Tampere University

Jenni Kaipainen

STRATEGIC RENEWAL PROCESS TOWARDS SUSTAINABILITY – AN ECOSYSTEM APPROACH

Case Neste Oyj

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ABSTRACT

Jenni Kaipainen: Strategic Renewal Process Towards Sustainability – An Ecosystem Approach
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Due to the ongoing sustainability megatrend, companies are increasingly incorporating environmental sustainability concerns into their strategies. Meanwhile this sustainability transition, strategic renewal processes of individual companies are inevitably co-evolving with their increasingly dynamic and complex business ecosystems. The internal rate of change in a company needs to be adjusted to that of its environment. Consequently, when companies are renewing their strategies, they need to consider not only the transition towards sustainability, but also their alignment within the constantly evolving business ecosystem and its focal value proposition. Addressing the limited existing knowledge on these issues, the objective of this study is to investigate how the process of strategic renewal towards environmental sustainability is co-evolving with its business ecosystem.

To meet the research objective, a qualitative longitudinal single-case study of extreme kind was conducted at a technological forerunner Neste Oyj. Longitudinal and multi-sourced data covered Neste's strategy process renewal from 2000 to 2019 with 6 top management interviews, validating group discussions with interviewees and Neste strategy team, 14 annual reports from 2005 to 2018, and versatile secondary data. Data-driven and thematical analysis of the rich dataset was enhanced by mapping the longitudinal processes with critical incident technique and ecosystem mapping software Kumu.

The findings show that the mapped strategic renewal process follows the steps of formulation, implementation and evaluation meanwhile its encompassing business ecosystem follows the business ecosystem lifecycle of birth, expansion, leadership and renewal. These co-evolutionary processes in Neste case have taken place over time in four identified eras, which each have had their own critical incidents that construct sub-processes of strategic renewal. These sub-processes have been influenced by both internal and external drivers, which have discrete and ongoing natures. Identified internal drivers include organizational structure, organizational culture, competences and leadership, whereas external ones are divided into market development, regulation, collaboration, society and other drivers.

The study contributes to the intersection of strategic renewal, business ecosystem and sustainability transition literature by providing longitudinal and processual insights to an extreme case with an exceptional strategic renewal process. As for managerial implications, top management benefits from considering strategy as a cyclic process that co-evolves with its business ecosystem and acknowledging that in the early phases of this co-evolutive process, internal drivers have a dominant role. Along with other internal drivers, strengthening an internal vision is of high importance as it allows engagement and proactive steering of ecosystem actors through collaborations throughout the entire process of strategic renewal. When renewing a value proposition along the renewed strategy, communications with ecosystem actors play a significant role in ensuring a successful re-alignment of business ecosystem to its focal value proposition. Further, the findings of this study are useful to policymakers who consider driving measures for strategic renewal towards sustainability. For future research agenda, it is recommended to expand the research scope to the hindering factors and drivers which may simultaneously hinder and support the strategic renewal towards environmental sustainability.

Keywords: strategic renewal process, strategic renewal, strategy process, business ecosystems, ecosystems, environmental sustainability, sustainability transition

TIIVISTELMÄ

Jenni Kaipainen: Strategisen uudistumisen prosessi kohti kestävyyttä – Ekosysteeminen lähestymistapa
Diplomityö
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Meneillään olevan kestävyysmegatrendin vuoksi yritysten tulee enenevissä määrin sisällyttää kestävyysnäkökulmia strategioihinsa. Samalla kun kestävyystransitio etenee, yritysten strategiset uudistumisprosessit ovat kuitenkin jatkuvassa vuorovaikutuksessa yhä dynaamisempien ja monimutkaisempien liiketoimintaekosysteemiensä kanssa, halusi yritys sitä tai ei. Yrityksen sisäisten muutosten tahti tulee sovittaa sen ulkoisten muutosten tahtiin. Siksi yritysten täytyy strategioitaan uudistaessaan huomioida paitsi kestävyystransitio, myös sijoittumisensa jatkuvasti kehittyvään liiketoimintaekosysteemiin ja sitä yhdistävään arvolupaukseen nähden. Tämän tutkimuksen tavoitteena on täydentää rajallista nykytietoa siitä, kuinka strategian uudistamisen prosessi kohti kestävyyttä ja sen liiketoimintaekosysteemi ovat vastavuoroisessa vuorovaikutuksessa, koevoluutiossa, keskenään.

Tutkimustavoitetta lähestyttiin toteuttamalla laadullinen ja pitkittäinen extreme-tapaustutkimus, jonka kohdeyrityksenä on teknologinen edelläkävijäyritys Neste Oyj. Pitkittäinen data on kerätty monista lähteistä tutkimusajanjaksolta 2000-2019, kattaen kuusi johtotason haastattelua, validoivat ryhmäkeskustelut haastatelluille sekä Nesteen strategiatiimille, 14 vuosikertomusta vuosilta 2005-2018 sekä monipuolisesti dataa toissijaisista lähteistä. Rikas datasetti analysoitiin datalähtöisesti ja teemapohjaisesti. Lisäksi analyysia tuki pitkittäisten prosessien kartoitus kriittisten tapahtumien menetelmää ja Kumu-nimistä ekosysteemikarttaohjelmistoa hyödyntämällä.

Tuloksista käy ilmi, että kartoitettu strateginen uudistumisprosessi noudattaa muotoutumisen, toteutuksen ja arvioinnin vaiheita, samoin kuin sitä ympäröivä liiketoimintaekosysteemi noudattaa liiketoimintaympäristön elinkaaren vaiheita syntymästä laajentumiseen, johtajuuteen ja uudistumiseen. Nämä koevolutiiviset prosessit muotoutuvat Nesteen tapauksessa neljän aikakauden aikana, joilla jokaisella on omat kriittisten tapahtumien määrittämät alaprosessinsa. Erilaiset sisäiset ja ulkoiset ajurit ovat vaikuttaneet näihin aikakausien alaprosesseihin diskreetein ja jatkuvaluontoisin tavoin. Tutkimuksessa tunnistettiin sisäisiksi ajureiksi organisaation rakenne, kulttuuri, kyvykkyydet ja johtajuus, kun taas ulkoisia ajureita edustavat markkinakehitys, regulaatio, yhteistyö, yhteiskunta ja muut ajurit.

