business model, the bigger momentum they will be able to gain against their market competitors as consumers' growing eco-consciousness opts out from purchasing environmentally harmful products.

2.2.4.2 Facilitating administrative aid

Concerning the overwhelming administrative complexities SMEs need to comply with if they seek to make their activities more circular, García-Quevedo *et al.* (2020) suggest that decreasing the administrate burden and complexities on SMEs (policymakers need to understand and engage with the day-to-day difficulties that SMEs face) may aide their transition. Public institutions need to understand that SMEs are not heterogenous, as they face different issues, and there is no one-size-fits-all solution to their challenges.

2.2.4.3 Increasing customer interest

Susanty *et al.* (2020) find that 'greening' the supply chain is not worth much without collaborating with customers. The study asserts that 190 Indonesian SMEs in the wooden furniture industry are better off with focusing on customer collaboration to "reduce waste in their businesses and environmental costs, increase customer satisfaction, and simultaneously maximize the return volumes" (Susanty *et al.* 2020, 19). Thereby, the internal green supply of materials with customer

collaboration is considered the most effective way to overcome barriers to transition entities' practices towards CE.

Due to the absence of internal driving forces in developed countries, Fernández-Viñé *et al.* (2010) suggest that market pressure is an enabler for SME's adoption of eco-efficient practices. Their survey on Venezuelan SMEs conclude that even if managers are environmentally concerned, the driving force behind shifting towards sustainable manners is based on the demands of the other actors in their supply chain. The authors find that it is an acute social problem of Venezuelan SMEs being aware but not considering environmental problems; their 'environmental concern' can only be seen on their survey responses rather than on actions undertaken by the firms. Customers' demand and/or preference for sustainable products and services is also found to be an important driver behind EU SMEs' transition to motivate firms to redesign their line of production (Rizos *et al.* 2016).

2.2.4.4 Multi-stakeholder cooperation

Scipioni *et al.* (2021) uses organizational learning (OL) as the basis for their in-depth mixed-method study on Italian SMEs in the construction sector, mainly focusing on the role of OL processes and related elements. Within the proposed three dimensions (external environment, supply chain, and SME) where enterprises operate, the authors find that cultural, regulatory, structural, and process factors act both as barriers and enablers. Within these overarching themes, the role of cultural elements is highlighted as the most crucial barrier and enabler on all three levels. Besides these factors, intra- and interorganizational learning processes could help overcome negative elements and embrace the CE principles for the SMEs involved in the development. On the external environment level, green norms and national incentives is found to be the other key enabler besides altering the linear culture to green and circular. On the supply chain level, technology and research on product, as well as solutions for supply chain collaboration are further drivers.

One of the interviewees from a Finnish case study argues that the creation of a practical platform, which could help initiate the early stages of the transition and enter international markets, would support the concretization of the circular bioeconomy network (D'Amato *et al.* 2020). In the absence of supportive government, Ruggieri *et al.* (2016) find that a third party (brokers,

intermediaries or accelerators of cooperation) shall organize the exchange of materials between entities to move towards IS.

Another case study from Finland illustrates well how beneficial stakeholder engagement could be for SMEs. Upon assessing Naava Group Oy (henceforth: 'Naava'), a Finnish company constructing smart green walls, Yli-Suvanto (2020) finds that engaging with knowledge actors (e.g. higher education institutes) and participating on networking platforms have positively affected the company's activities. While Naava did not reach out to external institutions for knowledge-building, the entity benefited from having been researched by an international institute based in London. Thus, indirect and unintended networking turned out well for the company, because Naava used the knowledge to develop its products and to confirm the technology it has used. In regards of networking platforms, Navaa's participation in competitions, media, and events is another reason behind the company's growth. Navaa took advantage from the former two by gaining publicity and maintaining a good public image, while knowledge- and experience-sharing events, both in formal and informal settings, contributed to learn from other sustainability actors.

The implementation and sustainability of the CE is recommended by Barón *et al.* (2020) stating that it should be desirable that it is not just a single firm within a supply chain wishing to shift towards circularity but the supply chain as a whole entity. The authors suggest that firms can go by developing collaboration and better facilitating communication with other stakeholders (organizations, customers, users, administration). These can be achieved by more efficient information and communication tools to help companies continuously improve the practices implemented, as well as facilitate for others to join the collaboration to enhance the circular model. Cantú *et al.* (2021) also find that multi stakeholder collaboration with different actors (government; universities; MNCs; etc.) could help Mexican SMEs resolve technical, financial or other issues when it comes to the difficulties of transitioning their activities.

Formal and informal gatherings between market players help firms exchange ideas, knowledge, and experiences to provide each other new trending perspectives on the rapidly changing market. The informal meetings can contribute to firms coming together to form IS partnerships or the realization of market gaps that SMEs can try to quickly fill in (Wu *et al.* 2021). In regards of the formal assemblies, SMEs are given the opportunity to represent their interests, difficulties, opportunities, and future prospects thus stakeholders can jointly design the market and the supply chain of production.

Ormazabal *et al.* (2016) contend that industry associations could be a driving force for SMEs to close their loops through compatible value chains. Thereby, industry associations should first increase their own environmental awareness beyond legal requirements. Similarly, about a third of SMEs in Rizos *et al.* (2016) study on EU SMEs report that networking, a group of firms coming together to share experiences and practices towards sustainability or supply chain interactions for making the mode of production more environmentally efficient and eradicating waste, is a one of the key drivers behind their transition. In line with the former studies, Mura *et al.* (2020) assert that an enabler behind Italian SMEs' transition towards circularity is multistakeholder cooperation with local institutions, organizations, and association. In addition, the original producer of products paying attention on product purity (meaning that (components of) products should be made out of the same material thus the reuse of materials is possible due to the avoidance of material mixture) could further aid the work of RSC entities. Thereby, interviewees suggest that the supply chain should be redesigned with stakeholder meetings, because every actor of the supply chain needs to share their difficulties in order to have a common, encompassing solution (Garcia Martin 2016).

2.2.4.5 Collaborating with MNCs

In order to overcome internal and external barriers – mostly related to limited resources –, Min *et al.* (2021) propose that innovation is the major enabling factor for Chinese SMEs to adjust their business models. When it comes to innovation, however, it is not just about investing into R&D for modernizing the products based on CE principles. According to the authors, innovation should also touch upon business model innovation and organizational innovation. Business model innovation could enable entities to collaborate with MNCs thus smaller enterprises could benefit from shared knowledge and technology, gates to new markets, and improved business chains. In regards of organizational innovation, adding experts or a department on CE would help enable the company's transition by focusing on stakeholder collaboration and promoting circular principles. Added together, the restructured business and organizational models can effectively foster product innovation. Similar to China, Estonian SMEs owned by foreign capital and being a subsidiary of an MNC are in advantage to local SMEs because of being members of bigger groups or consortiums. Thereby, they can collaborate with external entities to gather knowledge from their network. It is especially important for SMEs to be able to rely on an MNC in a country like Estonia, because the country does not have the culture to initiate circular contacts and IS partnerships (Vihma and Moora 2020).

Singh *et al.* (2018) suggest that larger corporations should educate the smaller firms in the supply chain about the practices to reduce waste and the after-use treatment of industrial waste to steer clear of its potential damages and its health implications. SMEs, thereby, can achieve organizational sustainability by relying on the extended knowledge and technical and managerial support provided by MNCs.

Upon studying a manufacturing company in North Africa, Mishra *et al.* (2019) assert that multi-stakeholder collaboration with MNCs and government is essential for SMEs to survive when. The authors reason that small firms, who often lack both financial and non-financial capital, can benefit from OL and technology transfer from entities who have the capacities to develop and improve circular manners. Besides learning from large companies, SMEs can also shift their practices by simply choosing different players in their supply chain who are more interested and active in making their activities more sustainable.

2.2.5 Meso-level enablers

2.2.5.1 Greening the supply chain

In China, Li and Zeng (2018) consider technology as the main factor guiding SMEs through the transition. More specifically, the authors assert that the core practical approaches of realizing CE in Chinese SMEs are cleaner production and waste recycling in the supply chain. In regards to cleaner production, it should be facilitated in industrial parks, while waste recycling should take place in urban mining demonstrate base. Similarly, Austrian SME representatives consider the procurement of resources as the key driver to transition their activities towards circularity (Holzer *et al.* 2021). In addition, Susanty *et al.* (2020) claim that customer collaboration with an internal green supply chain is the effective combination for Indonesian SMEs in the wooden furniture industry to drive their circular transition.

Caldera *et al.* (2019) contend that the barriers hampering the transition of Australian SMEs can be addressed by the collaboration of stakeholders both in their respective supply chain and in their community. Once stakeholders come together to discuss potential obstacles (both internal and external) standing in the way of making their activities circular, they would have a better understanding what needs to be done. Additionally, the collaborative space can also help them

formulate how to overcome the respective barriers, essentially preparing their own set(s) of enablers.

2.2.6 Micro-level enablers

2.2.6.1 Managerial mindset

Prieto-Sandoval *et al.* (2018) find that managerial mindset change could enable SMEs to make their activities circular. An Online Delphi Panel with 11 European experts from different universities and consultancy firms yield that 'valuing the "waste" of some companies as resources for others' was the strongest enabler for SMEs to engage in IS with other enterprises. According to the findings of the same study, the third most important barrier, 'managing aspects such as trust and transparency among potential partners in the industry', is also correlated with managerial mindset; the experts believe that it is the duty of the heads of the entities that they reach out to one another and to initiate collaborating with others, otherwise they will not be able to resolve issues around information asymmetry among the different parties.

Upon surveying 30 European SMEs from the GreenEcoNet platform, Rizos *et al.* (2016) put forward that company environmental culture (management and staff) can ease SMEs' transition. However, the study involves SMEs that have already adopted CE practices thus it is anticipated that the firms' environmental attitude has already been set on sustainability. Furthermore, the authors add that it is relatively easier for newly-founded companies to consider and develop circular practices than for companies that have been stuck in a linear production mode for a while to change their existing practices.

In another cross-country study in Europe, Moric *et al.* (2020) contend that SME managers in the EU need to create the internal environment within firms that supports the uptake of CE and smooths the transition. The study finds that the adoption of circularity increases firm superiority against the market; thereby, the positive causation between CE and firm performance should encourage leadership to invest into sustainable production activities.

Ormazabal *et al.* (2016) conclude that Basque enterprises' environmental management maturity positively correlates with their willingness towards circularity, because the management is aware that companies' environmental improvement efforts are positively perceived in the public's eye and help reduce costs. In addition, the adoption of *flexible business models*, meaning that companies advocate CE principles such as manufacturing or rental services, implies that many

of these SMEs have services to inform their customers about the most sustainable use of their products to extend their life cycles. In another study, Ormazabal *et al.* (2020) claim that once the company evaluates the risks and costs in regards to implementing circularity with the environmental business strategy, it realizes the benefits of making their activities sustainable. According to Del Río *et al.* (2016), an environmental plan of a company brings together resources, capacities, and capabilities with eco-innovation, which could boost the company's overall performance and give a competitive advantage in the market. Thereby, once the main decision-makers of the entity are aware of the company's overall situation, as well as barriers and enablers of the transition towards circularity, they can plan better to prepare for them.

Sartal *et al.* (2020) reports how Frinova, a Spanish SME in the food industry, has responded well to the implementation of lean practices (5S). According to Liker (2004)'s definition, the 5S⁴ scheme is a tool that improves workplace efficiency and eliminates waste, originally developed by Japanese Hiroyuki Hirano. After the researchers spotted areas of improvement towards circularity, the six-month-long implementation of lean corporate structure helped the company improve its water circularity in two ways: first, the *direct path* improved and reduced water use during the manufacturing process; second, the *indirect path* amended the design of the equipment thus less water was required during the cleaning stage.

Assessing a single Italian SME from the office supply industry, Ünal *et al.* (2018) find that the managerial mindset was the driving force behind the transition. Ignited by personal events and experiences, the CEO of Alisea set her company on a circular path from the very beginning of the establishment in the mid-1990's. In spite of the lack of governmental support and effective legislation, the company has been able to pave and maintain its sustainable path while outcompeting their rivals in the industry. Due to the honest and meaningful environmental efforts of the company, Alisea demonstrates prestige in the market that they effectively communicate to reach customers. The case study illustrates how far a strong managerial vision can go when the entity is committed to doing something more profound than just doing business.

Another study on Italian SMEs in the fashion industry reveals that the lack of monetary funds has been balanced by the personal motivations of the leadership. All seven interviewees of the research demonstrate an overwhelming willingness and passion to seek sustainable practices and limit their ecological footprint as much as possible (Garcia Martin 2016).

⁴ The 5S stands for: Seiri/Sort; Seiton/Arrange; Seiso/Clean; Seiketsu/Set; and Shitsuke/Sustain

The assessment of Estonian SMEs in the mature manufacturing industry demonstrate that companies owned by foreign capital and applied environmental management systems, e.g. ISO 14001, are more likely to have a business strategy and strategic planning process to push the transition their activities towards circularity. In one of the cases, the parent company requires its subsidiary to implement rigorous strategic thinking in order to address environmental impacts of its activities by circular design (Vihma and Moora 2020). In relation of having a business vision to steer the companies' procedures towards circularity, a strong leadership to effectively guide and implement the process is just as important as having the business strategy on paper.

In Latin America, Torres-Guevara *et al.* (2021) also find that top managers sharing environmental values and being concerned about the firm's impacts is another driver for transitioning towards more sustainable practices. The authors come to this conclusion by having the top managers of the company being available for more than 50 hours of workshops and meetings, sharing company reports with the researchers, and being interested and open to the research project itself. In addition, the case study of the Colombian SME in the construction further support the hypothesis that having more women in managerial leadership positions of the company can increase managerial environmental consciousness of an enterprise (Graafland 2020). From the same region, a Mexican case study find that managerial mindset of creative and problem-solving thinking can act as a catalyst to find ways of resolving issues around the environmental sustainability of companies, even if the necessary conditions for entities' transition are lacking (Cantú *et al.* 2021).

