



Master's degree thesis

LOG950 Logistics

**Implementation of Circular Economy Business Models in the
Manufacturing Industry: The Role of Procurement**

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PREFACE AND ACKNOWLEDGEMENTS

This thesis marks the end of our two years at Molde University College, and conclusion of the Master of Science in Logistics programme. Working on this thesis has been both exciting and exhausting, but nevertheless extremely gratifying and educational. We now hold a deeper understanding in the fields of Circular Economy, sustainability and procurement, which is valuable to us as graduates.

The ongoing COVID-19 pandemic has provided us with a fair share of challenges, and due to the situation, we will not have any oral defence of this thesis. However, we would like to thank everyone who has made it possible for us to complete this thesis in the midst of the pandemic. From the essential workers keeping society going and healthy, to the administration of Molde University College and Studentskipnaden in Molde for facilitating the completion of our thesis, as well as ensuring our physical and mental health.

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Molde, May 2020

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TABLE OF CONTENTS

PREFACE AND ACKNOWLEDGEMENTS.....	I
TABLE OF CONTENTS	II
LIST OF TABLES.....	V
LIST OF FIGURES.....	VI
LIST OF ABBREVIATIONS	VII
ABSTRACT.....	VIII
1. INTRODUCTION.....	1
1.1. Chapter Introduction	1
1.2. Background for the Thesis	1
1.3. Research Problem.....	3
1.4. Research Questions	5
1.5. Thesis Structure	7
2. THEORETICAL PERSPECTIVES.....	8
2.1. Chapter Introduction	8
2.2. Introduction to Circular Economy.....	8
2.2.1. The Origins of Circular Economy.....	8
2.2.2. The Principles of Circular Economy.....	11
2.2.3. The Circular Economy System	13
2.2.4. The Implementation of the Circular Economy	14
2.3. Business Models.....	15
2.3.1. Business Models in General.....	15
2.3.2. Circular Economy Business Models (CEBMs)	16
2.3.3. The Main Types of CEBMs	18
2.3.4. Barriers to Implementing CEBMs	21
2.4. Procurement – An Overview.....	26
2.4.1. Defining Procurement	26
2.4.2. Procurement in a Supply Chain	28
2.4.3. The Strategic Role of Procurement.....	29
2.4.4. Procurement Maturity Model.....	32
2.4.5. Sustainability in Procurement	33

2.5.	<i>The Role of Procurement in Circular Economy</i>	35
3.	RESEARCH METHODOLOGY	39
3.1.	<i>Chapter Introduction</i>	39
3.2.	<i>Philosophical Position</i>	39
3.3.	<i>Research Approach</i>	41
3.4.	<i>Research Design</i>	42
3.5.	<i>Research Strategy</i>	43
3.6.	<i>Time Horizons</i>	46
3.7.	<i>Case Description</i>	46
3.8.	<i>Data Collection</i>	51
3.9.	<i>Data Analysis</i>	54
3.10.	<i>Quality Criteria in Qualitative Research</i>	56
3.10.1.	Credibility	57
3.10.2.	Transferability	57
3.10.3.	Dependability	58
3.10.4.	Confirmability	59
3.11.	<i>Chapter Summary</i>	60
4.	FINDINGS	61
4.1.	<i>Chapter Introduction</i>	61
4.2.	<i>Knowledge and understanding of CE in procurement</i>	61
4.2.1.	CE in general	61
4.2.2.	CE in procurement	64
4.2.3.	Section summary	66
4.3.	<i>Contributing factors of the procurement function in the implementation of CEBMs</i>	67
4.3.1.	Perceived contributing factors	67
4.3.2.	Section summary	70
4.4.	<i>Barriers the procurement function may encounter in the implementation of CEBMs</i>	70
4.4.1.	Internal barriers	71
4.4.2.	External barriers	73
4.4.3.	Section summary	75
5.	DISCUSSION	77
5.1.	<i>Chapter Introduction</i>	77

5.2.	<i>Knowledge and understanding of CE</i>	77
5.3.	<i>Contributing factors of the procurement function</i>	80
5.4.	<i>Barriers to the implementation of CEBMs</i>	84
5.5.	<i>Conceptual Framework</i>	91
5.5.1.	Supplier management with considerations of factors beyond the economic	91
5.5.2.	Support of the 3R principles through collaboration with other internal functions	92
5.5.3.	Ensure compliance with laws and regulations	92
5.5.4.	Ability to align with the company's competitive strategy.....	93
6.	CLOSING REMARKS	94
6.1.	<i>Chapter Introduction</i>	94
6.2.	<i>Summary of Results</i>	94
6.3.	<i>Contributions</i>	95
6.4.	<i>Limitations of the study</i>	97
6.5.	<i>Suggestions for further research</i>	97
	REFERENCES	99
	APPENDICES	107
	<i>Appendix 1: Information Letter</i>	107
	<i>Appendix 2: Interview Guide</i>	112

LIST OF TABLES

Table 2-1: Categories of barriers, per type of CEBM (Vermunt et al. 2019).....	22
Table 2-2: Three categories of supply's strategic contribution (Tchokogue, Nollet, and Robineau 2016).....	31
Table 2-3: Procurement Maturity Model, adapted from Lysons and Farrington (2016).....	33
Table 2-4: Comparison of barriers to CEBMs and sustainable procurement, based on Leal Filho et al. (2019), Vermunt et al. (2019), and Miemczyk, Johnsen, and Macquet (2012).	37
Table 3-1: Summary of philosophical positions based on Saunders, Lewis, and Thornhill (2012).....	40
Table 3-2- Research strategies based on Saunders, Lewis, and Thornhill (2012).....	43
Table 3-3: Overview of the case companies.....	47
Table 3-4: Overview of the Procurement Functions among the case companies.....	50
Table 3-5: Duration of the interviews.....	52
Table 4-1: The companies' knowledge and understanding of CE.....	64
Table 4-2: Summary of the companies' view on CE in procurement	66
Table 4-3: Perceived contributing factors of the procurement function in the implementation of CEBMs	69
Table 4-4: Mentioned barriers to CEBM, by category	70
Table 4-5: Summary of mentioned barriers to CEBMs.....	75

LIST OF FIGURES

Figure 1-1: Structure of this thesis	7
Figure 2-1: The Circular Economy System Diagram (Ellen MacArthur Foundation 2015)	13
Figure 2-2: Business model dimensions based on Richardson (2008).....	16
Figure 2-3: The Circular Value Chain and Circular Economy Business Models, based upon Accenture (2014)	20
Figure 2-4: Percentage of companies in each of the four CEBMs mentioning different types of barriers to implementation, adapted from Vermunt et al. 2019.....	25
Figure 2-5: The Relationship between procurement, supplier management and purchasing, adapted from Lysons and Farrington (2016)	27
Figure 2-6: Key Procurement-Related Processes, based on Chopra (2018) and Hahn, Watts, and Kim (1990).	29
Figure 2-7: Classification of CSCM research (Farooque et al. 2019).	36
Figure 3-1: Process of data analysis, based on Nujen (2018).....	54
Figure 5-1: Contributing factors of the procurement function in the implementation of CEBMs. Source: Own illustration.	91

LIST OF ABBREVIATIONS

3R	Reduction, Reuse and Recycling	NSD	Norwegian Centre for Research Data
B2B	Business-to-business	PLE	Product Life Extension
BM	Business Model	PMM	Procurement Maturity Model
BMI	Business Model Innovation	PSM	Procurement and Supply Management
C2C	Cradle-to-cradle	PSS	Product-as-a-service
CE	Circular Economy	RR	Resource Recovery
CEBM	Circular Economy Business Model	RQ	Research Question
CEBMI	Circular Economy Business Model Innovation	SBM	Sustainable Business Model
CLSC	Closed loop supply chain	SC	Supply Chain
CSR	Corporate Social Responsibility	SCM	Supply Chain Management
CSC	Circular Supply Chain	SDG	Sustainable Development Goal
CSCM	Circular Supply Chain Management	SME	Small and medium-sized enterprises
EMF	The Ellen MacArthur Foundation	SP	Sharing Platform
EU	The European Union	SSCM	Sustainable Supply Chain Management
GST	General System Theory	TBL	Triple Bottom Line
IE	Industrial Ecology	SUN	Foundation for Environmental Economics and Sustainability
IT	Information technology	UN	United Nations
JIT	Just-in-time		

ABSTRACT

The purpose of this thesis is to investigate the implementation of circular economy (CE) through a different lens, the procurement function. Its role in the CE to date, has received little empirical attention. Building on the findings and theoretical perspectives of CE, circular economy business models (CEBMs) and procurement, a conceptual framework is developed to describe the contributing factors of the procurement function in the implementation of CEBMs.

A multiple case study of manufacturing companies was conducted to explore the extent of knowledge companies have on procurement in CE, the contributing factors of the procurement function and barriers the function may encounter in implementation of CEBMs. By analysing qualitative data we identified patterns, concepts and themes in order to develop a conceptual framework.

The main findings of this thesis indicate a potential key role of the procurement function in the implementation of CEBMs. The proposed conceptual framework suggest that the procurement function can contribute to overcoming various internal and external barriers to CEBMs through factors such as; supplier management with consideration of factors beyond the economic, support of the 3R principles through collaboration with other internal functions, ensuring compliance with laws and regulations, and ability to align with the companies' competitive strategy. Our findings further suggest that a higher maturity level of the procurement function is necessary to manage the complexity of barriers and support a transition towards circularity.

A limitation of this thesis is the number of companies and informants. A more extensive investigation of a larger number of case companies and inclusion of more informants within the company, could potentially yield a more comprehensive understanding of the research problem. This thesis therefore suggests that further research should focus on exploring the role of the procurement function within more companies, to get a broader understanding of the similarities and differences across functions, companies and potentially across industries.

Understanding the role of the procurement function in the implementation of CEBMs, could potentially aid practitioners and companies in overcoming barriers and facilitate towards circularity.

Key words: Circular Economy, Circular Economy Business Model, Procurement, Sustainability

1. INTRODUCTION

1.1. Chapter Introduction

This chapter contextualises the topic of this thesis and identifies a research gap regarding the role of the procurement function in the implementation of circular economy business models (CEBMs). The chapter further presents and elaborates on the research questions used to address the research problem. Finally, an overview of the structure of the thesis is provided.

1.2. Background for the Thesis

There is a pressing need to find approaches that account for the economic, environmental, and social challenges while supporting a transition towards a sustainable society (Geissdoerfer et al. 2017). Circular economy (CE) has emerged as one of the approaches that can provide the means for realising sustainability ambitions and promoting economic growth (Geissdoerfer et al. 2017; Genovese et al. 2017; Lieder and Rashid 2016; Pieroni, McAloone, and Pigosso 2019; Suárez-Eiroa et al. 2019; Witjes and Lozano 2016). Thus, the concept of CE calls for a disruption of the traditional linear economy by challenging the way we manage resources, how we make and use products, and what we do with the material afterwards (Ellen MacArthur Foundation 2017b). The CE, as opposed to the current “linear” and “open-ended” economy which directly transforms natural resources into waste, describes how natural resources influence the economy by providing inputs for production and consumption, while simultaneously serves as a sink for outputs in the form of waste (Gusmerotti et al. 2019).

CE can be defined as “*a regenerative system in which resource input and waste, emission, and energy leakage are minimized by slowing, closing and narrowing material and energy loops. This can be achieved through long-lasting design, maintenance, repair, reuse, remanufacturing, refurbishing, and recycling*” (Geissdoerfer et al. 2017, 759). The Ellen MacArthur Foundation and the McKinsey Center for Business and Environment stated in their report *Growth Within*, that CE, enabled by the technology revolution, would allow Europe to increase resource productivity by up to 3% annually and generate a primary resource benefit of as much as €0.6 trillion per year by 2030. Moreover, it would generate €1.2 trillion in non-resource and externality benefits, bringing the annual total benefits to around €1.8 trillion (Ellen MacArthur Foundation, McKinsey Center for Business and

Environment, and SUN 2015). However, these high hopes will be fulfilled only if businesses start to embrace CE strategically and operationally, and if governments and international bodies start establishing a consistent set of rules (Carra and Magdani 2017). Increasing recognition of CE is evident in the formulation of *The European Circular Economy Package*, and the *Chinese Circular Economy Promotion Law* (Geissdoerfer et al. 2017). Furthermore, Schroeder, Anggraeni, and Weber (2019) suggest that CE can support the Sustainable Development Goals (SDGs) set by the UN. CE practises can, potentially, solve developmental and environmental challenges relating to overconsumption of resources on a global and local level, while offering opportunities for employment and pressing issues such as health and sanitation. These issues are addressed in SDG 6 (Clean Water and Sanitation), SDG 7 (Affordable and Clean Energy), SDG 8 (Decent Work and Economic Growth), SDG 12 (Responsible Consumption and Production), and SDG 15 (Life on Land) (Schroeder, Anggraeni, and Weber 2019).

However, according to Geissdoerfer et al. (2017), there is a significant disparity between approaches to the CE concept and sustainability. Thus, these concepts differ even though they are essentially global in their nature, share concerns with the current state of technology, industrial production, and consumption, which might not only jeopardise future generations, but also present sources of unexplored competitive advantage, (Geissdoerfer et al. 2017). Moreover, they also stress the importance of better integrating environmental and social aspects with economic progress and set system-level changes at their very core. Nonetheless, the sustainability concept prioritises the triple bottom line (TBL) perspective, in terms of the environment, the economy, and society at large. While CE prioritises the economic system, and the economic actors are at the core, which the concept has received criticism for (Geissdoerfer et al. 2017). The relationship between the concepts remain unexplored by academics and practitioners, and the similarities and differences between them remain ambiguous (Geissdoerfer et al. 2017). Regrettably, this hinders a consensus regarding the definitions and development of a widely accepted theoretical framework on which the development of strategies and the implementation of CE systems can be founded. This warrants further research that seeks to clarify the various aspects of CE, and how it can be applied in practice (Geissdoerfer et al. 2017).

Further, increasing global competition is concerning and impacting manufacturing businesses as the intense competition puts pressure on scarce resources; affecting both their availability and cost competitiveness (Bag et al. 2020; Feger 2014). Development and

improvement of sustainable business and supply chain (SC) practices is now obligatory for businesses, not just an option (Johnsen 2019). The rate of change has accelerated to the point where the business models (BMs) that have served well in the past may no longer work at all tomorrow (Christopher 2016). Furthermore, observations of current market philosophy indicate a shifting pattern from the idea of mass-market and mass production to the idea of “markets-of-one” serviced by mass customisation, according to Christopher (2016). Even though this observation has been around for a while, the linear supply chain BM is still focusing and exploiting economies of scale (Christopher 2016). This is contradictory to the concept of CE, which calls for changes in the way companies create, deliver, and capture value for their business and its wider group of stakeholders (Bocken et al. 2019; Pieroni, McAloone, and Pigosso 2019).

The linear approach and its BMs are no longer adequate due to their environmental load and social inequity- a clear indicator of resource inefficiency. Thus, companies need to revisit the way they conduct business by adapting their BMs or creating new ones in a shift towards a CE (Ghisellini, Cialani, and Ulgiati 2016; Urbinati, Chiaroni, and Chiesa 2017). CEBMs presents approaches that can minimize the excess utilization of scarce natural resources, in addition to slowing, closing and narrowing material and energy loops (Bag et al. 2020; Schroeder, Anggraeni, and Weber 2019).

1.3. Research Problem

The scientific literature about CE is scarce and both the conceptual discussion and the design of practical strategies of implementation are still emerging (Suárez-Eiroa et al. 2019). Martin Charter, director of the Centre for Sustainable Design at the University of the Creative Arts in Farnham, UK, notes a «*lack of overall clarity over the concept of CE. Perhaps just 100 companies worldwide have adopted a true circular mindset as a core strategy.*» (Kiser 2016, 444). Moreover, Bocken et al. (2016) note a significant disparity between theoretical approaches to the CE concept, which hinders a consensus regarding the definition of a widely accepted theoretical framework on which the development of strategies and the implementation of CE systems could be founded. CE goals and principles need to be better considered and translated into action, and more coordinated actions among different levels of implementation are required (Suárez-Eiroa et al. 2019).

Business environments are continuously changing as the competition, broadening product range, altering customer demands and economic pressure continues to intensify (Umble, Haft, and Umble 2003). Bag et al. (2020) explain that managing resources efficiently is a crucial element in managing supply chains that are based on closed-loop principles, as remanufacturing and recycling-based operations can be complex. To successfully handle these operations, a company is dependent on how they manage procurement and corresponding logistics flows (Bag et al. 2020). Furthermore, the procurement function is increasingly viewed as one of the important management activities through which organisations can realize their strategic objectives (Oloruntobi 2015; Schweiger 2015). Given the call for businesses to embrace CE strategically and operationally (Carra and Magdani 2017), a new approach to procurement is therefore needed. An approach that is more collaborative and inclusive, where purchasers are encouraged and have the confidence to work with the market to develop new solutions that are more sustainable, more circular and in the long term more profitable.

However, Farooque et al. (2019) found in their study that most research on circularity in SC functions has focused on supply chain management (SCM) and/or value chain from a sustainability perspective, BMs, end of life and waste management or the design function. Their study highlighted a research gap regarding the role of procurement in CE and circular supply chain management (CSCM). This is surprising, especially bearing in mind that procurement has grown tremendously as a business discipline both in practice and in academia in the last decades (Johnsen 2019).

As concluded by Bag et al. (2020), procurement is no longer seen as a mere support function in manufacturing companies. In fact, procurement plays an important role in CE based operations as supplier selection, strategic supplier partnerships, green certifications and green process adopted by suppliers are all activities that enable the supplier to support the SDGs of a company (Bag et al. 2020). According to Johnsen (2019), it is further evident in the increasing consensus that successful analyses and development of procurement and SCM practices are critical for holistically improving the TBL, i.e. the social, environmental and financial perspective. Hence, the role of the procurement function in promoting the implementation of CEBMs warrants attention.

Put succinctly, the role of procurement in SCM is all but clear, as some people regard procurement as an integral part of SCM whereas others regard it as something complementary, yet separate (Johnsen 2019). However, the recent development of

procurement as a strategic challenge for businesses and society has boosted the importance of procurement and SCM. The degree of sustainability a business can claim to be, depends on the sustainability of its suppliers and partners, i.e. creating sustainable businesses implies creating and managing sustainable SCs, according to Johnsen (2019).

Consequently, the increasing importance of circularity in the sustainability debate globally and the increased pressure on businesses and SCs to become more sustainable warrants more attention to the lacking research regarding the role of procurement in the implementation of CEBMs. How procurement can contribute in a shift towards CE, contributing factors of such a transition and barriers hindering the implementation, are all relevant questions that need to be addressed to provide better insight to the concept as a whole. This thesis aims to increase knowledge and understanding of CE in practice, and the role that the procurement function can play in the implementation of CEBMs. We have therefore defined our research problem as;

There is lack of knowledge on how the procurement function can contribute to the implementation of CEBMs.

1.4. Research Questions

In order to address our research problem and explore how the procurement function can contribute to the implementation of CEBMs, the following research questions (RQs) are proposed:

RQ1: *To what extent do companies know about CE in procurement?*

An observed excitement and methodological support of circular oriented implementation strategies and BMs are challenged by the lack of knowledge, particularly in regards to how to make it happen (Pieroni, McAloone, and Pigosso 2019). Thus, knowledge of and understanding of the CE concept is a prerequisite for successfully implementing it into a company or organisation. This research question, therefore, seeks to explore to what extent companies know about CE in procurement. This will provide insights into how the companies understand the concept both in general and in relation to the procurement function, which will aid in our understanding of the companies.

RQ2: *What are the contributing factors of the procurement function in the implementation of CEBMs?*

Procurement is increasingly viewed as an important management activity which can realise the strategic objectives of a company (Oloruntobi 2015; Schweiger 2015). Farooque et al. (2019) argue that the function can play a vital role in a company's sustainability performance and that the implementation of CE into procurement will re-define price, quality, time and value for money principles. However, due to the relative newness of the CE philosophy (Farooque et al. 2019), the role of the procurement function in the implementation of CEBMs represents a research gap. This research question, therefore, aims to explore if the practitioners can identify contributing factors, and how such factors can help facilitate the implementation of CEBMs.

RQ3: *What are the barriers that the procurement function may encounter in the implementation of CEBMs?*

Widespread adoption and implementation of CE has yet to have happened, despite the interest from politicians, practitioners and scholars in the strategic management field (Urbinati, Chiaroni, and Chiesa 2017; Vermunt et al. 2019). This can be attributed to various barriers that companies encounter and perceive when developing and implementing CEBMs (Vermunt et al. 2019), specifically the procurement function. Thus, even though the procurement of goods and services is a crucial element in the CE concept, most procurement processes and practices are based on the purchase of goods and services through a linear approach (Anthesis 2017). At the procurement stage, end of life or reuse/recycling opportunities are rarely considered unless the purchased item has an obvious residual value. An intriguing question is therefore what hinders such a function from operating in accordance with the principles of the CE? This research question seeks to explore what barriers the procurement function may encounter in the implementation of CEBMs.

1.5. Thesis Structure

This thesis is structured into six chapters (Figure 1-1). Chapter 1 introduces the background of this thesis, which leads to the research problem and the research questions defined to explore and discuss the problem. As the core topic of the thesis is to explore the role of the procurement function in the CE, it is important to understand the concepts of CE, CEBMs and procurement, as they are evolving and subject to different interpretations and focuses. For this purpose, the theoretical perspectives are explored in Chapter 2, starting with identifying what CE entails, how companies can create and capture value in a CE (i.e. CEBMs), and then an overview of procurement is provided. Finally, the role of the procurement function in CE is conceptually presented. Chapter 3 specifies the research methodology applied for this thesis. This Chapter presents the philosophical position, research approach, design, and strategy and time horizons, followed by a description of the cases, data collection and analysis, and quality criteria. The findings from the cases analysed are summarised in Chapter 4, while the research problem and questions in relation to the findings and theory are discussed in Chapter 5. In addition, the chapter presents a framework of how the procurement function can contribute to the implementation of CEBMs. Finally, the closing remarks, including a summary of the results, contributions, limitations of the study and suggestions for further research, are presented in Chapter 6.

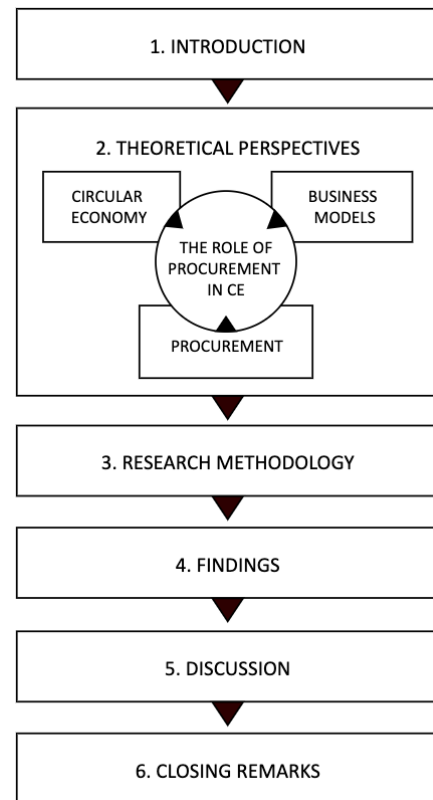


Figure 1-1: Structure of this thesis

2. THEORETICAL PERSPECTIVES

2.1. Chapter Introduction

This chapter presents the theoretical perspectives underlying this thesis. First an introduction to CE is given, followed by literature on BMs in general and BMs for a CE. Further an overview of procurement is presented, and finally a review on the role of procurement in CE is provided.

2.2. Introduction to Circular Economy

This section presents the basics of CE, starting with the origins of the concept. The principles that CE builds upon will then be presented, followed by an overview of the CE system. Thereafter, the implementation of CE is reviewed.

2.2.1. The Origins of Circular Economy

The concept of CE has gained momentum since the late 1970s, tracing back to different schools of thought (Geissdoerfer et al. 2017; Ghisellini, Cialani, and Ulgiati 2016). The environmental economists Pearce and Turner (1990) pointed out the lack of recycling in the traditional open-ended economy, which is reflected in the way the environment is treated as a waste reservoir (Geissdoerfer et al. 2017; Ghisellini, Cialani, and Ulgiati 2016; Su et al. 2013). Pearce and Turner (1990) call for a need to contemplate earth as a closed economic system, where the economy and the environment are regarded as a circular relationship, not linear inter-linkages. This economic system is developed from Boulding (2013)'s idea of the economy as a circular system; a requirement for maintaining the sustainability of human life on earth (Geissdoerfer et al. 2017; Ghisellini, Cialani, and Ulgiati 2016). In their theoretical framework, Pearce and Turner (1990) explain the shift towards the CE as a consequence of the law of thermodynamics that dictates matter and energy degradation (Ghisellini, Cialani, and Ulgiati 2016). However, Andersen (2007) argues that the first and most obvious recycling options provide evident benefits, but acknowledges that at some stage there will be a cut-off point where recycling becomes too difficult to provide a net benefit.

Roots of CE are further found in General Systems Theory, Industrial Ecology, and industrial economics (Ghisellini, Cialani, and Ulgiati 2016). General Systems Theory (GST) proposes that all organisms be considered as systems, the main characteristic being the relationship

among their components (Bertalanffy 1968). As a consequence, the behaviour of an economic agent or organisation should be investigated within their environment, and not in isolation (Ghisellini, Cialani, and Ulgiati 2016). Ghisellini, Cialani, and Ulgiati (2016) argue that GST promotes holism, system thinking, complexity, organisational learning, and human resource development, all considered important premises of CE.

Further, Industrial Ecology (IE) introduces a different perspective by analysing the industrial system and its environment as a joint ecosystem characterised by flows of material, energy and information as well as a provision of resources and services from the Biosphere (Ghisellini, Cialani, and Ulgiati 2016). Thus, IE promotes the transition from open to closed cycles of materials and energy leading to less wasteful industrial processes (Ghisellini, Cialani, and Ulgiati 2016). Besides, Stahel and Reday-Mulvey (1981) introduce certain features of the CE, with a focus on industrial economics. They conceptualise a loop economy to describe industrial strategies for waste prevention, regional job creation, resource efficiency, and dematerialisation of the industrial economy. Stahel and Reday-Mulvey (1981) further emphasise selling utilisation instead of ownership of goods as the most relevant BM for a loop economy, enabling industries to profit without externalising costs and risks associated with waste (Geissdoerfer et al. 2017).

The modern understanding of CE and practical applications have evolved to incorporate different features and contributions from different concepts that share the idea of closed loops (Geissdoerfer et al. 2017). According to Geissdoerfer et al. (2017), some of the most relevant theoretical influences are cradle-to-cradle (McDonough and Braungart 2010), performance economy (Stahel 2010), regenerative design (Lyle 1996), biomimicry (Benyus 1997), and the blue economy (Pauli 2010). However, each framework focuses on different sets of problems or benefits, resulting in different definitions of their purpose and processes (Blomsma 2018).