Tutkimus antaa panoksensa strategian uudistumisen, kestävyystransition ja liiketoimintaekosysteemikirjallisuuden leikkauspisteeseen strategisen uudistumisen extreme-tapauksen pitkittäisillä ja prosessuaalisilla tutkimustuloksilla. Yritysjohtajille tutkimus suosittaa strategian mieltämistä sykliseksi prosessiksi, joka kehittyy vuorovaikutuksessa liiketoimintaekosysteeminsä kanssa. Vuorovaikutteisten prosessien alkuvaiheissa yrityksen sisäiset ajurit ovat dominoivassa roolissa ja erityisesti yrityksen visiota tulee vahvistaa sisältä käsin, jotta sillä voidaan sitouttaa ja ennakoivasti ohjailla yhteistyössä toimivia ekosysteemitoimijoita läpi strategisen uudistumisen prosessin. Jos strategian mukana myös yrityksen arvolupaus ja mahdollisesti koko liiketoimintaekosysteemin arvolupaus uudistuu, kommunikaatio ekosysteemitoimijoiden kanssa varmistaa liiketoimintaekosysteemin onnistuneen uudelleenryhmittymisen muutoksiin nähden. Yritysjohtajien ohella myös päättäjät voivat hyötyä tutkimustuloksista harkitessaan, kuinka kannustaa yrityksiä muuttamaan strategioitaan kestävämpään suuntaan. Jatkotutkimusaiheiksi suositetaan tässä tutkimuksessa tunnistettujen ajureiden tutkimista niiden strategian ympäristöllisesti kestävää uudistumista hidastavien piirteiden näkökulmasta sekä myöskin puhtaasti hidastavien tekijöiden tutkimusta.

Avainsanat: strateginen uudistumisprosessi, strateginen uudistuminen, strategiaprosessi, liiketoimintaekosysteemit, ekosysteemit, ympäristöllinen kestävyys, kestävyystransitio

PREFACE

The metaphors of research-making as a flashlight or orienteering in a forest, which I came across in the literature review, at first seemed amusing but turned out to be rather accurate. Even if sometimes having felt like wandering in the jungle of literature streams and study scope opportunities in the certainly-not-so linear research process, I still enjoyed the challenging ride. This is largely because I had an excellent thesis ecosystem around me with plenty of actors who were driving this strategic process towards a sustainable thesis.

First to thank are my great supervisors for the thesis: I was lucky to have Leena and Valtteri to continuously share their advice and evident passion towards the study field with me, guiding me through the jungle of options and encouraging me to believe in the contributions of this study. I also want to thank the office of CITER and colleagues at CICAT2025, who were eager to help and share their views on the study. Equally importantly, writing a thesis with such an inspirational topic was made possible by very cooperative Neste top managers. Thank you for giving such interesting insights.

I am feeling fortunate to thank for the love and support of my family. I want to thank you for being there for me, sharing the whole journey with me and believing in me at all times, even when I was still in the dark forests of literature with no flashlights in sight. Furthermore, there are a few good friends who deserve gratitude for sharing the thesis journey with me. The countless discussions have not only benefitted the research process, but also maintained a socially healthy life even in the most intense periods of writing. Your special support has been highly valued, including specialization in my IT related worries. In fact, some of these people have supported me to reach this point for much longer than only the thesis process. Thank you for making the time in Hervanta an incredible experience; thank you for the countless nights at the university that progressed my graduation or did the contrary.

I rise a virtual glass of wappuishly bubbling champagne for the memories built during these past years at Tampere University of Technology and for those who have been part of the journey. Some might say this is an end of an era. Even if it would be an era, or a stage in my lifecycle, I will keep the amazing memories in my heart while continuously renewing the strategy of my life towards a success story with the beloved co-evolving ecosystem actors around me:

“Instead of ending, strategic renewal is ongoing and co-evolving with the – ecosystem that has its specific lifecycle stages.” (Kaipainen 2020)

Tampere, 6 April 2020

Jenni Kaipainen

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LIST OF SYMBOLS AND ABBREVIATIONS

ABFA	Advanced Biofuels Association in the United States
ASFE	Association of European Synthetic Fuels
ASTM	Previously American Society for Testing and Materials, dedicated for standardizations in the United States
B2C	Business to consumer
CE	Circular Economy
CEN	European Committee of Standardization
CEO	Chief Executive Officer
CES	Corporate Environmental Sustainability
CICAT2025	Research program *Circular Economy Catalysts: From Innovation to Business Ecosystems*
CIT	Critical Incident Technique
CLEEN	Cluster for Energy and Environment
CLP	EU regulation for Classification, Labelling and Packaging
CONCAWE	European association for oil refiner safety, health and environment management
CORE	Consortium of Resource Experts
CRFA	Canadian Renewable Fuels Association
CSR	Corporate Social Responsibility
EBB	European Biodiesel Board
EED	Energy Efficiency Directive
EEF	European Energy Forum
ETS	Emission Trading Scheme
EU	European Union
FQD	Fuel Quality Directive
HVO	Hydrotreated vegetable oils
IATA	International Air Transport Association
IED	Industrial Emission Directive
ILUC	Indirect Land Use Change directive
IMO	International Maritime Organizations
ISCC	International Sustainability & Carbon Certification
LUT	Lappeenranta University of Technology
NExBTL	Brand name for Neste's technology for hydrotreated vegetable oil
NGO	Non-governmental organization
OCIMF	Oil Companies International Marine Forum
OEM	Original Equipment Manufacturer
REACH	Chemical regulation of EU (registration, evaluation, authorization and restriction of chemicals)
RED I	Renewable Energy Directive I
RED II	Renewable Energy Directive II
RFS2	Renewable Fuel Standard 2
RSB	Round Table of Sustainable Biomaterials
RSPO	Round Table of Sustainable Palm Oil
RTRS	Round Table of Responsible Soy
US/USA	United States/United States of America

1. INTRODUCTION

1.1 Background of the study

Strategic renewal, nowadays, is more and more concerned on the environmental actions of the company. As the environmental problems are increasingly visible and discussed in the industry, academia and policymaking (Geissdoerfer et al., 2017), sustainability megatrend within the dynamic business environment has become inevitable and provides more new strategic alternatives than before (Schrettle et al., 2014). Infinite internal and external pressures demand the integration of sustainability into the company-level strategy processes in order to attain sustainability strategies (da Rosa et al., 2013). Therefore, company strategies are increasingly incorporating sustainability concerns (Geissdoerfer et al., 2017) once renewing their strategies. Not only individual companies, but also complete sociotechnical systems face this pressing need of transiting towards sustainability (Geissdoerfer et al., 2017). Thus, an individual firm renewing its strategy under these pressures must consider not only the sustainability aspect (da Rosa et al., 2013), but also the encompassing, ever-increasingly complex ecosystem (Adner, 2017).