A literature review of the Bangladeshi leather industry and feedback of expert opinion from the academia and the industry conclude that KCE is the most relevant driver behind companies' transition. Due to the lack of human resources, small-scale firms should pay more attention during the implementation of sustainable manufacturing practices (Moktadir *et al.* 2018).

2.2.6.2 Financial aid

While Moric *et al.* (2020) argue that managerial willingness is required to initiate the transition towards circularity within SMEs, tangible investment is needed in order to effectively implement sustainable practices, something that many SMEs simply cannot afford at any point.

In the absence of government support, Naava claims it would not have got to where it is today without the aid of venture capitalists (Yli-Suvanto 2020). The case study on the Finnish

company constructing green walls reaffirms the significance of a growing company's need for financial support; due to the help received from venture capitalists, the company has been able to grow its operations, invest in researches, and get more resources.

Once the government has set up the necessary conditions for SMEs to change the course of their production, Zamfir *et al.* (2017) report that sector activity is another indicator that could drive SMEs. Their study finds that SMEs with lower levels of turnover display lower willingness about the adoption of circular practices, as almost all the companies of the 10,618 assessed EU SMEs having a total turnover of more than 10 million euros indicated that they have commenced such activities.

When specifically assessing SMEs that have already undertaken CE activities, Bassi and Dias (2019) assert that firms' green behavior depends on the size, total turnover, percentage of turnover devoted to R&D, and type of activity of the entity. This supports the general understanding that financially-squeezed SMEs do not have the financial resources to consider sustainability protocols. The study finds that firms with total turnover over €500,000 are more likely to apply sustainable designs for their products by reflecting on better environmental performance. Once a company has 'excess' revenue, the likelihood of the company increasing the percentage of turnover devoted towards R&D, which can then simultaneously reduce costs and apply circular solutions, grows.

2.2.6.3 Potential economic savings

Upon learning about the process of IS and the possible opportunities entailed with it, four mushroom producing SMEs in Sweden indicated their intention to invest in new opportunities to initiate engaging in circular procedures, mainly due to potential economic savings (Patricio *et al.* 2018). In the same study, beer producing companies also reveal economic profits as the main driver behind their intention to engage in IS partnerships in the future. In addition, marketing reasons is also named as an enabler factor, which is essentially another revenue stream for companies to generate more profit. Indeed, consumers with environmental consciousness tend to opt-out of purchasing unsustainable products and face higher costs for overall ecological benefits.

In order to resolve difficulties around sourcing sustainable materials, UK-based SMEs in the fashion and textile industry demonstrate that the design of products with the low cost entailed by applying CE principles could act as a catalyst to make their practices circular (Ballie and Woods 2018). Indeed, experts on the field of CE overwhelmingly agree that the design phase is the makeor-break phase whether a product is to become circular.

2.2.6.4 Environmental motivation

After naming potential economic profits, Swedish SMEs in the mushroom producing industry imply environmental benefits as a motivating factor to engage in IS (Patricio *et al.* 2018). The same study investigating beer producing entities also demonstrate the intrinsic motivation of the leaderships to have their activities done in a sustainable manner.

When asked whether corporate social responsibility (CSR) models could enable the application of the CE concept, nine SMEs from the Italian agri-food industry emphasize the necessity to have an eco-centric approach towards the external environment of the companies (Fortunati *et al.* 2020). CSR is a concept that goes beyond the application of traditional business models with trace elements of sustainability; an approach that often originates from the leadership of companies. Considering how sensitive companies in the food sector are towards sustainability and the climate, the authors conclude that a clear connection between CSR and CE can be established; however, entities' further education and development on the latter is required.

3. Methodology

The aim of this research is to explore and critically analyze the 'street-level' barriers Hungarian SMEs face in order to transition their activities towards the realm of the CE. Subsequently, this study also seeks to highlight the enabling factors for smaller businesses that could potentially ease the transition and push their activities towards circularity. Thereby, a qualitative research method is adopted to gain a thorough understanding of their situations. The research embraces a multi-method design to address the aim and objectives of the study. This helps the researcher identify and test the findings of one method against the other. Besides, the two research methods can also complement each other by addressing the shortcomings of the other, and vice versa.

In order to achieve consistency throughout the present thesis, businesses that employ less than 250 people and have annual net sales revenue of \notin 50 million at most are considered SMEs in the study, as these qualities are the general characteristics of SMEs (Tóthné *et al.* 2017).

3.1 Systematic literature review

Xiao and Watson (2019) underline that knowledge advancement must be based on the proper understanding of existing research findings. Likewise, Webster and Watson (2002) finds that a literature review "creates a firm foundation for advancing knowledge. A successful literature review facilitates theory development, closes areas where a plethora of research exists, and uncovers areas where research is needed" (8). Piper (2013) argues that a systematic review of the literature is a vital part of the research procedure to explore the contemporary literature in order to assess its limitations, quality, and potential. In addition to answering some research questions, the collected data sets the directions of the research.

Mengist *et al.* (2020) distinguishes the systematic literature review (SLR) from traditional reviews, because a systematic review adopts "replicable, scientific, and transparent producers" (2). Fink (2014) defines the SLR as a "systematic, explicit and reproducible method for identifying, evaluating and synthesizing the existing body of completed and recorded work produced by researchers, scholars and practitioners" (3). According to Dewey and Drahota (2016), the SLR identifies, selects, and critically appraises research in order to answer a clearly formulated

question. Pittway (2008) highlights seven principles behind SLRs, namely transparency; clarity; integration; focus; equality; accessibility; and coverage. Similarly, the Cochrane definition (2013) puts forwards that the SLR attempts "to identify, appraise and synthesize all the empirical evidence that meets pre-specified eligibility criteria to answer a given research question". In line with the former definitions, Mengist *et al.* (2020) deem the SLR suitable to gather relevant information on a certain subject that fits the pre-determined eligibility criteria and to provide answers for the formulated research questions. Overall, the SLR enables the researcher to realize general patterns and to build a theoretical framework prior to proceeding with the research.

Piper (2013) finds that the SLR is an appropriate tool for "test[ing] hypotheses, synthesiz[ing] a new idea, or reach[ing] a conclusion" (3). Furthermore, he recommends to limit the review questions for precise matters in order to avoid finding vague answers. Thereby, a carefully considered collection of keywords is essential to shave off hundreds or thousands of irrelevant studies in any given paradigm; the 'search-string' needs to be explicit, comprehensive, and aware of the usage of various terms. Nevertheless, Piper (2013) draws attention that a poorly conducted SLR may mislead both the researcher(s) and readers, so that careful preparation and execution of the research design can help minimize any negative elements in the study.

According to Mengist *et al.* (2020), the SLR has four basic steps: 1) *search* (formation of search-string and types of databases), *appraisal* (pre-defined literature inclusion and exclusion, and quality assessment criteria), *synthesis* (extract and categorized the data), and *analysis* (narrate the result and finally reach into conclusion); this is the so-called SALSA approach. However, the authors explain that two additional steps, namely the *research protocol* (outlining the research scope) and *reporting results* (communicating the outcome of the research to the public) were added to the SALSA procedure as the initial and last steps. Thereby, the PSALSAR method is an explicit and reproducible technique to undertake SLR, as it can help the researcher analyze both quantitative and qualitative content analysis. Correspondingly, Brown University Library (2021) claims that the key characteristics of the SLR are "clearly defined research questions with inclusion and exclusion criteria; rigorous and systematic search of the literature; critical appraisal of included studies; data extraction and management; analysis and interpretation of results; and report for publication". The University of Minnesota Libraries (2021) suggests to undertake similar steps for writing a systematic review of the literature.

Taking into consideration the above to have a thorough understanding of the challenges and drivers that SMEs face to transition from the LE to the CE, an in-depth literature review is carried out. Since there has not been a research before on the topic of Hungarian SMEs' challenges and opportunities towards the CE, SLR is particularly useful in the present study to recognize global trends and to subsequently test them whether the worldwide factors are relevant in the case of Hungary. The key words of "circular economy" + "SME" + "transition" with either "challenges", "drivers", "enablers", "barriers", "obstacles", or "opportunities" were searched on Google Scholar search engine and the CEU online library platform. In addition to the review of academic research literature, grey literature was also assessed to find reports of companies, think tanks, or research institutions.

3.2 Interviews with SME managers, CE experts, and the government

According to Miller and Crabtree (1992), "listening, along with seeing and touching, is one of the primary sources of information about the world" (194). Boyce and Neale (2006) pronounces that "in-depth interviewing is a qualitative research technique that involves conducting intensive individual interviews with a small number of respondents to explore their perspectives on a particular idea, program, or situation" (3). The authors assert that this research method is particularly useful when a researcher wants detailed information about the perspective of people and/or organizations. Thereby, interviews can help the researcher gain access to subtle data which can facilitate the research to provide a more complete picture of the respective topic(s).

The Wallace Foundation (2021) outlines the four stages of an in-depth interview, namely developing a sampling strategy, writing an in-depth interview guide, conducting the interviews, and analyzing the data. The first step entails of deciding whose attitudes and beliefs matter the most to a study, and how to find these people. Given the scope of the present research, the three stakeholder groups are 1) the SME managers who have to implement the circular changes first hand; 2) the government that should guide companies with policies and legislation; and 3) the scientific professionals studying, analyzing, and offering their expertise to the field. In the present research, this step is fulfilled with a representative group of study subjects (see section 3.3 for more detail). The further steps are also undertaken in the present study, as the questions were prepared in advance but questions were added and altered in real-time, enough respondents

accepted the invitation to the interviews that have taken place, and an analysis made sense of the findings.

According to Cassell and Symon (2004), sampling advantages of this method allows the researcher to have greater control over respondent selection, and hence, more depth, context, and flexibility in the process of inquiry. These aspects were particularly useful (as per discussed in more detail below in section 3.3), because only a few interviewees had to accept the invitation to have a lengthy conversation with the researcher; nevertheless, these discussions reveal several subtle but significant details about SMEs' operation thereby allowing to uncover the "real story from the people in the know" (Wallace Foundation 2021, 4).

Moreover, Hedges (1985) praises the methodology's *preferential outcome* for yielding depth and widespread information on the respective topic(s). Berent (1996) regards that it is due to two reasons: first, the respondent is allowed to reflect on the motivations of the researcher, and second, the unusual feeling of being listened with the potential anonymity afforded empowers the interviewee during the procedure. Webb (1995) further lists three specific preferential outcomes: 1) it makes it possible to build a high degree of trust between the researchers and the interviewee thereby improving the quality and increasing the quantity of the data which is highlighted by the Wallace Foundation (2021) as well; 2) it allows more precise interpretation by attributing the views to the individual interviewees; and 3) it enables "easier expression of non-conformity" (Stokes and Bergin 2006).

Nevertheless, in-depth interviews have a few limitations, as every other research design does. First, generalizations of the results usually cannot be made due to the small sample size and the selection of study subjects instead of the application of random sampling (Boyce and Neale 2006). However, in-depth interviews offer valuable information that can be assessed by further research involving a higher sample size. Nevertheless, Boyce and Neale (2006) emphasize that the sufficient sample size is reached when the same findings and themes emerge from the interviewees. Second, interview responses may be biased, because the interviewees seek to "prove" that a certain scheme works well; in addition, respondents with directly vested contact and interest to the topic could also be biased considering their stake and role (Boyce and Neale 2006). This disadvantage could be best addressed during the preparation stage for the interviews by preparing the questions ahead; thereby, structured interviews can help mitigate this drawback. Third, in-depth interviews can be time-intensive due to finding the proper sample, conducting the interviews themselves, as

well as transcribing, analyzing, and interpreting the results (Boyce and Neale 2006; Wallace Foundation 2021). This can be best addressed by starting to schedule the interviews in time and early thereby providing sufficient time for the other parts of the research to take place.

Considering the focus of the research, which is to learn about factors that either facilitate or prevent Hungarian SMEs' circular transition, in-depth interviews are deemed to be an appropriate methodology for exploration. Following the analysis of the takeaways from the SLR, structured in-depth interviews were organized for three target groups: managers of Hungarian SMEs, Hungarian CE experts, and the responsible Hungarian ministry related to the CE to gather qualitative data and to understand the circular transition of Hungarian firms. Contacts were made via three means of communication: telephone, email, and LinkedIn.

3.3 Data collection

First of all, it was deemed to be important to seek out the opinion of those who will have to face the challenges of the country's circular transition first hand, the owners and/or managers of businesses. They are the ones who will have to implement the changes coming with the transformation of the traditional business models, especially now that the Hungarian government has officially announced that the country's economy will be fully circular and digital by 2030 (Government of Hungary 2021), even though the majority of the populations does not know what the CE actually is (Torontáli 2021). Hungarian SMEs have been facing numerous challenges ever since MNCs gaining ground in Hungary since the 2004 enlargement of the EU (Hoványi 2004) and the expanding globalization (Árva *et al.* 2018). Thereby, businesses that are already occupied to stay afloat with the increasing competition and supply coming from across the border now have to transform their activities in accordance with the principles of the CE. Shifting their business models seems to add SMEs an additional burden, which is why it is significant to know and assess the difficulties lay SMEs currently face and will face in the near future.

Not every SME manager was familiar with the term of the 'circular economy', which was anticipated prior to beginning the study, thereby some questions were operationalized in various ways. For example, it was asked what kind of waste companies produce and how they could reduce, reuse, and recycle it within the company; whether firms sell byproducts generated during the manufacture of products to other entities; what needs to happen to make the supply chains more efficient in terms of reducing excess waste; and so on. Two SME managers have been in the network of the researcher, and they were contacted via telephone and indicated their willingness to take part in the study upon learning about its aim and objectives. Once the first two interviews were conducted, the snowball sampling technique was adopted by asking the first two interviewees whether they could help identify further subjects from among their network base built through their work. Both initial study participants showed inclination in this regard and were able to help recruit one-one additional study participants; once learning about the proclivity of the two additional SMEs to take part in the research, contacts were made via telephone. The fifth SME was also contacted via telephone after one of the interviewees telling a story about its activities. There was a sixth contact made with another SME, but the owner of the company was not interested in participating in the study. Out of the six SMEs contacted, five of them accepted the invitation to take part in the study. Out of the five SMEs involved in the research, four of them granted permission to record the interviews and to be named in the thesis.