Cradle-to-cradle (C2C) aims to improve and preserve human and environmental health, fixing the «materials in the wrong place problem», while continuing to serve current needs and wants (McDonough and Braungart 2010). This is achieved through the application of eco-effectiveness, e.g. designing for continuous recovery and reutilisation of products. C2C distinguishes between two main metabolisms: the biological and technical. The biological cycle consists of products made of materials that can either biodegrade and provide nutrients to the biosphere, or become food, providing nutrients to people or animals. The materials that cannot be cycled biologically, belongs to the technical cycle, in which they will

continually circulate as valuable nutrients for industry (McDonough and Braungart 2010). C2C can be implemented through designing products for cycling in the appropriate metabolism, the creation of material banks, and the practice of material pooling. The key principles of C2C are waste equals food, use current solar income, and celebrate diversity, with later additions of cascading and generation of multiple benefits (Blomsma 2018; Ellen MacArthur Foundation 2017a).

The Performance Economy aims to «close the loop» in production processes and pursues four main goals: product-life extension, long-life goods, reconditioning activities, and waste prevention (Stahel and Reday-Mulvey 1981). The Performance Economy insists on the importance of selling services rather than products (Ellen MacArthur Foundation 2017a).

Biomimicry aims to imitate nature's best ideas and take these designs and processes to solve human problems (Benyus 1997). Biomimicry relies on three key principles: 1) nature as a model to emulate forms, processes, systems, and strategies to solve human problems; 2) nature as a measure to judge the sustainability of innovations; and 3) nature as a mentor to view and value not based on what we can extract, but from what can be learned from it (Ellen MacArthur Foundation 2017a).

Regenerative design aims to provide the necessities for daily life; energy, shelter, water, food and waste processing, through ecologically harmonious development that requires no mitigation, whilst recognising that humans are integrally part of the environment (Lyle 1996). Regenerative design focuses on system and infrastructure designs that are inspired by ecosystems (Blomsma 2018). The key principles of regenerative design are to 1) seek integration with natural and social processes; 2) minimal use of fossil fuels and manmade chemicals; 3) minimal use of non-renewable resources, except when future reuse and recycling is possible and likely; 4) use renewable resources within their renewable capacity; and; 5) keep waste composition and volume within the capacity of the biosphere (Blomsma 2018).

The Blue Economy aims to better serve human needs, such as food security, fertile soil, clean water, medicine and jobs, whilst staying within planetary boundaries (Pauli 2010). The Blue Economy proposes that this can be done through working with natural processes, as they bear the ability to transform apparent scarcity into sufficiency and even abundance (Blomsma 2018). Blomsma (2018) summarises the key principles of the Blue Economy into four categories; replace something with nothing, cascade through multiple successive kingdoms, celebrate diversity, and generate multiple benefits.

These abovementioned theories or schools of thought are attributed to the Ellen MacArthur Foundation (Ghisellini, Cialani, and Ulgiati 2016), whose work is important to consider in the context of CE (Geissdoerfer et al. 2017). The Foundation publishes a range of publications on the topic and acts as a collaborative hub for businesses, policymakers, and academia (Geissdoerfer et al. 2017).

Based on different contributions, Geissdoerfer et al. (2017, 759) define CE as “*a regenerative system in which resource input and waste, emission, and energy leakage are minimised by slowing, closing, and narrowing material and energy loops. This can be achieved through long-lasting design, maintenance, repair, reuse, remanufacturing, refurbishing, and recycling*”. This definition will serve as the basis for understanding CE throughout this thesis. In the following section, the principles of CE will be presented.

2.2.2. The Principles of Circular Economy

A traditional linear SC is often described as «take, make, and dispose», or «take-make-waste», which refers to the activities of mining and extraction, processing and manufacturing, and waste management and disposal (Ellen MacArthur Foundation 2015; Gaustad et al. 2018). By contrast, a CE aims to create a closed-loop system where resources are conserved and brought back into the life-cycle after being used (Gaustad et al. 2018; Genovese et al. 2017; Lieder and Rashid 2016).

Ghisellini, Cialani, and Ulgiati (2016) and Lieder and Rashid (2016) indicate that CE mainly emerges in the literature through three main actions or the so-called 3R principles: Reduction, Reuse, and Recycle. The *reduction* principle aims to minimise the input of primary energy, raw materials, and waste through eco-efficiency (Ghisellini, Cialani, and Ulgiati 2016). Eco-efficiency refers to the improvement of efficiency in production and the consumption process, by keeping or increasing the value of products while also reducing environmental impacts (Ghisellini, Cialani, and Ulgiati 2016; Su et al. 2013). This can be achieved by using fewer resources per unit of value produced and by replacing harmful substances in favour of less harmful ones per unit of value produced (Ghisellini, Cialani, and Ulgiati 2016). The *reuse* principle refers to any operation by which products or components that are not waste are used again for the same purpose for which they are conceived (EU 2008; Ghisellini, Cialani, and Ulgiati 2016). The *recycle* principle refers to any recovery operation by which waste materials are reprocessed into products, materials or substances whether for the original or other purposes. It includes the reprocessing of organic material

but does not include energy recovery and the reprocessing into materials that are to be used as fuels or for backfilling operations (EU 2008; Ghisellini, Cialani, and Ulgiati 2016).

Circularity can be seen in many applications, from the well-known principles of reduction, reuse and recycling, to the lesser-utilised remanufacturing (Gaustad et al. 2018; Ghisellini, Cialani, and Ulgiati 2016). In general, remanufacturing refers to recovering value from end-of-life products to manufacture like-new products, often having lower embodied energy than a comparable virgin product (Gaustad et al. 2018). The Ellen MacArthur foundation includes reduction, reuse, recycling and remanufacturing amongst other actions, in their formulation of the principles. The foundation states that a CE is based on the principles of designing out waste, building resilience through diversity, relying on energy from renewable sources, thinking in “systems”, and waste equals food (Ellen MacArthur Foundation 2013).

The Ellen MacArthur Foundation, McKinsey Center for Business and Environment, and SUN (2015) further state that the first principle seeks to preserve and enhance natural capital by controlling finite stocks and balancing renewable resource flows. When resources are needed, the circular system selects them wisely and chooses technologies and processes that use renewable or better-performing resources, when possible. A CE enhances natural capital by encouraging flows of nutrients within the system and creating the conditions for regeneration (Ellen MacArthur Foundation, McKinsey Center for Business and Environment, and SUN 2015; Popa and Popa 2016). The second principle seeks to optimise resource yields by circulating products, components, and materials at the highest utility at all times in both the technical and biological cycles (see Figure 2-1). This means designing for remanufacturing, refurbishing, and recycling to keep components and materials circulating in and contributing to the economy. Circular systems use tighter, inner loops, such as maintenance over recycling whenever possible to preserve more of the embedded energy and other value (Popa and Popa 2016). The third principle intends to foster systems effectiveness by revealing and designing out negative externalities. This includes reducing damage to human utility (e.g. food, mobility, shelter, education, health, and entertainment), as well as managing externalities (e.g. land use, air, water and noise pollution, toxic substances, and climate change) (Ellen MacArthur Foundation, McKinsey Center for Business and Environment, and SUN 2015; Popa and Popa 2016).

2.2.3. The Circular Economy System

The Ellen MacArthur Foundation illustrate their view on CE, as illustrated in the following diagram (Figure 2-1). The diagram seeks to capture the flow of materials, nutrients, components, and products, whilst adding an element of financial value (Ellen MacArthur Foundation 2015).

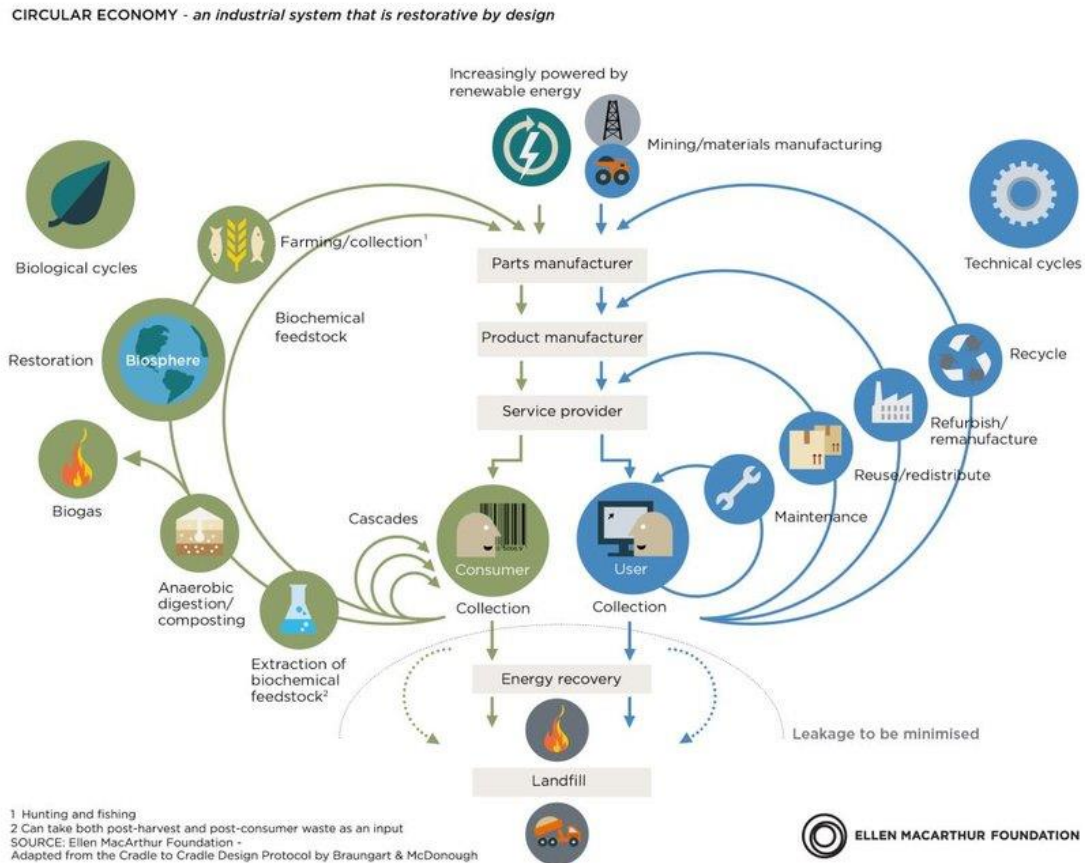


Figure 2-1: The Circular Economy System Diagram (Ellen MacArthur Foundation 2015)

The principles of CE assume that the raw materials used in production systems must be both technical and biological (Genovese et al. 2017; Suárez-Eiroa et al. 2019). The biological flow of materials contains materials that can safely re-enter the natural world and are designed to be consumed or metabolized by the economy and regenerate new resource value (Popa and Popa 2016). For these materials, the essence of value creation lies in the opportunity to extract additional value from products and materials by cascading them through other applications. Once the materials have gone through one or more cycles, where they will biodegrade over time, the embedded nutrients will return to the environment (Ellen MacArthur Foundation 2015; Popa and Popa 2016).

The technical flow of materials are materials that cannot re-enter the environment, for instance, metals, plastic and chemicals. These must continuously cycle through the system to capture and recapture their value (Ellen MacArthur Foundation 2015). The innermost loop refers to the strategy of keeping products and materials in use by prolonging their lifespan through designing for durability, maintenance and repair. These products can be shared amongst users, removing the need to create new products. The next loop refers to reuse and redistribution of products and material in their original form. The following loop seeks to restore the value of a product, where remanufacturing entails disassembly at component level and rebuilding to as-new condition, whereas refurbishment is the process of repairing the product as much as possible without disassembly or replacement of components. The last loop, recycling, refers to the process of reducing a product to its basic material level and allowing those materials to be remade into new products (Ellen MacArthur Foundation 2015). As in any linear system, pursuing yield gains across all levels is useful and requires continued system improvements. However, unlike a linear system, a circular one would not compromise effectiveness (Ellen MacArthur Foundation 2015; Popa and Popa 2016).

2.2.4. The Implementation of the Circular Economy

Implementation of the CE concept is a challenging task due to the prevailing linear mind-set and structures in industry and society (Lieder and Rashid 2016). The government and companies emerge as two of the key players in addressing a number of CE components and transformations (Witjes and Lozano 2016). Lieder and Rashid (2016) suggest a concurrent approach which operates through public institutions from top-down and through industry from bottom-up. This approach assumes that inverse motivations exist among the stakeholders of CE, which need to be aligned and converged. Governmental bodies and policy makers advocate a collective consciousness about environmental issues as well as social benefit of industrial activities, while the manufacturing companies possess potential awareness about the environmental impacts of their industrial activities and economic feasibility. Collaboration between the two parties can balance the economic, environmental, and social dimensions, and avoid prioritisation of either at the expense of the other (Lieder and Rashid 2016).

Through an analysis of companies, which are making the transition towards a CE, the Ellen MacArthur Foundation (2015) have identified four building blocks essential to fostering a more CE and these include: 1) *CE design* involves investment in building core competence

to facilitate product reuse, recycling and cascading. Circular product and process design requires advanced skills, information sets, and working methods. 2) *New BMs* can be obtained in two ways, either by designing an entirely new one or by adapting the existing one through seizing of new opportunities. 3) *Reverse cycles* are needed for the cascading and the final return of material to the soil or back into the industrial production system. With cost-efficient, better-quality collection and treatment systems, and effective segmentation of end-of-life products, the leakage of materials out of the system will decrease, supporting the economics of circular design. 4) *Enablers and favourable system conditions* means that market mechanisms need to play a dominant role, supported by policy makers, educational institutions and popular opinion leaders. These enablers include collaboration, rethinking incentives, providing a suitable set of international environmental rules, leading by example and driving up scale fast, and access to financing.

Pieroni, McAloone, and Pigosso (2019) state that the observed excitement and the increasing development of methodological support for circularity oriented implementation strategies and BMs are challenged by the lack of knowledge on how to make it happen in practice (Pieroni, McAloone, and Pigosso 2019). The transition to a functioning CE regime will require a systemic multi-level change, including technological innovation, new BMs, and stakeholder collaboration (Witjes and Lozano 2016).

The subsequent section presents BMs in general, followed by BMs in a CE and their respective challenges.

2.3. Business Models

For a company or an organisation to move towards circularity, a description of the business and a plan for how it will make a profit is necessary. This is commonly referred to as the BM and is key to understand the rationale of how an organisation creates, delivers, and captures value (Bocken et al. 2014).

2.3.1. Business Models in General

The essence of a BM is to describe how a business proposes, creates, delivers and captures value for the business, customer and a wider group of stakeholders (Bocken et al. 2014). A BM can be defined by three main elements; value proposition, value creation and delivery and value capture mechanisms (Richardson 2008), as shown in Figure 2-2.

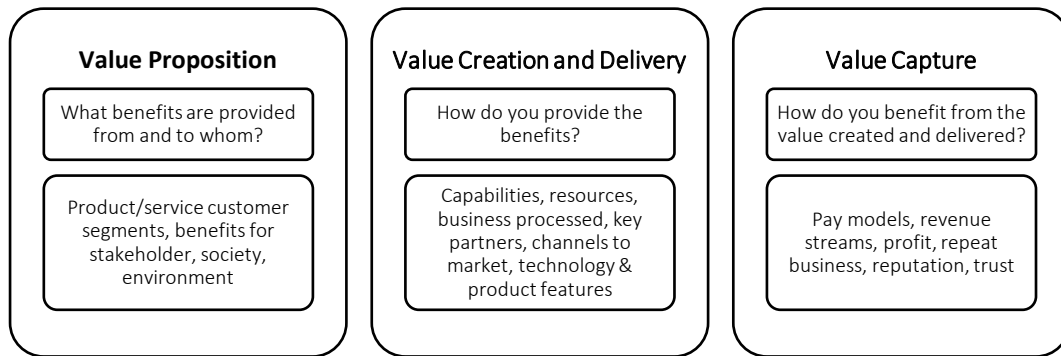


Figure 2-2: Business model dimensions based on Richardson (2008)

The *value proposition* consists of elements that raise the important question of why a company exists at all. Beyond what it will offer and to whom, it is important to ask why the market is not well served by other companies. In other words, how is the company going to do something better? The value proposition can therefore be described as a statement of the company's theory about how to compete (Richardson 2008). The *value creation and delivery* system describes how the company will create and deliver value to its customers. The sources of competitive advantages, i.e. resources and capabilities are specified and described, along with the activities related to creating, producing, selling and delivering their offering to customers (Richardson 2008). Finally, the *value capture* describes how the company is generating revenue and profit, such as revenue sources and streams, i.e. the economics of the company (Richardson 2008).

BMs function as a tool to investigate and identify how businesses capture value in each dimension, but also to reveal the potential value that is uncaptured. This opens the door for business model innovation (BMI), i.e. companies finding new ways to create and deliver the existing product or service with new value capturing attributes (Björkdahl and Holmén 2013). BMI allows for a change in how to do business instead of what to do, and it can comprise a new combination of new or old products or services, market position and process changes (Amit and Zott 2012; Björkdahl and Holmén 2013).

2.3.2. Circular Economy Business Models (CEBMs)

A traditional BM creates economic value for the actors in the value chain. A sustainable BM (SBM) however, is argued to entail a broader understanding of value and stakeholders since it captures economic value while maintaining or regenerating natural, social and economic capital beyond the organisational boundaries (Guldmann and Huulgaard 2020). A CEBM is a type of SBM that integrates environmental and economic value creation by shifting the

business logic; from generating profits from one-time sales of goods to generating profits from a continuous flow of reused materials and products over time by capitalising on the value embedded in used products (Bocken et al. 2016; Guldmann and Huulgaard 2020).

According to Pieroni, McAloone, and Pigosso (2019), innovation towards circularity includes the discovery of new ways to provide value to stakeholders and exploring economic value along the products life cycle to systematically improve resource efficiency and effectiveness. Putting CE into reality combined with the practice-oriented BMI approach leads to the concept of CEBMs, according to Geissdoerfer et al. (2018). This term is used to describe BMs that are suitable for CE by incorporating elements that slow, narrow and close resource loops so that the resource input into the organisation and its value network is decreased, and the waste and emission leakage from the system is minimised (Geissdoerfer et al. 2018).

However, a transition to CE is an example of radical change that requires a new way of doing business (Bocken et al. 2016). The change for CE requires as much of organizational innovation as of technological or product innovation (Pieroni, McAloone, and Pigosso 2019). According to Lacy and Rutqvist (2015, xxi), companies today are not built in a way that capitalises on the opportunities that the CE presents. Their strategies, structure, and operations are deeply rooted in the linear approach. Hence, companies need to develop BMs that are free of the constraints of linear thinking (Lacy and Rutqvist 2015, xxi). Moreover, companies that want to capitalize on circular practices need to adopt an innovation perspective that exceeds the direct SC needed for its current productions, according to Bocken et al. (2019). The new approach should be considering networks for multiple cycles of value creation as well as disposal when the end of life is irreversibly reached (Bocken et al. 2019). Guldmann and Huulgaard (2020) state that CEBMs have to consider how to recreate, redeliver and recapture value in every cycle the product goes through in its lifetime. At the same time, it must ensure an attractive value proposition to customers in each cycle. The first cycle is when a product is initially manufactured and sold or leased to customers, the second cycle could be product upgrade, the third cycle could be remanufacturing, and the final cycle could be material recycling (Guldmann and Huulgaard 2020).

The circular approach differs from linear BMs of take-make-use-dispose and a system which largely relies on fossil fuels, as the aim of the business shift is to generate profit from the flow of materials and products over time (Bocken et al. 2016). CEBMs also differ from the traditional BMs due to their value creation and delivery elements, particularly in the SC

(Geissdoerfer et al. 2018). CEBMs provide suitable approaches to create a sustainable business and possibly enhance revenues, and further enable economically viable ways to continually reuse products and materials, using renewable resources where possible (Bocken et al. 2016; Tunn et al. 2019; Yang et al. 2018). To get a better understanding of CEBMs, the following section will review and describe the different main types of CEBMs.

2.3.3. The Main Types of CEBMs

There are five main types of CEBMs with different sub-models that all have unique ways to protect the embedded value in a product, component, material or process (Lacy and Rutqvist 2015). Each of them represents a differentiated strategic option with implications regarding the future core customer value proposition. The characteristics within each model enable them to be used singly or combined. This can help companies achieve resource productivity gains, enhance customer value and reduce cost and risk (Accenture 2014). The following section describes the five main categorizations of CEBMs, which are illustrated Figure 2-3.

Product-as-a-Service

Product-as-a-service (PSS) is the transition from having ownership of the product to offering the use of the product or the performance as a service, i.e. offer outcome-oriented solutions (Gusmerotti et al. 2019). The value proposition in this CEBM focuses on the delivery of the service to provide capability and functionality, while remaining ownership within the company (Vermunt et al. 2019). The inconvenience of service or maintenance of products is taken over by the manufacturer or retailer, and the user can solely focus on the use and access of the service, thus, value creation and delivery (Bocken et al. 2016). Regarding the value capture mechanism, the pricing could be per unit of service. This CEBM allows financial benefits that would not be possible in a linear model, such as additional costs for life extension are balanced out by additional revenues as the company can use the product longer (Bocken et al. 2016).

Product Life Extension

Product life extension (PLE) aims to extend the life cycle of the product and create value by exploiting the residual value of used products (Bocken et al. 2016), with a distinction between the reuse strategies and the product upgrade strategies. Reuse strategies involve immediate resale or reuse of the product while upgrade requires activities such as repairing, refurbishing or remanufacturing before the product is resold and reused (Vermunt et al.

2019). The number of different activities that can be conducted within PLE, from repairing to reselling, can be considered as BMs on their own (Lacy, Long, and Spindler 2020). Repair activities are conducted to fix the specific shortcomings of a product while remanufacturing or refurbishment entail replacing or repairing entire product components (Vermunt et al. 2019). The success behind PLE is product design which is influenced by the product's original manufacturer, thereby power often lies with the manufacturer (Vermunt et al. 2019).

Resource Recovery Model

The resource recovery model (RR) evolves around the central process of recovery of materials from discarded products. The value proposition in this BM revolves around exploiting the residual value of resources and converting them into “new forms” of value (Vermunt et al. 2019). The value of embedded materials or energy from industrial goods is captured through collection, aggregation and processing at the end of product use through either recycling, upcycling or downcycling infrastructures and practices (Lacy, Long, and Spindler 2020). Aspects of the RR model has been the most widely adopted approach, and the main activities are related to collecting discarded materials, sorting, disassembling components and materials, processing and then use these materials to manufacture new products (Lacy, Long, and Spindler 2020; Vermunt et al. 2019).

Circular Supply Chain

Circular supply chains (CSC) represents a BM that creates and enables a shift from linear take-make-dispose approaches to be replaced by circular alternatives. These circular alternatives can be categorized into three groups; renewable resources, renewable bio-based materials and renewable man-made materials (Lacy, Long, and Spindler 2020). The implementation can also be viewed from a short/medium term to the long term. The short-term view concentrates on identifying and implementing substitutions of production inputs with circular alternatives. The long term is taking this a step further by aiming to close and dematerialize resource loops completely and thereby eliminating waste through a close collaboration with cross-industry and cross-sector stakeholders (Lacy, Long, and Spindler 2020). Furthermore, Geissdoerfer et al. (2018) present CSC as; the configuration and coordination of the organisational functions marketing, sales, R&D, production, logistics, IT, finance and customer service within and across business units and organizations. These functions then aim to close, slow, intensify, narrow and dematerialise material and energy loops to minimize resource input and emission leakage out of the system. By doing this, the

operative effectiveness should improve alongside with improved efficiency, and followingly generate competitive advantages (Geissdoerfer et al. 2018).

Sharing Platform

The Sharing Platform (SP), like the PSS model, target consumption and the relationship between the product and the consumer (Lacy, Long, and Spindler 2020). This CEBM uses technology to enable the connection between product users, encouraging shared use, access or ownership to increase efficiency and exploit the synergies in product use (Gusmerotti et al. 2019). The platform facilitates the renting, swapping, lending, or bartering of resources, reducing demand for new manufacturing. The platform owner does not offer any products itself but creates a revenue stream from matching demand for idle resource capacity by, for example, taking a percentage fee overall transactions occurring through the platform, or selling collected user data, using analytics to market complementary products, or supplying insurance (Lacy and Rutqvist 2015). The use of SPs is not limited to individual consumers and is becoming more visible in the business-to-business (B2B) market.

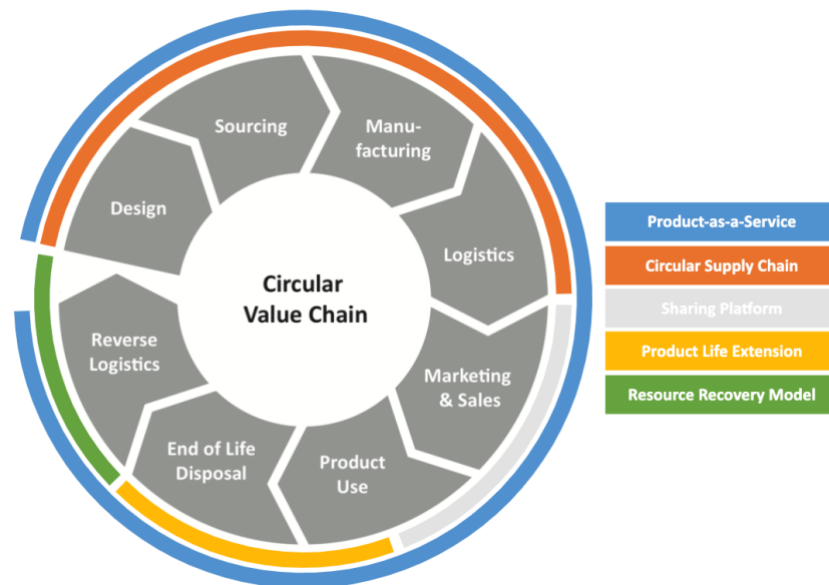


Figure 2-3: The Circular Value Chain and Circular Economy Business Models, based upon Accenture (2014)

Figure 2-3 illustrate the different CEBMs and indicates which areas of the circular value chain they are most relevant to due to their characteristics. Nevertheless, even though companies can gain several different benefits from engaging in the CE, widespread adoption and implementation of CEBMs has not happened yet and the transition to a CE has been slow (Guldmann and Huulgaard 2020; Vermunt et al. 2019). This has been attributed to

various barriers that companies encounter and/or perceive when developing and implementing CEBMs (Linder and Williander 2017; Vermunt et al. 2019). These barriers will be presented in the following section.

2.3.4. Barriers to Implementing CEBMs

The barriers related to CEBM innovation (CEBMI) that exist in the literature can broadly be categorized into external and internal barriers (Govindan and Hasanagic 2018; Guldmann and Huulgaard 2020; Vermunt et al. 2019). The external barriers range from governmental barriers, such as a lack of support and effective legislation, to barriers related to the value chain and other stakeholders. The latter is related to network collaboration challenges i.e. difficulties with creating needed networks for circularity due to little interest or lack of information and/or knowledge (Rizos et al. 2015). SC barriers such as higher dependence on external parties and conflicting interests between actors in the SC could also occur (Vermunt et al. 2019). Several external barriers are related to the uncertainty about the residual value of products and that they can be unpredictable or can decrease quality of returned or recycled products and materials (Guldmann and Huulgaard 2020; Ravi and Shankar 2005; Rizos et al. 2015).