For reducing the environmental impacts of industrial operations, the most successful strategic choice is the one that leads to improvements in environmental management practices (da Rosa et al., 2013) and looks for new opportunities in terms of sustainability (Sharma, 2000). Those opportunities emerge through redesigning practices, which increase the circularity and reduce resource leakages (Jørgensen & Remmen, 2018). Capabilities to sense, seize and reconfigure the strategy for example by orchestrating the business ecosystem are especially important to sustainability-based strategies (Mousavi & Bossink, 2017). However, until today, there is still little agreement on the circumstances under which sustainability practices can support creating a source of strategic competitive advantage (Schrettle et al., 2014). Strategic renewal towards sustainability within individual companies is the key research avenue for investigating these concerns. Strategic renewal is a matter of change, addressed for strategies of an organization being modified over time (Thompson et al., 2014). Strategic renewal in this study is considered as *a combination of process, content and outcome of updates or changes in organization's characteristics, which may affect the long-term prospects of an organization* (Agarwal & Helfat, 2009). The study focuses on the processual dimension by discussing

strategic renewal process throughout the study, even when shortening it to strategic renewal.

Research still lacks definite conclusions when it comes to understanding the choice (Schrettle et al., 2014) and implementation of sustainable organizational strategies (da Rosa et al., 2013). The choice and implementation of sustainability can be influenced by various drivers, which facilitate the renewal of strategy processes for more sustainable sociotechnical systems (Geissdoerfer et al., 2017). Systemic transition towards sustainability is increasingly approached in companies by strategic decisions in slowing down, narrowing and closing resource flows with technological, social or organizational solutions; in other words, circular economy. Circularity in resource flows goes hand in hand with sustainability with a set of different re-designing practices. They are increasingly gaining attention and being incorporated into strategies of both private and public sector organizations because of their abilities to respond to internal and external pressures of sustainability. (Jørgensen & Remmen, 2018)

Drivers of strategic renewal do not have an unambiguous definition. Instead, many synonyms, such as driving forces, triggers, motivators or enabling, facilitating or enhancing factors, emerge in literature when discussing positive driving forces of strategy. This study understands drivers as positive forces of change, which emerge in ecosystems, both inside and outside the investigated company. For example, markets, technology (Das & de Ven, 2000), regulation and consumers (Schrettle et al., 2014) do influence the strategic renewal from outside of the company but within its ecosystem scope. Among the external drivers of strategic renewal towards sustainability, the role of stakeholders calls special attention. In particular, investigation is needed on different stakeholders with which to interact to achieve sustainability goals. Furthermore, the nature of these stakeholder relationships is to be examined for enhancing development towards sustainability. (Banerjee, 2002)

Complex business settings demand managers to both consider sustainability aspects (Schrettle et al., 2014) and to look beyond their business setting's networks (Aarikka-Stenroos et al., 2017). As the current literature does not fully cover how networks can be best used in this difficult strategic decision-making of managers (Abrahamsen et al., 2016), encompassing actors need to be considered more broadly on a business ecosystem level in strategic renewal of firms. Operating in dynamic ecosystems with multiple ecosystem actors, companies need to re-consider their strategies in terms of their alignment within the ecosystem and the focal value proposition (Adner, 2017) along with the transition towards sustainability (da Rosa et al., 2013). In this study, ecosystem is understood as *an alignment structure of multilateral set of partners, which need to interact for*

materializing the focal value proposition (Adner, 2017, p. 40). This approach distinguishes more clearly from other constructs because it provides a more actionable perspective on interdependence and offers a host of new, distinctive questions in the strategy field (Adner, 2017). More specifically, this study concerns a setting of a business ecosystem, which typically has clear focal actors and highlights co-evolution of competition and collaboration as well as supply chain aspects. (Aarikka-Stenroos & Ritala, 2017)

Along with the transition to ecosystems, strategy literature has expanded to consider not only stakeholders, but more broadly ecosystem actors (Priem et al., 2013). Therefore, this study takes an ecosystem approach to consider stakeholders from traditional strategy literature as ecosystem actors within a business ecosystem setting. Coordination between multiple ecosystem actors and shared responsibilities is seen evident (Geissdoerfer et al., 2017) as ecosystem actors are a driving force for strategic renewal towards sustainability (Damert & Baumgartner, 2018). This is because ecosystem actors see the societal sustainability challenge and react by adjusting their expectations towards individual companies accordingly (Schrettle et al., 2014). In fact, corporate sustainability by its core definition is based on the importance of ecosystem actors, defined as *meeting the needs of a firm's direct and indirect stakeholders without compromising its ability to meet the needs of future stakeholders* (Dyllick & Hockerts, 2002, p. 131).

Once one ecosystem actor renews its strategy, other actors in the ecosystem are prone to be influenced by the move, thanks to the co-evolutional nature of ecosystems (Peltoniemi & Vuori, 2004). Thus, the evolution of ecosystems and strategic renewal processes of ecosystem actors are dynamic and interdependent. This makes the research area very interesting for academics and practitioners alike; for firm's strategic renewal over time, it is required that the internal rate of strategic change is co-aligned with that of external environment (Ben-Menahem et al., 2013).

Discovering and understanding the transition from innovation to business ecosystems is the key aim of a joint research program CICAT2025, to which this study belongs and contributes to. The research program is to support Finland's strategic objective to become a global leader in circular economy by investigating the transition from linear to circular economy with a dedicated ecosystem approach. Being part of the research program, this study investigates strategic renewal towards sustainability and its co-evolving business ecosystem with a longitudinal qualitative case study.

1.2 Research objective, questions and scope

Understanding strategic renewal towards sustainability within a business ecosystem context is an important yet under-researched avenue to give understanding and tools for co-creation and radical innovation of ecosystem actors (Aarikka-Stenroos & Ritala, 2017). Literature is still in need of building more knowledge on the co-evolving temporal processes of strategy and business ecosystem evolution. The relationship of firm's internal strategic renewal and its co-alignment with the ecosystemic change over time (Ben-Menahem et al., 2013), as well as discovering what kind of drivers are the most influential and at what time of this co-evolution, is a research avenue addressed in this study.