Due to the improving COVID-19 situation in Hungary in May 2021, all interviews with the SME managers were conducted in-person at the sites of the companies while practicing COVID-19 precautionary measures. This allowed to have all five interviews lasting over one hour; the longest interview was almost two hours long. In case of the plastic package manufacturing companies, the interviews were followed by tours around the factory, which allowed to gain an even greater understanding of the production lines and supply chains of these firms. Table 1 below summarizes the most relevant information of the interviewed SMEs.

Name of the	Number of	Industry	Interviewed personnel	Length of the
company	employees		from the company	interview
	(approximately)			
Dekorátor Stúdió Kft.	10	Clothing	Owner & CEO	1h30m
Mark David Hungary	15	Plastic	Executive officer	1h15m
Műanyag Gyártó,				
Feldolgozó,				
Kereskedelmi Kft.				
Powear Gifts Korlátolt	7	Clothing	Co-owner & marketing	1h
Felelősségű Társaság			manager	

Table 1 – Company information (Source: Own elaboration)

Corporation A	8	Plastic	Owner & CEO	1h40m
Holofon Zrt.	50	Plastic	Administrative	1h20m
			Director	

Second, following the SLR indicating the significant role of the government in assisting SMEs to transform their activities towards the CE, it was deemed to be important to learn and analyze the position of the government in regards of the research aim and objectives. Therefore, an email was sent to the Hungarian Ministry for Innovation and Technology⁵ (henceforth: "MIT") to request an interview with a representative from the newly-founded CE department within the ministry, the Cabinet of State Secretary for the Development of the Circular Economy, Energy, and Climate Policy⁶. MIT requested the interview questions to be sent via email and answered thereafter thus the position of the government is also presented in the study. The ministry requested the respondent to remain anonymous, therefore the answer provided is treated as the viewpoint of the MIT.

Third, interviews were requested from three Hungarian CE experts via LinkedIn, email, and telephone. These interviews were planned to be last ones in order to see whether they confirm the findings from the SLR and the input received from the other two target groups. The researcher reached out to the three professionals after reading about the work they have done in regards of the CE; one of them indicated that he would not be able to add much thus declined the invitation for the interview, while the other two experts denoted their readiness to participate and to have a conversation about Hungarian SMEs' circular transition. Upon providing details about the scope of the present research, both experts approved the exchanges to be audio recorded, but one of them wished to remain anonymous.

Overall, a total number of 10 potential interviewees were contacted via email, telephone, or LinkedIn, and eight of these provided a positive response in regards of their participation in the study. The aim and objectives of the study were explained to each interviewee beforehand. Out of the eight interviewees, six of them provided consent to publish their names and affiliation, as well as the interview to be audio recorded; two interviewees requested to remain anonymous, one of

⁵ In Hungarian: Innovációs és Technológiai Minisztérium

⁶ In Hungarian: Körforgásos Gazdaság Fejlesztéséért, Energia- és Klímapolitikáért Felelős Államtitkári Kabinet

them also requesting not to record the conversation. Table 2 below summarizes the most relevant information of the conducted interviews.

#	Interviewee	Affiliation	Interview date(s)
1	László Cselle	Mark David Hungary Műanyag Gyártó,	03.18.2021. &
		Feldolgozó, Kereskedelmi Kft.	05.12.2021.
2	János Hartmayer	Dekorátor Stúdió Kft.	05.05.2021.
3	Ádám Balogh	PoWear Gifts Kft.	05.10.2021.
4	Interviewee #1	Corporation A	05.20.2021.
5	Interviewee #2	Cabinet of State Secretary for the Development of	06.01.2021.
		the Circular Economy, Energy, and Climate Policy	
		within the Ministry for Innovation and Technology	
6	Ádám Horváth	HOLOFON Műanyag Újrahasznosító,	06.02.2021.
		Alapanyaggyártó és Forgalmazó Zrt.	
7	Interviewee #3	CE Expert	06.02.2021.
8	Gábor Bartus	National Council for Sustainable Development ⁷	06.09.2021.

Table 2 – List of conducted interviews (Source: Own elaboration)

3.4 Limitations

Given the scope of this study, this research interviewed SME managers who were available for at least one hour to gain a thorough understanding of the company's activities, challenges, and circularity outlooks. This, however, yielded a few drawbacks that need to be addressed below. As per mentioned above, five in-depth interviews took place with people from managerial positions of SMEs, three plastic- and two textile-related businesses, respectively. While there are at least two interviews from both sectors, which aims to avoid presenting a single, deviant case, different industries and sectors can have different problems. Thereby, it may be inappropriate to bring the findings from the two industries under one umbrella and mix the takeaways, even though the results from the interviews are consistent with each other. Nevertheless, the following results and discussion section examines the results from both industries separately and together.

⁷ In Hungarian: Nemzeti Fenntartható Fejlődési Tanács

Furthermore, the five entities interviewed for this study are positioned differently in their respective supply chains. One of the textile companies is only associated with reselling products to other firms, while the other directly sells apparels to customers besides reselling. In case of the plastic package manufacturing companies, two of them exclusively makes plastic packaging materials for other entities, while the third one purchases and processes plastic waste to produce plastic granules to be sold to other entities. None of the companies is exclusively the last player in their respective supply chain prior to reaching the final user, the consumer. However, a common feature between these five companies is that there is another business between themselves and the end users.

Every research design has its trade-offs: an inherent weakness of the present research is that companies' position in the supply chain and sector of activity are not entirely consistent. This could have been prevented by keeping the number of interviews at one. Although even just a single interview could provide empirically-rich data and accuracy to the existing literature (Willis 2014), the present study aims to reach higher precision to demonstrate similar trends happening to diverse Hungarian SMEs. Overall, having five interviews with businesses from two sectors is more favorable than having conducted a single case study that lack external validity; thereby, the findings of a single case study could not be generalized, because the example of one sample could be an outlier, deviant case. Therefore, the generalizability of the study was increased by first having multiple structured, open-ended interviews conducted with Hungarian SMEs, then seeking the standpoint of the other two target groups, the experts and the Hungarian government, namely, to cross-check the data gathered from the SLR and the SME managers.

In addition, the limitations mentioned above have been offset by having structured interviews thereby all interview questions were prepared in advance and all SME managers were asked similar questions. They were asked similar and not the same questions because of the companies coming from different industries and being engaged in different activities (it was not considered appropriate to ask the same exact questions from a plastic manufacturing company and a business that resells clothes). However, the context and nature of the questions at each interview were the same: this research seeks to know and explain companies' establishment, activities, histories, and supply chains; what kind of material they work with; how they apply and could apply the 3-R initiative; what barriers and enablers they perceive to push their entities towards the realm of the CE; the opportunities companies see to reduce waste during the production process; how

they perceive the role of the government, other actors in their supply chains, and their own position to make their activities circular; and so on. Moreover, open-ended questions were posed during the interview, because the research pursues elaborate and thoughtful answers from the interviewees, and is interested in finding out whether the general patterns discovered during the SLE is relevant in the case of Hungary.

Last but not least, another limitation of the present thesis is that only English and Hungarian studies were reviewed when conducting the SLR due to language barriers; however, it is safe to assume that there are more papers written around the topic in different languages, especially in developing countries. Even though the present research aimed at including as diverse cases as possible, the lack of non-English and non-Hungarian sources essentially leads to the fact that there is a limited amount of studies from certain regions, e.g. there is only one study from Africa; there are not any studies found from North America nor from the Middle East. Moreover, besides three literature reviews coming from mixed regions, there are only 14 studies from out of Europe. Therefore, the results of the SLR are tilted towards overrepresenting European SMEs' perspectives in terms of their circular transition.

4. Results and discussion

4.1 Company profiles

Dekorátor Stúdió Kft.

Dekorátor Stúdió Korlátolt Felelősségű Társaság (henceforth: 'Dekorátor') is a firm in the clothing industry. It was established right after the fall of the Soviet Union, and started its activities in the events industry. Specifically, the company was making decorative material, mostly signboards, to decorate events. At this time, the company only had two employees and hired external workforce when there was a great deal of work overload.

The company changed its activities in the late-90's and began its current endeavor. The intuition to change the main focus of the company towards the design of clothing arose from the family of the head of the firm previously working in embroidery; in addition to embroidery, the company added screen printing to its portfolio, as well as the production of personalized labels. Until 2005, the company was thriving by constantly working with 100-120 Hungarian fashion designer brands and considered expanding its business. However, the customers of Dekorátor were not able to keep up with the supply of the incoming MNCs on the fashion market such as H&M or C&A.

Due to the appearance of fashion conglomerates on the Hungarian market, Dekorátor lost approximately 90% of its customers within a year thus had to rethink its activities and find new markets for its expertise. After finding success in another job while keeping the business afloat, Dekorátor decided to apply its knowledge and experience to design logos for other companies' promotional products and workwear clothing from 2008 onwards. However, when the financial crisis of 2007-08 reached Hungary, the firm had to face the dire consequences of the global market once again. The first thing most companies had to cut back was from the PR budget thereby the number of orders kept decreasing until the firm was able to stabilize and reset itself. The past decade after the financial crisis went peacefully and brought steady increase with a peak year in 2019 when the COVID-19 pandemic slashed its revenues. Things have started to look up at the end of 2020, but the new wave(s) of pandemic and the market volatility are constant uncertainty factors. Nowadays, the products of Dekorátor are sold both directly to customers and through resellers. The biggest obstacle the company faced in the past decade was the lack of adequate workforce, but they did not want to move to the rural areas of Hungary because of feeling responsible for its staff and being afraid of losing some of their customers.

The company receives several components from various places to produce the final products: 1) the pieces of clothes from several whole distributors throughout Europe and Hungary (the textile material is, however, from the Far East); 2) water-based printing paste from the same European company over the past three decades; 3) material for digital transfer printing and screen printing; 4) embroidery machines from Germany or Asia (China, Japan, or South Korea); and 6) embroidery thread from European suppliers.

Mark David Hungary Műanyag Gyártó, Feldolgozó, Kereskedelmi Kft.

Mark David Hungary Műanyag Gyártó, Feldolgozó, Kereskedelmi Korlátolt Felelősségű Társaság (henceforth: 'MDH Kft.') specializes in the manufacture of plastic packaging for products, primarily cosmetics, pharmaceuticals, household chemicals, and food products. Essentially, the company creates an *added value*; MDH Kft. sells plastic packages to its customers who then fill these up with their primary products.

MDH Kft. was also established around the time Hungary gained independence at the beginning of the 1990's. The company, as well as the whole plastic package manufacturing market, has gone through multiple ups and downs and significant transformation in the past three decades, especially around 2007. Until then, small companies like MDH Kft. used to create products for several MNCs; however, MNCs developed their own plastic packaging factories in the meantime. MDH Kft. is a victim of this occurrence: the firm used to make the plastic packaging to Colgate and Palmolive, and yet these enterprises moved their plastic production to their headquarters in Italy once their own plastic packaging factories were built. Now that they lost the big fish, MDH Kft. has been mostly creating plastic packaging to smaller Hungarian enterprises. Up until MDH Kft. lost its biggest clients, stable, permanent, predictable, and transparent order stocks characterized its market; however, the termination of these large customers has changed everything in 2007, and the company had to restructure its activities and settle for a lot of smaller and less stable orders. Then things got more difficult during the financial crisis, which the company felt on the very first days on its own skin. While they were able to stabilize themselves and to get used to the new market conditions, constant fluctuations and the unpredictable future make their activities much more challenging.

The supply chain and the life cycle of plastic starts with 'MOL Petrolkémia Zrt.' (henceforth: 'MOL') and other suppliers using oil and other components needed to create plastic granule formats. Besides the virgin plastic granules, they also purchase coloring material (these are also plastic granules, but they contain pigments) from other suppliers. There is no further additive thus MDH Kft. mixes the two types of plastic granules and blows bottles or other shapes out of the raw materials with heavy machineries to produce plastic packaging in accordance with its customers' expectations. Afterwards, the customers of MDH Kft. purchase the plastic packages, fill them with their products, and throw them on the market in the end.

One of the most important difficulties of MDH Kft. is the constant commodity price fluctuations. The suppliers, seemingly in a coordinated manner, randomly change the value of plastic granules from time to time; the explanations behind sudden price changes are usually the variation of oil price, the demand-supply side (for example, vast amount of Eastern acquisitions can increase the cost from one day to another) or some other reason, but the plastic manufacturing companies never know the real factor(s) driving the price instability.

PoWear Gifts Kft.

Powear Gifts Korlátolt Felelősségű Társaság (henceforth: 'PoWear') is a firm in the textile industry and was built from the ashes of a company that the financial crisis of 2007-08 swept away. Since the owners of the previous company knew the ins and outs of the market, they decided to save whatever they can (this mostly meant their customer base and suppliers) and establish a new entity in the same sector in small steps; this has led to PoWear recently celebrating its 10th birthday. The company is a wholesale for work and promotional clothing and works exclusively with resellers; thereby, the firm does not create additional competition in the market for themselves and for their clients by trying to undercut the prices of their potential competition to better reach end users. Not mixing their customer base with competition was entirely an ethical decision to earn the trust of their clients and to have smooth operations in the supply chain.

The company receives its supply from Western European warehouses where they store the products in large quantities, but none of the products are made in Europe. They are usually made in Bangladesh, Pakistan, Myanmar, and China, because the textile industry almost completely disappeared in Europe with the exception of Italy and France. The sector was doing well in Hungary, however, the regime change in the '90s, the appearance of the MNCs, and the financial

crisis in the late '00s were the three main nails in the coffin of the Hungarian textile industry.