The internal barriers revolve around a lack of management support, knowledge, resources, complexity in product design, and incentive structure (Guldmann and Huulgaard 2020). There are, in particular, several barriers related to the lack of in-house knowledge about CE and its benefits, as well as remanufacturing and recycling (Ravi and Shankar 2005; Rizos et al. 2015). Lack of knowledge is also evident concerning developing and designing new BMs, which is further restrained by the lack of technical and technological know-how and the needed tools (Ravi and Shankar 2005; Rizos et al. 2015). New CEBMs also impose higher costs e.g. costs of collection and segregation of components, which require high up-front investment costs (Govindan and Hasanagic 2018; Vermunt et al. 2019). In addition, traditional incentive structures and performance metrics that are dictated by the practices of the linear economy are inappropriate and inadequate to support new CEBMs (Govindan and Hasanagic 2018; Guldmann and Huulgaard 2020; Ravi and Shankar 2005).

However, Vermunt et al. (2019) discuss that even though earlier studies have discovered and examined several barriers through different lenses, barriers remain featured in general terms and conceptual clarity is lacking on how barriers may differ between the various CEBMs. Ignoring the differences could lead to unjustified generalizations about the barriers and feed

upon the lacking conceptualization of the variety of barriers for different CEBMs (Vermunt et al. 2019). According to Vermunt et al. (2019), only a few examples provide valuable insights; the literature stream on closed-loop supply chains (CLSCs), provide barriers that relate to the organization of close loops and reverse logistics. This insight is key for various CEBMs that aim to reuse products and materials, i.e. models based on remanufacturing or recycling (Govindan and Hasanagic 2018; Vermunt et al. 2019).

According to Vermunt et al. (2019), there are differences in types of barriers encountered between the different CEBMs. Based on the results from their study, the following sections describe the barriers encountered by the specific CEBMs, summarised in Table 2-1 and compared to each other in Figure 2-4. However, the SP model is not presented in the figure or the description, as it is not mentioned in the study by Vermunt et al. (2019). There is little research available on barriers specific to the SP within the context of CE, but Lacy and Rutqvist (2015) bring up institutional barriers in the form of appropriate laws and regulations to enable sharing as an example.

Table 2-1: Categories of barriers, per type of CEBM (Vermunt et al. 2019)

Barrier	Type of CEBM			
Categories	PSS	PLE	RR	CS
INTERNAL				
Knowledge and technology			•Lack of knowledge of and technology for recycling processes	•Lack of technology on how to use circular materials in production processes
Organisational	<ul style="list-style-type: none"> •Legal challenges related to contract •Administrative barriers related to lease contracts •Organisation of service component of PSS model 			
Financial	<ul style="list-style-type: none"> •Up-front investments needed •Higher cost and economically non-viable BM due to high service costs (especially when product components are cheap) 			

EXTERNAL

Supply chain	<ul style="list-style-type: none"> • Dependence on suppliers that: <ul style="list-style-type: none"> - do not focus on reuse: creates challenges in terms of quality - do not focus on third-party product design and product information: creates conflicting interests in supply chain • Lack of partners 	<ul style="list-style-type: none"> • Dependence on other parties for waste as input: <ul style="list-style-type: none"> - Uncertainty about suppliers in terms of quality, quantity, and delivery time of waste • Lack of partners and a low volume of waste 	<ul style="list-style-type: none"> • Lack of partners • Current suppliers resist change 	
Market	<ul style="list-style-type: none"> • Resistance from customer: consumer has not understood or accepted lease contracts • Disposable products are cheaper in market: PSS model option in less attractive 	<ul style="list-style-type: none"> • Resistance from customer: <ul style="list-style-type: none"> - Not valuing “used” product - Market asks for “make-to-order” instead of standardisation • Resistance from competitors: no focus on reuse 	<ul style="list-style-type: none"> • Resistance from customers: distrust of products made from waste • Resistance from competitors • Low prices of virgin materials 	<ul style="list-style-type: none"> • Resistance from customers: image problem, circular product received as lower quality • Market price of virgin materials is low and bio-based materials are expensive
Institutional	<ul style="list-style-type: none"> • Vested rules in society not focused on circular economy: within companies, key performance indicator and accounting rules focus on linear economy and on products eventually becoming waste • Legislation/policy: V.A.T. • Resistance from society: prevalence of a “buy-and-own” culture • Investors are reluctant to invest in lease models 	<ul style="list-style-type: none"> • Waste legislation hinders use of waste • Lack of policy incentives to use waste; waste is not a competitive resource • Insufficient societal awareness about waste separation 		

Product-as-a-service

Companies with PSS model mainly mention organisational and financial barriers (Vermunt et al. 2019). The organisational challenges are related to legal challenges i.e. contract and administrative barriers related to leasing contracts. Companies mention the high up-front investments needed as a financial barrier, in addition to challenges with creating economic viability due to high service costs. The external challenges are related to market and institutional barriers. Market-related barriers occur when consumers do not understand or accept the lease contracts. Furthermore, some disposable products are cheaper in the market, making this model less attractive. Institutional barriers manifest through the lack of understanding of the CE in society in general and the lack of vested rules, i.e. companies' key performance indicators focus on the linear economy and products becoming waste. Moreover, society is reluctant due to a prevailing "buy-and-own" culture, and investors are unwilling to invest in lease models (Vermunt et al. 2019).

Product Life Extension

PLE models mostly encountered external SC and market barriers. Supply chain barriers are encountered due to dependence on suppliers that do not focus on reuse or third-party product design and product information i.e. it creates conflicting interests in the SC. Market barriers are related to resistance from customers by not valuing "used" products. Instead of standardization, the market is asking for "make-to-order" (Vermunt et al. 2019).

Resource Recovery

RR models mention external barriers related to SC followed by institutional barriers and market barriers. Supply chain barriers are related to dependency on other parties for waste as input, thus creating uncertainty about quality, quantity and delivery time of waste. Besides, there can be a lack of partners and low volumes of waste. Institutional barriers are present in the form of missing policy incentives to use waste, thus enabling waste to be considered as a competitive resource. There is also resistance from customers and competitors to use products made out of waste. Furthermore, in some cases, the price of virgin materials can be lower than reused options. Regarding the internal barriers, they are mainly mentioned as a lack of knowledge and/or technology for recycling processes (Vermunt et al. 2019).

Circular supply chains

CSC models mention internal knowledge and technology as a significant barrier; not knowing how to use circular materials in the production processes. External SC barriers such as lack of partners and hesitation from current suppliers to change are mentioned as major barriers. Market barriers may occasionally arise within CSC and are then identical to market barriers experienced by the above mentioned CEBMs (Vermunt et al. 2019).

Overall, this subsection has presented the various challenges of implementing CEBMs identified by Vermunt et al. (2019), and there are indeed differences between the models, as illustrated in Figure 2-4. Furthermore, Vermunt et al. (2019) found that many barriers appear to be interlinked and that internal barriers were often related to an external barrier. For instance, investor reluctance to invest in PSS models resulted in a lack of financial backing to enable leasing, and technological challenges for recycling and PLE occurred when other actors decided on product design.

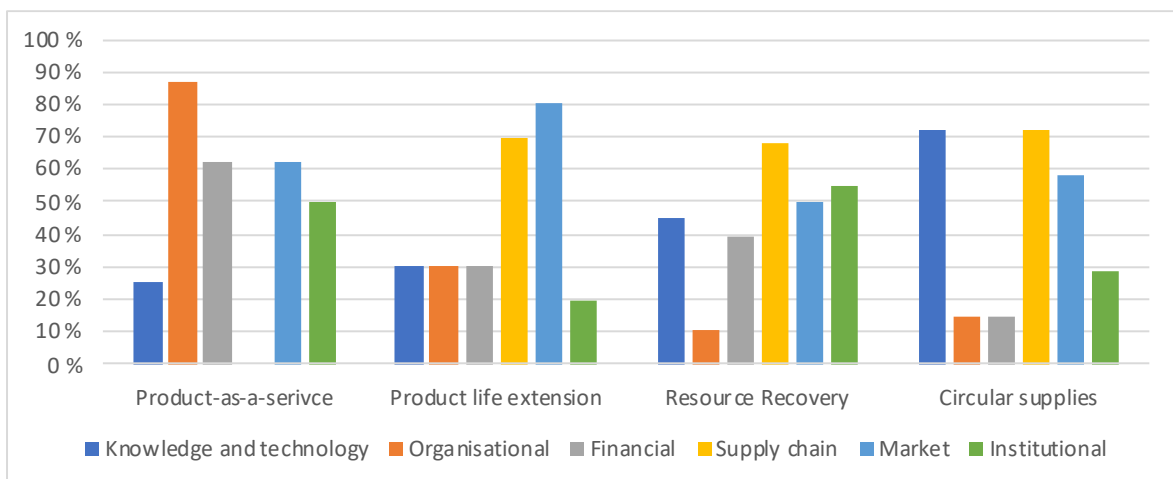


Figure 2-4: Percentage of companies in each of the four CEBMs mentioning different types of barriers to implementation, adapted from Vermunt et al. 2019

That being said, the CE requires a disruption of the linear economy and a change in how a company delivers value. Implementation of CE and its BMs will entail alignment across all functions within a company, and full implementation is possible only when all contribute. However, the focal function of this thesis is procurement which warrants an introduction, before the role of procurement in CE can be reviewed. The following section will discuss the definition of procurement, as well as present activities and its strategic role in a SC.

2.4. Procurement – An Overview

To implement CE efforts and BMs within a company, it is necessary to understand the concept of CE, the company rationale, as well as the organisation of the company. The first elements have been presented in the previous sections, whereas this one will give an overview of how the company is organised. The focus of this thesis is on the contributions of the procurement function and will start by clearing up issues related to the definition of procurement. A brief introduction to SC and SCM follows, in order to understand the business context of procurement, before its strategic role is reviewed. Finally, as the similarities and differences between the concepts of CE and sustainability remain ambiguous in literature (Geissdoerfer et al. 2017), a general approach to sustainability in procurement is presented.

2.4.1. Defining Procurement

The classic description of purchasing by Baily, Farmer, and Jessop (2005, 3) state that *“one has to purchase the right quality of material, at the right time, in the right quantity, from the right source, at the right price”*. The quote indicates the different objectives of the purchasing function and serves as a good starting point to understand its aspects (Johnsen 2019, 8). The term purchasing often describes the transactional processes concerned with acquiring goods and services, including payment of invoices. Procurement, on the other hand, describes all the processes concerned with developing and implementing strategies to manage an organization’s spend portfolio in such a way that it contributes to the organization’s overall goals and to maximize the value released and/or minimize the total cost of ownership (Johnsen 2019). However, the UK Charter Institute of Procurement & Supply states that *“there is little consensus on the precise definition of the terms such as procurement and purchasing, and in the United States, in particular, the term purchasing describes what in Australia, New Zealand, Europe and Asia is more widely known as procurement”* (Johnsen 2019, 8). The institute further acknowledges that even though the characteristics and definitions differ regarding how comprehensive they are, they are still used interchangeably (Johnsen 2019).

By viewing van Weele (2009, 8) definition, it is clear that he places the strategic aspect on the purchasing definition; *“purchasing is the management of company’s external resources in such a way that the supply of all goods, services, capabilities and knowledge which are necessary for running, maintaining and managing the company’s primary and support*

activities is secured at the most favourable conditions". Procurement, on the other hand, is simply described as activities that are required to get product from supplier to its final destination (van Weele 2018). However, procurement can also be described as supplier management (Lysons and Farrington 2016). This indicates an aim to rationalize the supplier base and the selection, to coordinate, appraise the performance of and develop the potential of suppliers, and build long-term collaborative relationships. This description places the procurement amongst strategic and cross-functional activities, rather than just "buying" which is too transactional focused (Lysons and Farrington 2016). Suppliers are an important source for competitive advantage to companies and need to contribute in the aim of delivering customer value, societal value and shareholder value (van Weele 2018). Therefore, Procurement and Supply Management (PSM) can be considered as an important and crucial function in a company (Schweiger 2015).

In addition to the differences between the practical business perspective and the somewhat more theoretical academic perspective, there are additional variations within these perspectives (Johnsen 2019). Moreover, procurement is considered to have a strategic role and involves the development of effective and integrated purchasing strategies that sustains the goals and objectives of the organization (Oloruntobi 2015). For the purpose of this thesis, the term procurement will be used, as it can be viewed as more comprehensive by including both the more strategic activities of supplier management, and mainly transactional and commercial activities of purchasing, as illustrated in Figure 2-5.

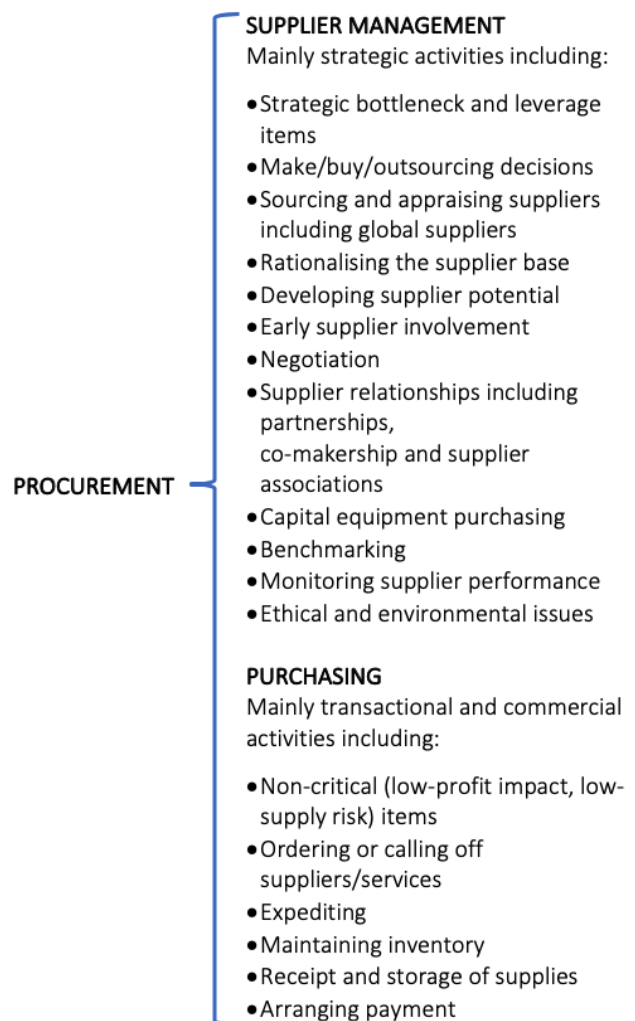


Figure 2-5: The Relationship between procurement, supplier management and purchasing, adapted from Lysons and Farrington (2016)

2.4.2. Procurement in a Supply Chain

To understand the role of procurement in a SC, a brief description of SC and SCM is needed. According to Chopra (2018, 13), *«a supply chain consists of all parties involved, directly or indirectly, in fulfilling a customer request. The supply chain includes not only the manufacturer and suppliers, but also transporters, warehouses, retailers, and even customers themselves. Within each organisation, such as a manufacturer, the supply chain includes all functions involved in receiving and filling a customer request. These functions include, but are not limited too; new product development, marketing, operations, distribution, finance, and customer service».*

Christopher (2016, 3) further suggest that SCM can be defined as *«the management of upstream and downstream relationships with suppliers and customers in order to deliver superior customer value at less cost to the supply chain as a whole».* Lysons and Farrington (2016) present four key enablers to effective SCM, which become barriers if not in place. The first most essential enabler is the organisational infrastructure, which includes important attributes such as; coherent business strategies that align the business units towards the same goal, formal processes that methodically enable SCM improvements, and having the right process metrics to guide the performance towards the strategic objectives. The second enabler is technology, which enables coordination within the company. The two final enablers are strategic alliances and human resource management, which enable collaboration with external resources and ensures internal knowledge and expertise (Lysons and Farrington 2016).

As for procurement, Chopra (2018, 445) defines it as *“the process by which companies acquire raw materials, components, products, services, or other resources from suppliers to execute their operations”.* Once a decision to outsource has been made, sourcing processes include the selection of suppliers, design of supplier contracts, product design collaboration, procurement of material or services, and evaluation of supplier performances (Chopra 2018), as shown in Figure 2-6. This is similar to Hahn, Watts, and Kim (1990), who suggest that the basic objective of the procurement function is to secure competent supply sources that will provide an uninterrupted flow of required materials at a reasonable cost.

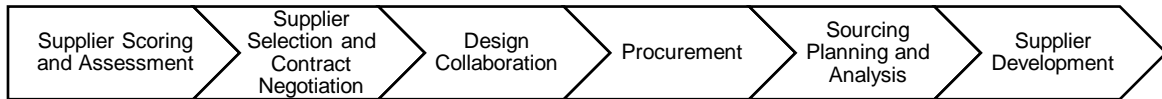


Figure 2-6: Key Procurement-Related Processes, based on Chopra (2018) and Hahn, Watts, and Kim (1990).

According to Chopra (2018, 445), *Supplier scoring and assessment* is the process used to rate supplier performance. Suppliers should be compared not only on the price charged, but also on other supplier characteristics, such as lead time, reliability, quality, and design capability. These characteristics affect the total cost of doing business with a supplier, and the scoring and assessment process must identify and track performance along all dimensions. In the *supplier selection* process, a supplier is chosen based on the previous assessment and a contract is negotiated. A good contract should account for all factors that affect SC performance and should be designed to increase SC profits in a way that benefits both the supplier and the buyer (Chopra 2018). Furthermore, as Chopra (2018) states, 80% of the cost of a product is determined during the initial design, thus making it crucial for the supplier and the buying companies to partake in *design collaboration* to ensure that design changes are communicated effectively to all parties involved. Once the product is designed, the *procurement* process starts, whereby the supplier sends the product in response to orders placed by the buyer. The goal of procurement is to enable orders to be placed and delivered on schedule at the lowest possible overall price. The role of *sourcing planning and analysis* is to analyse the spending across various suppliers and component categories to identify opportunities for decreasing total cost (Chopra 2018). Hahn, Watts, and Kim (1990) place much emphasis on the *development of suppliers* and argue that the procurement function is required to work with the suppliers to improve their technical, quality, delivery, and cost capabilities. Because the market demands continuous improvement in the products and services purchased, the continuous evolution of the suppliers' capabilities must be a long-term objective of the buying company (Hahn, Watts, and Kim 1990).

2.4.3. The Strategic Role of Procurement

According to Schweiger (2015) the procurement function has evolved from the traditional and mostly operational objective of ensuring secure, low cost and high-quality supply of materials to entail more strategic goals with mid- to long term orientation. For instance, procurement contributes to product design and innovation through early (supplier)

involvement and building differentiated sourcing strategies and supplier partnerships (Schweiger 2015). Lysons and Farrington (2016) further note that the operational and tactical role of procurement, such as agreeing on the price, placing purchase orders, attending meetings, chasing overdue deliveries, handling stakeholder queries and handling order acknowledgements, however necessary, lack any strategic dimensions. Schütz et al. (2019) argue that in the evolution of the procurement function and its changing environment, the configuration of knowledge, skills, and competences of the procurement professionals have always played a significant role. As the role of the function becomes more strategic, a new knowledge set is needed, including the development of suppliers, market research, outsourcing activities, cost analysis, risk management, as well as commodity and sourcing strategies (Schütz et al. 2019).

Lysons and Farrington (2016) present several capabilities a procurement function must master to fulfil its strategic roles, such as *due diligence*, *risk management of the supply chain*, *relationship management*, and *continuous improvement of the supplier*. Conducting *due diligence*, includes considerations of the financial robustness, competence, and expertise of the supplier, and requires probing beyond the superficial. This is in line with the scoring and assessment process presented by Chopra (2018) in Section 2.4.2. Identifying *supply risks* and developing acceptable risk mitigation strategies is a requirement of strategically focused procurement operations. This includes managing SC risks that the supplier and the buying organisation can manage individually, but also those risks that must be jointly managed (Lysons and Farrington 2016). According to Schneider and Wallenburg (2013), once purchasing is organised as a separate business function within a company, its internal *relations* to other functions become highly important and impose a broad range of problems in practice. Still today, managing relations across different functions is one of the biggest challenges in optimising SCs. As described by Lysons and Farrington (2016), the procurement community has a strategic role to motivate suppliers to *continually improve* their performance. The performance on long-term contracts can be incentivised to reward the supplier's investment, initiatives, collaboration, evolution and innovation (Lysons and Farrington 2016).

Lysons and Farrington (2016) further note that procurement and SCM today reflect a growing emphasis concerning the strategic business importance of suppliers. The relationship with suppliers has shifted from an adversarial approach to a more cooperative approach, which imposes a different mindset amongst procurers. The new way to create

value within the SC is through supplier development, partnering, supplier-design involvement, use of full-service suppliers, lifecycle costing and long-term supplier contracts (Lysons and Farrington 2016).

According to a systematic literature review and content analysis conducted by Tchokogue, Nollet, and Robineau (2016), the strategic contributions of supply can be classified into three categories; support to corporate improvement targets, support to the organisational competitive advantage, and a source of sustainable competitive advantage. The specific contributions to each category are presented in Table 2-2 below. Tchokogue, Nollet, and Robineau (2016) argue that the contributions in the first category are necessary to master before supply can take on those in the following categories:

Table 2-2: Three categories of supply's strategic contribution (Tchokogue, Nollet, and Robineau 2016)

Categories of strategic contribution	Specific types of contribution
Support to corporate improvement targets	<ul style="list-style-type: none"> • Passive participant in the planning process • Cost savings through efficient procurement practices • Identification of potential suppliers • Service to internal customers • Material-flow synchronisation initiatives
Support to organizational competitive strategy	<ul style="list-style-type: none"> • Strategic cost management • Strategic resource planning • Strategic resource for high-quality levels, fast delivery and cost savings • Improvements to both internal and external interfaces • Preservation of credibility with both suppliers and internal departments
Source of sustainable competitive advantage	<ul style="list-style-type: none"> • Mobilisation of difficult-to-duplicate external resources • Development of the organizational innovation ability through the supplier network • Knowledge and expertise as a critical resource in defining the future of the organisation

The authors point out that supply's strategic contribution is multi-faceted and that trends such as just-in-time (JIT), international procurement, outsourcing, increased professionalism, and information technology (IT) have spearheaded its strategic evolution over time (Tchokogue, Nollet, and Robineau 2016). Information technologies, in particular, have allowed more time for procurement professionals to focus on new forms of supplier relationships, supply management, advanced planning and value-added activities (Tchokogue, Nollet, and Robineau 2016). To which extent supply's strategic contribution is achieved depends on two factors; the environment within which an organisation operates (e.g. competitors, integration level in the industry, the extensiveness of SC) and supply's

position in the organisational structure and the extent to which supply is a recognised contributor to the organisational strategy (i.e. top management allocates sufficient resources). Therefore, if the potential of supply is not recognized, it is likely that its strategic contribution is under-utilized (Tchokogue, Nollet, and Robineau 2016).

For supply to be able to play an appropriate strategic role, it needs sufficient achievement across several dimensions, such as the alignment of supply strategy with organisational strategy, the supply structure, the integration level of supply processes, the tools and techniques used, and the competencies displayed by the supply personnel (Tchokogue, Nollet, and Robineau 2016). These dimensions can be used to determine the maturity level of procurement, which is the topic discussed in the next section.

2.4.4. Procurement Maturity Model

To cope with the tasks and processes highlighted in the previous sections, a high level of professionalism and innovative orientation in the procurement function is fundamental (Rozemeijer, Van Weele, and Weggeman 2003; Schweiger 2015). Thus, to assess the level of professionalism, the Procurement Maturity Model (PMM) can be applied. Rozemeijer, Van Weele, and Weggeman (2003) explain that procurement maturity is related to; professionalism in the organisation expressed through the status of the function, role and the organisational status of the procurement department, availability of the procurement information systems, and level of collaboration with the suppliers.

As noted by Schweiger (2015), several scientific, as well as practice-oriented models, have been developed over the last decades in order to describe the evolvement and status of the procurement function. These maturity models express the characteristics for each stage and the hypothesis is that a mature procurement organisation apply best practices, and that greater maturity is associated with better (business) performance (Schweiger 2015). However, the handling of too many initiatives and actions alongside daily business leads to more diversity and complexity for the employees of the procurement function. This can provoke counter-productive effects, especially for small and medium-sized companies (SMEs) with limited organizational resources (Schweiger 2015).

Lysons and Farrington (2016) present a model that illustrates the stages of procurement development reached by an organisation and they assess it on a scale from 1-4 (Lysons and Farrington 2016). Table 2-3 is developed based on their work and it summarises the stages and its inherent procurement characteristics at different stages.

Table 2-3: Procurement Maturity Model, adapted from Lysons and Farrington (2016).

Stage 1 Passive	<p>The procurement function has no strategic direction and primarily reacts to the request of other functions</p> <ul style="list-style-type: none"> • A high proportion of time on quick fix routine operations • Functional and individual communication • Supplier selection based on price and availability
Stage 2 Independent	<p>Adapts to the latest procurement techniques and processes, but its strategic direction is independent of the company's competitive strategy</p> <ul style="list-style-type: none"> • Performance is primarily based on cost reduction and efficiency disciplines • Coordination links are established between procurement and technical disciplines • Top management recognizes the importance of professional development
Stage 3 Supportive	<p>The procurement function supports the company's competitive strategy by adopting procurement techniques and products, thereby strengthening the company's competitive position</p> <ul style="list-style-type: none"> • Purchasers are included in sales proposals teams • Suppliers are considered as a resource, with emphasis on experience, motivation and attitude • Markets, products and suppliers are continuously monitored and analysed
Stage 4 Integrative	<p>Procurement's strategy is fully integrated into the company's competitive strategy and constitutes part of an integrated effort among functional peers to formulate and implement a strategic plan</p> <ul style="list-style-type: none"> • Cross-functional training of procurement professionals and executives is made available • Permanent lines of communication are established with other functional areas • Professional development focuses on strategic elements of the competitive strategy • Procurement performance is measured in terms of contribution to the company's success

2.4.5. Sustainability in Procurement

The sustainability concept in the SCM literature is largely based upon Elkington (2013)'s idea of the TBL, which suggests that organisational sustainability consists of three components; the natural environment, society, and economic performance at a broader level (Farooque et al. 2019). Based on a definition by Pagell and Shevchenko (2014), sustainable supply chain management (SSCM) is the designing, organising, coordination, and controlling of SCs to become truly sustainable. The minimum expectation of a truly sustainable SC is to maintain economic viability while doing no harm to social or environmental systems (Pagell and Shevchenko 2014).

Kraljic (1983) claims that in many companies, procurement, more than any other business function, is dictated by routines. Companies continue to negotiate annually with their established networks of suppliers and sources, ignoring or accepting economic and political disruptions to their supply of materials. According to Kraljic (1983), no company can allow procurement to lag behind the other functions in acknowledging and adjusting to worldwide environmental and economic changes, stating that such an attitude is not only obsolete but also costly.