To respond to these issues and address the current limitations in the intersection of current strategic renewal, sustainability transition and business ecosystem literature, the objective of this study is to understand how the process of strategic renewal towards environmental sustainability is co-evolving with its business ecosystem**.** The threefold issues are approached through the following research questions: firstly, the study investigates the critical incidents and eras that take place in the process of strategic renewal towards environmental sustainability. Secondly, the study examines how the business ecosystem evolves during the strategic renewal process. Only once understanding what exactly is happening throughout the strategic renewal (RQ1) and its co-evolving business ecosystem (RQ2), it is possible to derivate what drivers emerge within the business ecosystem and influence the process of strategic renewal towards environmental sustainability (RQ3). The exact research questions are constructed as follows:

RQ1. What critical incidents and eras take place in strategic renewal process towards environmental sustainability?

RQ2. How does the business ecosystem evolve during the strategic renewal process towards environmental sustainability?

RQ3. What are the drivers identified within the business ecosystem during the strategic renewal process towards environmental sustainability?

In order to seek answers to these research questions, the study scope is framed to a longitudinal and processual single-case study, which is a purposively selected extreme case. The longitudinal approach highlights the temporal dimension of the renewal process and is promising for gaining reliable findings over time, for instance on the effect of climate policies during the evolution of strategies (Damert & Baumgartner, 2018). The processual approach, on the other hand, enables addressing important questions lying in the heart of management and organizational life (Langley et al., 2013). That, in turn,

is the key concern to be researched further in order to understand strategic change in terms of temporality and change actors (Kunisch et al., 2017).

With longitudinal and processual approach, this study is not only contributing to the strategic renewal, business ecosystem and sustainability literature, but also provides practical implications to company strategists and policymakers who intend to accelerate the strategic renewal processes towards sustainability within individual companies. Longitudinal insights to the co-evolving strategic renewal processes and their business ecosystems are valuable in order to respond to the increasingly visible and discussed environmental problems that concern the industry, academia and policymaking alike (Geissdoerfer et al., 2017). Companies considering or already applying sustainability practices in their strategies can benefit by familiarizing with this processual case and its findings to accelerate their progress towards sustainability. Particularly, companies can benefit from understanding what drives the strategic renewal process and at what time in the co-evolving processes of strategic renewal and business ecosystem evolution.

In order to address the defined research scope, the study makes conscious limitations. The theoretical frame is limited to strategic renewal process, business ecosystems and the intersections of these streams of literature with highlighted sustainability context. These theory approaches offer a suitable perspective for the empirical case analysis. However, studies on strategic renewal are not expected to try cover all aspects of strategic renewal at once (Agarwal & Helfat, 2009). Therefore, the selected focus is on the process dimension of strategic renewal and less on the content, which is given in the case as an evident outcome of renewal towards sustainability. Further, the study considers strategic renewal and strategic renewal process to be synonyms. It uses the latter to highlight the processual dimension of the researched phenomenon.

Strategic renewal process is influenced by positive drivers. Thus, hindering and opposing forces are purposively excluded from the research scope. Regarding methodological choices, the study limits to qualitative methods because they are seen suitable to describe real life, form a big picture of the research target and reveal new information in an explorative way (Hirsjärvi, 2009, pp. 161–166).

Because of the versatility in ecosystem literature, it is important to specify how this study understands the researched ecosystem. The case ecosystem is constructed much like Adner (2017) understands it, thus having a focal firm in the center and business ecosystem actors around it materializing a focal value proposition (Adner, 2017). Finding it suitable for this kind of case, the study applies business ecosystems as a generic overarching concept of co-evolving systems of actors, technologies and institutions (Aarikka-

Stenroos & Ritala, 2017). Business ecosystems have commonalities with innovation ecosystems, which are characterized by innovation-driven goals and value creation and capture uncertainties. (Aarikka-Stenroos & Ritala, 2017) However, in this study, innovation ecosystem is to be considered inherent to business ecosystem, the unit of analysis applied in the study. Studying business ecosystems, the study's main interest lies on their temporal dimension, including dynamics and co-evolution which occur during the lifecycle of the ecosystem. (Phillips & Ritala, 2019)

Even though being part of circular economy driven CICAT2025 research program, this study is not limited to circular economy per definition. Instead, while recognizing sustainability to consist of environmental, economic and social aspects explained in the triple bottom line of Elkington (2013), this study focuses only on the environmental side of sustainability. Thus, when discussing sustainability in this study, it refers only to the ecological aspect of the triple bottom line, while keeping in mind that it has its indirect effects on the social and economic aspects within the ecosystem (Elkington, 2013).

The study is narrowed to a specific single-case context and industry. Many scholars recommend empirically investigating industry-specific ecosystems to better understand the strategic renewal towards sustainability (Abrahamsen et al., 2016; Banerjee, 2002; Schrettle et al., 2014). For example, academic literature and media have scrutinized large players in the oil and energy industry, but the degree to which they accept and adapt the disruptive renewable energy technologies appears to stay under-examined (Chaiyapa et al., 2018). The purposively selected extreme case, Neste Oyj, is a company operating in the oil and energy industry. The industry is typically characterized by large and expensive investments. (Adelman, 1987) Within the empirical case, the study limits to strategic renewal regarding its renewable business instead of including the fossil fuel business in the research scope.

1.3 Structure of the study

The first chapter introduces the background and the focus of the research in the intersection of strategic renewal, sustainability and business ecosystem literature. Furthermore, it addresses the objectives, research questions, scope and structure of the study. The first chapter is followed by two theory chapters. First of them covers strategy literature to position this study within the strategy process stream and presents strategic renewal ad its drivers in sustainability context in more detail. The second chapter introduces a short recap of literature development towards ecosystem paradigm, examines the ways ecosystems evolve over time and how strategies can consider ecosystems,

and evaluates ecosystem actors as drivers for strategic renewal. Thus, both theory chapters take a differing view on studying the theoretical basis on how the process of strategic renewal towards environmental sustainability is co-evolving with its business ecosystem, which is concluded in an integrative framework at the end of the third chapter.

Theory chapters are followed by the research methodology of the study, which discusses and justifies the methodological choices in chapter 4. As for methodology, a qualitative approach with a longitudinal extreme case has been selected. Multi-sourced data gathering from interviews and annual reports was complemented with group discussions and other secondary data, such as the case company website and news articles. Data-driven analysis of the data follows thematic approach and takes advantage of critical incidents technique as well as an ecosystem mapping software called Kumu.