Overall, the supply chain has five steps until the final product reaches the customers. The products are made in the Far East on demand in quantities of 10s or 100s of containers, which are then transported to Western European warehouses stored by large European companies. Following the products getting to European storage facilities, these businesses distribute their products through entities like PoWear and other smaller firms. These entities order products from the Western European warehouses, which usually get to Hungary (or elsewhere in Europe) within three to four working days. Once the products are within the borders of the country, PoWear passes on the products to resellers, who then sell clothes to the end users in the end. The textile industry is a bit difficult to navigate in at first, because vast amount of quantities needs to be produced due to varying colors and sizes to satisfy customer needs. This is why distributors like PoWear has to get their products from larger Western European firms that have large storage capacities.

Corporation A

Corporation A started as a family business in the 1980's in the form of a plastic processing company. At the time, there was a lack of plastic packaging material in Hungary thus the government collaborated with entities to fill the void. Having owned a foil blowing extruder machine, Corporation A was exporting packaging material abroad but continued its business within the Hungarian borders after having to work for the producer cooperative (in Hungarian: "termelőszövetkezet" or "TSZ")⁸. The producer cooperative paid all the expenses entailing the production of packaging material from wages to the purchase of raw materials thereby Corporation A only had to worry about producing the orders on time. The regime change in the Soviet Union meant the liquidation of many companies similar to Corporation A, which is why the firm continued its business as a sole proprietor to build its own market and to work as a reseller. Due to the huge and increasing demand from plastic packaging companies, the managers of PP. Kft. did not have to bother much about the logistics of the firm, because their customers simultaneously brought the raw material and the market with themselves. This went on until the mid-90s, when

⁸ After the Second World War, collectivization in Hungary was carried out in several waves, following the Soviet model; it aimed to dismantle the large landed estate system and to reorganize agricultural production in the framework of agricultural cooperatives and producer cooperative groups (in common parlance, TSz or TSZCS), or state-owned farming organizations, state farms.

the incoming MNCs squeezed out Hungarian firms, thus Corporation A has been working for large businesses ever since then.

Even though a well-timed advertisement on Google aided the company to get ahead of its market competitors and grow during the years following the financial crisis of 2007-2008, the owner of Corporation A firmly believes the best marketing is to have their customers recommending the services of Corporation A to the next. Thereby, the firm always strives to have flawless goods completed on time and transparent and open communication with its customers. Even during the coronavirus pandemic, when many companies had to cut their costs due to diminishing demand, Corporation A has been able to keep its customer base.

The biggest problem the company continuously faces is the shortage of people, specifically manual labor. The owner of the firm thinks it is not just an issue for Corporation A but an issue that may paralyze Hungary in the near future. According to his opinion, Western European countries from the EU were able to resolve this issue within their borders by enticing Eastern European workers with higher wages. Manufacturing work is mundane and requires people who can tolerate monotony, because most people quickly get bored. In addition, these workers earn the least, because the final player in the supply chain prior to the end uses gets most of the profit. While some of the activities in the production line of plastic packaging can be automated, currently there is not a technology to arrange, seal, and store the final products. What makes the staff shortage even more urgent is that the plastic producing machines must be operated at all times; it would take an hour or so for these machines to heat up, as well as a lot more energy when turning them on. The owner of Corporation A is concerned that there will be no people to undertake these positions soon, because these jobs have been getting less and less appreciation from society. Nevertheless, jobs from the manufacturing and industry sector are the ones that actually produce *something* that people always need and run the economies.

The supply chain starts with purchasing polyethylene (PE) granules either originally from the producers (e.g. MOL) or from traders who sell the material on a slightly higher price in various quantities. Due to the increasing and fluctuating price of virgin plastic granules, the company aims to purchase more recycled plastic granules. While the quality of the recycled plastic granules is worse because of its color and pollution than virgin plastic granules' characteristics, plastic packaging for industrial purpose does not require excellent material purity as opposed to food or cosmetics packaging. Another way to get their hands on plastic granules is to recycle the plastic thrown away *in-house*; for example, the company granulates the accidentally created plastic products that cannot be sold. The company processes the waste generated during production, using recycled regrind as much as possible in the manufacture of new products. This is mixed with the original, virgin granules as required by the customer. Of course, when calculating the mixing ratios, Corporation A always make sure that the quality of the product is not affected. The firm does not use hazardous materials in the production and recycling processes and ensures that no hazardous waste is generated. Next, the packaging can proceed in the form of 1) plastic sheets being rolled up on wooden cylinders to wrap other products or 2) final products being tailored by the needs of the customers. 50% of the production is made up for bags, sacks and other packaging, and the remaining 50% is sold as plastic bags, foil hoses, and plastic pouches. The company can adapt the finished products to the needs of their customers in many aspects: they can choose the width and thickness, as well as request certain products in color or in printed version. Since the producers of goods make less money if there are more players in the supply chain, Corporation A tries to keep their supply chain as short as possible.

HOLOFON Zrt.

HOLOFON Műanyag Újrahasznosító, Alapanyaggyártó és Forgalmazó Zártkörűen Működő Részvénytársaság (henceforth: 'Holofon') has started producing plastic granules since 1999, the raw material that finished product manufacturers can use. The company takes over the waste coming various streams, thereby the company relies on three sources. First, there are the industry partners who are either traders that generate waste in the course of trading, waste handlers, or manufacturers that accidentally generate manufacturing scrap; roughly 80% of their sourcing comes from this origin. The second group is the plastic waste that they take or buy from public service providers. Public service providers collect and sort the selective waste, and Holofon purchases a certain fraction of it, the so-called high-density polyethylene (HDPE) bottles, the classic shampoo and shower gel bottles. Finally, the third branch is the private suppliers; these are people who generate or find and collect different kinds of plastic waste, and Holofon purchases it from them. *Figure 6* below displays one of the two sites of Holofon, where the company collects, grinds, washes, and liquifies the incoming plastic waste which later becomes plastic granules.



Figure 6 – Holofon's site at Annavölgy (Source: Holofon 2021)

The difference between the granules produced by MOL and Holofon is that the products of MOL are original, virgin granules and primary petroleum derivatives that are suitable for any kind of purposes. On the other hand, the granules produced by Holofon are the recyclates of the product made from the original granules.

The plastic waste collected from the three waste streams is grinded and washed, then homogenized and granulated. The end of the granulation process is the so-called regranulate, which is packaged and sold to other firms to create new plastic products thus Holofon's contribution to new goods is providing the raw material for them. The regranulates are sold to companies engaged in creating corrugated pipes, optical fiber cable tubes, car number plate makers, DVD cases, and so on. Essentially, anyone can purchase the product of Holofon unless it is a food/beverage-related industry, or equipment that comes into contact with the mouth area, because Holofon is not certified for that.

The biggest market advantage of the company is that they can easily adapt to the processing of small series waste (30-50 tons). In contrast, there are companies that have automated their equipment to process larger amounts of plastic material, allowing them to regranulate at a much faster rate and with fewer people; however, if their products are not needed by anyone, they can go bankrupt quickly. Examples include disposable plastic companies, which may be in trouble as the government bans the distribution of single-use plastic products. Overall, it is advisable to diversify a company's activities, so that it can handle more types of materials and smaller quantities, which in turn is much more human-intensive.

Until 2008, the company was selling its products 90% domestically. However, a lot of local small firms went bankrupt around that time as a result of the financial crisis. After that, the company's foreign sales increased dramatically, with roughly two-thirds of their production going overseas until 2016. Since then, domestic demand for products has increased again, accounting for roughly two-thirds of its revenue and activity. Since the regranulate market is extremely price sensitive, it is not worth for the company to take its products far beyond the surrounding countries.

Most of the waste generated on the site of Holofon is the outcome of inadequate selective waste treatment of the public service providers. As per mentioned above, the plastic waste processing company heavily relies on the bottles made of polypropylene (PP) and HDPE collected and arranged by public service providers. These waste products are grinded by Holofon and then washed; the company does so, because these bottles contain contaminants inside and outside and the selection by the public service provider is not 100% accurate. Therefore, the company receives plastic waste that are not made of PP or HDP, and this is not even a small fraction: roughly 20-30% of the total plastic waste obtained, which is around 300-400 tons of secondary waste generated at the company's site in one year. Upon washing, the secondary plastic waste sits at the bottom of the sink, which is then taken to an incinerator to produce electricity out of it sooner or later. Besides through a sieve cloth which filters out any residual impurities e.g. aluminum. These screens need to be replaced over time, and used filters cannot be reused and have to be thrown away.

4.2 How companies operate in accordance with the 3-R principle

Prior to introducing and discussing which barriers and enablers the interviewees regard the most important factors for Hungarian SMEs to transition from the LE to the CE, interviewed companies' current activities are observed through circular lenses as well as their technical concerns on how to achieve better natural resource management. This allows the researcher and the reader to learn how some of the activities of these firms are already in line with the principles of the CE, even though some of the SME managers do not know what the CE actually is. This emphasizes a few points in regards of people's perception of the CE. First, the CE is not a

revolutionary economic model that governments, businesses, and other stakeholders have recently come up with. Second, the fact that some of these SMEs have been engaged in circular activities without knowing it reaffirms that businesses have always been interested in reducing waste and raw material use at all levels of their supply chain. Third, SMEs' engagement in waste reduction and application of circular practices is not purely out of environmental interests but rather economic reasons to cut costs.

Below, this section presents how companies practice the first two Rs of the 3-R principle, reduce and reuse. The third R, recycling, is not introduced below in detail, because only MDH Kft. and Corporation A recycle the recyclable waste generated during the production of their plastic products on their site. Essentially, excess plastic waste generated at the factory is grinded to recycle, because the companies want to turn everything into money. In addition, companies' stance on making the supply chain circular is also discussed.

4.2.1 Keeping the waste generated at the companies' factories at the minimum

MDH Kft. generates a minimal amount of waste, and it only occurs when mixing of different substances. They insert various polymers into their machineries to make products, but it is difficult, if not impossible, to get all the raw material out of the machines from previous production lines. For example, the company uses PE to make one product but has to use PP to make another in the same machine. It is not possible to completely use up the earlier material from the machine and for the materials to not encounter with one another. They, however, do not throw away the generated plastic waste, because there are plastic waste processing companies, for example, Holofon, specifically looking for these kinds of plastic scraps to generate plastic regranulates, in which the mixed polymers do not cause quality problems, because the plastic processing companies organically formed a long time ago because of the win-win scenario: the plastic processing companies help MDH Kft. to take care of the unintentionally created waste while obtaining the needed material on a lower price or for free. Mr. Cselle welcomes this, because his company does not have to fuss about disposing waste and seldom receives financial remuneration.

Even though it was not an entirely environmentally conscious decision from the SME managers, economic reasons pushed MDH Kft. and other plastic processing companies to engage

in IS. The excess waste that the one firm cannot handle anymore further becomes the raw material of another, essentially reducing both companies' impact on natural resources. At this point, it does not necessarily matter whether there were environmental or economic motives behind initiating the collaboration between these entities, both sides' reduction of natural resource use is what should be noteworthy from this relationship that are mutually beneficial for everyone.

Dekorátor stores the leftover paint mixture from previous works to reuse it in later projects where the same hue is needed, but it is often difficult to effectively organize the surplus material. The company tried to organize excess paint based on customers, color shade, or on other variants, but they can quickly run out of space when the shelves are overloaded, and it is impossible to see what kind of paint is at the inner parts of shelves thus they have to get rid of paint from time to time. In other words, Dekorátor tries to make sure that leftover printing paste does not go to waste, because that is money wasted away. Thereby, they are aware that a more efficient production would entail reduced costs, but unsure whether the invested time bothering with these subtle activities is actually worth it for the company rather than using this time at another part of the production section.

Another waste stream of Dekorátor originates from the application of digital printing the desired image on a special foil (the carrier), which is cropped after a preset shape, and then applied on the clothing item by hot pressing. This carrier is called vetex, which is a thin, synthetic, nonelastic white stiffening material that gives the garment a stronger hold with adhesive on one side. Screen printing is the same methodology with the difference that the (leftover) carrier material is paper instead of plastic. Nevertheless, the used-up foils end up in trash in both instances. The leftover foils could possibly be collected by the producer(s) if it were organized, however, they are not interested in reusing and reprocessing the leftover material. They are unsure whether investing their time into collecting, arranging, and reusing these materials is actually worth the time to do rather than expending their time on the regular activities of the production line. In short, it may not make economic sense to spend working hours on these manners rather than throwing away.

In regards of PoWear, the company creates the least amount of waste out of the interviewed firms, because the firm simply transmits the products to the next actors, the resellers, in the supply chain. Once the products get to Hungary, they need to sort out the products to send them to their customers, but PoWear uses the same cardboard boxes and plastic packaging that the clothes arrive to them at the first place for two reasons: environmental protection and economic factors. The

company does not want to create excess waste by throwing away usable packaging due to their environmentally conscious behavior, but it also does not want to spend extra money on unnecessary wrapping materials due to their intention to cut costs wherever possible. Nevertheless, the company's activities do not entail a significant amount waste and the existing excess waste is passed on to their resellers.

Overall, waste generation is neither a goal nor a good thing for a company. In doing so, everyone strives to reduce waste. This section reveals that it is not in the interest of companies to dump all their garbage as communal waste for two reasons: 1) they can receive money for it (for example, Holofon buys waste from another company for money); and 2) it is better for the company to turn their waste into money. Mr. Cselle emphasizes this point by stating that "waste production is the lowest among manufacturers. This is a hard-economic interest." Indeed, manufacturers do not need to be motivated to reduce waste generation by environmental conscious behavior, because it is out of entrepreneurs' pockets if waste is produced unnecessarily. It is always their primary consideration to produce the least amount of waste and scrap, because that would be wasted money. As economic organizations, firms have always made sure to keep their waste production at the lowest level possible; they grind back and reuse every piece of material they can. Even though the reduction of waste is not necessarily because of an environmental conscious directive, SMEs do everything they can to keep the waste generated during manufacture at the lowest level possible.