Sustainability in procurement reflects a relatively new field of sustainable transitions for both public and private organisations (Leal Filho et al. 2019). According to Johnsen (2019), a company is no more sustainable than the suppliers it sources from, which puts procurement right at the heart of sustainability implementation. Procurement considers the environmental, social, ethical and economic issues in the management of the organisation's external resources in such a way that the supply of all goods, services, capabilities and knowledge, provide value not only to the organisation but also to the society and the economy (Leal Filho et al. 2019; Miemczyk, Johnsen, and Macquet 2012). Moreover, sustainable procurement can facilitate organisational efficiency and transparency, as well as compliance, financial savings and a more productive work environment (Leal Filho et al. 2019).

Leal Filho et al. (2019) argue that sustainable procurement practices and policies are likely to place focus on reduced packaging and waste, assessment of environmental performance in suppliers, development of eco-efficient products, and performance in carbon emission reduction in transportation of goods. Leal Filho et al. (2019) present six barriers and drivers of sustainable procurement in their study; perceived cost and budget restriction, leadership attitude and stakeholder fatigue, lack of knowledge and experience, availability of suppliers of sustainable products and services, procurement evaluation criteria, and diverse stakeholders. Leal Filho et al. (2019) argue that budget constraints and the perceived higher cost of "green" goods contradict the common procurement objective of lowest possible price, which is further challenged by the limitation in the number of suppliers offering sustainable products and services. Furthermore, a lack of top management commitment and stakeholder support combined with the financial concern creates a dismissive attitude towards sustainability and the implementation in procurement can become difficult. The low levels of awareness and knowledge leads to challenges in implementing practices and policies, and difficulties evaluating the efforts (Leal Filho et al. 2019).

Moreover, Miemczyk, Johnsen, and Macquet (2012) suggest that sustainability problems are likely to stem from indirect supplier relationships that are part of the extended SC. This makes it relevant to consider a higher level to fully grasp the implication of sustainability on procurement and SCM. They further propose a distinction between three levels of sustainability analysis pertinent to PSM: dyadic (one-to-one) relationships, SCs and industrial networks. This is in line with Johnsen (2019), who emphasises the need to understand the SC as a business system that consists of a complex network of actors and stakeholders that are directly or indirectly involved in the supply process from raw material to consumers.

Now that the concepts of CE, CEBMs, and procurement in SC have been reviewed, we can take a closer look at the role of procurement in the CE.

2.5. The Role of Procurement in Circular Economy

Before we explore the role of procurement in CE, it is necessary to establish a definition on Circular Supply Chain Management (CSCM). According to Farooque et al. (2019, 3), there is no comprehensive definition of the term and suggest that “*circular supply chain management is the integration of circular thinking into the management of the supply chain and its surrounding industrial and natural ecosystem. It systematically restores technical materials and regenerates biological materials towards a zero-waste vision through system-wide innovation in BMs and supply chain functions from product/service design to end-of-life and waste management, involving all stakeholders in a product/service lifecycle, including parts/product manufacturers, service providers, consumers, and users*”.

As stated by Johnsen (2019), there is by no means certain that procurement or SCM will play a key role in creating SBMs, but many companies are developing in that direction. Johnsen (2019) further emphasises the need for sustainability to become integrated into the company, as a core part of business strategy, process and function, with procurement and SCM taking a leading role. Pollice and Batocchio (2018) claim that for SCs to operate in the new environment that the CE creates, the PSM organisations will be important to accommodate for this change. Procurement, in particular, will play a key role in the acceleration of the CE and complete integration of the circular concepts in the procurement process is necessary to make circular procurement a new norm (Pollice and Batocchio 2018).

Sönnichsen and Clement (2020) explain how green and sustainable procurement has gained attention for addressing social, environmental and social challenges. However, CE and procurement is a new field both in academia and practice, and most research done concerns public procurement. In their literature review on green, sustainable and circular public procurement, Sönnichsen and Clement (2020) report similarities in the definitions of the concepts and refer to them collectively as circular public procurement. The European Commission defines circular public procurement as: *“the process by which public authorities purchase works, goods or services that seek to contribute to closed energy and material loops within supply chains, whilst minimising, and in the best case avoiding, negative environmental impacts and waste creation across their whole life-cycle”* (EU 2017, 5).

Additionally, Farooque et al. (2019) conducted a structured review of the literature to summarise the current state of academic research on CSCM. As Figure 2-7 shows, most of the research is concentrated on the topics of CSCM and BMs, end of life and waste management, SCM and/or value chain, or design. Nevertheless, the role technology, consumption, logistics, production and procurement have received less attention from researchers, with the procurement only accounting for three studies. Procurement in regards to CSCM represent a significant research gap, which is surprising as procurement is a strategic function in many organisations, playing a vital role in a company’s sustainability performance (Farooque et al. 2019). Furthermore, Farooque et al. (2019) state that introducing CE into the procurement function will re-define price, quality, time and value for money principles in procurement. It is also claimed that the relative newness of the CE philosophy is the reason for lack of studies exploring this interaction (Farooque et al. 2019).

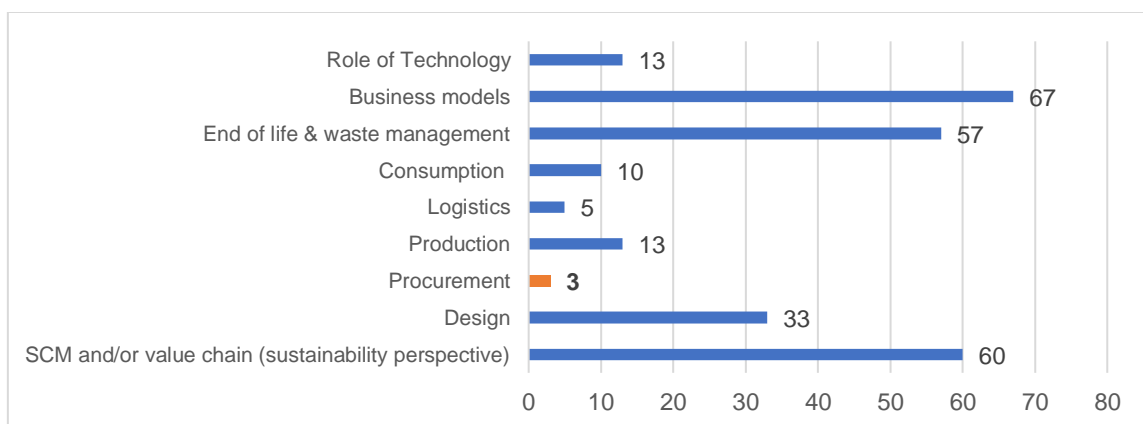


Figure 2-7: Classification of CSCM research (Farooque et al. 2019).

Witjes and Lozano (2016) suggest that applying CE principles to leverage points under a company's control can provide significant strategies for mitigating SC vulnerability. Their research proposes that collaboration between procurers and suppliers can lead to reductions in raw material utilisation and waste generation, whilst promoting the development of more SBMs, thus contributing to making societies more sustainable (Witjes and Lozano 2016). This is supported by Popa and Popa (2016) who assert that green public acquisitions enable opportunities to save public money and to protect the environment simultaneously. However, Gaustad et al. (2018) indicate that many companies are not able to allocate the required time and resources to track these dynamic, complex issues. They suggest that circularity strategies such as recycling, lean principles, dematerialisation and diversification have a significant potential for reducing the vulnerabilities in material supply. Complete integration of circular procurement concepts and practices in the procurement organisations and structures is required to achieve the next stage of the procurement evolution (Pollice and Batocchio 2018). The maturity level of procurement has to be viewed from a perspective beyond the boundaries of a single company, namely value creation in the total industrial ecosystem (Pollice and Batocchio 2018).

Through the review of the theoretical perspectives for this thesis, we have noted similarities in the barriers presented for both the CEBMs and sustainable procurement. Table 2-4 presents a summary of these similarities, structured into the categories presented by Vermunt et al. (2019). These similarities might indicate that several of the general barriers to, and enablers of CEBMs, are related to the barriers of sustainability efforts in procurement.

Table 2-4: Comparison of barriers to CEBMs and sustainable procurement, based on Leal Filho et al. (2019), Vermunt et al. (2019), and Miemczyk, Johnsen, and Macquet (2012)

	Barriers to CEBM	Barriers to sustainable procurement
Internal		
Knowledge	Lack of knowledge of and technology	Lack of knowledge and experience
Organisational	Legal challenges, organisation, and administrative issues	Leadership attitude Procurement evaluation criteria
Financial	Upfront investments needed and perceived higher cost	Perceived cost and budget restriction

External		
Supply chain	Dependence on suppliers and lack of partners	Emphasis on relationships in the extended SC
Market	Resistance from customers and competition from disposable products	Diverse stakeholders Availability of sustainable products and services
Institutional	Established rules in society and lack of legislation enabling CEBMs	Regulations and policies

In sum, this Chapter has presented the theoretical perspective for this thesis and will serve as the basis for the analysis and discussion of the cases. The procurement theory, i.e. the strategic contributions and PMM will aid in establishing what strategic level the case companies are. This will determine in what way procurement can contribute to CE efforts and the implementation of CEBMs. The next Chapter will present the research methodology employed by this thesis.

3. RESEARCH METHODOLOGY

3.1. Chapter Introduction

This Chapter presents methodological issues that are relevant to this thesis. A suitable methodology is identified by using the “research onion”-model developed by Saunders, Lewis, and Thornhill (2012). The model illustrates that the research problem lies in the centre and that several layers need to be peeled away. The layers are considered as core aspects when determining the research methodology (Saunders, Lewis, and Thornhill 2012, 128). The outermost layer to be identified is the research philosophy, followed by research approach, design, and strategy; where a rationale for using a multiple case study approach, case selection and case descriptions is given. Consequently, time horizon, the data collection and analysis are described, followed by an assessment of the quality criteria related to this thesis.

3.2. Philosophical Position

Research philosophy refers to the system of beliefs and assumptions about the development of knowledge (Saunders 2016, 124). Saunders (2016) further notes that the assumptions encountered during the research will inevitably shape the understanding of research questions, methods used, and how findings are interpreted. A thoughtful and consistent set of assumptions can, therefore, establish a credible research philosophy which followingly underpins the methodological choice, research strategy and data collection techniques and way of analysis (Saunders 2016, 125). Furthermore, Ates and Bititci (2008) explain that consideration of philosophical assumptions can guide the researcher to choose the right research strategies and techniques. Besides, understanding the different characteristics of the different philosophical paradigms can guide the researcher to choose a suitable research design (Ates and Bititci 2008). Paradigms exist due to the differences in the underpinning philosophical positions, which give different approaches a distinct set of assumptions that may be incompatible with each other (Easterby-Smith, Thorpe, and Jackson 2015, 57). Willis (2007) further describes paradigms as comprehensive belief systems, world views or frameworks that guides research and practice in a field (Willis 2007, 8).

According to Saunders (2016), the above-mentioned assumptions can be categorised into ontological, epistemological and axiological assumptions. Ontological assumptions are

related to researchers' assumptions made about human knowledge and the nature of the world and reality. Epistemology is concerned with how we know what we say we know and what constitutes acceptable, valid and legitimate knowledge. Lastly, axiological assumptions consider to which extent and in which way your own, and others' values and ethics influence the research process (Saunders 2016, 127). The categorisation makes it easier to distinguish different philosophies by viewing the differences and similarities in their ontological, epistemological and axiological assumptions (Saunders 2016, 127).

Table 3-1 below summarises the four main categorisations of philosophies: positivism, realism, interpretivism and pragmatism.

Table 3-1: Summary of philosophical positions based on Saunders, Lewis, and Thornhill (2012)

	Philosophy category			
	Positivism	Realism	Interpretivism	Pragmatism
Ontology View on the nature of reality	The mindset of the natural scientist. Social reality is observable, and the researcher is external to the data collection process.	Relates to scientific inquiry. What we sense is reality. Differs between direct- and critical realist. Direct views the experiences as an accurate representation of the world, whilst critical realists argue that it is merely a sensation of reality	Social (complex) constructions where the focus is on people and not objects.	Can be several solutions. Chooses what is best suited to answer RQ. A single point of view cannot paint the whole picture
Epistemology View on what constitutes acceptable knowledge	Unit of analysis is reduced to simple terms. Only observable phenomena provide facts. Focus on law-like generalisations and causality.	Observable phenomena provide credible facts. Insufficiency indicates inaccuracies in sensations	Unit of analysis may include the complexity of whole situations. Interpretations of meanings that are assigned to social roles	Depending on RQ; both observable phenomena and subjective meanings are acceptable. Focus on practical consequences of findings
Axiology View on the role of values in research	The researcher is independent of the data and the research is value-free.	The researcher is biased by world views and research is value-laden	The researcher is part of the research making the research value-bound	Adopting both subjective and objective point of view
Methodology	Highly structured and emphasis on quantifiable observations and statistical analysis	The method must suit the subject matter, quantitative or qualitative	Small samples, qualitative	Mixed or multiple, quantitative or qualitative.

As stated in the introduction, the overlapping field of procurement and CE has received little attention, and more research is warranted to gain an understanding of the phenomenon. Several questions need to be answered in both fields individually, with an emphasis on the relationship between procurement, CE and CEBMs. We recognise that there are many ways to interpret and explore the topic of this thesis and that choosing only one philosophical stance is unrealistic in practice. This supports the pragmatic philosophical position. However, as this position suggests, one of the philosophical positions might be more suited than others to answer particular questions. As our research problem proposes, there is lack of knowledge on how the procurement function can contribute to the implementation of CEBMs. Businesses are made by people, and of people, and the rich, complex dynamic that occurs within the procurement function is necessary to gain insight into how it can contribute to the implementation of CEBMs. We, therefore, suggest that the interpretivism position is more relevant, as we seek to “understand, explain and demystify social reality through the eyes of different participants; the participants themselves define the social reality” (Cohen, Manion, and Morrison 2013, 15). Hence, an interpretive stance will align with our perception that knowledge is considered as personal and subjective (Cohen, Manion, and Morrison 2013, 6).

3.3. Research Approach

The relationship between theory and empirical research can be viewed through three different approaches, namely deduction, abduction and induction (Bryman 2012, 24; Saunders, Lewis, and Thornhill 2012, 144). A deductive approach consists of the development of a theory, which is then subjected to a rigorous test through a series of hypothesis. This is the dominant research approach in natural sciences where laws present the basis of explanations and therefore permit them to be controlled. The research strategy is designed to test the hypothesis, and the methodology is highly structured in order to facilitate replication (Saunders, Lewis, and Thornhill 2012, 145). Another important characteristic is that concepts need to be operationalised in a way that enables facts to be measured, often in a quantitative way. Generalisation is also an important aspect, and it is, therefore, necessary to select the sample carefully and ensure a sufficient size (Saunders, Lewis, and Thornhill 2012, 146).

An inductive approach collects data to explore a phenomenon, identify themes and develop the conceptual framework as a result of the data analysis (Saunders, Lewis, and Thornhill

2012, 144). The inductive approach is used when the concern is related to the context in which the events take place. The study consists normally of a small group of objects and the collection of qualitative data. A variety of methods can be applied to establish different views of phenomena (Saunders, Lewis, and Thornhill 2012, 146)

Lastly, abduction also uses data to explore a phenomenon, identify themes and explain patterns. However, the aim is to generate new or modify an existing theory, which is subsequently tested through additional data collection. Abduction begins by observing a surprising fact followed by the development of a plausible theory why it occurred, resulting in additional testing and further development of theory, creating a back and forth process (Saunders, Lewis, and Thornhill 2012, 147).

As this thesis seeks to gain knowledge on the role of the procurement function in the implementation of CEBMs, we find that an inductive approach is most compliant with our aim. Thus, this thesis employs a qualitative research method, where the systematic inquiry into the social phenomenon is in its natural setting (Teherani et al. 2015, 136). We consider the procurement function as the phenomenon, where we seek to find out which experiences people have, how individuals and/or groups behave, how organisations function and how interactions shape relationships (Teherani et al. 2015, 136). Moreover, the features of the applied interpretive stance described in section 3.2 are corresponding with the inductive approach, as this thesis focuses on people in small samples of complex and dynamic procurement functions. Through the interpretation of the data collected through interviews and documents, this thesis proposes a framework as the outcome of the research (Saunders, Lewis, and Thornhill 2012, 144).

3.4. Research Design

The research design is the general plan of how this thesis went about when addressing the research problem. Moreover, it describes how the research questions will be answered and how data will be collected and analysed (Saunders, Lewis, and Thornhill 2012, 159). Yin (2018) presents three different research designs for case studies; exploratory, descriptive and explanatory. Exploratory research is pre-conditional to other research, hypotheses and/or questions, whilst descriptive research aims to account narratives and provide detailed descriptions. Explanatory research tests hypotheses and aims to establish causal relationships (Yin 2018, 9).

We have chosen an exploratory research design for this thesis since it allows for exploration in order to address our research problem. Exploratory research does not aim to provide answers, rather it seeks to gain insight about a topic of interest (Saunders, Lewis, and Thornhill 2012, 171). Besides, since the aim is to gain knowledge on the topic of procurement and implementation of CEBMs, we seek to generate theory, rather than testing it (Bryman 2012, 41). Exploratory research is conducted in three ways; a search of the literature; interviewing “experts” in the subject; or conducting focus group interviews (Saunders, Lewis, and Thornhill 2012, 171). This study has conducted interviews with “experts” in the field and searched through the literature, which will be further described in the subsequent sections.

3.5. Research Strategy

Research strategy can be explained as the plan of how the research questions will be answered, i.e. it is the methodological link between the philosophy and the following choice of method to collect and analyse data (Saunders, Lewis, and Thornhill 2012, 173). Thus, the choice of the research strategy is dictated by the research question and objectives, the coherence with these links to the philosophy, research approach and purpose. Furthermore, other concerns such as existing knowledge, amount of time, access to participants and other sources of data could influence the choice of strategy (Saunders, Lewis, and Thornhill 2012, 173).

According to Saunders, Lewis, and Thornhill (2012), there are several strategies; experiment, survey, archival research, case study, ethnography, action research, grounded theory and narrative inquiry (Saunders, Lewis, and Thornhill 2012, 173-189). Table 3-2 presents the different strategies and briefly explains its inherent characteristics, as discussed by Saunders, Lewis, and Thornhill (2012).

Table 3-2- Research strategies based on Saunders, Lewis, and Thornhill (2012)

Strategy	Research method	Characteristic
Experiment	Quantitative	Rooted in natural science and a strong focus on variables and hypotheses rather than research questions
Survey	Quantitative	Uses a deductive approach by gathering standardised data before an analysis using

		descriptive statistics is applied. Aims to explain the relationship between variables
Archival research	Quantitative/qualitative	Use of administrative records and data to answer RQ related to the past and changes over time
Case study	Quantitative/qualitative	Explores a research topic or phenomenon to gain a richer understanding of the context and related processes
Ethnography	Qualitative	The study of groups and the interaction between people that share the same space
Action research	Qualitative	A social and iterative process of inquiry that aims to develop solutions to real organisational problems through a participative and collaborative approach
Grounded theory	Qualitative	Generates theory, which is grounded in the data produced from social interactions and processes
Narrative inquiry	Qualitative	Collects and analyses experiences as complete stories and preserve chronological connections and the sequencing of events

When selecting a strategy for this thesis, we sought out to choose the option that enabled us to address our research problem and meet our research objectives. Moreover, considering our interpretive philosophical stance, inductive approach and the research questions, a case study strategy is found to be the best-suited option. The reasoning of choosing a case study and the following case selections will be presented in the following subsections.

Case study

Case study research is considered as a useful approach when the aim is to address complex organisational, managerial, and other business issues, which are difficult to study with quantitative methodologies (Ghauri and Grønhaug 2005). According to Yin (2018, 15), a case study investigates a contemporary phenomenon in depth and within its real-life context, especially where the boundaries between phenomenon and context are not clearly evident. Further, Yin (2018) suggests case study as a research strategy if: 1) the main research question is “how” or “why” questions, 2) you have little or no control over behavioural events, and 3) the focus of the study is a contemporary phenomenon- a case. The phenomenon in this thesis is related to the relationship between procurement function and CE, and a case study research is chosen to gather in-depth data to get a better understanding

of this phenomenon. Additionally, the result benefits from the prior development of theoretical propositions to guide design, data collection, and analysis. Lastly, it relies on multiple sources of evidence, with data needing to converge in a triangulating fashion (Yin 2018, 15-16).

Since we decided to look at the procurement function in different companies and studied more than two subjects or settings, it is referred to as a multiple case study (Bogdan and Biklen 2007, 69). Precisely, this study employs a holistic, multiple-case design. This means that there is a single *unit of analysis*, which in our case is *the procurement function*, across several manufacturing companies. When given a choice of design methods, multiple case studies are preferred due to being less vulnerable and the analytical benefits from having multiple cases may be substantial (Yin 2018, 61). Also, when we considered the research problem in our thesis, we found that a multiple case design is appropriate; findings are more robust, and it provides a stronger base for theory building (Yin 2018, 54).

Case selection

A critical aspect of case study research is the case selection. When the study involves more than one case, i.e. multiple-case studies, the design and selections should follow a replication logic over a sampling logic (Yin 2018, 55). The rationale behind this is that case studies, in contrast to survey or experiment, rely on analytical rather than statistical generalisation (Shakir 2002, 192; Yin 2018, 37). The potential implications through an analytical approach and replication-oriented path could lead to greater insights about the proposed topics in the study (Yin 2018, 38). As our objective is to shed light upon the lack of knowledge related to the procurement function and CEBMs, the analytical approach allows us to make generalisations that go beyond the setting of our specific cases (Yin 2018, 38).

When selecting the cases for a multiple-case study, the approach to establish the replication logic differ between literal and theoretical replication. The literal replication chooses cases with similar settings that are expected to provide similar results, whilst theoretical replication is used when cases are predicted to show contrasting results but for anticipatable reasons (Shakir 2002, 193). In selecting the cases for this thesis, we used the following criteria: 1) manufacturing companies that are within a relatively close proximity, for easy facilitation of face-to-face interviews, and 2) manufacturing companies whose procurement function is in-house, as they are considered to have a (more) tangible procurement function and products. The selected case companies vary according to their size, scope and the type of products

they offer, which supports the logic of theoretical replication, where differences in the outcome are to be expected.

When it comes to the number of cases that should be included in a multiple case study research, there are no precise rules (Fletcher and Plakoyiannaki 2008). The number of cases selected is a discretionary judgement and depends on the number of case replications that are desirable (Yin 2018, 59). Since the nature of our thesis is explorative and interpretive, one could argue that for each case we apply, it can increase the number of replications and thereby the generalisations. As long as each of the cases is equally and thoroughly examined, it can be favourable to have a lot of cases. However, practical restrictions such as time and resources limit the number of cases that are possible to include. Considering that this thesis seeks to gain knowledge on the topics of CE and procurement, any number of cases could potentially provide valuable input. Due to this consideration and time restriction, three case companies with a total of five informants were selected for this thesis.

3.6. Time Horizons

When designing the research, it is also important to consider the time horizon and the choice between cross-sectional studies and longitudinal studies. Cross-sectional studies represent a “snapshot” taken at a particular time whilst longitudinal studies represent a series of snapshots that cover events over a given period (Saunders, Lewis, and Thornhill 2012, 190). Longitudinal studies are favourable when studying change and development in addition to providing a measure of control over some of the variables being studied (Saunders, Lewis, and Thornhill 2012, 190). If the research and study revolve around a particular phenomenon at a particular time, it will most likely be cross-sectional research. Since this thesis is concerned with gaining knowledge on the procurement function in particular, over a limited period, it can be considered as a cross-sectional study. Moreover, as this thesis seeks to explain how factors within different organisation are related, a qualitative research strategy is selected; interviews are conducted over a short period (Saunders, Lewis, and Thornhill 2012, 190).

3.7. Case Description

In this section, we will describe all the three cases selected for this research in more detail. The companies have provided valuable insight into their organisation, procurement

functions and activities. This section will start with an overview of the case companies, all of which are in the manufacturing industry, however, the company size, type of product and customer market varies (see Table 3-3). This is then followed by a description of the companies' procurement functions. That is the procurement function's role in the company, collaborations, relations and guidelines, which is finally summarised in Table 3-4. We will not disclose the names of the companies involved in this thesis, and will, therefore, categorise them into company 1, 2, and 3, abbreviated as C1, C2, and C3, respectively.

Table 3-3: Overview of the case companies

	C1	C2	C3
Industry	Manufacturing	Manufacturing	Manufacturing
Company size (number of employees)	327	344	30
Product type	Lighting solutions	Propulsion, positioning, and manoeuvring systems	Ship propeller components
Customer market	B2B	B2B	B2B
Key informant	Purchasing manager Purchaser	Factory manager Production manager	Production manager

Company 1

Company 1 (C1) is an international supplier of lighting solutions and offers complete package solutions to businesses and organisations. The company offers its customers a wide range of solutions, engineered, produced and tested at their facilities. C1 is a large corporation that sells and produce in many other European countries, as well as in Asia and North America. However, this thesis only focuses on their Norwegian facilities and organisation. Moreover, C1 participates in knowledge and innovation forums with local partners, as well as collaboration with the local university on research projects.

The procurement function of C1 consists of less than five employees and is described to have both an administrative and broad role in the company. For example, C1's procurement function has financial responsibility, a budget and goals both in terms of inventory value and stock circulation on the goods and so on. At the same time, it has to make sure that production never runs out. However, in an unpredictable world that is becoming more unpredictable in terms of needs and lead time, this is a challenge to them.

The strategic aspect of the procurement function of C1 is described as increasing and important to the company. A lot is being invested in that field, and they see great opportunities financially to save money and become more competitive. Further, C1's procurement function collaborates with several other functions, such as the technical department, production and planning, and goods receipt. A lot of changes are initiated by the technical department and the sales team, but procurement is involved to find solutions, such as alternative components and suppliers. A new focus for the company is the involvement of procurement in the developing, design and testing phase. The company believes it is important with early involvement in development, especially when it comes to procurement and cost. In a design phase, for instance, it is typical that only new items are wanted. However, it is important to consider what is already there, what can be used, so C1 does not end up with 100 000 different screws that are not needed at that particular time.

Besides, C1 has a close collaboration with several of their suppliers, and they do audits several times a year to ensure compliance. Moreover, C1 has established guidelines where there are, amongst others, descriptions on how to choose and evaluate a supplier. The guidelines set demands and criteria based on regulations and describe the processes for approval and quality assurance. In addition, the suppliers need to meet certain criteria, i.e. economic and health, environmental and safety, to be approved.

Company 2

Company 2 (C2) is a single-source supplier of propulsion, positioning, and manoeuvring systems. The company mainly deals with a wide range of tailor-made package supplies for medium speed configurations for vessels in the maritime industry, such as cruise, fishing, research, offshore and navy vessels. The company offers solutions for electric, hybrid and diesel drive systems, as well as providing service and support for the lifetime of the system. Development and production are done in-house, and according to the informants, they have approximately sold 9 000 units since the early 1960s, where 85% is exported. Their turnover is split between new sales and service on existing units. C2 strives to generate steady and healthy long-term growth and profitability, guided by policies for health, environment and safety, CSR, and business ethics.