Addressing the lack of empirical validation in the existing sustainability strategy literature (Menon & Menon, 1997; Schrettle et al., 2014), chapter 5 presents the empirical results for each of the research questions. Thus, first the emerging eras and their critical incidents during the strategic renewal process are identified. Second, the business ecosystem evolution during the strategic renewal process is mapped era by era with a relationship mapping software. Lastly, the drivers emerging from the business ecosystem are analyzed.

In chapter 6, the empirical results and integrative theoretical framework are compared and discussed in order to derivate fruitful insights for practitioners and academics alike to understand how the process of strategic renewal towards environmental sustainability is co-evolving with its business ecosystem. Before references and appendices, chapter 7 finalizes the study with conclusions, including meeting the objectives, presenting both theoretical and managerial implications, assessing the quality and limitations of the study and finally providing its suggestions for future research agenda.

2. STRATEGIC RENEWAL PROCESS TOWARDS ENVIRONMENTAL SUSTAINABILITY

This chapter defines strategy and the related key concepts and approaches before positioning itself to the strategy process stream. Then, the chapter continues by presenting different approaches to strategic change and renewal. Lastly, this chapter covers recent strategy literature in the context of environmental sustainability to identify drivers for strategic renewal process towards sustainability.

2.1 Strategy and its research streams

Strategy, often considered in its simplicity as a way to achieve goals, has a multidimensional nature. Strategy can be understood as a plan of getting from one point to another or a pattern of actions over time. On the other hand, strategy is a position, which reflects decision-making on offerings for particular markets. Strategy can also be a perspective, which means a vision and direction. (Mintzberg, 2000, pp. 23–27) There are as many definitions of strategy as there are definers (Lindroos & Lohivesi, 2006, 27). In an attempt to integrate these various definitions, Hax & Majluf (1988) clarified strategy to be *a fundamental framework through which an organization can assert its vital continuity* (Hax & Majluf, 1988, p. 37).

Strategy itself is as old as the profession of managers, originating from the military use of ancient Greeks (Ghemawat, 2002). Strategy literature has recognized many strategy types throughout its relatively long history, including for example technology strategy, business strategy and innovation strategy. The series of strategy types is to be continued with the most recent topics at hand; sustainability and ecosystem strategies (Adner, 2006; da Rosa et al., 2013). Traditional strategy literature has been interested in strategic planning and strategic management. Strategic planning is a top management process, typically described by annual planning sessions and reviews with, for example 5-year planning cycles (Stead & Stead, 2013). In contrast, the term of strategic management has emerged to consider strategizing as a continuous process. Strategic management aims at achieving organizational goals by fitting the organization to its environment with the support of competitive advantages and the efforts of top managers. (Barney, 1991) Strategic management consists of strategic actions, which are an effort of a company to influence its network position in the network of which it is part of. As for an example of strategic actions, strategizing is an activity concerning the choices on how to interact with actors who are connected through business relationships (Gadde et al., 2003, 358).

Strategic management is understood in the academic literature as a three-dimensional phenomenon, consisting of content, context and process (Figure 1). Content refers to the actual product emerging from the strategizing, the “what” of the strategy. Context refers to the fact that the companies are strategizing to suit a varying combination of organizational and environmental factors, as discussed shortly in the previous chapter. Finally, the third dimension is process, the “how” of the strategy shaping. These three dimensions are intertwined and hence cannot be observed in isolation. (De Wit & Meyer, 2010, p. ix)

Figure 1. *Three dimensions of strategic management (adapted from De Wit & Meyer 2010, p. ix)*

Similar to what Barney (1991) noted on strategic management, strategy is traditionally an attempt to maintain a dynamic adjustment between company offering and what the environment is looking for (Miles et al., 1978). As the study field is very broad due to the relatively long history of strategy literature, two main schools have emerged, focusing either on the position within the external environment (e.g. Position school) or the internal environment (e.g. Resource-based view). (Martins et al., 2014) Both schools agree that a match between the company and its environment must be established, but the approach for achieving this fit differs (De Wit & Meyer, 2010, 214-215).

The first school is focusing on how the environment must be considered in strategies and strategizing. In other words, the success is determined by the market positioning of a company. (Porter, 2008) Positioning matters the most because the structure of the environment largely affects company’s performance. Positioning school is traditionally

concerned on finding a market position that is safe from existing and potential competitors as well as bargaining power of suppliers and buyers (Porter, 1991). Strategy must enable managing the adaption to the changes of environment in order to gain competitive advantage. Thus, addressing the stakeholder benefits is the ultimate goal of a strategy. (De Wit & Meyer, 2010, 12) Strategy itself can be seen as an emergent process of learning and adapting to the external environment of the organization, while taking into account the stakeholder interests and satisfaction (Martins et al., 2014). Levels of unpredictability, malleability and harshness of the environment define the best way to approach the strategy (Reeves et al., 2012).

As a response to positioning school of strategy, resource-based view emerged to concern the internal resources of a company as a source for sustained competitive advantage (Barney, 1991). Internal company resources, let them be financial, physical, human or organizational, enable conceiving or implementing strategies. The company has both external and internal competencies, which are built and reconfigured by dynamic capabilities of the company. (Teece et al., 1997) Dynamic capabilities have evolved from the resource-based view on strategy (De Wit & Meyer, 2010, 214), differing in the belief of being more able to develop the internal capabilities than the previous paradigm suggested (Ghemawat, 2002). Dynamic capabilities have risen interest in strategy literature in the beginning of the millennial thanks to their central role in the development and sustainability of competitive advantages.

No matter the strategy research approach trusted more, companies face the need to continuously adjust their strategies based on both environmental conditions and organizational structures to the established strategies. Consequently, strategy and strategic alignment are not done in isolation, but as a continuous process of adaptation and change instead. (Mintzberg et al., 2003) A process can be seen as a sequence of events, incidents and steps describing the change of things over time. (de Ven, 1992). Process deals with the steps needed - let them be rational, structured, formal or not – in order to form a strategy (De Wit & Meyer, 2010, 2). The research on strategy processes is a field of study dating back to at least 30s, concerned with the administrative systems and decision processes that influence company's strategic positions (Chakravarthy & Doz, 1992). The processual perspective on strategies is supported by popular strategy researchers Pettigrew and Mintzberg among others (De Wit & Meyer, 2010, 2).