4.2.2 How companies reuse materials during the manufacturing processes

Dekorátor usually purchases the water-based printing paste, one of its supply for manufacture, in bulks of 30 kg barrels, which used to be recollected by their supplier. These hermetically-sealed barrels were always retrieved from Dekorátor thus they did not have to worry about the barrels' cleaning and storing procedures. However, when a new owner took over the company, this scheme changed. The printing paste supplier redesigned its supply from the 30 kg barrels to 20 kg buckets; both of these containers are made out of plastic, but the barrels were difficult and uncomfortable to transport. In addition, the 20 kg buckets were also more user-friendly, because the employees of Dekorátor were easily able to squeeze out all the paste material from the bottom of the buckets rather than being covered in paint up to the neck. However, the supplier did not take back the 20 kg buckets because it was not worth for the company due to
having the buckets designed for single-use only; the bucket walls were thin thereby they were easily damaged and not intended for continuous reuse. After some time, the company actually switched back to the allocation of 30 kg barrels, because it was more work and time for them to fill up the 20 kg buckets. Furthermore, they saved more money on having the 30 kb barrels collected, cleaned, and reused rather than having the 20 kg buckets designed for single-use. Last but not least, continuously passing on the extra fee of the buckets onto the buyers might have cost the company losing some of its customers, which is why they are back to collecting and reusing the barrels.

While the owner of the Corporation A is unaware of what the CE is, there are circular aspects in his firm's operation. For example, when plastic rolls are sold to other businesses, plastic is rolled up on wooden cylinders varying in their width, length, and weight. Initially, customers threw away the wooden cylinders, but once Corporation A began its deposit-refund system (DFS) for 800 Ft/kg of the shapes, every cylinder has been returned since then. The owner of Corporation A considers that this type of scheme can work on its own by having people becoming economic stakeholders, stating that "if it is not worth it, nobody bothers to change their habits... people will not change until they see the financial implications."

4.2.3 Concerns around reaching the circular supply chain

Currently, plastic recycling essentially faces the issue of 'golden oldies': the purity challenge of this high-volume recyclates. Additionally, a linear lock-in phenomenon characterizes the supply chain in which MDH Kft. is currently situated. Mr. Cselle says that the end-of-life treatment responsibility of the plastic products should fall onto their buyers, because they buy the products from them, consequently the ownership and the responsibility over plastic. MDH Kft. feels squeezed between the big players to experiment with sustainability. On the one side, there is MOL creating plastic itself, the price of which depends on the price of oil and other resources; on the other side, the buyer that wants to have top-quality plastic packages on the lowest cost possible (Bajnóczki 2021).

Regarding making the supply chain of plastic products circular, for example, by reusing plastic bottles, interviewees indicated that they are worried that many people may refuse to purchase a bottle that was used by several others beforehand due to their overestimated hygienic expectations and skepticism about the cleaning procedure. For example, in the case of single-use

plastic bottles for drinking, according to Mr. Cselle, it requires a well-designed promotion to make people believe that they do not need to worry about numerous people drinking out of the same bottle beforehand and to have them accept the new procedure and be on board with it. In addition, the cleaning of plastic bottles may impact the environment in a more harmful manner through excessive water and chemical use than simply having them floating in our oceans and breaking down into microplastic.

In terms of reusing thrown away textile materials and making the supply chain circular, the main issue is that the production and the sale happen at two distinct points of the world, the Far East and Europe, respectively. Mr. Balogh agrees that it would indeed be great if the wasted fabric from Europe could go back to the Far East and be remanufactured or reused for other products. As a result of the diverging locations of production and waste generation, this entails such a high logistic cost as of right now thus it is not worth for anyone to bother with this procedure.

4.3 Factors hindering and paving the circular road forward

In the section below, the main factors influencing SMEs circular transition are presented and discussed. From the interviews, it seems that a factor mentioned by any of the interviewees is perceived both as a barrier and an enabler. In other words, the presence of a barrier can be best tackled with the improvement of the very same element. To put this simply, the lack of financial support can be best addressed by increasing the amount of monetary aid to businesses. There are, however, some factors that can be addressed in different ways. For example, many SMEs assert that they are unable to transition towards the realm of the CE, because they are stuck in a linear supply chain and respond to market demands. This can be changed by multiple ways. First, ecofriendly products are currently more expensive on the market, which is why many consumers are discouraged to purchase these. This, however, can be altered if the final price of products would depict the scarcity of natural resources and externalities (see more on this in section 4.3.1). Second, consumer behavior could also be changed by capacity building and awareness raising of the public as per discussed in more detail below in section 4.3.6.

4.3.1 Role of the government

When asked about the role of the government, the head of Dekorátor considers that holding onto old habits deters them and others from reaching out for public assistance. Instead of public

CEU eTD Collection

officials being helpful, they rather sound threatening when it comes to implementing governmental procedures. The marketing manager of PoWear indicates that financial support from the government would help the company acquire their own site instead of renting it. Similarly, Interviewee #1 remarks the role the government in helping firms reducing, reusing, or recycling their material use, as he believes that public officials should implement monetary policies to incentivize companies by underlining his point that "many people can achieve anything for money... must be worth it for everyone, because everyone is motivated by the material cost of things." When asked about public official's role in the circular transition of the country, Mr. Cselle argues that the state is inevitable on this issue, because it is the government that collects the taxes. He adds that "policymakers can determine extra fees that are not production or commercial-related costs. Now, there are environmental product taxes, waste recycling fees... which could protect the environment. The application, implementation, and execution of these should be a matter for the state with the obvious involvement of experts."

In accordance with the words of Mr. Cselle, the two interviewed CE experts also emphasize that the rules of the game need to change in order to have a serious conversation about environmental protection and resource management. If the scarcity of natural resources was systematically built into the economic systems and the price of externality appeared from natural resource extraction, then the supply chain would automatically change regardless of whether the respective company is at the beginning, middle, or end of the supply chain, because the pay for fixing externalities would affect every player in the supply chain. General economic norms, incentives, different type of taxes, or cost-incorporating solutions would be suitable, because the scarcity of natural resources is reflected in the prices. Therefore, everyone would be forced to adjust to the new relative price conditions in the supply chain at the same time.

The interviewees from the plastic package producing firms reveal that regranulates are more expensive than natural, virgin granules on the polyethylene terephthalate (PET) line, because they are worth more for the manufacturer to write on its product that the finished product is made of a certain percent of recycled plastic. This illustrates well how skewed and disoriented the PET granule market has become, as the price of a material (PET regranulate) increased, because it has recently become trendy, even though the use of it would help restore balance in our natural resources. In short, it is cheaper to create new products than to bother collecting, cleaning, and redistributing plastic products. Currently, eco-products are more expensive because these items depict the true cost including the externalities. On the other hand, the price of non-eco-friendly products excludes the environmental impact entailed during the manufacture, and there are no external costs involved in their price. However, as soon as external costs would be included in the prices, customer habits would change immediately, because it would turn out that a more environmentally friendly solution is not the more expensive option. Regardless of involving or excluding the externality cost in the price, Interviewee #3 asserts that regular customers should not be put in the position of choosing between the currently more expensive eco-friendly product and the cheaper but more harmful items to the environment.

4.3.1.1 Lack of government aid

In terms of governmental programs to reduce waste and increase resource efficiency announced by the government, the interviewed companies are unaware of any. The only environmental tenders that these firms come across are renewable energy submissions to install solar panels. Some of the interviewed companies have been renting their factories and sites thereby the owner of the property should be the one applying for these opportunities. In other cases, even though the price of renewable energy production has been decreasing and energy-efficient machines would entail lowering the monthly electricity bill, the financially squeezed SMEs cannot allow themselves to direct their profit towards these practices when they are in a day-to-day struggle to stay afloat. Otherwise, firms are not financially motivated in investing to operate their machines on renewable energy, or buying energy-efficient and electric machines. Overall, return on investment takes too much time, which is why it is simply not worth it for anyone to go down on the renewable energy production path.

Looking into the future, Mr. Cselle hopes that government will help them by *not interfering* in the market at all and have *laissez-faire* market. Governmental measures have been making it harder for MDH Kft. to keep up with the industry. The implementation of the Rural Development Program⁹ meant that by having based in Budapest, MDH Kft. falls out of most of the governmental development aid. "Before the fall of the Soviet Union, a centralized supply-chain was preferred with Budapest being in the centre, especially with the notable influence of Csepel Művek… Now

⁹ Vidékfejlesztési Program

the government, probably understandably, wants to develop the previously underdeveloped areas of the country, thereby decentralizing the supply-chain of production" (Cselle pers.comm.).

Similarly, the other interviewed companies have not been getting much support from the government either. They are aware of financial support mostly going towards the rural areas of Hungary because of the government taking most of taxpayers' money to the developing regions of the country. Most of the tenders exclude companies from Budapest and Pest county thus they cannot even apply for grants to modernize their businesses. Overall, financial support from the government in the area of Budapest and Pest country almost ceased in the past decade.

On the other hand, the perspective of SME managers collides with the stance of Dr Bartus on the matter of government aid. He finds that Hungary is a relatively large redistributive country, where there is a fairly strong political consensus behind the redistribution of taxpayers' money. The political competition and conversation are about who would spend the redistributable amount for what, but no one questions the redistributable amount being reduced and whether there is a need for the state to redistribute half of the national income. Whatever investment is made in Hungary today, there is usually taxpayers' money tied to it, and people take that for granted.

Consequently, the state redistributing half of the national income is on everyone's mind. Dr Bartus adds that companies can say that they only do something if the state opens calls for environmental tenders. In the same time, the mindset of companies is understandable that they will not build a new infrastructure without the government allocating taxpayers' money into the project(s). According to Dr Bartus, this leads to a distorted economic thinking. It is a Hungarian problem that the economy must be state-centered thus the development of the CE can only be imagined by many actors through governmental redistribution of taxpayers' money, although, economic rationality says that this should be solved by restructuring taxes and prices (Bartus pers.comm.). For example, more taxes should be levied on the extraction of natural resources.

In contrast of Dr Bartus' proposal, Interviewee #2 reveals that the government seeks to assist SMEs by several waste management tenders instead of a new overarching tax scheme. According to Dr Bartus, the problem with tenders and grants is that they only work as long as the program is running, and they will only affect those who will be the winners of that particular competition and everyone else will not be affected. He adds that "taxing pollution is always more effective in solving an environmental problem than by supporting non-polluters. This is a basic truth in environmental economics."

4.3.1.2 The worsening condition of public service providers

Public service providers have been undergoing continuous transformation since the early-2010s. According to Mr. Horváth, the classic public service activity is a loss-making occupation and does not operate without the adequate state support. Although there are plenty of public utilities, the interviewees from the plastic industry believe that they cannot and should not be managed under the current scheme from a central location like the National Waste Management Coordinator and Trustee (NHKV)¹⁰, considering that there are many problems with it: the provided information is often inaccurate, it is very weak in terms of information technology, there are no serious investments, and waste transportation fees are frozen due to the overhead reduction. Garbage collection from people's homes is extremely expensive and not financially worth it. A similar approach to the West could help solve the issues around waste management, where selective waste collection is for free, while municipal waste collection is very expensive; this would encourage people to selectively collect their garbage and to produce less waste altogether. Overall, public utilities are not in a good position at all due to the continuously changing systems.

Indeed, the organization and supervision of waste and waste management is frequently transferred to another place at the highest level in the government; a ministry was established to manage it, then the National Waste Management Agency¹¹ was established and abolished, and now it has been with the MIT. Overall, the complete Hungarian waste management industry has been approached in three completely different systems in the last 10 years. And when the population had almost learned what to do, they smashed that system and invented another one.

According to Mr. Horváth, the improvement of public service providers' waste trash selection could help plastic waste processing companies avoid creating excess debris at their sites. In Hungary, waste selection takes place in either manual or automated manners. The latter is a technology in which the mixed selective waste is sorted by a machine into different material streams. The quality of this method is much better, but it costs more and is not yet widespread in Hungary (currently, there are two such sites in the country with the third one being built now in Budapest). Obviously, there are human shortcomings in the former approach, however, neither approach can work with 100% accuracy.

¹⁰ In Hungarian: Nemzeti Hulladékgazdálkodási Koordináló és Vagyonkezelő Zártkörűen Működő Részvénytársaság (NHKV Zrt.)

¹¹ In Hungarian: Országos Hulladékgazdálkodási Ügynökség (OHÜ)

The government seems to be aware of the unsustainable condition of public service providers and plans to improve the current system. Interviewee #2 asserts that the new model of the waste management system requires the development of infrastructure in the field of waste collection and management. The purpose of the relevant provisions is to ensure that waste management services are accessible to everyone, and that all waste streams affected by the obligation are returned to the treatment system. As a result of the waste system improvement, MIT strives to introduce innovative and modern solutions wherever possible. In addition, the interviewee emphasizes the Recovery and Resilience Facility as a crucial monetary source from the EU to assist the progress of public service providers. Within the framework, it is expected to have EU resources available towards funding the country's transition to the CE, especially in the field of public waste management services. Overall, the government seeks to develop a waste management infrastructure that ensures the efficient use of state aid and increases the competitiveness of the waste management sector.

4.3.1.3 Issues beyond the applicability of the CE

Mr. Cselle hopes that the government would support enterprises moving towards sustainable technological solutions; he would like to see the role of government positively pushing enterprises toward eco-friendly solutions. He adds that the company pays a relatively high, 54-60 forint ($\in 0,15-0,16$)/kg environmental protection tax upon their production, but neither sees nor knows whether this money is funneled after it leaves the company's account. Mr. Cselle wants to know why this money is not directed towards environmental protection if it is paid towards that cause. However, there is neither transparency nor communication from the side of the government (Bajnóczki 2021).