C2 participates in knowledge forums and is active in research and development projects with the local university and other organisations. Thus, they have been very open about

participating in different projects, even though others are restrictive and careful depending on the type of project, given that the results are public.

C2 has a procurement team of less than ten employees, which is described to take an operational and active part in the daily activities. To them, procurement has an important role to play. Everything C2 purchases and all the commercial commitments it makes, it channels towards procurement. The procurement function has a vital role to make sure the company gets what it needs. After all, it is true that in all manufacturing companies, what they buy or procure is a big part of the value creation.

C2's procurement function collaborates both with production and the technical department. The function's involvement in the SC has increased, and it tries to be part of the processes from the start of the SC. Thus, the procurement function is involved from the development of new components and products, so that it can account for commercial factors. This is new, as traditionally the technical department has dealt with the technical and the procurement function was just there to do the procuring of components.

Further, C2 has growth ambitions, especially in developing continuous supplier relations that keep both parties "on their toes" and focus on building relations with the suppliers, i.e. delivering the larger volumes and most critical components. In addition, C2 has strong quality criteria, and expect what is supplied to meet their demands. The company is also a part of providing classification and a documented list of components, that is used for future discarding of the finished product.

Company 3

Company 3 (C3) manufactures cast bronze components for ship propellers and is an innovator in casting technology. The company mainly produces blades to ship propellers from bronze castings, engineered by the customers. After a wooden model is approved, production of the casting starts. When the casting is set, it is ground, measured and controlled. Finally, C3 provides documentation and approval of class categorisation. As the company is a supplier of components to a larger unit, it does not provide aftermarket service for the final customer but does however aid shipyards in repairing propellers if requested. C3 participates in industry-specific knowledge forums and development projects, as well as collaborations with the local university.

The procurement function of C3 is subject to the production manager and is described as mainly transactional and commercial activities through tendering. C3 see that procurement

is strategically important since a big part of its costs is the raw material but does not put much emphasis on the function. The procurement function does not collaborate with other functions, besides production through the manager. The function focuses on long term relationships with their suppliers and mainly deals with three European suppliers.

The company is conscious of ethical issues in choosing which supplier to source from. For instance, those that involve child labour are not considered at all, even if they are cheaper relative to others. C3 also evaluates the quality, availability and price when approving suppliers, and has started a new evaluation project with new suppliers, where it gets small samples that are analysed and checked for compliance with the certificate.

Table 3-4 presents an overview and comparison of the procurement functions in the described case companies.

Table 3-4: Overview of the Procurement Functions among the case companies

	C1	C2	C3
Organisation	<ul style="list-style-type: none"> • Procurement team (less than 5 employees) 	<ul style="list-style-type: none"> • Procurement team (less than 10 employees) 	<ul style="list-style-type: none"> • Subject to production manager
Role in the company	<ul style="list-style-type: none"> • Transactional and commercial activities • Broad role 	<ul style="list-style-type: none"> • Transactional and commercial activities • Operational and active role in day-to-day activities 	<ul style="list-style-type: none"> • Mainly transactional and commercial activities • Tendering processes
Strategic importance	<ul style="list-style-type: none"> • Described as important to ensure cost savings and competitive advantage • Currently developing the function 	<ul style="list-style-type: none"> • Described as important to commercial commitments, value generation, cost savings and long-term supply safety 	<ul style="list-style-type: none"> • Not strategic
Internal Collaboration	<ul style="list-style-type: none"> • Collaboration with the technical department, production and planning and goods receipt • Involved in testing and development of new products • Support sales and order team 	<ul style="list-style-type: none"> • Collaborates with production and technical department • Involved in several SC processes 	<ul style="list-style-type: none"> • Collaborates with production
Supplier relations	<ul style="list-style-type: none"> • Close collaboration • Focus on development of suppliers 	<ul style="list-style-type: none"> • Close, professional collaboration • Participates in supplier development • Focus on local suppliers 	<ul style="list-style-type: none"> • Long term collaboration • Ethical considerations
Guidelines, values and classifications	<ul style="list-style-type: none"> • Established guidelines on supplier selection and approval 	<ul style="list-style-type: none"> • Quality driven • Participate in industry-specific documentation and certifications 	<ul style="list-style-type: none"> • Quality, availability and price evaluation • Test compliance with criteria

3.8. Data Collection

Research data collection can be divided into two categories, namely primary and secondary data. Primary data includes the collection of new data whilst secondary data has already been collected for other purposes (Saunders, Lewis, and Thornhill 2012, 304). For this thesis, we have collected primary data through interviews and secondary data through reviewing the literature. Primary data collection can be costly and time-consuming, however, it is advantageous as it enables the research design and theoretical construct to be tailored according to our research questions (Hox and Boeijs 2005). This allowed us to collect primary data which were tailored to address our research questions and thereby our research problem. The collection of both primary and secondary data will be discussed in the following subsections.

Interviews

As described by Saunders, Lewis, and Thornhill (2012), the different types of interviews vary from highly formalised and structured to more informal and unstructured conversations. In between, there are also intermediate positions that differ in the degree of formality and structure, depending on the purpose of the interview. The typology used to categorise interviews according to their level of formality and structure are structured interviews, semi-structured interviews or unstructured/in-depth interviews (Saunders, Lewis, and Thornhill 2012, 374). Structured interviews typically use questionnaires based on a standardised set of questions for every research participant. This type of interview is often used to collect quantifiable data, thereby also referred to as quantitative research interviews (Saunders, Lewis, and Thornhill 2012, 374). However, if the research design has an inductive approach, and especially an exploratory nature, it could benefit from in-depth interviews or semi-structured interviews, which are categorised as qualitative research interviews (Saunders, Lewis, and Thornhill 2012, 377). Following this logic, we have conducted semi-structured interviews with informants from the procurement and other departments in each of the respective case companies. To get several viewpoints of the procurement function, we interviewed employees with different positions related to the procurement function.

When conducting semi-structured interviews, we had a frame of questions that formed the outline, however, the sequence of questions could vary as we conducted the interviews (Bryman 2012). The questions were considered as more general to allow for the informant to elaborate on the topic without being “dictated” or restricted by the content in the question.

Furthermore, a semi-structured approach allowed us to ask follow-up questions in response to what was considered as a significant reply or information (Bryman 2012). This made the conversation flow more easily and contributed to the collection of detailed data that was further used to explore topics and explain findings (Saunders, Lewis, and Thornhill 2012, 408).

Both the time and location for the interviews were decided by the informants. This was done intentionally since participants who are given this choice may feel more empowered in their interaction with the researcher (Elwood and Martin 2000). All of the informants were informed in advance of the approximate length of the interview, which was estimated to take one hour at most. Accordingly, the time and dates were chosen according to what suited their schedule the best, in order to respect their time restrictions (Yin 2015, 159). All of the interviews were conducted at the workplace of the informants in closed meeting rooms of their choosing, creating an atmosphere where they felt comfortable to speak freely (Elwood and Martin 2000). In total, we conducted 5 semi-structured interviews that lasted between 35 and 60 minutes (see Table 3-5). Before we conducted the interviews, the informants received an information letter which explained how their privacy was accounted for (see Appendix 1). Furthermore, the interview guide (see Appendix 2) that was used in every interview was also sent to the informants in advance, enabling them to prepare and reflect on the questions or topics. To ensure that every detail of information was included, we audio-recorded every interview. Permission to audio-record the interviews was explicitly requested in advance of the interviews. In addition, the informants were informed that the recording would be deleted when the thesis was finished. Audio-recording allowed us to listen and pay attention to the informants, rather than concentrating on taking “correct” notes (Saunders, Lewis, and Thornhill 2012; Yin 2015). The audio-recordings were used to analyse the data, which will be discussed more closely in Section 3.9.

Table 3-5: Duration of the interviews

Case company	Date	Interviewees	Interview duration
C1	11.02.2020	Purchasing manager	60 min
C1	18.02.2020	Purchaser	60 min
C2	17.02.2020	Factory manager	56 min
C2	17.02.2020	Production manager	35 min

Documents

The initial step of designing a multiple-case study should consist of theory development, as the use of theory and theoretical propositions function as an aid to define the research design (Yin 2018, 35). To develop a theoretical framework, literature has to be examined since it acts as a proxy for theory, which is often implicit in the literature (Bryman 2012, 22). After the initial preliminary search that revealed the research problem, we conducted a more critical review of the literature. The critical review is necessary as it enabled us to assess the current state of knowledge in the subjects, its limitations and how the research fits in the wider context (Saunders, Lewis, and Thornhill 2012, 71). Following this logic, we reviewed literature to gain insight and develop sharper and relevant questions about the topics, concepts and issues related to procurement and CE (Saunders, Lewis, and Thornhill 2012, 74; Yin 2018, 13). Besides, as this thesis has an inductive approach, our findings will be discussed and subsequently related to the theoretical part in the discussion (Saunders, Lewis, and Thornhill 2012, 74). Thus, the theoretical framework formed the groundwork for the analytical generalisations (Yin 2018, 38).

The secondary data used for this thesis consists of research articles, books and reports. The initial literature search aimed to find relevant scientific articles that discussed topics related to procurement, CE and CEBMs. This was mostly found through search tools such as “Science direct”, “Researchgate” and “Google scholar” to mention a few. The keywords used were mainly “CE”, “CEBM”, “sustainable procurement”, “procurement”, “purchasing”, “business models” and “business model innovation”. After the identification of articles that were suitable and useful for further development of the thesis, we reviewed their references to further identify significant articles.

Our preliminary knowledge of the subjects also guided us in the search for literature. Regarding the major topic of, for instance, CE, we knew that the Ellen MacArthur Foundation could provide several reports and publications that could identify other sources of information. Even though it is not a scientific journal, the foundation’s extensive work is important to consider in the context of CE, according to Geissdoerfer et al. (2017). Moreover, several of the peer-reviewed articles we used referred to their reports and publications, indicating that it is acknowledged as a viable source.

3.9. Data Analysis

The aim of analysing qualitative data is to discover patterns, concepts and/or themes (Miles, Huberman, and Saldana 2014, 10). Case study data analysis can be executed through several procedures, for instance; examination, categorisation, formulation, and testing or as recombination of information to draw conclusions and/or recommendations from empirical data (Nujen 2018; Yin 2018). Miles, Huberman, and Saldana (2014) describe qualitative data analysis as data condensation, which refers to the process of selecting, focusing, simplifying and transforming data in order to make data stronger. They further explain that data condensation allows for data to be sharpened, sorted and organised in a way that conclusions can be drawn and verified (Miles, Huberman, and Saldana 2014, 12).

Before we started with the analytical process, we had to transcribe the interviews. The interviews were conducted in Norwegian, as we considered this to be beneficial for the data collection. Moreover, the informants might be more comfortable answering in their native language, as well as avoiding linguistic obstacles, loss of content and risk hesitation to speak freely.

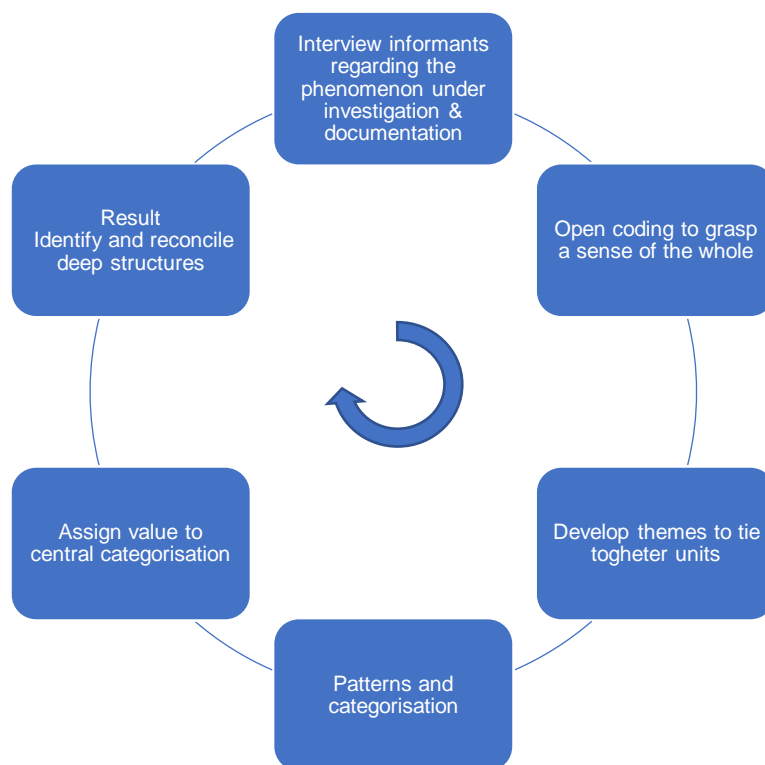


Figure 3-1: Process of data analysis, based on Nujen (2018)

Our analytical process started with a concentration of the whole, which was taken apart and then re-constructed again to increase understanding and meaning (Nujen 2018). Following Miles, Huberman, and Saldana (2014), codes were developed to describe and assign a symbolic meaning to parts of the data. Furthermore, the codes categorised the data into similar data chunks, which enabled us to cluster the segments and relate them to themes and/or research questions (Miles, Huberman, and Saldana 2014, 72). Coding is considered a heuristic method of discovery, meaning that through reading and reflecting, we were able to determine codes that were assigned to parts of the data that showed reoccurring patterns. Followingly, from these patterns, similar codes were clustered to create a smaller number of *pattern codes*. It is the interrelationship between these categories that is constructed to further develop analytical meanings for propositions and/or theoretical development (Miles, Huberman, and Saldana 2014, 73). Categorisation contributes with a process of comparisons and differences between identified patterns, enabling the researcher to reflect on specific areas and make sense of them (Nujen 2018). As illustrated in Figure 3-1, the data analysis process was iterative, meaning that it was a back and forth process where the analysed data was combined with new data i.e. data collection and analysis informs and builds on each other (Nujen 2018). Patterns and relationships emerged as data was analysed, enabling a re-organisation of existing data to see if identified patterns were present in cases where data was already collected (Saunders, Lewis, and Thornhill 2012, 562).

Even though there is no standardised approach to analyse qualitative data (Saunders, Lewis, and Thornhill 2012, 556) the analytical process has enabled us to identify deep structures and link the content to the theoretical framework and revise the research material to address our research questions. We recognise that the nature of qualitative data needs to be considered when evaluating the quality of this thesis and qualitative research in general. According to Miles, Huberman, and Saldana (2014), the general nature of qualitative data is somewhat more about actions, and the inherent intentions, meanings and consequences, rather than behaviour. Furthermore, some actions are straightforward, and others require what is described as impression management; how people want others, including researcher to see them (Miles, Huberman, and Saldana 2014, 11). Actions like these occur in specific situations (social and historical context), which influence how they are interpreted by both insiders and the researcher as the outsider, disabling the researcher to always be truly objective (Miles, Huberman, and Saldana 2014, 10).

Thus, an interpretive stance and inductive approach allow us to take part in the research, where we function as research instruments. However, this can bring a particular research lens to the data collection process (Yin 2015, 288). The lens may lead to selectivity and influence the scope of the study, choice of data to be collected in the field and interpretations of our findings (Yin 2015, 288). Influences cannot be eliminated or avoided, however; to recognise and address them can provide criteria and serve as quality control measures of the study (Yin 2015, 288). These criteria and measures will be addressed in the following section.

3.10. Quality Criteria in Qualitative Research

Since case study research, in general, is often criticised as subjective and interpretive (Flyvbjerg 2006), quality criteria must be identified with the aim to ensure a valid and reliable approach (Yin 2018, 42) The critique on qualitative research may stem from the split between researcher who are quantitatively oriented positivists and those that are qualitatively focused interpretivists. Positivist use the conventional quality criteria, namely objectivity, internal validity, external validity and reliability (Halldórsson and Aastrup 2003). These criteria can be considered as predominant since the majority of logistics research are conducted through quantitative research methods such as simulations, model building and statistical testing of survey data (Halldórsson and Aastrup 2003). However, the qualitative emergence in logistics requires a rethinking of the notion of research quality. It should be taken into account that the discipline is changing and that the embedded aspects of quantitative criteria are not necessarily fully compatible as qualitative criteria (Halldórsson and Aastrup 2003).

As previously stated, this thesis follows an interpretive philosophy. However, we also recognise the pragmatic view as applicable for this type of thesis; there is not one correct approach to answer our research problem or questions. It is therefore important to note that we do not reject the conventional ways of evaluating the quality of a thesis. Even though the inherent differences between qualitative and quantitative research disables them to be verified in the same way, there is a need to address the need for verification (Denscombe 2010, 298). It is not necessary to reject either one, but rather draw on the insights of emerging concepts in social research (Denscombe 2010, 298). Guba and Lincoln (1985) referred to in Miles, Huberman, and Saldana (2014), presented a qualitative parallel to the four

conventional criteria; credibility, transferability, dependability and confirmability and these are discussed in the following subsections.

3.10.1. Credibility

Credibility is equivalent to the conventional criteria internal validity. Internal validity is mainly a concern for explanatory or causal studies when an investigator is trying to explain the causal relationship between certain events. Exploratory studies are not concerned with causal situations, making internal validity inapplicable (Yin 2018, 44-45). Credibility is therefore established on the notion that there is not a single objective reality. Furthermore, credibility is a test of the degree of match between respondents' constructions and the researchers' representation of these (Halldórsson and Aastrup 2003). In order to ensure a credible thesis, we have sought out to present context-rich and meaningful descriptions throughout the thesis. In addition, the findings are presented in a clear, coherent and systematically related manner (Miles, Huberman, and Saldana 2014, 312-313).

Another practice to ensure credibility is the use of triangulation, which carries great importance in qualitative research (Yin 2015, 161). One type of triangulation is data triangulation, which in this thesis is applied through the use of multiple sources across different sites during the data collection phase (Korstjens and Moser 2018; Riege 2003). Further, investigator triangulation has also been incorporated by being two researchers to code, analyse and interpret the data (Riege 2003; Yin 2015, 87). As Yin (2015) also points out, triangulation may be used as a frame of mind, meaning that throughout the study, one should be aware of conflicting ideas or data, and try to develop converging lines of inquiry (Yin 2015, 87). In addition, by having a triangulating mind and critically reviewing the literature that was used to develop the thesis, we sought out to better understand the field and its key theories, concepts and ideas (Saunders, Lewis, and Thornhill 2012, 71). This was done in order to grasp a broader understanding of the subject knowledge, relevant issues and debates to further clarify our research questions (Saunders, Lewis, and Thornhill 2012, 71).

3.10.2. Transferability

The conventional criteria are external validity, which similarly to transferability is described as the measure for generalisability; if case study findings can be generalised and transferred to other contexts (Halldórsson and Aastrup 2003; Korstjens and Moser 2018). As for case study research, the issues related to transferability are many and contentious (Miles,

Huberman, and Saldana 2014, 314). The issues range from the lack of the researchers' ability to find levels of universality in the cases, and that specific site(s) create constraints to construct theory and thus, generalisation (Halldórsson and Aastrup 2003; Miles, Huberman, and Saldana 2014, 314).

However, as mentioned by Kvale (1996) in Halldórsson and Aastrup (2003), there is a shift from generalisation to contextualisation. This indicates that knowledge acquired in one context could be relevant for other contexts in different sites and/or time (Halldórsson and Aastrup 2003). Furthermore, as argued by Denscombe (2010), "although each case is unique, it is also a single example of a broader class of things" and that "the extent to which findings from a case study can be generalised to other examples depends on how far the case study example is similar to others of its type" (Denscombe 2010, 60). Following the logic of Denscombe (2010), this thesis describe not only behaviour and experiences but the context as well. By doing so, the context may become meaningful to an outsider and enabling the reader to assess potential transferability (Korstjens and Moser 2018; Riege 2003).

When analysing data in search of key findings, we continuously cross-checked against the theoretical framework and literature. By doing this, we could provide and support our analysis/discussion with viable explanations. According to Riege (2003), the comparison of our findings with existing literature and general theory is a technique that can enable generalisation and thereby the transferability (Riege 2003).

Moreover, as we discussed in the subsection "case selection"; generalisations made in a multiple-case study should be analytical. Thus, by analysing from the case study as a whole, and not the individual cases, we draw our generalisations beyond the setting of our specific cases, thereby enabling transferability (Yin 2018). In addition, our thesis follows a theoretical replication strategy as our cases vary between size, scope and product type, which are likely to produce contrasting results for predictable reasons. This therefore increase the scope of generalisation that can be made outside the context of this thesis.

3.10.3. Dependability

The quantitative quality test parallel to dependability is reliability. Reliability is achieved when demonstrations show that the procedures and operations in the research inquiry can be repeated by other researchers in the same way and result in similar findings (Riege 2003). Issues regarding dependability are related to quality and integrity, which is manifested through reviewing if the process of the study is consistent and reasonably stable over time

(Miles, Huberman, and Saldana 2014, 312). For example, in order to provide consistency, we used the same interview guide when conducting all the interviews.

Dependability can, therefore, be described to enable trackability of variance (Halldórsson and Aastrup 2003). Dependability is enhanced through clear research questions and a corresponding feature of the study design, explanation of basic paradigms and clearly specified analytical constructs (Miles, Huberman, and Saldana 2014, 312). The methodological Chapter in this thesis has strived to describe and follow the research steps from the start to the final development of the findings (Korstjens and Moser 2018). By reflecting on procedures and decisions made throughout the thesis, we aim to enable readers to judge if the procedures are reputable and reasonable (Denscombe 2010, 300).

3.10.4. Confirmability

The equivalent criteria for confirmability is objectivity. The confirmability of the study evolves around issues related to the relative neutrality and freedom from unacknowledged biases from the researchers (Miles, Huberman, and Saldana 2014, 312). In order to ensure confirmability, this thesis has presented and described the general methods and procedures that are used, thereby enabling an external part to assert the results of the study (Halldórsson and Aastrup 2003). Conclusions are explicitly linked with exhibits of condensed data, and the data collection and process, in general, is explained (Miles, Huberman, and Saldana 2014, 312).

In addition, by considering the research lens and the role of the researcher, mentioned in Section 3.9, we are aware of the effects and biases that the researchers can have on their studies (Yin 2015, 288). Moreover, the triangulating mind that we have described in the credibility section can also contribute to avoiding biases. According to Denscombe (2010), one should have a critical, yet open mind towards the findings. This includes that even though if we were to have findings within the data that contradicts or deviates from the general trend, it should not be ignored; active investigation of deviations can reveal if there is significance in them (Denscombe 2010, 303).

3.11. Chapter Summary

This chapter presented the methodological issues related to this thesis. Following the “research onion” model developed by Saunders, Lewis, and Thornhill (2012), each layer is discussed and the choices are presented. Firstly, the research philosophy, where we took an interpretive stance, is discussed. Followed by the reasoning for an inductive approach, qualitative design, and strategy; multiple case study approach, case selection and case descriptions. We identified this thesis to be cross-sectional, and the process of data collection and analysis are elaborated. Lastly, we discussed the quality criteria applied for this thesis to provide credibility, transferability, dependability and confirmability.

4. FINDINGS

4.1. Chapter Introduction

This Chapter presents the findings from the analysis of the interviews related to our research questions. Consequently, each section addresses one of the three research questions. Section 4.2 addresses to what extent the companies know about CE, whilst section 4.3 focus on the contributing factors of the procurement function in the implementation of CEBMs. Section 4.4. investigates the barriers the procurement function may encounter in the implementation of CEBMs. As previously mentioned, the case companies are marked by the abbreviations C1, C2, and C3. In addition, to distinguish between the informants within a company, a number is given, for instance, informant 1 of company 1 is abbreviated as C1I1.

4.2. Knowledge and understanding of CE in procurement

This section presents findings related to the first research question: “*To what extent do companies know about CE in procurement?*”. This section will start with a case-by-case presentation of what the companies know and their understanding of CE in general, the perceived enablers and benefits to be gained. These findings are summarised in Table 4-1. The next section presents the findings on how the companies view CE in procurement, which is summarised in Table 4-2. The last section summarises the findings and addresses these in relation to the research question.

4.2.1. CE in general

The informants of C1 did not have previous knowledge of CE or their own definition. However, they recognised some elements and they agreed with the provided definition in the interview guide (see Appendix 2). This definition states that CE is “*a regenerative system in which resource input and waste, emission, and energy leakage are minimized by slowing, closing, and narrowing material and energy loops. This can be achieved through long-lasting design, maintenance, repair, resume, remanufacturing, refurbishing, and recycling*» (Geissdoerfer et al. 2017, 759).

“It says it very clear here (provided definition). Reduction in raw material consumption, waste, emission, energy consumption, and the goal of reusing outside intended purposes” C1I1

C1 emphasises the need for the company to have strategic goals within CE, as an important enabler of CE development and implementation. The informants see economic potential in CE, in regard to coordination of multiple functions and saved cost. One informant note that the economic factors are the drivers, while the environmental benefits are a bonus.

“We have several examples where we have requested a change in packaging method, to get more boxes on one pallet to reduce the number of pallets in transportation. Of course, it means we save cost, but also the environment. The economic initiate, but we don’t need to use resources to unpack.” C1I1

Furthermore, C1 naturally works towards a reduction in raw material consumption on a daily basis and has set goals and evaluates recycling. The company sees the implementation of CE efforts as a way to satisfy customer requirements and demands, which in turn can lead to a competitive advantage.

In contrast, C2 primarily understands CE in relation to sustainability. The company focuses on the TBL perspective, i.e. economic, environmental and social, and emphasises on long term commitments.

“Number 1 for a company is to make money, if you don’t, you are not sustainable. If you conduct business and see that you are polluting a lot, then you are not sustainable, because you won’t make money. ... You have to do something that you see you can carry on with without destroying for others and without destroying for yourself. That’s how we look at sustainability. You have several areas. You have to take care of the community around you, for example, we are a company that is dependent on recruits all the time. After all, we invest a lot in training and apprentices ... It’s sustainable, we think. To develop competence and be long-term. ... You have to be here for a long time. We want to be serious and decent.” C2I1

However, one informant describes an understanding of loop mentality in CE, while the other had no comment on the topic.

“That things go around and that there is no use and throw. That when the functionality is there, reuse, and if it is not there see if it is possible to find another way to use it.” C2I1

The informants describe the nature of the product, i.e. it is meant to last a long time, as an important enabler to CE, in particular relation to service and maintenance. However, the informant does connect this with the sustainability perspective.

“It’s a part of sustainability as we see it, we don’t build something today that is discarded tomorrow and build new again. We build it to last a long time.” C2I1

The focus on longevity in C2 has resulted in developing and producing products with long lifetimes. The informants mention the nature of the material, metal, which has a scrap value as an incentive. The nature of the industry is also described as an enabler of CE, as the maritime sector can enforce a consistent set of rules internationally. C2 sees benefits to be gained from CE in the form of market advantages and competitive advantages.