Strategy process research focuses on exploring how effective strategies are shaped, validated and implemented successfully in a company, taken that the change is evident to stay up to date with the dynamic business environment and use the gained compe-

tencies (Chakravarthy & Doz, 1992). Strategy process research has evolved considerably, transferring the focus from strategic planning to how antecedents affect the strategy process and its outcomes (Hutzschenreuter & Kleindienst, 2006). Strategy process approach was distinct especially strongly from strategy content approach in the 90s to complement the needs of traditional strategy literature (Burgelman et al., 2018). Hirsch (1991) provides a metaphor on point: strategy process resembles a full color cinematography, whereas strategy content research of the days equaled black and white still pictures (Hirsch, 1991).

Having presented the position school, resource-based view, dynamic capabilities, content and process approaches of strategy, Table 1 concludes the main streams of strategy research with the authors that have been cited in this literature review (Table 1). Among the existing approaches to strategy research, this study is adopting a strategy process perspective. Thus, the study positions itself in the strategy process literature stream by considering strategy to be an ongoing process.

Table 1. *Strategy research streams*

RESEARCH STREAM	CITED AUTHORS	FOCUS AREA
Position	Porter 1991; Porter et al. 1995; Porter 2008	Market positioning in relation to external environment
Resource-based view	Barney 1991	Internal resources of a company as a source for sustained competitive advantage
Dynamic capabilities	Teece et al. 1997	Dynamic capabilities of a company build and reconfigure company's internal and external resources
Content	(To distinct content from process approach) Burgelmann et al. 2018; Hirsch 1991	The outcome of a strategy, what strategy is about; "black and white still picture"
Process	Mintzberg et al. 2003 ; de Ven 1992 ; Chakravarthy & Doz 1992 ; Cohen & Cyert 1973 ; Hutzschenreuter & Kleindienst 2006	Strategy is a continuous process of adaptation and change; "full color cinematography"

If a strategy is a process, how is this process constructed? The question has been answered by many different strategy process frameworks, but a classical way is to divide strategy process into three steps: formulation, implementation and evaluation of strategy (Cohen & Cyert, 1973; Mintzberg et al., 2003). Content-wise the different strategy process frameworks are rather similar to the classical model despite some of them having more detailed steps. To provide an example how the strategy process steps can be framed differently, Cohen & Cyert (1973) claim the formulation stage to consist of formulation of goals, analysis of the environment, assigning quantitative values to the goals, the micro process of strategy formulation, the gap analysis and strategic search and selecting the portfolio of strategic alternatives (Cohen & Cyert, 1973). Then again, for

Andrews & David (1987), strategy formulation is a sub-process that consists of identifying opportunities and risks, determining resources, considering management's personal values and acknowledgement of noneconomic responsibility towards society (Andrews & David, 1987). Later evaluation of Farjoun (2002) suggests to further include scanning, problem finding, interpretation, analysis, evaluation, choice, implementation planning, negotiation, persuasion and invention to the formulation process (Farjoun, 2002).

In this study, strategy formulation is considered as the first main step of strategy process, followed by strategy implementation and evaluation (Cohen & Cyert, 1973; De Wit & Meyer, 2010, pp. 42–45; Mintzberg et al., 2003) (Figure 2).

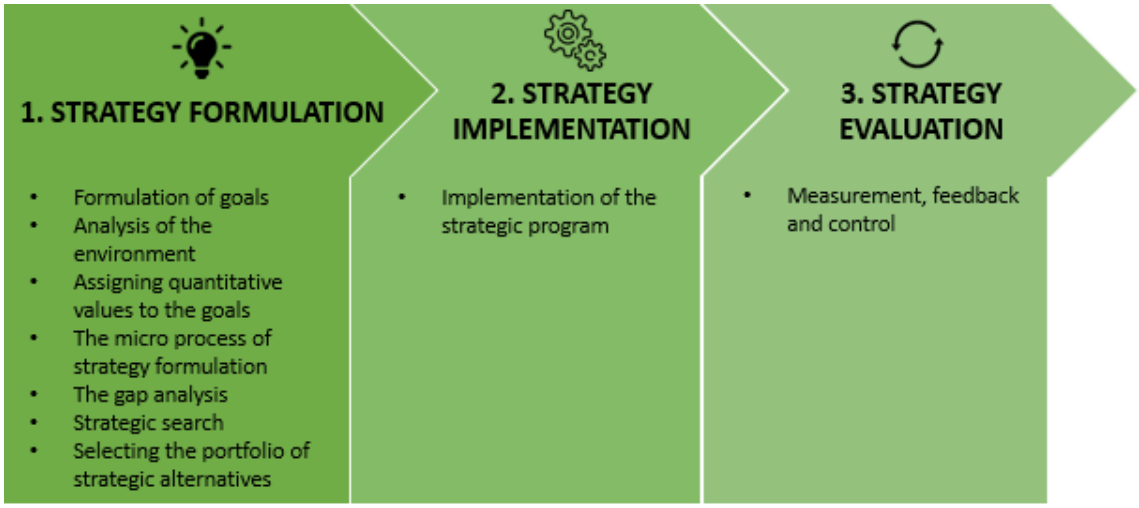

Figure 2. *Strategy process steps (adapted from Cohen & Cyert 1973)*

In practice, the strategic management steps are not necessarily this discrete, but interrelated instead (Nicholas, 2009). The strategy process is rarely as linear as the traditional schools suggest because of the nature of strategic decisions (Farjoun, 2002). On the contrary, it is emphasized that strategy process shall be considered as a repetitive, cyclic process (Cohen & Cyert, 1973). Furthermore, MacKay & Chia (2013) call for a renewed strategy process approach that acknowledges the reality to be complex and chaotic, thus needing a more open perspective towards the unintended changes in organizations. (Mackay & Chia, 2013)

There are dozens of more specified strategy processes presented by academics than that of Figure 2. For instance, according to MacKay & Chia (2013), there are four ways to form a strategy; intention, natural selection, reactive adaption and chance (Mackay & Chia, 2013). Similar more specified processes are reflected for instance in the strategic approaches of Reeves et al. (2012): classical, adaptive, visionary, shaping and renewal approaches. For each of them, a specialized combination of steps, different from the

traditional ones from for example Cohen & Cyert (1973), are recommended (Reeves et al., 2012). Classical approaches to strategy shaping focus on return on capital and making the most out of profit, often with a gap in the design and implementation phases of strategy. Classical approach has discrete steps from analyzing to planning and execution. Evolutionary approach sees the environment as a survival ground of natural selection where differentiating is the key for continuity. Reactive approach lets strategy emerge step by step while the company has to face contingencies and changes in the market. Shaping approach is based on engaging the partners with a shared vision and orchestrating them to evolve the whole ecosystem, whereas renewal is a strategy approach to react or anticipate to a change in environment in order to economize and reach new growth. (Reeves et al., 2012) Despite the different categorizations of specified process steps, the described strategy processes have typically many commonalities and the differences are mostly on the label level.