The tokenistic approach applied by the government when it comes to engaging with companies is echoed by another interviewed firm in the plastic industry. Mr. Horváth asserts that prior to the concession procedure, the government held a consultation with companies like his firm. However, public officials simply ordered the respective firms to the consultation meeting to discuss waste management matters, where the government announced what was going to happen and asked the companies to sign the attendance sheet. He adds that even though his company maintains close and good relations with advocacy bodies, the voice of these organizations is not

considered by the state either. Last but not least, Mr. Horváth recalls the ÖKOINDUSTRIA event¹² from a few years ago, when policymakers from the state reached out to companies asking the main challenges about waste management, however, the government has yet to follow up with any of the respondents how their input has been taken into consideration when developing domestic waste policies.

While discussing the matters of stakeholder engagement and government transparency are beyond the scope of the present study, practicing these should be very much connected to the government's approach to engage with SMEs if public officials want to be serious about the country's circular transition. Nevertheless, the actions of the government experienced by the interviewees say otherwise. These instances demonstrate the lack of communication and transparency to the public from public bodies; while the conceptualization of government engagement and transparency vary from country to country, this sort of consultations are more analogous to announcing a pre-determined directive rather than engaging in meaningful conversations with businesses.

4.3.2 The power of the consumer and the market

While it was easy for Corporation A to implement the DFS for the wooden cylinders into its supply chain, the owner of the firm does not believe that it would work for everyday people. Coming with over three decades of experience in plastic manufacturing, he is not concerned about the recent anti-plastic campaigns to ban straws or utensils, because these articles are a tiny fraction of the overall plastic pollution throughout the globe. While these campaign slogans may sound green and can get customers to buy from companies advertising themselves as anti-plastic, the current trends will unlikely to do any harm to businesses like Corporation A or MDH Kft. The owner of Corporation A is not afraid of plastic disappearing from our lives, because plastic has become an integral part of it. He adds that life would become inconvenient and does not believe many people would go back to washing and returning their empty bottles, because "… people have become too comfortable and want to live their lives in the most convenient way possible."

While the design phase of the production would be able to reduce much of the waste created, buyer demands dictate how plastic products need to be manufactured. However, when

¹² ÖKOINDUSTRIA is an annual international exhibition of environment, energy efficiency, and renewable energy sources.

attempting to move towards extending the life cycle of plastic through the inner loops of the CE, the maintenance of products through reuse or remanufacture tend to entail more harmful environmental effects than creating new plastic products and (not) having to deal with plastic waste. The reuse of plastic packages is also not up to MDH Kft., because the ownership of plastic moves on to the buyers of MDH Kft. when they buy the products from them. Moving further out of the loops, Mr. Cselle argues that even recycling, is also tricky, because the price of recycled plastic granules is three times more expensive than virgin plastic granules due to the distorted plastic granule market as well as the high cost of cleaning and processing procedures.

A main difference between Corporation A and MDH Kft. is that the former produces plastic packaging material for industrial purposes, while the latter company specializes in the manufacture of packaging for plastic products, mainly cosmetics, pharmaceuticals, household chemicals and food products. Corporation A can purchase and use the recycled and cheaper plastic granules even though the recycled material's quality is worse than virgin plastic granules', plastic packaging for industrial purpose does not require excellent material purity as opposed to food packaging; however, MDH Kft. is requested to only use virgin and absolutely pure plastic granules because of the end-user. If end users would not be picky about the quality of the packaging, then MDH Kft. would be happy to buy the cheaper material, but until customers demand top-quality packaging, Mr. Cselle and his company is forced to rely on the use of the virgin granules.

Even though the interviewed companies from the plastic industry reveal that demand for recycled materials has been around for more than a decade, it is difficult to achieve their widespread application due to quality issues. Mr. Horváth recalls a story of a possible collaboration with an oil-company that wanted its engine-oil bottles produced from 100% regranulates while retaining the original bright color of the product: the firm was concerned that it could potentially lose customers due to the 'poor' design of the bottle given the inadequate purity of the regranulates. However, the recyclates are black after the mixed color mixture produces a greenish gray hue coated with soot, and natural regranulates (colorless, odorless) do not exist. There is a constant demand for natural, odorless, and colorless regranulates, but there is no such thing. On the other hand, there are constant efforts to add recyclates to the manufacturing of products that are not color sensitive (e.g. compost bins or lawn mower wheel). In addition, some firms make a 'class B' product in addition to their main product, which is made from recycled material.

When it comes to deciding which type of granules must be used to make the plastic packages, it is not even up to the interviewed SME managers, but rather the final player in the supply chain prior to reaching the end users. Thereby, the step towards circularity is through the persuasion of the buyers to extend the life cycle of plastic. In order to give more space to lower quality and less aesthetic plastic wrapping in other areas, promoting these kinds of products should reach the demand network and/or end users. In the end, it all comes down to customer demands whether a plastic bottle will be made out of recycled granules or not. Just because a plastic bottle would not have perfect color purity, that does not mean the product it contains (e.g. hair or skin cosmetics) is degraded; however, most consumers are reluctant to purchase products that have less aesthetically pleasing packaging, according to the interviewed plastic SME managers.

In accordance with the findings from the plastic industry, both firms from the textile sector underline that the market is directed by the demand of the end users as well as the opportunities for the supply of goods. If there were demand for more sustainable products, then PoWear is always ready to provide and suggest products, because PoWear does feel responsible to spread the awareness and to influence the further actors in the supply chain. On the other hand, Mr. Balogh finds it difficult for the company to initiate making the supply chain circular, because the company positioned in the middle of it. At the end of the day, they do not have direct contact with the end users, so that the only way they can generate demand for green products is by highlighting these products in their catalogues and on their website, but they cannot force their customers and the end users to select 'eco-friendly' products.

Similar to PoWear, the other interviewed firm in the textile industry is bounded by the market. When it comes to purchasing their clothing material, Dekorátor gets their resources from multiple wholesale business who respond to market demands when they place their orders at the Far Eastern manufacturing factories. Dekorátor's suppliers have begun to move down the sustainability path due to a layer in their demand network, who do not mind spending more money on eco-friendly products. Thereby, a growing number of businesses have started their eco product lines, in which 65% of the final product is from organic cotton, while the remaining 35% is from recycled plastic. This kind of product has been available for a long time, but has been recently labelled as 'eco' due to a growing new layer in their consumer base.

While there is a new layer of customers who are willing to spend more on eco-friendly products, most of Dekorátor's customers still prefer regular clothing products because of their

lower cost and comfort. These companies look for a price equilibrium where the product is affordable and comfortable to wear, and do not worry much about the ecological impact of their purchase. Most of Dekorátor's consumers purchasing eco-friendly products are smaller retailers who are specialized in selling this kind of products to their demand network.

Overall, SMEs' circular pathways forward comes down to whether these new products generate income or not. Companies, understandably, do not and will not start making products that does not have a market. There is indeed a clearly visible new tendency of more and more companies attempting to 'green' their supply chain; however, it all depends on the willingness of their demand chain at the end of the day.

4.3.2.1 Western Europe and MNC trends influence the greening of the textile supply chains

The customers of PoWear that seek products in line with the new environmental tendencies are usually the MNCs with at least a minimal amount of foreign capital. Western European corporations bring movements related to environmental awareness to Hungary, because the West is four to five years ahead of Hungary, according to Mr. Balogh. While there was zero tendency from others to purchase these products five years ago, Mr. Balogh perceives that there is a transition towards greener products; however, domestic customers are often deterred as soon as they hear or see the prices of these kinds of products. Once environmental awareness becomes trendy in Western Europe, surrounding countries begin to pay attention and adopt the new norms. Nevertheless, it is a slow process until Hungarian firms get accustomed to and take over environmentally conscious behavior. In the meantime, the most that firms like PoWear can do to make the supply chain greener and more circular is to be ready to provide more sustainable products to their customers and the end users.

Overall, Western European trends guide and control the textile industry in Hungary and is four-five years ahead of the Hungarian market. For example, the appearance and availability of organic cotton in the market five years ago went completely unnoticed in Hungary due to its price range and domestic distributors' unawareness of what it actually was. However, these Western European market trends eventually infiltrate Hungary. It is mostly the MNCs with Hungarian offices that start bringing in sustainable trends to the country, as they would like to paint a green image of themselves for PR purposes. More and more companies look for clothes made out of organic cotton and recycled polyester fabric from PET bottles, but the price of the products still discourage most of the customers from purchasing 'eco-friendly' products.

4.3.3 Financial benefits

An important takeaway of the study is that SME interviewees believe in the driving force of the economy more than they believe in creating a collective environmental consciousness. They consider that if this new circular transition will be motivated by an economic interest, then it will be self-organizing for every stakeholder group in the economy. Once people know that they are throwing value in the trash, they will automatically learn to collect and sell their garbage. In the case of plastic package manufacturing companies, this could be encouraged by having plastic material *representing value*; thus, the customers are either incentivized to return the empty packages or discouraged from purchasing products with plastic packaging at the first place due to the increased price. For example, the DFS has already begun in Western Europe on country-scale, where buying a bottle of mineral water the bottle costs the same as the water. However, the money can be refunded to customers if they drop it off upon consumption at selective sites thus people are deterred from throwing away their waste at inappropriate places. The same goes for companies: if the collection and treatment of various waste streams will be motivated by economic motives, then sooner or later businesses will find the adequate technology for the proper treatment of their waste.

Overall, the SME managers consider financial motives as one of the most crucial factors behind both the barriers and enablers to apply the 3-R approach. First and foremost, investing into sustainable practices must be worth for companies without having to confront surcharges as part of implementing the new mode(s) of production. From then on, firms are willing to engage in any program the public officials set the country on.

4.3.4 Administrative burden

Besides being worth it to invest in sustainable practices, interviewees would like to avoid having an additional burden created by applying these methods. Mr. Hartmayer refers to the collection and reuse of printing paste barrels as an easy procedure that can be easily adopted and practiced by everyone. On the other hand, when Dekorátor orders the wrong clothing item, it has the possibility to return the goods to the wholesale businesses where they deduct 15% handling charges due to the administrative procedure. However, the administrative procedure is so long and complicated that they rather keep the excess products than going through the multi-layer procedure when the return of small quantities is in question. Even though the surplus clothes are used for other purposes (e.g. wiping cloth), they are downcycled for a less valuable and functional use, and they end up in the waste stream eventually.

Furthermore, the overbearing administrative burden seems to be making SMEs' lives more difficult rather than simpler and more sustainable. Mr. Hartmayer believes that everyone has intentions towards sustainability, but bureaucratic and administrative obstacles deter many economic players for many reasons ranging from lack of time and short-term vision to lack of personnel and financial capacities. While MNCs have the capacity to hire additional personnel to design a company's waste stream to practice the 3-R principle, small entities do not have enough financial capacity to spend on paying someone else to upgrade the company's waste stream nor enough time to figure it out for themselves. Mr. Cselle reaffirms the points stressed above. He asserts that his company can obviously always use all kinds of help, but his "greatest wish... would be that it should not be tied to conditions that would put an additional burden on [the company]."

Thereby, firms are willing to utilize all kinds of support towards environmental protection, but they should not be tied to conditions that would disrupt their current operations. Due to the contemporary economic environment, many SMEs are financially squeezed and do not have the reserves to burden their activities with investing more money. They are simply not in a situation where they could buy new equipment or make further investments in the spirit of environmental awareness with public aid when it is tied to self-financing conditions.

4.3.5 Bottom-up and top-bottom approaches coming together

According to the two CE experts, SMEs could also start their circular transition with a bottom-up approach. They can demand the purchase of renewable raw materials, more sustainable manufacture, less waste to be produced or to be reused, and so on from their supplier(s). Everyone is a subordinate in the supply chain, but everyone can influence their subordinate simultaneously. Thereby, it is possible to achieve results and successes in an autonomous way with the implementation of the CE at the company level. On the other hand, it is indeed valid that in many situations, SMEs cannot influence the other actors in the supply chain. Nevertheless, Interviewee #3 asserts that there are new, youthful ownership or management teams, who are interested in

implementing not only matters around environmental protection and sustainability but the CE principles as well. Besides the question of whether they have the willingness, the availability of financial capacities can make or break their intentions. Oftentimes, it would be necessary to spend on R&D, a field that does not exist at the SME level; however, firms seldom have enough surplus to cover these additional fees.

In addition to SMEs influencing their own supply chains, the experts add that large corporations can and should be allied. They have great lobbying power and economic weight, which can also be offered to give smaller firms the opportunity to increase their businesses. Thereby, SMEs are not automatically doomed to death, as they can transform their business to remain one of the market leaders in that segment, they just have to do their activities differently.

Dr Bartus (pers.comm.) emphasizes that a meaningful breakthrough towards the CE can only be achieved if top-down and bottom-up processes meet. In environmental matters, sometimes there is either this or that, but the two approaches rarely come hand in hand. He contends that the business community have the potential in both directions: they can influence politicians on the one hand, and encourage consumers through social messages on the other, which could also guide their consumers' thinking about the use of natural resources. If large companies make decisions that many elements of the CE need to be implemented, they can demand that Hungarian SMEs transform their supplier activities in line with the CE. From this perspective, the business sector has the potential to influence top-down and bottom-up thinking. In sum, the CE expert regards that a bottom-up approach from MNCs could initiate the transition without the input of the government.

4.3.6 Awareness raising among the public

Both CE experts consider that education is key to enable the public to properly access and implement the various sides and benefits of the CE. Many times, there are obvious knowledge gaps and value problems, which is that there is an urge in people to worry about what will happen to future generations, but above all, they want to live well now. It stems from people's psychological attitudes that what matters the most is the here and now rather than the elsewhere and later.

According to the CE experts, this could be best addressed through transforming people's attitude around environmental protection and resource management. This, however, is not just about teaching primary school students what the CE is, but it should flow from the media in the

same way as the propaganda topics of recent years until this topic is entrenched in people. In addition, capacity building and awareness raising should be at all levels of education, most importantly in higher education, especially in engineering, science, or economics courses to internalize the natural resources rather than to view them as externalities.