“It’s a competitive advantage if you can be so good at it that you can show that you are ahead of your competitors” C2I1

The company notes an increased demand from customers regarding sustainability and views conscious use of CE efforts as a way to satisfy customer requirements. In addition, one informant thinks that commitment to CE can satisfy the employees’ wishes to work in a company that focuses on sustainability.

“Employees want to work in a company that takes sustainability into account. I think that young people are becoming more and more aware than my generation. So, it will probably reinforce. It is an effect that is an advantage” C2I2

C3 views themselves as somewhat circular and emphasises the need to take care of the resources. C3 describes the nature of the product (metal), and its ability to be recycled and reused, as an enabler of CE. The informant further explains that they have a loop in production, and that very little material is wasted as it can be melted and reused. The company has also focused on the energy efficiency of this melting process. The informant lays emphasis on the willingness of the company to take a role in the development of the concept and a need for openness to new BMs.

“You need to be open to new business models. It’s not directly procurement-related, but the whole company needs a strategy to develop new business models where you don’t sell, but take care of the product as an everlasting resource” C3

Furthermore, the informant addresses close proximity to customers as favourable in terms of transportation and an enabler to CE. The informant also states that the national rules, regulations and mentality regarding the concept of sustainability puts pressure on development in the direction of circularity. As for the benefits of CE implementation, C3 addresses the economic benefits as a consequence of the use of secondary material, which the informant argues is cheaper and more ethical than procuring virgin material directly from a mine.

Table 4-1: The companies' knowledge and understanding of CE

	C1	C2	C3
Understanding of Circular Economy	<ul style="list-style-type: none"> • Adopted provided definition • Focus on reduction and reuse 	<ul style="list-style-type: none"> • Resource loops and not "take-make-dispose" • Focus on reuse and recycle 	<ul style="list-style-type: none"> • Resource loops • Focus on efficient use of energy and resources
Perceived enablers of CE	<ul style="list-style-type: none"> • Defined company goals 	<ul style="list-style-type: none"> • Nature of the product, material and industry • Knowledge of the concept • International rules and regulations 	<ul style="list-style-type: none"> • Nature of the material • Company willingness • Openness for new BMs • Close proximity to customers • National advantages
Perceived benefits of CE	<ul style="list-style-type: none"> • Economic potential • Competitive advantage • Satisfy customer requirements • Environmental benefits 	<ul style="list-style-type: none"> • Market advantage • Competitive advantage • Satisfy customer requirements • Satisfy the employee's wishes to work in a sustainable company 	<ul style="list-style-type: none"> • Economic advantage from recycled material

4.2.2. CE in procurement

The informants of C1 have no clear definition of CE in procurement but describes it in relation to the sustainability perspective. Sustainability is considered important, and the function has put more focus on it in recent times. The environmental benefits are primarily viewed as a consequence of economic reasonability, such as accumulation of supplies to reduce transportation cost, resulting in less emissions.

“There are small things that we consider as reasonable, that subconsciously are environmentally sustainable” C1I2

The company has started several projects related to the reduction of energy consumption and waste in all functions. The procurement function focuses on logistics, transportation, packaging and collaboration with suppliers as areas they can affect. One informant mentions

work related to the reduction of packaging as the main focus of the procurement function in the company.

“Every component was in a plastic bag, that was in a box, and then taped. So, we got rid of the plastic bags. A very good and easy example.” C1I1

Additionally, the informants did not have a clear understanding of the procurement function in CE and addressed the concept in relation to their general TBL perspective on sustainability, with an emphasis on the economic perspective. The company has started to view sustainability in relation to procurement, and the focus is on the reduction in transportation cost and pollution, as well as collaboration and development of suppliers and local partners.

“It has to do with collaboration with the supplier, and what we can do to make them better. How can we accommodate so that we get good solutions? You are dependent on understanding the suppliers. We try to use suppliers that are in close proximity. ... The closeness, of course, is sustainable in regard to the environment and in building the community.” C2I1

The company is also conscious of the sustainability goals set by the UN and describes the procurement function as a key to ensure long term commitment to sustainability, and necessary to ensure supplier compliance and development.

“If you consider the environmental perspective, any company today that does not have its eyes open to what is happening tomorrow environmentally, will not be here tomorrow.” C2I1

Moreover, the function has focused on the reduction of transportation cost and pollution and have in recent times started to rely more on transportation by sea rather than road. Reductions in production, as well as recycling and reuse where possible, is also viewed as important.

“We buy a lot of steel for production. The fewer kgs we buy, the less energy we use to melt what we have bought. So, we are conscious of that.” C2I2

C3 sees CE in relation to sustainability, and the procurement function focuses on the economic perspective while putting emphasis on the lower cost of procuring secondary material.

“Reuse has always been the tune of the time when it is such expensive material that we are talking about, so there is probably a financial consideration.” C3

However, the company does perceive sustainability in procurement as important.

“It is important. It is so important that we buy more expensive than we could have done. It becomes more expensive for the whole chain that goes through us, but then we have to compete on conditions other than price instead.” C3

More so, the company mainly focuses on the efficient use of materials, and reuse through melting. The metal waste C3 cannot melt is sent to recycling.

“When we buy old components, we chop them up in smaller parts to fit in the oven. Then they melt” C3

The company has in addition partaken in innovation projects to reduce the need for materials in the melting process and has made the switch to cleaner ovens.

Table 4-2: Summary of the companies’ view on CE in procurement

	C1	C2	C3
CE in procurement	<ul style="list-style-type: none"> • Sees CE in relation to general sustainability • View environmental benefits as a consequence of economic reasonability • Viewed as important to overall sustainability efforts • Focus on reduction in packaging, and purchasing volume and frequency 	<ul style="list-style-type: none"> • Sees CE in relation to general sustainability • Primarily economic perspective, then environmental and social benefits • Key to ensure long term commitment from sustainable suppliers • Necessary to ensure suppliers compliance and development • Focus on reduction in transportation, supplier collaboration and local partners 	<ul style="list-style-type: none"> • Sees CE in relation to general sustainability • Primarily economic perspective • Conscious considerations of factors beyond environmental • Focus on resource efficiency through recycling and reuse

4.2.3. Section summary

This section has presented the findings related to the first research question: *“To what extent do companies know about CE in procurement?”*. Overall, the companies had some understanding of CE in general, apart from C1 which learned about it through their involvement in this thesis. All the companies could describe some enablers necessary for them in transitioning into CE, such as the nature of the product, knowledge, company

commitment, and openness to new BMs. The companies could also perceive certain benefits relevant to themselves, such as competitive advantage, economic potential, and ability to satisfy customers' requirements of sustainability measures. However, the companies mainly focused on certain aspects of the concept, and none provided a holistic and systematic picture of CE in relation to their own company. The lack of concept understanding, and knowledge gaps became evident in their understanding of CE in procurement. None of the informants described an understanding of CE without addressing it from a sustainability perspective. An overall focus on the economic perspective was also evident. Nevertheless, the primary view of the procurement function as an important contributor to sustainability efforts stand. C2, in particular, emphasised the importance of sustainable development of suppliers and procurement as the key to ensure compliance. In addition, all companies addressed initiatives in the 3R (reduce, reuse and recycle) principles.

4.3. Contributing factors of the procurement function in the implementation of CEBMs

This section presents the findings related to the second research question: "*What are the contributing factors of the procurement function in the implementation of CEBMs?*". The section starts with a case-by-case presentation of what the companies perceive to be contributing factors before an overview is given in Table 4-3. A summary of these findings is then presented in relation to the research question.

4.3.1. Perceived contributing factors

C1 asserts that the procurement function can contribute to the implementation of CEBMs by ensuring recyclability and reusability through procuring the right materials, and following guidelines, laws and regulations.

"We have the opportunity to follow guidelines that are given in order to have a good circular economy. Laws and regulations. After all, we are requirement to recycle and reuse if possible. Materials should not contain this and that and must be in accordance with regulations." C1I1

This implies a need for regulatory bodies to establish a set of laws and regulations to guide and encourage companies in the implementation of CEBMs.

One informant further state that since they are in control of what and how much is procured, they have the ability to avoid unnecessary waste.

“We can avoid waste through what we buy. That what we buy can be used. I buy steel, where we have a lot of cuts, which is waste, it is recycled, but yes... We can ensure that what we buy is usable simply put. Not that half must be discarded, and that it is of good quality, and that it is according to our drawings. That we get what we need.” C1I2

This infers that the procurement function, through proper procurement practices, can contribute to the overall implementation of CEBMs by ensuring that the quality and volume is in accordance with what is needed.

C2 states that the procurement function is in a key position to identify sustainable suppliers, conduct business in a healthy manner, and continuously develop expertise.

“We want suppliers that are proper, and that conduct business reasonably and in a healthy manner. They build expertise and evolve every day. That is the kind of suppliers we want. Because they are there tomorrow. ... Then we must set requirements to the suppliers, formal requirements. And if they don’t develop in that direction, then the procurement function is in a key position to find alternative suppliers. So, the procurement function is an important contributor.” C2I1

This implies that the procurement function can contribute through evaluating the suppliers from a TBL perspective, not just the economic perspective. This emphasises the need for the procurement functions to have a holistic approach to the selection of and collaboration with their suppliers, to contribute to the implementation of CEBMs.

One informant further argues that the procurement function can conduct evaluations of the suppliers and ensure supplier compliance with the set requirements.

“We have some ethical guidelines that we use in our contracts. We wish that the suppliers will commit, not necessary to our values, but to similar value sets. The procurement function is here involved in building a common understanding of what is required to be a supplier long term.” C2I1

This accentuates the need for the companies to have established values, guidelines and strategies in relation to CE so that the procurement functions can ensure compliance and contribute to the overall implementation of CEBMs.

Another informant discusses how the procurement function can support efforts set by other functions.

“I think the design phase facilitates a circular economy in practice. Then it needs to be implemented in the value chain. ... And the procurement function can contribute, by recycling, and modularization. Standardisation.” C2I2

This implies a need for the procurement function to collaborate with the other internal functions so that the efforts to implement CEBMs is coordinated.

C3, however, is not sure how the procurement function can contribute beyond what they already do. The company's procurement function is subject to the production manager, and the informant describes the activities of the procurement function as transactional. Nevertheless, the company tender from three European companies and have considered the ethical issues and costs of procuring from other locations.

“Shipping is a large percentage of the price. And the price is largely determined from the stock exchange ... It's a lot cheaper, but we have chosen not to get into the stuff there, the Bengali market. Because we know that the working conditions are not all good down there. Maybe elements of child labour. Yes. We have chosen for ethical reasons that we do not buy from there.” C3

This suggests that the procurement function of C3 can contribute to the implementation of CEBMs through the considerations of factors beyond the economic perspective.

Table 4-3: Perceived contributing factors of the procurement function in the implementation of CEBMs

C1	C2	C3
<ul style="list-style-type: none"> • Ensure recyclability • Ensure reusability • Avoid wastage • Ensure compliance with guidelines, laws and regulations 	<ul style="list-style-type: none"> • Identification and choice of sustainable suppliers • Evaluation of supplier compliance • Support reusability and modularity • Compliance with ethical guidelines 	<ul style="list-style-type: none"> • Ensure reusability • Choice of supplier and material • Consideration of ethical issues

4.3.2. Section summary

This section has presented the findings related to the second research question: “*What are the contributing factors of the procurement function in the implementation of CEBMs?*”. Overall, the findings imply that the companies do consider the procurement function as a contributor to implementing CEBMs. The companies emphasise the role of the procurement function in relation to supplier management, particularly in the selection, evaluation and development of suppliers. Furthermore, the companies point out that the function has the ability to ensure the 3R principles by procuring the right quality and volume. This emphasises the need for the procurement function to collaborate with internal partners to get the full picture of what is needed from the material and components procured. The companies also view the procurement function as an important contributor to ensuring compliance with guidelines, laws and regulations, through considerations of the TBL perspective. This, however, highlights the need for regulatory bodies to create and enforce regulations in order to transition towards CE.

4.4. Barriers the procurement function may encounter in the implementation of CEBMs

This section will presents the findings in relation to the third research question: “*What are the barriers that the procurement function may encounter in the implementation of CEBMs?*”. This section starts with an overview of the types of barriers mentioned by the informants, categorised according to the structure suggested by Vermunt et al. (2019)(see Table 4-4). This is followed by a more detailed case-by-case presentation of the barriers, as summarised in Table 4-5. Finally, a summary of the findings in relation to the research question is presented in the last section.

Table 4-4: Mentioned barriers to CEBM, by category

	C1	C2	C3
Internal			
Knowledge		x	
Organisational	x		x
Financial	x	x	
External			
Supply Chain		x	x
Market		x	
Institutional		x	

4.4.1. Internal barriers

Knowledge

C2 mentions that CE is in its starting phase and calls for more knowledge on how to implement CE efforts and an understanding of how the company can implement CEBMs in an economically viable way.

“We need to find solutions that are smart and good enough that you get something in return, then it is sustainable” C2I2

This implies that there needs to be more awareness, research and development of the concept, as well as practical approaches as to how a company can implement CEBMs. This can also imply that the company has not put enough efforts into understanding and training its employees in the concepts of CE and its BMs and that the informants, therefore, do not see its potential.

Neither C1 nor C2 mentioned any barriers related to knowledge in the implementation of CEBMs. In C1’s case, which did not have previous knowledge of CE, this might imply that knowledge of the concept is indeed a barrier to implementing CEBMs. As for C3, which describes themselves as somewhat circular, this might imply that they do not see any barriers related to knowledge or lack thereof.

Organisational

C1 mentioned the lack of reverse logistics, in particular in-house activities related to recycling, as a barrier the procurement function might encounter. However, the informant recognises external collaborators as a solution to these barriers in their case.

“Recycling in-house can become a challenge. We don’t have the equipment for that, but we do have sub-contractors that can handle that.” C1I1

This implies that the procurement function, or at least the informant, sees the potential in using external partners as a means to enable CEBMs.

On the other hand, C2 does not mention any organisational barriers to CEBMs, which might imply that they do not see, or are not yet aware of, any such barriers in implementing CEBMs in their organisation and procurement function.

C3 mentions their lack of physical space as a barrier to expand their operations. The company did look into the possibility of drying the material they could not recycle themselves, but the operations would be too voluminous and expansive, so it could not fit the current facilities.

“We have expanded as much as we can here. So, there is no place to do it. So, we sell it to recycling” C3

This underscores the fact that the procurement function sees potential in collaborating with external partners in order to enable CEBMs. The informant does also note the size of their company, i.e. low opportunity to impact the extended supply chain, as a barrier.

“Their complicated. There is an entire chain that has to be on the same page, and it might be difficult for us as a small player to implement CE” C3

This implies that the informant might believe that in order for their company and procurement function to implement CEBMs, the system around, i.e. their customers and suppliers, must enable such a transition.

Financial

C1 perceives the company’s high focus on cost and quality as a barrier the procurement function might encounter in implementing CEBMs.

“Things are cost-driven and quality-driven. The core of the company is that it's supposed to be the best, it is not a cheap product.” C1I2

This implies that the procurement function might see CE measures, practices and approaches, as more expensive than their current linear operations, thus hindering a transition towards CEBMs.

C2 mentions the cost as the main barrier in a similar fashion to C1.

“It can’t be too big of a difference, because you can’t, if you are to choose alternative companies where some are very good at circular economy, and some are bad, but the cost difference between them is too big, then it will take a lot to choose the more expensive option” C2I2

“If I’m honest, there will come a time where the cost of doing it, what weighs the heaviest? It is rare that companies do something that cost them a lot, without receiving anything in return.” C2I2

This might indicate that in evaluating CEBMs, the procurement function focuses primarily on the cost and does not note potential opportunities for value generation.

C3 does not mention financial aspects as a barrier. However, it is important to note that the informant sees the economic potential in CE, due to the lower cost of procuring secondary material, as opposed to virgin material. This infers that the procurement function might not view the financial aspect of implementing CEBMs as a barrier, but rather a driver.

4.4.2. External barriers

Supply Chain

C1 and C2 do not see any SC-related barriers to implementing CEBMs. This might imply that they do not see, or have yet to discover, any issues related to their dependency on other parts of the extended SC.

C3, however, is a subcontractor and perceives their size and lack of influence as not only an organisational barrier, as previously mentioned, but also as a SC-related barrier.

“I don’t know, we are a subcontractor, and there are many players after us. We deliver to a producer of propellers, which delivers to a shipyard, which delivers to a shipping company. So, you would have to permeate the entire chain in a way” C3

This implies that the informant sees their implementation of CEBMs as dependent on their customers’ implementation of CEBMs. The procurement function also perceives a barrier to reverse logistics, in the form of logistical issues in transporting big components back to them for reuse.

Market

C2 mentions society’s lack of awareness and focus on CE as a barrier to implement CEBMs, but recognises the fast evolvment of the concept, and believes that the market can potentially incentivise the transition.

“I think the circular economy has a long way to go, but things are evolving fast now. As our society is built up, and our economy is built up, it awards the ones that are at the forefront. ... You need market forces that pull in that direction.” C2I1

In addition, the procurement function perceives a lack of customer focus on CE efforts as a barrier to implementation.

“Today, none of our customers asks us how good we are at circular economy, or how good we are at sustainability when deciding whether or not to buy from us. But we must be honest. It’s probably coming.” C2I1

This emphasises the need for societal awareness on the concept, as well as customer demand, in order for the company to implement CEBMs.

Neither C1 nor C3 addressed barriers related to the market, which might imply that they have yet to discover a lack of customer acceptance and/or resistance from their competitors. They do not appear to have experienced similar issues related to society as C2.

Institutional

C2 believes there needs to be uniform, international rules to ensure implementation of CE, and the lack of it as a barrier. One informant particularly raises the issue of international differences in laws related to health, environments and safety.

“If the laws and regulations are strict, then it will cost more, and that’s a problem. If the laws and regulations are different internationally, then that’s a problem. We export a lot and have international competitors. If there are other demands of them than us, then it is a problem ... It needs to be distributed somewhat better” C2I1

This emphasizes the need for regulatory bodies to create a consistent set of rules that account for differences, as well as provide incentives to ensure implementation.

C1 and C3 did not mention institutional barriers, which might imply that they have yet to have experimented with efforts that are affected by regulations and laws. It might also suggest that their company or product is not as heavily regulated as C2.

Table 4-5: Summary of mentioned barriers to CEBMs

	C1	C2	C3
Internal			
Knowledge		Lack of knowledge on implementation in practice	
		Lack of knowledge of economically viable solutions	
Organisational	No reverse logistics		Lack of physical space Small company
Financial	Cost-driven Quality-driven	Cost driven Perceived cost difference	
External			
Supply Chain		Lack of partners	Dependent on customer and extended SC Logistical issues in regard to reverse logistics
Market		Lack of demand from society Lack of demand from customers	
Institutional		Lack of uniform, international rules and regulation	

4.4.3. Section summary

This section has presented the findings related to the third research question: “*What are the barriers the procurement function may encounter in the implementation of CEBMs?*”. Not all of the categories of barriers suggested by Vermunt et al. (2019) are present in each individual procurement function, however, they are all collectively mentioned. A general lack of knowledge is noted as a barrier, particularly in relation to approaches for implementation. As for organisational barriers, the lack of in-house activities and physical space is mentioned. Nevertheless, the informants seem to imply that this can be overcome by collaborating with external partners. The financial barriers seem to centre around a perceived higher cost of CEBMs, which do not align with goals of cost reduction. As for the first external barrier, SC barriers, the main finding is in relation to the dependency on external partners. C3 notes a challenge in influencing the extended SC to fully implement CEBMs, whereas the two larger companies did not mention SC barriers. C2 was the only

company that mentioned market and institutional barriers. These focused on the lack of awareness and demand for CE efforts by society and their customers, as well as challenges in creating a consistent set of international regulations. This emphasises a need for an overall increased awareness on the topic of CE and CEBMs. Overall, lack of mentioning certain categories of barriers might imply that the companies and their procurement functions have not invested enough time into understanding CE and their BMs or have not come far enough in implementing CE efforts.

In the subsequent Chapter, these findings are discussed.

5. DISCUSSION

5.1. Chapter Introduction

The prior chapter has presented our findings in relation to the research questions used to explore how the procurement function can contribute to the implementation of CEBMs. This will be used as a basis for discussing the topics in relation to the theoretical perspectives, which were introduced in Chapter two. In this chapter, we will elaborate on our analysis, challenge our findings and evaluate their fit with existing knowledge. The first section will elaborate on companies' knowledge and understanding of CE, followed by an evaluation of the contributing factors of the procurement function, before the barriers to the implementation of CEBMs are discussed. Consequently, a conceptual framework of how the procurement function can contribute to the implementation of CEBMs is then presented.

5.2. Knowledge and understanding of CE

Our findings suggest that the awareness of the CE concept is mainly visible in the light of the activities, such as a focus on the 3R principles, loop mentality and efficient use of energy and resources. The findings indicate that companies participate in these activities on a general level, such as goals of reducing packaging and waste, reusing materials that are easily transformable and recycling when they cannot reuse the materials in-house. This implies an understanding of certain elements of how CE operates, but there is a lack of an overall systematic view. The brief mentioning and lack of elaboration, in general and in relation to how to implement CE, could indicate that a broader understanding of CE from a systematic and holistic perspective is missing.

Furthermore, the findings indicate that companies do not differentiate much between the concepts of CE and sustainability, thus, companies mainly see CE as a way to achieve sustainability goals. This is not necessarily a huge misconception, according to Pieroni, McAloone, and Pigosso (2019), who describe CE as an approach to realise sustainability ambitions as well as promoting economic growth. However, as pointed out by Geissdoerfer et al. (2017), the prevailing emphasis on the TBL perspective is generally understood as the main perspective within the sustainability concept. Therefore, a lack of differentiation between CE and sustainability could hinder the overall understanding of the CE concept.

This point corroborates with Suárez-Eiroa et al. (2019) who state that the development of strategies to implement CE is hampered when there is a lack of consensus of the definitions.

Additionally, the findings imply that companies mainly see the drivers of CE from an economic perspective, as benefits are represented as saved cost by reducing and reusing materials, thus resulting in competitive advantages. The competitive advantage companies perceive mainly centre around the ability to outperform their competitors on sustainability measures, resulting in increased market share and therefore an increase in turnover.

Furthermore, the view on the environment as a driver among the companies is not that explicit, resulting in the perception that environmental benefits are merely a bonus. This might indicate that companies struggle to see other than economic benefits to be gained in direct relation to themselves. This finding is also pointed out by Ghisellini, Cialani, and Ulgiati (2016) who state that there is a heavy focus on the economic perspective in CE, making it one of the biggest criticisms of the concept. However, the environmental benefits of CE can be easier to understand if they are viewed from a value chain perspective, as done by Guldmann and Huulgaard (2020). They present that SBMs, such as CEBMs, entail a broader understanding of value and stakeholders as they capture (economic) value while maintaining or regenerating natural, social and economic capital beyond the organisational boundaries. Moreover, our findings indicate that some companies see the need for strategies to develop new BMs where the aim is not to sell but rather take care of the products as an everlasting resource. This aligns with Bocken et al. (2016) who explain that CEBMs can provide integrated (new) environmental and economic value creation; shifting business logic into generating profits from a continuous flow of reused materials and products through the value embedded in used products.

Nevertheless, there is still criticism that the CE approach only prioritises the economic system and environmental benefits, while only implicitly including social aspects, as argued by Geissdoerfer et al. (2017). Our findings suggest some indications of certain social benefits, such as the implementation of CE as a way to satisfy customer and employees requirements or expectations of sustainability whether it is related to the product or process. In addition, our findings imply that companies do consider the social aspect, particularly in the form of job creation and investment in the training of apprentices. This is considered an important aspect of companies' community involvement and corporate social responsibility. A similar social consideration was noted in Geissdoerfer et al. (2018), where the social aspect of CE considers creation of local jobs.

Our findings further suggest that the struggle to separate the understanding of CE and sustainability affects companies' ability to view CE in the procurement function. Companies mainly view sustainability through activities such as reduced packaging, reduction in transportation, and collaboration and evaluation of suppliers. This is supported by Leal Filho et al. (2019), who stated that sustainable procurement practices and policies are likely to place focus on these activities. The lack of elaboration on procurement in CE emphasises the need for clarifications on the relationship between the concepts. However, even if companies do not have a clear picture of how to implement CE in procurement, the function is considered to be important to overall sustainability efforts. In particular, companies understand the strategic importance of the procurement function in relation to managing suppliers. This corroborates with Johnsen (2019), who stated that the degree of sustainability a company can claim to be depend on the sustainability of its suppliers and partners, i.e. sustainable businesses imply the management and creation of sustainable relations. This indicates that the procurement function could in future play a vital role in the accommodation for change and acceleration of CE, as suggested by Pollice and Batocchio (2018).

More so, the findings demonstrate that the companies have yet to adopt a true circular mindset, a term coined by Martin Charter (Kiser 2016). However, the lack of such a mindset is to be expected when companies do not describe themselves as directly circular. Therefore, if a company were to consider CE, our findings suggest that awareness and in-house knowledge is necessary. This is supported by Pieroni, McAlloone, and Pigosso (2019), who claim that the development and methodological support to implement CEBMs are challenged by the lack of knowledge on how to make it happen in practice. This could provide an understanding of why it should be implemented in each function of a company, the whole value chain and areas beyond organisational boundaries.

In addition, our findings indicate that companies believe the following to be CE enablers: the company strategy and willingness, nature of the product, material and industry, a suitable set of international and national rules and regulations, openness to new BMs, as well as close proximity to customers and suppliers. This indicates that the companies perceive the implementation of CE as both dependent on internal and external factors. Thus, they emphasise a need for a concurrent approach to CE, where governmental bodies, industry regulators, companies and society at large collaborate on the implementation of CE. This is supported by Ghisellini, Cialani, and Ulgiati (2016), who describe that successful transitions towards CE require involvement from all actors of the society and their capacity to create

suitable collaboration and exchange patterns. The current understanding of enablers that the companies suggest also align with what Ellen MacArthur Foundation (2015) points out, as the building blocks towards a CE, namely CE design, new BMs, reverse cycles and enablers and favourable system conditions.

The next section discusses the contributing factors of the procurement function in the implementation of CEBMs.

5.3. Contributing factors of the procurement function

Our findings imply that companies consider the procurement function as important in the management of suppliers and external partners. This is supported by Johnsen (2019), who argues that a company is no more sustainable than the suppliers it sources from, enabling the procurement function to contribute in sustainability efforts. The findings suggest that the procurement function is able to consider factors beyond the economic, such as ethical issues related to child labour and working conditions, sustainability efforts in suppliers, and the supplier's continuous development of expertise. This is in line with Miemczyk, Johnsen, and Macquet (2012) and Leal Filho et al. (2019), who perceive the ability to consider environmental, social, ethical and economic issues, as a way to provide value not only to the organisation but also to the society and the economy. The findings suggest that the procurement function can contribute to the implementation of CEBMs, through the identification and evaluation of suppliers that are sustainable and have the ability to follow ethical guidelines and values set by the company. Furthermore, through the conduction of audits and evaluations of the suppliers, the procurement function is able to evaluate and build a common understanding of what is required to be a supplier long term. Uncovering and assessing these potential suppliers requires probing beyond the superficial and is one of the important capabilities a procurement function must master to fulfil its strategic role (Lysons and Farrington 2016). This highlights the need for companies to establish guidelines and values to aid the procurement function in evaluating supplier compliance and support the company's overall goals.