Process studies of strategic change are often focused on the individuals who crucially shape the course of organizational events and thus determine the success or failure of the strategy. However, unintended outcomes tend to rise, even if there is not much room for them in the handling of organizational processes. In fact, the possibility of so-called unknown unknown is ever present. They do have their roots in the decisions made by different organizational actors, with chance of environmental circumstances, but arise unexpectedly and might still be decisive for the organization's future. Therefore, recognizing this chance is highly valuable for the organization. (Mackay & Chia, 2013) Therefore the consideration of strategy process' ecosystem is valuable.

2.2 Strategic change and renewal

Strategy process literature gets an interesting twist once considering the change of an existing strategy. The issue is often researched in a situation of emerging innovation (Aarikka-Stenroos et al., 2017), crisis or organizational change. It is acknowledged that strategic change can happen through different channels, depending on the choice, the environment and the degree to which those are "owned" by the organization (Reeves et al., 2012).

Strategic change is seen as a combination of events, activities and choices over time (Langley et al., 2013). Strategic change is defined as changes taking place over time to the strategies and objectives of an organization. Change can take place in various forms. Traditionally, the types of strategic change are presented in three categories. Explained in the systemic review of Kunisch et al. (2017), the literature in the field is divided among deterministic, dialect and voluntarist change studies. According to the deterministic view,

strategic change results of exogenous shifts in the environment or in the organizational structure, whereas the voluntarist change in a result of managerial choice, emphasizing the individuals. Dialect perspective sees strategic change as something in between, a dynamic phenomenon born in the reciprocal relationship between deterministic constraints and managerial choice. (Kunisch et al., 2017)

The degree of severity for change is depending on the level of change. There are six different levels, starting from the least radical for the change: operational tasks and activities, competitive strategies, organization structures, systems and processes, corporate strategies, the organizational mission and lastly the corporate culture. (Thompson et al., 2014, 837) Other divisions of strategic change are for example gradual, emergent, evolutionary, or discontinuous, dramatic and revolutionary change. Gradual change occurs slowly, similarly to emergent strategies, which emerge over time and typically involve elements of trial and error. (Thompson et al., 2014, 10) Evolutionary change describes prolonged time periods of growth without major occurrences whereas revolutionary refers to substantial turmoil in the organization (Greiner, 1998). Discontinues and dramatic changes are not as large. (Thompson et al., 2014, 10) As a more recent addition to the list is restoration as a change move to re-enact an abandoned strategy (Miller et al., 2019).

Strategy can follow a so-called path, which can be dependent on the external shocks. The phenomenon of the actors becoming locked into their selected path by self-enforcing mechanisms is referred to as path dependence. The evolution of the path is determined by contingencies, chance events on the path. In other words, the strategy process can change its path only once an external shock takes place. (Vergne & Durand, 2010) Thus, a path dependent process develops as a function of the process' own past (David, 2001). However, the given self-reinforcing mechanisms can be not only given (Vergne & Durand, 2010), but also strategically manipulated by actors within path creation. The initial conditions are thus constructed instead of been given, and the contingencies emerge based on the ongoing action. In path creation, the actor is locked in temporarily within a wider structurational process. As a key element of path creation, an actor can create its path based on the combination of its past and future visions instead of waiting for an external shock to disturb the balance. (Garud et al., 2010)

One certain type of change is renewal, defined as a process allowing organizations to change their path dependence by transforming the strategic direction and capabilities (Schmitt et al., 2018). Strategic renewal is a managerial process that adjusts or substitutes the business model of a firm in order to adapt to emerging environmental opportunities and risks. This process is eventually building up to firm's long-term survival and

prosperity (Schmitt et al., 2016). The combination of process, content and outcome of refreshment or replacement of organization's attributes may notably affect the long-term opportunities of the organization. Strategic renewal influences the operating ecosystem on multiple levels, which makes the impact of strategic renewal to the organization very deep. Activities demonstrating strategic renewal include for instance innovation, market entry and investment. (Agarwal & Helfat, 2009)

Strategic renewal can be divided into two categories, which also fall into the strategic change categories (Thompson et al., 2014, 10): discontinuous strategic transformations and incremental renewal. Large transformations require typically multiple dimensions of a company to change, such as business model, technological base and organizational structure. On the other hand, proactive incremental renewal might also help coping with changes in the external environment either through altering or exploring outside the core business, enabling even to shape the environment to the company's advantage. When observed in a longer time span, a series of incremental improvements can accumulate into a larger change within a company. (Agarwal & Helfat, 2009)

Drivers are triggering or accelerating the change in strategy, which is why strategy process begins typically with the analysis on the internal and external factors that drive the change in process. Five classical drivers for general strategic change include technical obsolesces and technical improvements, political and social events, globalizing markets, organizational transform and increased strategic awareness and skills of managers and employees. (Thompson et al., 2014, 808-809) As for strategic renewal, external factors include for example technology and technological change, globalization, market entry, acquisitions, venture capital investments, customer demand, market pressures, primary market maturation or declination, deregulation, governmental regulation and changes in the competition. (Agarwal & Helfat, 2009) External drivers can also be found in company's environment, including the ecosystem actors, their attributes and behaviors, strategies, relationships and performances, developments, forces and discontinuities. (Farjoun, 2002) Then again, internal drivers include organizational capabilities such as states, forces and developments of company resources, relationships, technologies, social structure, organizational structure and processes such as the strategy making process. (Farjoun, 2002) More specifically for strategic renewal, internal drivers of strategy may consist of R&D efforts, underlying processes, rules, routines, capabilities, organizational-level attributes, organizational structure, reorganization, internal social and political context, organizational identity, incentives and individuals in especially top management level. (Agarwal & Helfat, 2009)

2.3 Drivers for strategic renewal towards environmental sustainability

Existing strategy literature related to environmental issues is developed in a diverse but somewhat unsystematic way (Burritt et al., 2018), including concepts of corporate sustainability, corporate responsibility and environmental. These streams of literature are reviewed to collect the drivers relevant for strategic renewal towards sustainability, which are presented more closely in this section and concluded below in Table 2.