Nevertheless, consciousness transformation should not be a substitute for incentivizing government policies. Even though some people may know that an eco-friendly product is better for the environment, even a proportion of eco-conscious people do not make this commitment to pay more for an environmentally friendly if it is not competitive in the market at the first place. Price conditions need to be shaped in a way that even an ill-informed person decides to buy the cheaper product without knowing that it is also the environmentally friendly option.

4.3.7 Eco-confusion amidst SMEs

In terms of approaching the design question of products with a circular perspective, material purity is essential. Circular designs in the upstream should ensure 100% product purity thus remanufacturing and other regenerative manners are possible once a product can no longer be used in its original form. However, it is a much more complicated question in the case of the textile industry. Clothes made out of 100% cotton are the most comfortable to wear, but they are not durable and shrink after one wash, which is why cotton is often mixed with other materials (for example, five-10% elastane) at the first place. In order to resolve product durability, cotton is mixed with polyester to make the final product durable after multiple washes and to keep its shape and colors well. On the other hand, the higher the polyester content of a cloth, the more uncomfortable it becomes because of restricted ventilation and inadequate binding of moisture. One of PoWear's partnership illustrates the issue around product purity well. As per mentioned above, the company distributes workwear clothes to other firms, for example, to laundries who provide the clothing to manufacturing companies. The used, dirty, and often oily clothes are collected by the laundries and go through heavy washing procedure on high temperature thus the clothes have to be suitable for industrial washing. Otherwise, the products can stretch or widen and lose its color, and becomes unusable after one use and wash.

Nowadays, clothes made out of 100% PET bottles, 50-50% organic cotton and PET bottles, 65-35% cotton and polyester, 50-50% PET bottles and polyester, and so on (these proportions vary and depend on the specific purpose of the products and the market demands) are all available in

the market. As opposed to the 65-35 polycotton products, clothes made out of 100% recycled plastic is a circular design, in which worn out clothes and materials can easily be given a new life cycle. Since these items are entirely made out of upcycled plastic, they are reusable and can be included in the remanufacturing of new products. In this way, waste is reduced and the consumption of raw material becomes circular. Even though polycotton products may do more harm than good, clothes fully made out of man-made, synthetic fibers is a good example of extending the cycle of products. On the other hand, Mr. Balogh underlines that even though it seems the supply chain could have all the required PET material in the form of thrown away bottles to create green products, the mechanism to produce these merchandises is more expensive than the regular fabrication methods. In addition, the collection, arrangement, cleaning, and grinding of the PET bottles often entail a higher carbon and ecological footprint than the regular procedure.

The same observation goes for the plastic industry. Besides ensuring adequate funding to public service providers for capacity building as per discussed in detail above in section 4.3.1.2, "plastic waste could be reduced more effectively if manufacturers were required to ensure that the HDPE bottle does not have a propylene cap and a polyvinyl chloride label. Or do not put propylene foil on a PET bottle" (Horváth pers.comm.). Sorting people do not have the necessary capacities to distinguish between the different types of plastics; thus, the different plastic materials are mixed together, which makes it harder for companies like Holofon to reduce and process existing waste. Therefore, product design should consider whether and how the generated waste can be recycled. Unfortunately, product designers do not consider the reusability or recyclability of items and materials; even if it is considered, it is usually one of the last aspects.

5. Conclusion

The SLR and the interviews indicate that Hungarian SMEs are in a similar position than most SMEs throughout the globe when it comes to transitioning from the LE to the CE. In order to better categorize obstructing and enabling factors and to ease navigating between them, they are to be broken up into three segments, macro-, meso-, and micro-level factors, respectively.

In spite of one of the CE experts indicating that SMEs tend to rely on state support too much and wait for the signal of public officials prior to engaging in new areas, the interviews are in line with the literature that the government is responsible for creating a fertile ecosystem, where SMEs have the necessary capacities and environment to transform their business models towards circularity. In regards of what exact capacities they need, both the literature and interviews provide diverse points: most SMEs would like to see incentivizing programs and tenders that encourage business to restructure their activities; some believe that knowledge-building conferences and/or awareness-raising meetings could assist them to redesign their supply chains; others consider that general state support is crucial for SMEs not get stuck during their circular transition. Regardless of financial and non-financial motivators, the interviewed CE experts find that the implementation of green taxes and changing the rules of capitalism, where environmental destruction would not just count as externalities but would be calculated in the total cost of products and manufacture, are essential prior to having a serious conversation about a meaningful circular transition. These last points are especially important, because they impact macro-, meso-, and micro-level factors as per discussed below.

In addition to the new tax policies and including externalities in the total sum during production pushing SMEs to change their business models, these measures would automatically push customers to opt for more eco-friendly products. Sustainable items are currently more expensive than traditionally linear goods, because they entail the price for environmental pressure; thereby, only the environmentally-dedicated people do not bat an eye over the noticeably steep price differences. However, people should not be presented with such an option to pay more for an environmentally friendly product, because it is usually people with higher incomes that can make this decision for themselves. Thereby, once the rules of capitalism would be changed, even

the ill-informed people would automatically choose the green products, because those would be the cheaper options.

Besides the presence of overall state support and the interest of the demand network, administrative burdens often deter businesses to even attempt to make their production sustainable. Instead of genuinely supporting and helping SMEs, some interviewees and the literature highlight that they perceive that the complex administrative procedures make businesses' lives even more difficult, when some of them are already in a day-to-day battle to stay afloat. In addition, there is research on this matter highlighting that SMEs already involved in making their manufacture circular perceive this factor even more serious than those businesses that are at the very beginning of their transition. Thereby, it is especially more urgent to address this issue, because more and more firms will have to adjust their business models as the world needs to get on the circular path forward.

Moving down the ladder, there is only one meso-level factor but it is another make or break element towards the realm of the CE, namely, the supply chain being stuck in linearity. This could be address by both bottom-up and top-down approaches; the best outcome would be achieved if these two procedures simultaneously started and met. Supply chains and businesses have the means to initiate both approaches as they can advertise their products with positive social messages that have been becoming more and more popular and have become an important PR aspect in contemporary business models. Aside from potentially influencing customer demands, SMEs are *ideally* in touch with public officials in order to come up with solutions to pressing problems; nevertheless, this thesis finds that the government often applies a tokenistic approach when it comes to stakeholder engagement which shakes the confidence of the business sector.

In addition to attempting to influence both the government and the lay people, putting a price on externalities would force the supply chain actors to restructure each segment of the manufacture. As soon as there was an increased price on the traditional raw natural resource extraction with the modified price depicting the actual, real cost that considers environmental deterioration, each player would automatically come up with options to cut their expenses. Of course, one of these solutions could be the application of the 3-R approach to keep materials and products in use by extending their life cycles thereby hindering producing waste back into the environment.

Last but not least, the micro-level factors influencing SMEs' transition is mainly about the actions taken by businesses themselves. While the interviewed SMEs do not produce much waste during the manufacture of products since they are all interested in applying the 3-R mindset to cut costs wherever possible, even though most of them are not even familiar with the CE, the matter around the treatment of products at the end of their lives still remains a question, because none of the studied SMEs are the final actors in their supply chains prior to the products reaching customers. Essentially, extended producer responsibility is not applicable to any of the interviewed businesses, because they sell the products to at least one other business prior to customers would receive the goods; thereby, the interviewed SMEs should not be held accountable, because firms sell the rights and responsibility over products as well.

Overall, the implementation of circular principles has to make an economic sense to businesses. The firms are willing to implement whatever they are asked to do and are interested in cutting their costs further; however, many of them are already financially squeezed and unable to invest into new, green technologies due to their inadequate economic environments. Since environmental tenders would only affect the SMEs involved in the various programmes, incentivizing tax policies could best push corporations to collectively redesign their supply chains and activities, as well as customers to automatically choose the greener, more sustainable products. In addition, the increasing willingness of customers and businesses to choose products from a more sustainable manufacture process should be channeled by multi-stakeholder collaboration and communication to further advance the circular transition of the government, businesses, and customers alike.

6. Recommendations

Upon a thorough analysis, the present study suggests adjustments to take place in three areas, namely on supranational, national, and firm levels, for Hungarian SMEs' proper circular transition. As per discussed below in more detail, all three areas should modify their current functions simultaneously thus they can reinforce the transition of the other actors. Considering the current rate of ecological destruction, neither actor can wait nor can point fingers at the others to initiate change in order to prevent and reverse the ecological impact of the Anthropocene. Nevertheless, the overarching role of the EU must be emphasized, as it can and should act as a catalyst to smooth the continent's meaningful circular transition.

First of all, the EU has made good work of connecting the Recovery and Resilience Facility funds to the implementation and spread of the CE in Member States; its impact can be seen in igniting the efforts of the Hungarian government towards circularity. In addition to the Cohesion Policy support for the circular economy and Just Transition Fund, these monetary sources incentivize Member States to adopt the principles of the CE on national level without leaving stakeholders behind. However, the EU needs to make sure that a meaningful implementation takes place instead of governments misusing the funds either accidentally or deliberatively. The matter of national governments misusing EU funds has become a concern in other areas, not just in the field environmental protection, and is beyond the scope of the present research; nevertheless, time is ticking to reverse the dire effects of climate change, and the application of the CE could be one of the most effective methods to do so. This should stimulate EU Commissioners to make sure that the funds are spent in a just and transparent manner.

In addition to making sure that the provided EU funds are managed correctly, what is even more important from the EU is to go beyond announcing environmental programmes and tenders to meet ever-more ambitious climate goals. These calls only affect those who end up getting their hands on these financial resources and will leave out most of the stakeholders; simultaneously, most of the climate objectives set by the EU are unmet. Instead of continuously rolling out environmental tenders and missing climate goals, the EU should plan the adoption of green taxes that would encourage economic stakeholders to redesign their supply chains in accordance with circular principles and to push them towards embracing CBMs. Of course, this would go against the serious lobbying interests of those who are concerned in retaining the current economic order with the contemporary method of production. Considering that the implementation of green taxes should be one of the main pillars of the actual realization of the CE, the EU somehow needs to make the leap forward over the powerful lobby groups that have been leading humanity towards an unsustainable and uncertain future. Further research shall focus on how bureaucrats could possibly implement such taxation policies and legislation on supranational level that overcomes the serious power of advocacy groups who are interested in maintaining the current linear economic model.

Once the green taxes that facilitate the transition towards CBMs are realized on supranational level, Member States will automatically have to come up with their own sets of regulations. In addition to enabling companies' circular transition, the green taxes would also push the end users, the consumers, to opt out from purchasing items that are less sustainable. With the application of the new green tax scheme, the price increase of the currently cheaper and more environmentally harmful products would economically convince lay people to choose the more sustainable products given that the new prices would entail the environmental externalities associated with the production.

Second, the Hungarian government shall implement environmental policies and legislation similar to the EU. Currently, the government relies on a substantial amount of EU monetary sources to financially encourage domestic firms to redesign their business models towards circularity. However, the suggestion mentioned above in regards of the dilemma between financing environmental tenders and programmes as opposed to the implementation of overarching green taxes is applicable in domestic level policy-making. The latter would influence each economic actor to redesign its activities in accordance with the principles of the CE, while the former would only reward a few firms from hundreds of thousands of companies. Needless to say, influencing all economic stakeholders is much more effective; thereby, the urgent roll out of a taxation policy that considers externalities is recommended on the national level as well.

Furthermore, the political will currently seems to be missing from the national level decision-making towards environmental protection efforts. The Hungarian government is planning to revitalize the public service providers for the fourth time in the last 10 years, which may lead to further confusion amongst the public. National environmental protection efforts are in a similar vein: the abolition of Ministry of Environment and Water in 2010 and its integration into the

Ministry of Agriculture led Hungary to join a very small group of countries without an independent ministry for environmental protection. Eight years forward, 340 staff members from the Ministry of Agriculture got fired, and while the ministry had to lay off 32% of its staff, the environmental department experienced the highest, nearly 50%, staff reduction. In sum, the number of public employees for environmental responsibility decreased from 400 to approximately 70 within 10 years. Since the abolishment of the Ministry of Environment and Water, the Ministry of Agriculture used to be responsible for environmental tasks, however, the MIT has recently overtaken national efforts in the areas of climate change and environmental protection, as well as the country's circular transition. These instances, the continuous back-and-forth, passing responsibilities between ministries and bureaucrats, and uncertainty around the governmental protection and climate politics seriously.

In addition, the 2012 law on waste was a groundbreaking piece of legislation that could have pushed the country being the spearhead of the CE in the EU, however, not much of the law has been realized in real life. Similarly, the potential implementation of green taxes came up in 2013, but its actual enactment still has not taken place. From the outset, the inadequate implementation of domestic environmental legislation and policies suggests the government's lack of political will. This is further stipulated by looking at the receding staff number that has taken place in the past decade. Beyond the re-establishment of an independent ministry dedicated to environmental protection, the Hungarian government needs to decide whether it wants to take environmental protection seriously, which would require appointing public officials with honest interest in achieving sustainability throughout the ministries. After all, the present research demonstrates that environmental protection goes way beyond the tasks entailed by an environmental ministry, as the efforts of policymakers from other departments, such as economics or infrastructure, are also essential. These public officials would be up against strong lobbying interests who are concerned in preserving the currently unsustainable economic models. In addition, the obviously-needed increase of public officiers would also be urgently needed.