Overall, our findings demonstrate that supplier management is an important capability for a procurement function to be considered strategic, as well as a contributing factor to the implementation of CEBMs. In order to assess the strategic level of the procurement function, a Procurement Maturity Model (PMM) can be applied, as suggested in section 2.4.4. Lysons

and Farrington (2016)'s PMM model illustrates the stages of development reached by the procurement function on a scale from 1-4. Stage 1 indicates that the procurement function is passive with no strategic direction and primarily reacts to the request of other functions. Stage 2 describes an independent procurement function that is able to adopt the latest procurement techniques and processes, but its strategic direction is independent of the company's competitive strategy. In addition, some coordination links are established between procurement and technical functions. In stage 3, the procurement function supports the company's competitive strategy by recognising suppliers as a resource, monitoring and analysing performance, as well as adopting new procurement techniques and processes. Finally, stage 4 indicates that the procurement strategy is fully integrated into the company's competitive strategy and permanent lines of communications with other functions are established. Thus, the function's considerations and monitoring of a supplier's experience and attitude, suggests that companies consider suppliers as a resource, which relates to a high degree of procurement maturity, which corresponds with Stage 3: Supportive in the PMM presented by Lysons and Farrington (2016).

Additionally, the findings indicate that the procurement function has a role to play in relation to the 3R principles. The *reduction* principle is reflected in the function's ability to avoid unnecessary waste, through thorough evaluations of what the company needs in terms of volume and quality of materials. The function does not directly affect the improvement of efficiency in production and the consumption process, i.e. eco-efficiency, but can ensure that the right resources are available. This avoids waste in the form of the wrong resources and can result in fewer resources used per unit of value produced, which is one way of achieving eco-efficiency according to Ghisellini, Cialani, and Ulgiati (2016). Our findings further suggest that the *reuse* and *recycling* principles are relevant to the procurement function, as the function can evaluate the material and components used and provide alternatives that enable a higher degree of reuse and recycling in the company. The ability to support 3R efforts suggests that the procurement function can contribute to the implementation of CEBMs; as the function considers multiple cycles of value creation as well as disposal when the end of life is irreversibly reached, which is necessary for companies that want to capitalise on circular practices, according to Bocken et al. (2019), and CEBMs (particularly PLE, RR, CSC).

However, based on our findings, we argue that the 3R principles are not something the procurement function can achieve in isolation, and that collaboration with various internal

functions is necessary. The findings suggest that involvement in the design and development stage and collaboration with the production is of utmost importance. Thus, the procurement function's involvement in the design and development stage is crucial in ensuring that design changes are communicated effectively to all parties involved (Chopra 2018). Further, Schweiger (2015) points out early supplier involvement and building differentiated sourcing strategies and supplier partnerships, as important company contributions of the procurement function. As for the production function, our findings suggest that collaboration is important to ensure a common understanding of what material and components are needed. The collaboration and relations with other internal functions is an essential capability that the procurement function must master to fulfil its strategic role (Schweiger 2015). Broadly, our findings suggest that the procurement function must be of some maturity to achieve coordination with the technical functions, which corresponds to Stage 2: Independent in Lysons and Farrington (2016)'s model. However, to fully contribute to the implementation of CEBMs, permanent lines of communication must be established with other functions, which warrants a high degree, Stage 4: Integrative, of procurement maturity.

Further, our findings suggest that the procurement function has the capability to follow guidelines, laws and regulation that are set in relation to CE and sustainability. This is supported by Leal Filho et al. (2019), who claim that procurement can facilitate organisational efficiency and transparency, as well as compliance with rules and regulations. The findings indicate that companies already follow requirements regarding recycling and reuse and that if regulatory actions regarding CE are taken, the procurement function can contribute by ensuring compliance. This, however, emphasises the need for governmental and regulatory bodies to establish laws and regulations, which is supported by Vermunt et al. (2019) in relation to the implementation of CEBMS (particularly PSS and RR). The ability to comply to a set of laws and regulations suggest an ability to adopt various procurement techniques and processes, which indicate a certain level of maturity, and corresponds with Level 2: Independent in the PMM by Lysons and Farrington (2016).

Notably, our findings demonstrate that the procurement function can contribute to the implementation of CEBMs through factors such as; supplier management with considerations of factors beyond the economic, support of 3R principles through internal collaboration, and ensuring compliance with laws and regulations. Furthermore, our findings and previous discussion indicates that the procurement function's maturity level might be an important contributing factor. By being able to perform due diligence, the function is able to

identify and evaluate supplier performance in accordance with guidelines. This indicates that the function can ensure alignment of company goals, by thoroughly examining the suppliers and choosing those that fit best. This is further evident in the findings of the procurement function's contribution of considering factors beyond the economic. This can enable the function to identify risks and potentially develop risk mitigation strategies. Besides, by collaborating with the other functions of the company, the company can ensure proper alignment of strategic goals to CE efforts as well as ensure coordinated implementation of CEBMs across the company. A procurement function's ability to manage these relationships might be a valuable contribution. In addition, as the procurement function is considered the key in managing suppliers, it has the ability to support and enable supplier development. This is an important contribution, as our findings suggest that in order to implement CEBMs, the entire SC must be involved to some extent. The procurement function is in an important position here to ensure that suppliers are accounted for in the implementation efforts and that their contributions are enabled. These capabilities are supported by Lysons and Farrington (2016), who state that due diligence, risk management of the supply chain, relationship management, and continuous improvement of the supplier, is necessary in order for the procurement function to master its strategic role.

However, we found suggestions that the procurement function does not necessarily need to be of a high strategic level to contribute to the implementation of CEBMs after all. One company that regards itself as rather circular, describes the function as a passive participant that primarily reacts to request from other functions, which corresponds with a low level of procurement maturity according to Lysons and Farrington (2016)'s PMM. Nevertheless, there are indications that other factors play a significant role in the implementation of CEBMs in this case. The nature of the product, which is metal and can be reused, and the size and organisation of the company, which is relatively small, appear to have an effect on the need for a strategically aligned procurement function. Since the company does not appear to allocate enough resources and emphasis on the procurement function, it might overlook its strategic potential, according to Tchokogue, Nollet, and Robineau (2016).

The following section will elaborate on the barriers the procurement function may encounter in the implementation efforts.

5.4. Barriers to the implementation of CEBMs

The findings of this thesis identified several internal and external barriers relevant to the implementation of CEBMs. In the following subsections, these barriers will be discussed in more detail.

Knowledge barriers

The findings suggest that the procurement function perceive a lack of knowledge on CE as a barrier. This mainly appears as a call for knowledge on how the theory applies in practice, a clear “how-to guide” per se. The observed barriers align with our findings on the general understanding of CE as well, which we discussed in section 5.2. Moreover, the barriers related to knowledge align with what is discussed by Rizos et al. (2015, 12) “that the lack of technical and managerial knowledge, skills and information, including the usability of new BMs limits the options for SMEs to adjust to a CE as new or adopted ways of doing business may not be known or staff may not be able to (easily) pursue new activities”. This raises the need for more awareness regarding the concept of CE, approaches and how to make CEBMs economically viable in specific ways. In addition, the findings indicate that there is a need to gain knowledge, create awareness, and research and development to implement CEBMs. This aligns with the findings in Homrich et al. (2018), that industry structure and policy reforms must be adjusted to promote the development of new technologies in order to reach solutions by changing the waste recycling focus.

Organisational barriers

Our findings indicate that organisational barriers are the most prominent when considering the lack of reverse activities, which are considered to enable CEBMs. This is somewhat contradictory to what previous literature shows, as none of the “typical” CEBMs that deal with reverse logistics (e.g. Resource Recovery and Circular Supply Chains) mention organisational barriers as a concern, according to Vermunt et al. (2019). However, the lack of expanding the operations, either due to physical space or lack of organisational structure to include reverse logistics initiatives can be viewed through other barrier lenses. Lack of knowledge and technology could also be considered as a reason for companies to not have reverse logistics. Knowledge and technology are both required skills to understand recycling processes and how to use the circular materials production processes, as stated by Vermunt et al. (2019). Furthermore, new or improved technology and expanding facilities to endorse

reverse logistics could impose high up-front investment costs which are considered as a financial barrier according to Rizos et al. (2015). Moreover, the findings suggest that the procurement function sees an opportunity in collaborating with external partners and sub-contractors to overcome some of these barriers. Collaboration can aid to overcome the in-house capacity barriers, however, that could potentially provoke SC barriers i.e. dependence on other parties for waste as input. This point is corroborated through the fact Vermunt et al. (2019) make; that barriers appear to be interlinked, and that internal barriers can be related to external barriers.

Financial barriers

As for the financial barriers, our findings indicate that they are relevant for procurement functions that have a high cost and quality drive. Procurement functions that put a lot of emphasis on cost reduction principles and consider the high quality of their products as the main characteristic, struggle to see how or why CEBMs can or should be implemented. This corroborates with the findings from Guldman and Huulgaard (2020); who discuss how companies that follow a traditional approach, i.e. linear business, are based on key figures such as payback time and/or return on investments. Yet, CEBMs operate at a different timeline, with different financial structures, disabling them to meet financial requirements within the same period; CE solutions must encompass a long run, which can span from 20-30 years according to Homrich et al. (2018). This can, therefore, seem like too much of a risk or financial uncertainty for companies that are cost-driven. This aligns with Tura et al. (2019), who claim that a reason for ineffective development of CE is due to high economic uncertainty, as defining and measuring the long-term benefits of CE is challenging.

Findings also indicate that if CE options, i.e. products and processes, are too expensive compared to their (linear) alternatives, they will require a lot to choose the expensive one. A perception that material-components and approaches within CE are in some way more costly than the linear ones, is also a point discussed by Linder and Williander (2017); higher complexity in designing for refurbishing and remanufacturing, and due to the required return logistics. This results in a perception of CEBMs as more costly, which may not align with goals in cost reduction. However, it can be speculated that the future solutions, if they are CEBM-developed products, will be favourable if the “new business standard” for certain products in the manufacturing industries is based on different modular systems of components. It can thereby be more costly to handle or try to sell products that have no residual value or components left to exploit. This corroborates with the discussions in Linder

and Williander (2017) who also point out that future solutions may be more favourable if they can provide technical, functional and economic dimensions.

However, our findings suggest that companies do not perceive the cost as a barrier, as some secondary materials may have a lower price than virgin materials. However, this might only be relevant in some industries that procure specific types of metal. The lower price of secondary materials is somewhat contradictory to the common perception and theoretical claims that in SCs there are higher costs related to recycled materials, contra virgin materials, as stated in Lieder and Rashid (2016). Thus, companies that find themselves in this position may have products with inherent characteristics that function as drivers of CEBMs.

Supply chain barriers

Moreover, barriers in relation to the SC perspective appear to have a significant effect on the view on CEBMs. Our findings suggest that SC barriers mainly appear within the procurement functions that perceived dependence on other external partners. Furthermore, it appears that procurement functions from larger companies do not regard the SC as a particular barrier to implement CEBMs, whereas those from smaller companies identify barriers related to the SC. This could simply indicate that in cases where there might be a power difference, i.e. in size and dependency, there will be challenges to implement CEBMs. This corroborates with Rizos et al. (2015) who stated that due to a small size and unequal bargaining power, smaller businesses can have little influence on their suppliers' engagement in sustainable activities.

As previously mentioned, findings made by Vermunt et al. (2019) indicate that barriers can be interlinked. The findings related to organisational barriers, regarding the size of the procurement function and its influence and the need to look beyond physical organisational boundaries, relates to the SC topic. As our findings suggest; smaller procurement functions with an interest towards circularity that takes part of a larger SC can experience difficulties with the transition, as all actors in the entire chain have to be involved and have similar interests. Thus, even though the small size of one procurement function can be perceived as an internal (organisational) boundary, it can also manifest as an external barrier in relation to its SC. On the other hand, can we assume that a procurement function from a larger company within a SC does not experience external SC barriers? As our findings suggest; some procurement functions from larger companies do not identify any prominent barriers within the SC. However, assuming that the SC consists of several actors, it is not given that

they will have identical impressions of what the SC is capable of. Other procurement functions in the SC may face barriers that their counterparts have yet to identify or experience. Considering that SC can be viewed as a network where all actors need to be involved and have similar interests, a mismatch between capabilities could result in unforeseen barriers. This perspective aligns with Johnsen (2019), who emphasises the need to understand the SC as a system where all actors and stakeholders are directly or indirectly involved in the supply process. Moreover, this could indicate that in addition to the contributing factors of the procurement function, implementation of CEBMs is dependent on the rest of the SC implementation of CEBMs to properly function. This aligns with Bocken et al. (2019), who claim that CEBMs require consideration of networks for multiple cycles of value creation, thus an innovating perspective that exceeds the direct SC needed for the current production. Thus, the transition to CEBMs requires systemic changes both on a multi-level in addition to stakeholder collaboration as Witjes and Lozano (2016) present in their findings.

Market barrier

When it comes to market barriers, our findings indicate that procurement functions can perceive barriers to CEBMs in the form of lacking demand from society and customers. Furthermore, the findings suggest that customers in the B2B manufacturing market do not demand circularity efforts from their suppliers, which could be a result of a lack of demand and focus from society in general. The lack of requests for circularity could also be interlinked with the barriers related to internal knowledge, as well as the general level of how much the public is informed of the concept. This corroborates with the findings in Lieder and Rashid (2016) that social awareness is a crucial part in the transition from a linear economy to a CE since customers are an integral part of the CE.

However, it seems that procurement functions expect that there will be an increase in demand for sustainability efforts and that CE can be an approach to meet the new demand. This is supported by Ghisellini, Cialani, and Ulgiati (2016), who argue that promoting a closing the loop production pattern within an economic CE system, aims to achieve a better balance between economy, environment and society, thus improved sustainability efforts.

The combination of market barriers and a lack of request for circularity can be related to supply chain barriers as well. The findings suggest a lack of awareness among suppliers or partners, which can hamper the actors in the SC to coordinate their activities and thereby

create conflicting interests. This aligns with the observations in Homrich et al. (2018), who claim that the core aspect of disseminating a CE strategy through a whole SC into a circular one is knowledge and information on the topic. In addition, the procurement functions that emphasised market barriers also stressed a need for regulatory bodies to create a consistent set of rules and provide incentives to ensure implementation. This can be seen in relation to market barriers by questioning that if there are no incentives (institutional legislations) to implement this type of business practices, why should the market request it? This is supported by the findings in Guldmann and Huulgaard (2020); that companies with new CEBMs operating in existing market structures, with few incentives to use recycled materials had difficulties to get funding due to the unclear market demand.

Furthermore, if the procurement functions expect a transition or change in the market powers, an early involvement within CE could result in competitive advantages in the long run. For example, if new markets with an incentive to buy circular products emerge, one can assume that the demand for products and systems aligning with CE principles could increase. Thus, an early change in how procurement and the overall business is organised to manufacture products that are aligning with CE principles can be beneficial. As Rizos et al. (2015) put it, involvement in CE can impose benefits by closing loops and improving resource efficiency, which may result in saved material cost, competitive advantage and attract potential new markets.

Institutional barriers

Our findings propose that lack of a consistent set of rules and regulation regarding CEBMs as an institutional barrier. This indicates that the procurement functions do not see enough value in CEBMs and will therefore not develop or innovate their BMs unless they are required to. Laws and regulations as a prerequisite might not be necessary for all companies, but our findings suggest that this can heavily influence companies in the manufacturing industry. This view corroborates with the discussion in Homrich et al. (2018) that systematic regulation and policy systems need better interactions among governmental bodies, policymakers, communities and manufacturing industries. This implies that the procurement functions, or businesses in general, are not likely to deviate from the linear mindset as of now. However, there are not any indications that sanctions per se are necessary for the companies to change their BMs into CEBMs; a well-functioning incentive structure or adequate taxations might be just as effective. Moreover, it is quite dependent on the market barriers and issues related to the demand, as discussed previously. A lack of encouragement

within the provision of funding opportunities and effective taxation policy, such as import duty, imposes significant barriers to the uptake of environmental investments, as found by Rizos et al. (2015).

Moreover, as our findings indicate, there are some differences in perceived institutional barriers. The differences can be explained by considering the degree of national and/or international competitors that the procurement functions experiences. Some of the findings suggest the need for regulatory bodies to create a consistent set of rules that account for differences between national and international actors, as well as provide incentives to ensure implementation. This is supported by Homrich et al. (2018), who claim that in addition to financial or economic incentives, the advantages for the industry must be explicit to enable CE implementation. Furthermore, the differences between national and international laws can impose differences in how CE is measured and evaluated, thus the need for a consistent set of uniform rules across industries. This is in line with Govindan and Hasanagic (2018), who identified a lack of a standard system for performance indicators to measure CE in the SC, as a barrier. Moreover, lack of standard performance indicators can be interlinked with barriers related to SC and how actors assess their suppliers; differences in measurement could create different perceptions and results, in addition to conflicting interests.

All in all, being aware of these barriers, can enable companies to evaluate which CEBMs is best suited for them. This is supported by Vermunt et al. (2019), who concludes that insights in the variation between CEBMs and their barriers may help to better understand how CEBMs could be better aligned in order to achieve closed-loop supply chains. In addition, Guldmann and Huulgaard (2020) indicate that factors other than size of the company, industry and customer segment influence what barriers a company might encounter in the implementation of CEBMs. Our findings indicate that companies that manufacture custom-made products and/or solutions that are relatively standardised to the B2B market could potentially generate value from providing their solution as a service. This is most relevant in the PSS model. This could imply a value mechanism that charges per hour in use, which would support a reduction in energy consumption. Given that the product itself is of relatively low maintenance, the lack of reverse logistics might not appear as a barrier initially. However, if the goal is to keep the product in the technological cycle (see section 2.2.3), the company will have to accommodate for reverse logistics. As our findings suggest, this could be enabled by collaboration with external partners.

As for companies that produce big, complex products, we suggest that the focus on longevity is aligning with the PLE model. The characteristics of the products and an industry appreciation of products with a long lifetime, such as ships in the maritime industry, might support PLE efforts. The particular focus to maintain and provide service to the product after the initial procurement can generate additional value creation. Our findings suggest that this is a low hanging fruit in the maritime industry and to some extent an industry standard. However, industry laws and regulations that support this might aid in the implementation of the model in more companies. The PSS model might also be beneficial in this case. For instance, the value can be generated through a “power by the hour”-system, similar to that applied by Rolls Royce (Smith 2013). However, this will require high investment cost in a leasing model and its contracts, and given that financial barriers are apparent, it might be difficult to achieve.

Whereas for smaller companies, that deal with reusable materials such as metal, the RR model might be beneficial. However, in the context of the maritime industry, the discarding of end of life ships in areas such as the Bengal bay is practically industry standard. The location of a company that wishes to capitalise on the opportunity of this scrap metal is therefore relevant, as the cost of transportation might be substantial. Nevertheless, if incentives to bring back the discarded materials were in place, this model could prove to generate and capture value.

Besides, as barriers may appear to be interlinked, it can be difficult to identify the accurate source or extent and complexity of a barrier. Thus, it can be challenging to identify what type of barrier that is experienced, and followingly, choosing the right procurement activity to approach the barrier may be complicated. A complicated or complex situation could require input from several functions, in addition to the procurement function, to coordinate the efforts into overcoming the relevant barriers. This corroborates with Tura et al. (2019, 96-97), who assert that “barriers are context-specific and business concepts that are successful in one context may fail in another context. Thus, CE concepts should not be directly copied, rather firms should analyse their environments to identify the relevant barriers and consider these when designing CE business concepts”.

5.5. Conceptual Framework

The transition from the current linear economy to a functioning CE regime will require a systematic multi-level change and new BMs, through the development of new strategies, structures and operations, according to Witjes and Lozano (2016). CEBMs represent new ways for companies to create, deliver and capture value, but to implement such models, certain barriers need to be overcome, as stated by Bocken et al. (2016) and Vermunt et al. (2019). This section will, therefore, present a conceptual framework (Figure 5-1) for how the procurement function can contribute to overcoming barriers, as the function is considered as an important contributor to realising a company's strategic objectives. The framework presents the contributing factors of the procurement function and the following sections details how these can contribute to overcoming the identified barriers to the implementation of CEBMs. The contributing factors and barriers are based on the findings and discussion presented previously in this thesis.

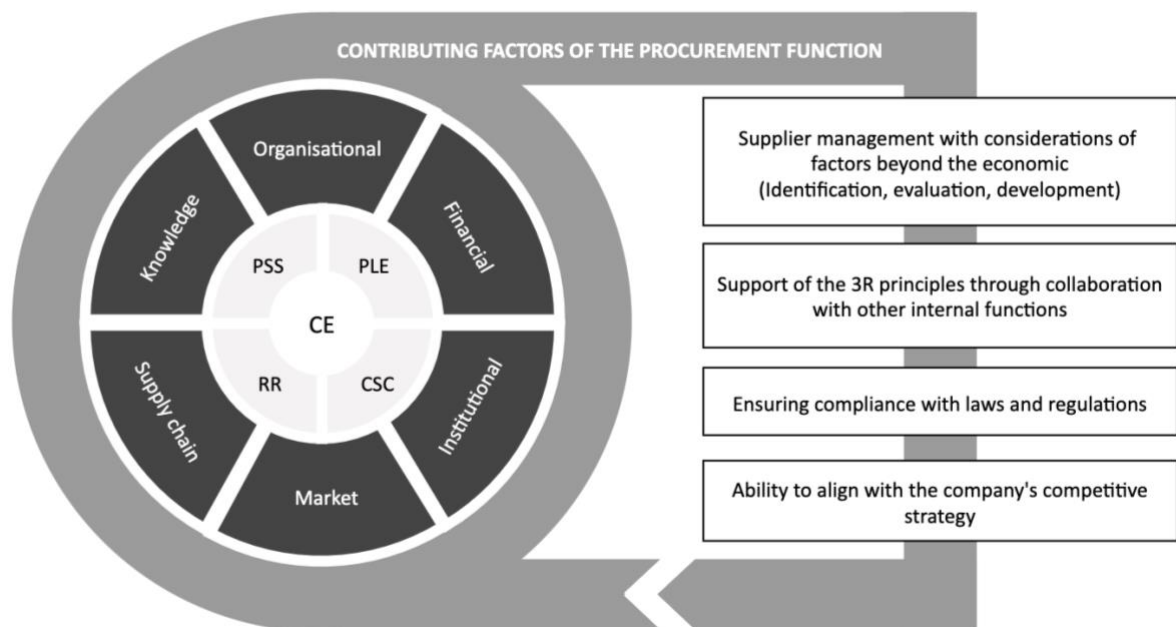


Figure 5-1: Contributing factors of the procurement function in the implementation of CEBMs. Source: Own illustration.

5.5.1. Supplier management with considerations of factors beyond the economic

Our findings suggest that the procurement function can contribute to overcoming SC related barriers through supplier management. Barriers such as dependence on suppliers, lack of

suitable partners and lack of influence on the extended SC, can be overcome by a procurement function that is able to manage its external suppliers. Through collaboration, the procurement function can ensure that factors beyond the economic are accounted for in contracts, and measures for evaluation are set to ensure compliance. In instances where a supplier cannot meet the requirements of the main company, the procurement function is in a key position to identify alternative suppliers, or potentially develop the current supplier's expertise. The procurement function's ability to collaborate with its suppliers are relevant to all CEBMs, as CE favours a systematic, industry level adoption of the concept.

5.5.2. Support of the 3R principles through collaboration with other internal functions

One type of barrier related to the implementation of CEBMs is the organisational barriers, which in our findings affect the enabling of reverse logistics. Reverse logistics is an important facilitator for CEBMs, as it unlocks the possibility of cascading and the final return of the material to the soil or back into the industrial production system. The procurement function can contribute by ensuring that the products and materials can be recycled or reused in the system again, supporting reverse logistics. The function will need to collaborate with other internal functions, such as production and design, to coordinate the needs of the company and functions, with the ability to reuse or recycle. This ability to support 3R principles are particularly relevant for the CEBMs which require reverse logistics, such as PLE, RR, and CSC.

5.5.3. Ensure compliance with laws and regulations

Our findings indicate that market barriers interlace with the institutional barriers, as the demand for CE by customers and society can be influenced by the regulations and laws set by governments. As of now, we have not found laws or regulations that require the implementation of CE efforts in the manufacturing industry. This affects the companies' efforts into the concept, as no regulations or demand require it. However, our findings suggest that companies believe that if market or institutional forces require it, and a consistent set of uniform, international rules are established, then the procurement function can contribute by ensuring compliance. This will require an adoption of various procurement techniques and processes that are in line with guidelines, laws and regulations in the implementation of CEBMs.

5.5.4. Ability to align with the company's competitive strategy

Our discussion suggests that the lack of CE inclusion in the competitive strategy can result in a lack of knowledge and understanding of the concept of CE, hindering a consensus within the company on how it should be implemented in practice. Furthermore, the lack of CE, as a strategic objective, results in the discarding of potential suppliers, products or processes, as they might be considered too expensive from a short-term perspective. However, as a procurement function of a high maturity level is able to align with the company's competitive strategy, and CE is included, this could potentially ensure several contributions and advantages in the long run. The high level of procurement maturity warrants cross-functional training of procurement professionals and executives, as well as a professional development that focuses on the strategic elements of the competitive strategy. This could enable the procurement function to become an integrated part of the company and an important source of knowledge and understanding of CE, thus contributing to the overall implementation of CEBMs.

6. CLOSING REMARKS

6.1. Chapter Introduction

This final Chapter of the thesis concludes with a summary of results, before highlighting the theoretical contributions and implications. Lastly, the entailed limitations of this thesis are provided, and, with those in mind, suggestions for further research are made.

6.2. Summary of Results

This thesis has sought out to increase knowledge and understanding through exploration of how the procurement function can contribute to the implementation of CEBMs. This topic has been addressed through the research questions; *to what extent do companies know of CE in procurement, what are the contributing factors of the procurement function in the implementation of CEBMs and what barriers the procurement function may encounter in the implementation of CEBMs*. A multiple-case study approach was used to gain insight into these topics and employees related to the procurement function from three selected companies within the manufacturing industry were interviewed.

This thesis has combined the insight from previous literature on CE, CEBMs and procurement with the findings from the multiple-case study. A conceptual framework for how the procurement function can contribute to overcoming barriers when implementing CEBMs has been proposed. The proposed framework presents four contributing factors of the procurement function; 1) supplier management with considerations of factors beyond the economic, 2) support of 3R principles through collaboration, 3) ensuring compliance with laws and regulations, and 4) ability to align with the company's competitive strategy. This thesis indicates that knowledge and technological, organisational, financial, supply chain, market and institutional barriers can be overcome with the aid of the procurement function. In addition, it was found that the maturity level of the procurement function plays a central role in overcoming the complexity of interlinked barriers. The framework offered in this thesis is likely to increase the understanding of the role of the procurement function in the implementation of CEBMs, and support companies in developing CE initiatives.

Finally, our findings suggest that the knowledge and understanding of CE from a systematic and holistic view does not only serve as a contributing factor to the implementation but is a prerequisite for applying the concept. The lack of awareness of the concept, and the overlap

with the sustainability perspective, might prove to be problematic for the transition towards CE.

6.3. Contributions

The findings contribute to several different fields of the current academic research, which are presented in the following paragraphs. This thesis extends the literature on CE and procurement in three important ways. First, the thesis has explored the role of the procurement function in the implementation of CEBMs, which has resulted in additional insight into the concept and theory. An incremental theoretical contribution is provided by building on the theory of CE and CEBMs and applying it in the context of procurement. This has resulted in an increased understanding of how companies view CE in procurement and provided insights into the role the procurement function can have within CE and CEBMs.

Second, the thesis contributes to theory through the identification of contributing factors of the procurement function in the implementation of CEBMs. By discussing the contributing factors in relation to the perceived barriers to implementation, this thesis has increased the understanding of procurement in CE. Furthermore, additional contributions to theory have been made by exploring the connection between procurement maturity and the procurement functions ability, through its activities, to overcome barriers to CEBMs.

Third, barriers to the implementation of CEBMs have been identified and mainly corroborate with existing literature on the topic. However, our findings suggest that the barriers encountered might be context-specific and industry related, which might be the reason why observed barriers differ from existing literature. In addition, our findings suggest that in order to support a systematic, holistic implementation of CEBMs, a wider SC perspective is necessary by looking outside organisational boundaries. Furthermore, a similarity between the barriers to CEBMs and the barriers to sustainable procurement is identified, which add additional insight into the disparity between CE and sustainability. Overall, the focus on barriers through this thesis has increased the general understanding of the complexity barriers impose on the procurement function in the implementation of CEBMs, which serves as a valuable theoretical contribution.

Fourth, this thesis combines insights on barriers and contributing factors of the procurement function in the implementation of CEBMs, in order to develop a conceptual framework. The framework aims to contribute on the current understanding of procurement's role in the

implementation of CEBMs. This conceptual framework takes a step towards uncovering the characteristics and activities of circular procurement, which could aid researchers in further expanding the literature on procurement in the CE.

Besides these theoretical implications described, several practical findings relevant for managers can be derived from this thesis. The extent to which companies know about CE in procurement has been explored in order to establish a baseline. This can provide valuable insights into developing practical approaches and guidelines to CE and its implementation in companies.

Furthermore, the identification of possible contributing factors of the procurement function can aid practitioners when assessing their own contributing factors, either when implementing CEBMs or evaluating their performance. Moreover, this thesis indicates a connection between the strategic level of the procurement function in relation to overcoming barriers in the implementation of CEBMs. This knowledge is useful to practitioners, as it suggests that the strategic level of procurement function should be assessed in the evaluation of CE implementation in a company.

Moreover, the identification of barriers raises awareness on their complexity and how they may be interlinked across categories and functions, whether internal or external. This awareness can facilitate a successful implementation of CEBMs. The insights into characteristics of the industry, product and company can aid practitioners in which barriers they may encounter when implementing CEBMs or engaging in CE related activities.

The proposed conceptual framework increases the understanding of how the procurement function can contribute to the implementation of CEBMs. The framework can aid practitioners in developing a right set of procurement activities in order to reach a high degree of procurement maturity. This can increase the ability to manage the complexity of barriers and support a transition towards circularity.

Overall, this thesis has attempted to fill the research gap regarding the role of the procurement function in CE, and has increased the knowledge on how the procurement function can contribute to the implementation of CEBMs.

6.4. Limitations of the study

In this Section, limitations of the study are presented. Thus, this study is based on a few numbers of manufacturing companies with perspective from the procurement function. In order to get a better of understanding of the function as a whole there can only be more insight to gain with a larger number of cases. Additional contributing factors and barriers of the procurement function could potentially be discovered or identified by increasing the number of cases.

Furthermore, to get an understanding of the procurement function it could be beneficial to interview other functions and their relations with procurement. As a company consists of several functions that should collaborate, it could be interesting to view, for instance, what visions the top management has for the procurement function on a strategical level. This could paint a more complex picture of how the company is organised and operates, thus allowing us to get an understanding from different perspectives and situations.

In addition, a more detailed exploration of the procurement activities within companies may lead to the discovering of even more complex constructions within the function. This thesis, for instance, did not have any insights in how suppliers are evaluated or assessed within each of the companies, which can be beneficial when assessing how suppliers are managed.

6.5. Suggestions for further research

In order to deepen the understanding on the role of the procurement function in CE and CEBMs, the results and limitations of this thesis suggest some areas for further research. Even though our research indicates a qualitative consideration (understanding the procurement function), it could be conducted in a quantitative manner as well. If it is possible to establish a set of standardised questions in relation to procurement as a function, more data could be obtained across different industries, and size and scope of companies. Characteristics or requirements of each business model could then be aligned with the maturity level of the procurement function, in order to evaluate if a given function can contribute to implementing a CEBMs. This would potentially yield more detailed and specific information regarding the need for various procurement capabilities in the different CEBMs.

Furthermore, there is still a need to raise awareness on CE, not just as a set of principles and practices that are considered circular, but as an entire systematic approach that account for

challenges related to human impact on the planet. We therefore suggest that further research should continue to clarify and conceptualise the concept of CE, particularly in relation to the sustainability concept.

In conclusion, further research should continue to test and validate the findings in large-scale empirical studies, covering more companies, industries and informants from other functions (e.g. design and production). To generalise the results, corroborating studies are necessary in order to challenge and extend the findings of this study.

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APPENDICES

Appendix 1: Information Letter



INFOMASJONSSKRIV *INFORMATION LETTER*

Forespørsel om deltakelse i master oppgaven: «Innkjøpsfunksjonens rolle i implementering av sirkulærøkonomiske forretningsmodeller i produksjonsindustrien»

Request for Participation in the Master Thesis: "Implementation of Circular Economy Business Models in the Manufacturing Industry: The Role of Procurement".

2020



Norsk versjon

Vil du delta i forskningsprosjektet «Innkjøpsfunksjonens rolle i implementering av sirkulærøkonomiske forretningsmodeller i produksjonsindustrien»?

FORMÅL

Målet med denne masteroppgaven er å utforske innkjøpsfunksjonen og sirkulærøkonomi. Oppgaven vil fokusere på kritiske egenskaper og utfordringer i innkjøpsfunksjonen, og hvordan disse forholder seg til sirkulærøkonomiske forretningsmodeller. Basert på informasjonen om innkjøp og sirkulærøkonomi samlet fra intervjuer og teori, vil vi forsøke å utvikle et rammeverk for hvordan innkjøp kan bidra i implementeringen av sirkulærøkonomiske forretningsmodeller.

HVEM ER ANSVARLIG FOR FORSKNINGSPROSJEKTET?

Høgskolen i Molde er ansvarlig for prosjektet. Monika Bjekic og Ine Opseth gjennomfører prosjektet, med veiledning fra Nina Pereira Kvadsheim.

HVORFOR FÅR DU SPØRSMÅL OM Å DELTA?

Utvalget er basert på arbeid og tittel tilknyttet innkjøpsfunksjonen og bedriftens interesse i sirkulærøkonomi. Kontaktopplysningene er innhentet via Nina Pereira Kvadsheim.

HVA INNEBÆRER DET FOR DEG Å DELTA?

Hvis du velger å delta i prosjektet, innebærer det at du deltar på et personlig intervju som vil vare ca. en time. Under dette intervjuet vil du bli stilt spørsmål angående bedriften og arbeidspraksis. Det blir lagt fokus på sirkulærøkonomi, bærekraft, og innkjøperens rolle i og for bedriften. Intervjuet vil bli avholdt på norsk, og det vil bli tatt lydopptak og notater fra intervjuet.

DET ER FRIVILLIG Å DELTA

Det er frivillig å delta i prosjektet. Hvis du velger å delta, kan du når som helst trekke samtykke tilbake uten å oppgi noen grunn. Alle opplysninger om deg vil da bli anonymisert. Det vil ikke ha noen negative konsekvenser for deg hvis du ikke vil delta eller senere velger å trekke deg.

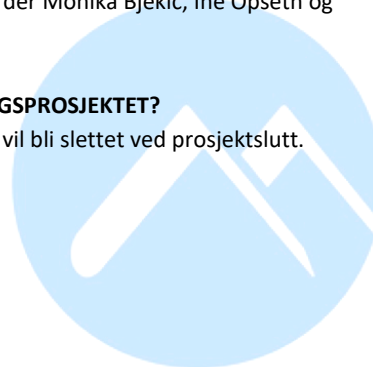
DITT PERSONVERN – HVORDAN VI OPPBEVARER OG BRUKER DINE OPPLYSNINGER

Vi vil bare bruke opplysningene om deg til formålene vi har fortalt om i dette skrevet. Vi behandler opplysningene konfidensielt og i samsvar med personvernregelverket.

Opplysningene vil bli lagret på forskningsserver ved Høgskolen i Molde, der Monika Bjekic, Ine Opseth og Nina Pereira Kvadsheim har tilgang.

HVA SKJER MED OPPLYSNINGENE DINE NÅR VI AVSLUTTER FORSKNINGSPROSJEKTET?

Prosjektet skal etter planen avsluttes juni 2020, og innsamlet materiale vil bli slettet ved prosjektslutt.



DINE RETTIGHETER

Så lenge du kan identifiseres i datamaterialet, har du rett til:

- innsyn i hvilke personopplysninger som er registrert om deg,
- å få rettet personopplysninger om deg,
- få slettet personopplysninger om deg,
- få utlevert en kopi av dine personopplysninger (dataportabilitet), og
- å sende klage til personvernombudet eller Datatilsynet om behandlingen av dine personopplysninger.

HVA GIR OSS RETT TIL Å BEHANDLE PERSONOPPLYSNINGER OM DEG?

Vi behandler opplysninger om deg basert på ditt samtykke.

På oppdrag fra Høgskolen i Molde har NSD – Norsk senter for forskningsdata AS vurdert at behandlingen av personopplysninger i dette prosjektet er i samsvar med personvernregelverket.

HVOR KAN JEG FINNE MER?

Hvis du har spørsmål til studien, eller ønsker å benytte deg av dine rettigheter, ta kontakt med:

- Høgskolen i Molde ved Nina Pereira Kvalsheim, nina.p.kvalsheim@himolde.no, Monika Bjekic, monika.bjekic@stud.himolde.no, og Ine Opseth, ine.j.b.opseth@stud.himolde.no.
- Vårt personvernombud: Merete Ludviksen, merete.ludviksen@himolde.no.
- NSD – Norsk senter for forskningsdata AS, på epost (personverntjenester@nsd.no) eller telefon: 55 58 21 17.

Med vennlig hilsen

Nina Pereira Kvalsheim
(Prosjektansvarlig/veileder)

Monika Bjekic
(Masterstudent)

Ine Opseth
(Masterstudent)

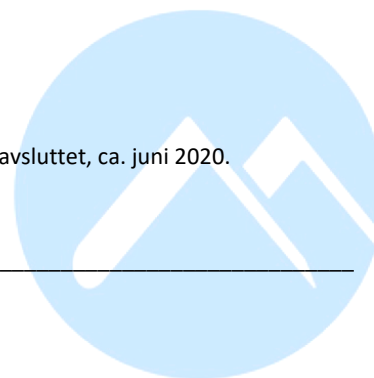
Samtykkeerklæring

Jeg har mottatt og forstått informasjon om prosjektet «Innkjøpsfunksjonens rolle i implementering av sirkulærøkonomiske forretningsmodeller i produksjonsindustrien», og har fått anledning til å stille spørsmål. Jeg samtykker til:

- å delta i intervju

Jeg samtykker til at mine opplysninger behandles frem til prosjektet er avsluttet, ca. juni 2020.

(Signert av prosjektdeltaker, dato)



English version

Would you like to participate in the research project «Implementation of Circular Economy Business Models in the Manufacturing Industry: The Role of Procurement»?

PURPOSE

The aim of this master thesis is to explore the procurement function and circular economy. The thesis will focus on the critical capabilities and barriers in the procurement function, and how these relate to the Circular Economy Business Models. Based on the opinions on procurement and circular economy gathered from interviews and theory, a framework on how procurement can contribute in the implementation of Circular Economy Business Models will be developed.

WHO IS RESPONSIBLE FOR THE RESEARCH PROJECT?

Molde University College is responsible for the project. The project will be carried out by Monika Bjekic and Ine Opseth, with guidance from Nina Pereira Kvadsheim.

WHY ARE YOU ASKED TO PARTICIPATE?

The selection of participants is based on your work and title associated with the procurement function and the company's interest in circular economy. Contact information is obtained via Nina Pereira Kvadsheim.

WHAT DOES IT MEAN FOR YOU TO PARTICIPATE?

If you choose to participate in the project, it means that you will take part in a personal interview that will last approximately one hour. During this interview you will be asked questions about the company you work for and its practices. The focus is on circular economy, sustainability, and the role of the procurement company in and for the company. The interview will be held in Norwegian or English, based on your preference. Audio recordings and notes will be taken from the interview.

IT IS VOLUNTARY TO PARTICIPATE

Participation in the project is voluntary. If you choose to participate, you may withdraw your consent at any time without stating any reason. All information about you will then be anonymized. It will not have any negative consequences for you if you do not want to participate or later choose to withdraw.

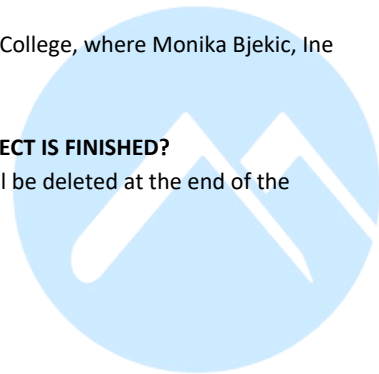
YOUR PRIVACY – HOW WE KEEP AND USE YOUR INFORMATION

We will only use information regarding you for the purposes we have stated in this letter. We treat the information confidentially and in accordance with the privacy policy.

The information will be stored on research servers at Molde University College, where Monika Bjekic, Ine Opseth and Nina Pereira Kvadsheim will have access.

WHAT HAPPENS TO YOUR INFORMATION WHEN THE RESEARCH PROJECT IS FINISHED?

The project is scheduled to end in June 2020, and collected material will be deleted at the end of the project.



YOUR RIGHTS

As long as you can be identified in the data material, you are entitled to:

- insight into what personal data is registered about you,
- revise of personal information about you,
- delete personal information about you,
- obtain a copy of your personal data (data portability), and
- to submit a complaint to the Data Protection Official or The Norwegian Data Protection Authority (Datatilsynet) regarding the processing of your personal data.

WHAT RIGHTS TO WE HAVE TO PROCESS PERSONAL DATA ABOUT YOU?

We process information about you based on your consent.

On behalf of Molde University College, NSD – Norwegian Centre for Research Data AS has considered that the processing of personal data in this project is in accordance with the privacy regulations.

WHERE CAN I FIND MORE INFORMATION?

If you have questions about the study, or wish to exercise your rights, please contact:

- Molde University College at Nina Pereira Kvadsheim, nina.p.kvadsheim@himolde.no, Monika Bjekic, monika.bjekic@stud.himolde.no, or Ine Opseth, ine.j.b.opseth@stud.himolde.no.
- The Data Protection Official: Merete Ludviksen, merete.ludviksen@himolde.no.
- NSD – Norwegian Centre for Research Data AS, by e-mail personverntjenester@nsd.no) or by phone: 55 58 21 17.

With best regards

Nina Pereira Kvadsheim
(Project manager/supervisor)

Monika Bjekic
(Master's student)

Ine Opseth
(Master's student)

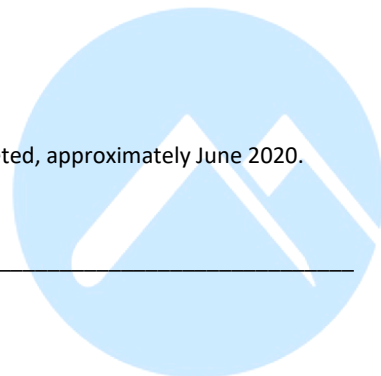
Statement of consent

I have received and understood the information regarding the project "Implementation of Circular Economy Business Models in the Manufacturing Industry: The Role of Procurement", and have had the opportunity to ask questions. I agree to:

- Participate in an interview

I consent to my information being processed until the project is completed, approximately June 2020.

(Signed by participant, date)



Appendix 2: Interview Guide



INTERVJUGUIDE I INNKJØP OG SIRKULÆRØKONOMI
*INTERVIEW GUIDE ON PROCUREMENT AND CIRCULAR
ECONOMY*

Data samlet som del av masteroppgaven
«Innkjøpsfunksjonens rolle i implementering av
sirkulærøkonomiske forretningsmodeller i
produksjonsindustrien»

*Data Collected as part of the Master Thesis “Implementation
of Circular Economy Business Models in the Manufacturing
Industry: The Role of Procurement”.*

2020



Norsk versjon

INTRODUKSJON

Det er et pressende behov for å finne løsninger som løser de økonomiske, miljømessige og sosiale utfordringene i dagens samfunn. Sirkulærøkonomi¹ har vist seg å være en løsning som kan realisere ambisjoner om bærekraft og fremme økonomisk vekst. Sirkulærøkonomi krever endring i måten bedrifter skaper, leverer og fanger verdi i sin virksomhet og bredere gruppe interessenter. Den lineære tilnærmingen² og dens forretningsmodeller er ikke lenger tilstrekkelig på grunn av miljøbelastning og sosial ulikhet, noe som gjør det nødvendig for bedrifter å revidere måten de driver virksomhet på.

Innkjøpsfunksjonen³ blir i økende grad sett på som en av de viktige lederaktivitetene der organisasjoner kan realisere sine strategiske mål. Gitt oppfordringen til bedrifter om å omfavne sirkulærøkonomi strategisk og operativt, vil det være nødvendig med en ny tilnærming til innkjøp for å utvikle nye løsninger som er mer bærekraftige, mer sirkulære og på lang sikt mer lønnsomme.

Målet med denne masteroppgaven er å utforske innkjøpsfunksjonen og sirkulærøkonomi. Oppgaven vil fokusere på kritiske egenskaper og utfordringer i innkjøpsfunksjonen, og hvordan disse forholder seg til sirkulærøkonomiske forretningsmodeller. Basert på informasjonen om innkjøp og sirkulærøkonomi samlet fra intervjuer og teori, vil vi forsøke å utvikle et rammeverk for hvordan innkjøp kan bidra i implementeringen av sirkulærøkonomiske forretningsmodeller.

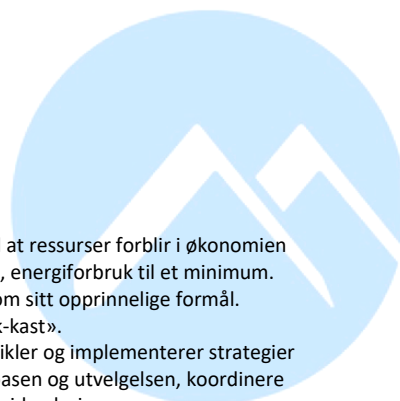
Vi setter pris på at du har tatt deg tid til å delta i dette intervjuet. Tusen takk.

Har du noen spørsmål før vi starter?

¹ Sirkulær økonomi er et prinsipp for økonomisk virksomhet som har som mål at ressurser forblir i økonomien lengst mulig. Dette ønskes oppnådd ved å redusere råvarebruk, avfall, utslipp, energiforbruk til et minimum. Sirkulær økonomi har også som mål at produkt gjenbrukes, gjerne også utenom sitt opprinnelige formål.

² Den lineære tilnærmingen referer til dagens økonomiske modell av «ta-bruk-kast».

³ I denne oppgaven blir innkjøp sett på som funksjonen og prosessen som utvikler og implementerer strategier som opprettholder organisasjonens mål. Målet er å rasjonalisere leverandørbasen og utvelgelsen, koordinere ytelsen til og utvikle potensialet til leverandører, og bygge langsiktige samarbeidsrelasjoner.



A. INTRODUKSJONSSPØRSMÅL

1. Beskriv din arbeidsstilling samt arbeidsoppgaver.
2. Beskriv innkjøpsfunksjonens rolle i din bedrift.
3. Beskriv verdikjeden⁴ i din bedrift.

B. INNKJØPSFUNKSJONEN

1. Hva er de viktigste produktene din bedrift leverer?
2. På hvilken måte er innkjøp knyttet til andre arbeidsfunksjoner i bedriften?
3. Anses innkjøp som en strategisk funksjon i bedriften? Hvorfor?
4. Hvor i prosessen består innkjøp? (Fra produkt idé, produktutvikling, design, produksjon, etc..)
5. Hvilke kriterier ligger til grunn i valget av materialer/leverandører?
6. Hvordan vil du beskrive samarbeidet med deres leverandører?

C. BÆREKRAFT (sosial, økonomisk, miljø)

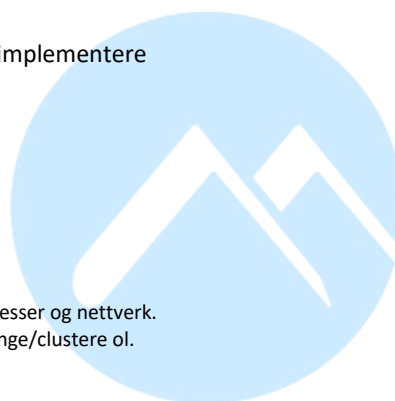
1. Hva legger du i begrepet bærekraft i innkjøpssammenheng?
2. Er det konkrete tiltak som har blitt satt i gang for å sikre en bærekraftig praksis? (Hvis nei, hva tror du er årsaken til dette? Hvis ja, fortsett med spørsmål 3-6)
3. Hvordan vil du beskrive de eksisterende tiltakene som bidrar til bærekraftig praksis?
4. Opplevs det som viktig at innkjøpsrelaterte handlinger er bærekraftige? Hvorfor?
5. Hvordan er samarbeidet med andre bedrifter i samme bransje?
6. Deltar dere i kunnskapsutveksling og samlinger med andre bedrifter/samarbeidspartnere⁵ i regionen?

D. SIRKULÆRØKONOMI I INNKJØPSFUNKSJONEN

1. Hva legger du i sirkulærøkonomi?
2. Hvordan ser du for deg at innkjøpsfunksjonen i din bedrift kan bidra til implementering av sirkulærøkonomi og eventuelle tiltak?
3. Hvilke egenskaper ved innkjøpsfunksjonen mener du er avgjørende ved implementering av sirkulærøkonomi?
4. Hva anser du som utfordringer ved å implementere i sirkulærøkonomi i din bedrifts innkjøpsfunksjon? (Interne/eksterne).
5. Hvordan mener du at disse utfordringene kan løses?
6. Hvilke fordeler ser du for deg at din bedrift kan oppnå ved å implementere sirkulærøkonomi?

⁴ Med verdikjede mener vi hvordan bedriften skaper verdi gjennom dets prosesser og nettverk.

⁵ Samarbeidspartnere kan være høyskoler/universitet, kunnskapssentre, klynge/clustere ol.



English version

INTRODUCTION

There is a pressing need to find approaches that account for the economic, environmental, and social challenges in today's society. Circular economy⁶ has emerged as one approach that can provide the means for realising sustainability ambitions and promote economic growth. Circular economy calls for changes in the way companies create, deliver, and capture value for their business and wider groups of stakeholders. The linear approach⁷ and its business models are no longer adequate due to their environmental load and social inequity, which makes it necessary for companies to revisit the way they conduct their business.

The procurement⁸ function is increasingly viewed as one of the important management activities in which organisations can realise their strategic objectives. Given the call for businesses to embrace circular economy strategically and operationally, a new approach to procurement is needed to develop new solutions that are more sustainable, more circular, and in the long term more profitable.

The aim of this master thesis is to explore the procurement function and circular economy. The thesis will focus on the critical capabilities and barriers in the procurement function, and how these relate to the Circular Economy Business Models. Based on the opinions on procurement and circular economy gathered from interviews and theory, a framework on how procurement can contribute in the implementation of Circular Economy Business Models will be developed.

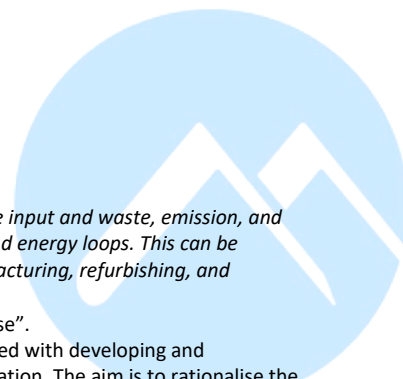
We appreciate that you have taken the time to participate in this interview. Thank you.

Do you have any questions before we begin?

⁶ Circular Economy can be defined as a *regenerative system in which resource input and waste, emission, and energy leakage are minimised by slowing, closing, and narrowing material and energy loops. This can be achieved through long-lasting design, maintenance, repair, reuse, remanufacturing, refurbishing, and recycling.*

⁷ The linear approach refers to today's economic model of "take-make-dispose".

⁸ In this thesis, procurement is regarded as the function and process concerned with developing and implementing strategies that sustains the goals and objectives of the organisation. The aim is to rationalise the supplier base and the selection, coordinate the performance of and develop the potential of suppliers, and build long-term collaborative relationships.



A. INTRODUCTION QUESTIONS

1. Describe your position and work assignments.
2. Describe the role of the procurement function in your company.
3. Describe the value chain⁹ in your company.

B. PROCUREMENT

1. What are the most important products your company delivers?
2. How is procurement related to other functions in the company?
3. Is procurement considered a strategic within the company? How so?
4. From which point is procurement involved in the process(es)? (Product idea, product development, production, etc..)
5. What criteria's are used in the selection of materials/suppliers?
6. How would you describe the collaboration with the suppliers?

C. SUSTAINABILITY (social, environmental, economic)

1. What do you add to the concept of sustainability in a procurement context?
2. Are there specific measures that have been taken to ensure sustainable practices? (If no, what do you think is the reason for this? If yes, continue with question 3-6).
3. How would you describe the existing measures that contribute to sustainable practices?
4. Do you find it important that procurement related actions are sustainable? Why?
5. Is there any collaboration with other companies in the same industry?
6. Do you participate in knowledge exchange and/or gatherings with other companies/partners¹⁰ in the region?

D. CIRCULAR ECONOMY IN PROCUREMENT

1. How do you define circular economy?
2. How do you envision that the procurement function in your company can contribute to the implementation of circular economy?
3. Which characteristics of the procurement function do you consider to be crucial when implementing circular economy?
4. What do you see as the challenges of implementing circular economy in your company's procurement function? (Internal/external).
5. How do you think these challenges can be solved?
6. What benefits do you envision your company can achieve by implementing circular economy?

⁹ By value chain, we mean how the company creates value through its processes and network.

¹⁰ Partners can be colleges/universities, knowledge centers, clusters and such.