Last but not least, the thesis suggests that Hungarian SMEs can start adopting circular activities on their own, as some of the firms involved in the study have already done so even as they have been unaware of what the CE really is. Not only does this demonstrate that the CE is not a revolutionary economic model but it also depicts the cost-efficient side of the CE, which could

incentive economic stakeholders to widely apply circular aspects to their business models. Hungarian firms are in a particular situation, as they can and should influence 1) policymakers via stakeholder engagement meetings; 2) their partners and other actors in their supply chains; and 3) the end users by crafting environmental messages to achieve social change. The present study finds that the first point is up to the government what to do with the input received from SME managers instead of continuing to go down on a tokenistic path that will eventually discourage economic stakeholders to take part in consultations with the government. While the deliberation-to-policy gap is an existing and problematic feature of stakeholder engagement, the present study finds that the government does not even attempt to make it look like it is interested in hearing out other stakeholders' perspectives, which should be studied in another research. The second and third point could be taken care of with the introduction of green taxes that would automatically push economic actors to the table to reconsider the origin of their supplies; besides, the new prices, which include the true externalities entailed during the production, would convince lay people to purchase the items from circular supply chains. Nonetheless, most SMEs are interested in environmental protection, because of some of its aspects connected to economic aspects such as cost-cutting as well as intrinsic motivation. Firm managers need to start igniting their circular transition on their own by relying on these two factors and redesign the supply chains with their partners, otherwise their businesses may be in trouble soon due to the depleting natural resources, more serious price fluctuations, unpredictable supply chains, and aggravating climate change.

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Appendix A – Summary table of literature review findings

#	Author	Methodolo gy	Country	Number of SMEs assessed	Sector of activity	Barriers	Drivers
1	Ballie and Woods (2018)	Interviews	United Kingdom	3	Fashion and textile	1. Sourcing sustainable materials	1. Low cost entailed by applying CE practices
2	Barón <i>et al.</i> (2020)	Qualitative report analysis	Catalonia	31	Industrial	N/A	1. Multi- stakeholder communication/ collaboration
3	Bassi and Dias (2019)	Survey	EU-28	10,618	Mixed	N/A	1. Green behavior depends on the size, total turnover, percentage of turnover devoted to R&D, and type of activity
4	Binek and Al- Muhannadi (2020)	Literature review	Unknown	41 papers were considered for analysis in this study.	Mixed	 Limited resources Supply and demand chain Lack of knowledge 	 Support from government policies (or even EU funds and support) and powerful market players Market demands

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5	Caldera <i>et</i> <i>al.</i> (2019)	Interviews	Australia	13	Manufacturing	 Lack of financial resources Lack of time Lack of knowledge Risks associated in implementing a sustainable practice Current regulations and Existing organizational cultures that impede sustainable business practice 	 Integrated strategy Continuous improvement Streamlining processes
ප CEU eTD Collection	Cantú <i>et al.</i> (2021)	Interviews	Spain	5	Manufacturing and services	 Consumer behavior (increased cost of sustainable/green products deter consumers from purchasing) Lack of adequate legislation Inadequate market environment 	 Multi stakeholder collaboration Consumer behavior (some consumers rather choose sustainable products and pay more) Legislation (taxation on non- green products, thus consumers have no reasons not to choose the greener and less expensive products) Transparent communication Managerial mindset

7	D'Amato <i>et al.</i> (2020)	Interviews	Finland	8	Mixed: packaging, textiles, composite materials, cosmetics, and pharmaceutical products	 Establishing cooperation and dialogue with key partners and operators in the value supply chain Lack of capital and financial resources 	 Regulations Costumer demand (new solutions and more sustainable alternatives are either required by regulations or demanded by customers) A practical platform to promote commercialization and the entry into international markets
8	De Jesus and Mendonça (2018)	Literature review	Unknown	Unknown	Unknown	 Hard factors: financial or technological factors Economic and market 	1. Soft factors (social, regulatory or institutional)
9	de Jesus Pacheco <i>et</i> <i>al.</i> (2019)	Literature review	Mixed	N/A	Mixed	 Lack of financial resource Lack of internal competencies Inadequate instruments 	 Internal capacity building Managerial attitude Multi- stakeholder engagement Market research
10	Demirel and Danisman (2019)	Survey	EU-28	5,100	Mixed	1. Financial – high investment cost	1. Policy interventions
11 ction	Fernández- Viñé <i>et al.</i> (2010)	Survey and interviews	Venezuela	54	Manufacturing	N/A	1. Market pressure 2. Governmental intervention (economic taxes or legal requirements)
EU eTD Colle	Fortunati <i>et</i> <i>al.</i> (2020)	Interviews	Italy	9	Agriculture	N/A	1. Application of CSR models/managerial mindset
130	Garcés- Ayerbe <i>et</i> <i>al.</i> (2019)	Survey	EU-28	10,618	Mixed	Barriers (in- going): 1. Lack of human resources 2. Lack of expertise to implement these activities	1. Regulation

14 15	Garcia Martin (2016) García- Quevedo <i>et</i> <i>al.</i> (2020)	Interviews Survey	Italy EU-28	7 10,098	Fashion and textile Mixed	 Complex administrative or legal procedures Cost of meeting regulations or standards Difficulties in accessing finance Barriers (no- going): Lack of human resources Lack of human resources Lack of expertise to implement these activities No clear idea about cost benefits or improved work No clear idea about investment required Complex administrative or legal procedures Cost of meeting regulations or standards Difficulties in accessing finance Redesigning the supply chain Regulation obstacle Lack of human resources 	1. Managerial mindset 1. Decreasing the administrate burden and complexities on
CEU eTD Collection	al. (2020)					 Lack of human resources (technical skills) Lack of expertise in new technologies Capability to change the mindset 	burden and complexities on SMEs
16	Garrido- Prada <i>et al.</i> (2021)	Survey	EU-28	10,618	Mixed	1. Administrative burden 2. Financial	N/A

17	Ghanta and Matei (2018)	Survey	Romania	401	Mixed	 Lack of resources (human and financial) Lack of expertise Complex administrative procedures 	1. Domestic government policy
18	Ghisetti and Montresor (2020)	Survey	EU-28	2,318	Mixed	1. Inadequate standard financial resources	1. Domestic policy to help SMEs overcome financial barriers
19	Guillard <i>et</i> <i>al.</i> (2018)	Unknown	EU-28	Unknown	Unknown	1. Lack of resources (knowledge; tools; and networking contacts) 2. Lack of human resources	1. Guidance tools
20	Hernandez (2019)	Interviews	Colombia	16	Manufacturing	 Difficult agreements with clients and suppliers, as well as lack of trust Industry facing difficult challenges such as smuggling, unfair competition, and tax problems 	 Providing the industrial conditions: stronger and more transparent relationship among the actors of the supply chain Design policies and taxes Networks of support
21	Holzer <i>et</i> <i>al.</i> (2021)	Survey	Austria	183	Mixed	N/A	1. Improved procurement
22	Jochems (2019)	Interviews	Netherlands	Unknown	Food	 Regulatory Technological Market 	1. Regulatory interventions
Collection	Katz-Gerro and López (2019)	Survey	EU-28	10,618	Mixed	N/A	1. Government support
CEU eTD	Kaufman <i>et</i> <i>al.</i> (2020)	Interviews	Australia	Seven Australian state and federal policy makers and three industry/envi ronmental organizations	N/A	1. Economic	N/A

				were interviewed			
25	Li and Zeng (2018)	Literature review	China	Unknown	Unknown	N/A	 Policy Technology
26	Milios (2021)	Interviews and survey questionnair es	Sweden	14	Manufacturing (automotive; buildings; electronics; furniture; maritime)	N/A	1. Policy intervention
27	Min <i>et al.</i> (2021)	Literature review	China	31 papers were considered for analysis in this study.	Unknown	1. Limited funds, lack of investment, inadequate time, lack of technology, technical resources, and technical specialists 2. Lack of government support	 Innovation Government incentives
28	Mishra <i>et</i> <i>al.</i> (2019)	Interviews	North Africa	1	Manufacturing	N/A	1. Collaboration with MNCs and the government
29	Moktadir <i>et</i> <i>al.</i> (2018)	Literature review and discussion sessions	Bangladesh	2	Leather	N/A	 Knowledge about circular economy Governmental support and legislation
30	Moric <i>et al.</i> (2020)	Survey	EU-28	4,237	Mixed	N/A	 Managerial willingness Tangible investment
CEU eTD Collection	Mura <i>et al.</i> (2020)	Mixed- method (interviews, surveys, and focus groups)	Italy	254	Mixed (mechanics/ manufacturing; tourism; human services; plant engineering; ICT)	 Perception: sustainability as a cost rather than investment Bureaucratic difficulties in applying regulations on sustainability 	 Policies to promote sustainability (e.g. tax credits, financing, subsidies) Multi- stakeholder cooperation

32	Oncioiu <i>et</i> <i>al.</i> (2018)	Survey	Romania	384	Mixed	 Financial problems Lack of human resources (labor shortages) Legal barriers 	 Fiscal, legal or organizational framework (National CE strategy)
33	Ormazabal <i>et al.</i> (2016)	Survey and interviews	Basque Country	17	Unknown	 Lack of governmental support (economic incentives; Limited resources Lack of customer interest 	 Policy to encourage SMEs Environmental management maturity: flexible business and information services to customers Industry associations
34	Ormazabal <i>et al.</i> (2018)	Survey	Navarra and the Basque Country	95	Mixed	 Lack of willingness from SMEs Lack of resources (financial capital and time) Short-term vision Inadequate support from public institutions 	1. Incentivizing policy instruments
35	Ormazabal <i>et al.</i> (2020)	Interviews and workshops	Basque Country	1	Rubber-metal	N/A	1. Managerial mindset
36 uoi	Patricio <i>et al.</i> (2018)	Interviews	Sweden	11	Food and beverage	 Lack of knowledge Time constraints Trust in new partnership 	 Potential economic savings Environmental benefits Marketing strategy
CEU eTD Collect	Piciu (2016)	Literature review	EU-28	Unknown	Mixed	 Treating high cost rather than investment Lack of knowledge Attraction factors (availability of technologies and consumer demands) 	N/A

38	Prieto- Sandoval <i>et</i> <i>al.</i> (2018)	Online Delphi Panel	Europe	In this study, data collection took place from 11 European experts from different universities and consultancy firms rather than from SMEs.	Unknown	N/A	 Valuing the "waste" of some companies as resources for others Government and public institution intervention Managing aspects such as trust and transparency among potential partners in the industry Creating joint value between companies. Sharing infrastructure or services with industrial neighbors Belonging to an industrial association, cluster or related organization
39	Rizos <i>et al.</i> (2016)	Survey and interviews	EU-28	30	Unknown	 Lack of support from the supply and demand network Lack of capital Lack of government support 	 Company environmental culture Networking Support from the demand network

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40	Roosendaal (2018)	Interviews	Netherlands	41	Textile	 High costs for producing/selling circular products Lacking consumer awareness and interest Limited circular designs (e.g. knowledge, options); 3. Limited volumes of circular supply streams Operating in a (mostly) linear system; 4: Lacking ability to deliver high quality circular products Obstructing laws and regulations 	N/A
41	Ruggieri et al. (2016)	Meta-model research design	Italy	1	Food	1. Fragmented regulation	1. Third party to organize exchange of materials
42	Sartal <i>et al.</i> (2020)	Mixed- methods: quasi- experiments (5S workshops) and semi- structured interviews	Spain	1	Food	N/A	1. Lean practices and corporate structure
CEU eTD Collection	Scipioni <i>et</i> <i>al.</i> (2021)	Mixed- method (surveys and focus groups)	Italy	~150	Construction	1. Stakeholder linear culture in the external environment, the supply chain, and the company	 Green stakeholder culture in the external environment, the supply chain, and the company Green norms and national incentives Learning processes between stakeholders

44	Sharma <i>et</i> <i>al.</i> (2020)	Literature review and interviews	India	6	Mixed: textile; pharmaceuticals; furniture; battery power; utensils; and food	 Consumers' attitude and behavior Management will Inadequate technology 	 Government Government Government Strong financial Sources Multi- Stakeholder Collaboration
45	Singh <i>et al.</i> (2018)	Survey	India	248	Dairy and dairy products; bakery and confectionery; food and food processing; pulp and paper; and cast-iron foundry industry	N/A	 Green economic incentives Owner- manager's attitude Social pressure Collaboration with MNCs
46	Susanty <i>et</i> <i>al.</i> (2020)	Survey	Indonesia	190	Wooden furniture/ manufacturing	N/A	 Customer collaboration 'Greening' the supply chain Government support
47	Torres- Guevara <i>et</i> <i>al.</i> (2021)	Workshops, meetings, and company reports	Colombia	1	Construction	N/A	 Fertile ecosystem Management commitment Identification of valuable materials Green teams CE Intermediaries
48 E	Ünal <i>et al.</i> (2018)	Interview	Italy	1	Office supply	N/A	 Managerial mindset Trust in the supply chain Effective communication
CEU eTD Collectio	Uvarova <i>et</i> <i>al.</i> (2020)	Stakeholder consultation meetings	Italy, Czech Republic, Latvia, Slovenia, Hungary, and Bulgaria	In this study, 215 people (SMEs representativ es, policymakers , researchers, business associations) were involved.	Mixed	 Lack of the appropriate environment and support measures Insufficient knowledge and skills Low credibility and financial performance 	1. Strategic objectives of EU and support directions of EU structural funds

50	Vermunt <i>et</i> <i>al.</i> (2019)	Interviews	Netherlands	31	Unknown	Internal: 1. Organizational 2. Financial External: 1. Supply chain 2. Market 3. Inadequate external environment	N/A
51	Vihma and Moora (2020)	Survey and interviews	Estonia	26	Mature manufacturing	N/A	 Business strategy and planning Leadership Ability to learn, cooperate, and create relationships with external entities for internal dissemination
52	Wu <i>et al.</i> (2021)	Interviews	Taiwan	14	Plastic waste	N/A	 Adaptive institutional governance Collective bricolage
EU eTD Collection	Yli- Suvanto (2020)	Interview	Finland	1	Smart green walls/interior design	N/A	 Networking with knowledge actors Capital providers (business angels and venture capitalists) Networking platforms
54	Yolin (2015)	Literature review	Japan	Unknown	Unknown	N/A	1. Governmental support
55	Zacho <i>et</i> <i>al.</i> (2018)	Interviews	Denmark	1	Waste	1. Inadequate regulation	 Supportive institutional environment Managerial mindset

56	Zamfir et	Survey	EU-28	10,618	Mixed	N/A	1. Whether
	al. (2017)						country has started
							transitioning
							towards CE
							2. Sector of
							activity