Table 2. *Drivers for strategic renewal towards environmental sustainability*

	CATEGORY	DRIVER	AUTHORS
INTERNAL DRIVERS	**Leadership**	Leadership	van Bommel 2011; Barbieri 2011
		Ethical motives of leadership values	Bansal & Roth 2000
		Top management commitment	Banerjee 2002
		Environmental values of managers	Papagiannakis et al. 2014; Sharma 2000
		Leadership values	Bansal & Roth 2000
		Managerial long-term focus	Banerjee 2002
		Business motivations	Damert & Baumgartner 2018
	Organizational culture	Ethical motives	Bansal & Roth 2000; da Rosa et al. 2013
		Culture	Schrettle et al. 2014; de Mattos & Albuquerque 2018
		Cooperation between departments	van Bommel 2011; Barbieri 2011
		External orientation and transparency	van Bommel 2011; Barbieri 2011
		General guidelines/ conduct code	van Bommel 2011
		Autonomy and possibility for experimenting	van Bommel 2011; Barbieri 2011
		Networking	de Mattos & Albuquerque 2018
		Team commitment	de Mattos & Albuquerque 2018
	Relationship with environment	Environmental operations	van Bommel 2011
		Sustainability activities	van Bommel 2011
		Current level of environmental action	Schrettle et al. 2014
		Past performance	Schrettle et al. 2014
		Climate issues' integration to risk management	Damert & Baumgartner 2018
		Sustainability-oriented innovation management process	da Rosa et al. 2012
		Eco-innovation activities	Paraschiv et al. 2012
	Organization & its structure	Company size	Schrettle et al. 2014
		Organizational structure	de Mattos & Albuquerque 2018
		Resources	Schrettle et al. 2014; de Jesus & Mendonça 2018
		Strategy	Schrettle et al. 2014
		Innovation	van Bommel 2011
		Product/organization	van Bommel 2011
		Organizational factors	Damert & Baumgartner 2018
		Learning and adapting	van Bommel 2011; Barbieri 2011
EXTERNAL DRIVERS	**Stakeholders**	Stakeholders	Damert & Baumgartner 2018
		International stakeholders	Papagiannakis et al. 2014
		Stakeholder pressure	Bansal & Roth 2000
		Multi-stakeholder initiatives	van Bommel 2011; Papagiannakis et al. 2014
		Partners	Papagiannakis et al. 2014
		Customers	Papagiannakis et al. 2014
		Suppliers	Papagiannakis et al. 2014
	Regulation	Regulation	Papagiannakis et al. 2014; Banerjee 2002; Damert & Baumgartner 2018
		Legitimation	Bansal & Roth 2000
		Regulatory intensity	Menon & Menon 1997
		Legislation	Bansal & Roth 2000; de Mattos & Albuquerque 2018
		Environmental regulation	Schrettle et al. 2014; Porter et al. 1995 ; de Jesus & Mendonça 2018
		Local government support	de Mattos & Albuquerque 2018
		Standardization	de Jesus & Mendonça 2018
	Competitiveness	Competitiveness	Bansal & Roth 2000
		Economic opportunities	Bansal & Roth 2000
		Competitive intensity	Menon & Menon 1997
		Market opportunity	Menon & Menon 1997
		Economic opportunities	Bansal & Roth 2000
		Market drivers	Schrettle et al. 2014
	Public concerns	Ecological responsivity	Bansal & Roth 2000; de Jesus & Mendonça 2018
		Public concern	Banerjee 2002
		Customer environment sensitivity	Menon & Menon 1997
		Societal values & norms	Schrettle et al. 2014
		Social awareness	de Jesus & Mendonça 2018
	Industry	Industry factors	van Bommel 2011; Banerjee et al. 2003; Banerjee 2000
		Certification/ Open schemas	van Bommel 2011

Once environmental issues started to rise in the past, the discussion concerned *corporate environmentalism and ecological responsiveness* of companies. Corporate environmental strategy (CES) can be defined as a dynamic process that is driven by accumulated capabilities from the investments of the past and to come (Papagiannakis et al., 2014). Corporate environmental strategy is not only a response to external pressures, but also potential for increasing competitiveness and creating short-term and long-term benefits (Porter et al., 1995). The level of environmental issues integration into a corporate strategy is influenced by numerous external and internal factors, which have remarkable differences in their influence. (Banerjee, 2002)

Corporate environmental strategies can vary from resource productivity, addition to legal compliance and leadership of environmental cost all the way to eco-oriented products. The decision between these options is based on company's focus on either creating competitive advantage through cost or differentiation, or competitive focus through products or processes. (Orsato, 2002) When having a short-term oriented focus, integration of environmental issues is implemented in strategy process by complying with environmental legislation, maintenance support of environmental issues and training of employees. This functional level of complying is called a single loop learning process. When gaining deeper integration level of environmental concerns not only functionally, but among the entire corporation, a double loop learning approach is taking place. (Banerjee 2002)

Instead of loops, Papagiannakis et al. (2014) consider environmental strategy to be shaped in a feedback process, triggered by attained positive environmental outcomes, which in turn develop capabilities and upgrade environmental goals. Goal setting can be dependent on the needs and wants of important stakeholders. The feedback process goes on until the high levels of environmental conduct are more and more integrated with business strategy and its competitive advantage. When comparing the original goals and the outcomes, positive or negative feedback is observed, which in turn affects both the expectations towards strategy's success as well as the level of commitment to the environmental goals. (Papagiannakis et al., 2014)

Managers can perceive corporate environmentalism through corporate environmental orientation, focusing on company's internal values, standards and ethical behavior, level of commitment to environmental protection and responsibility, perceptions on external stakeholders and the need to respond to their interests and needs. (Banerjee, 2002) To accelerate the feedback process and affect its magnitude, the environmental values and attitudes of the managers are significant (Papagiannakis et al., 2014); if managers value environmental issues high, they are more probable to see them as opportunities (Sharma

2000), and have a different level of expectations for the environmental outcomes. Once managers believe in corporate environmental goals, their environmental knowledge and organizational confidence is often strengthened. This has a positive effect on organizational commitment, and finally increasing the quality and quantity of the environmental outcomes. (Papagiannakis et al., 2014)

In the study of Papagiannakis et al. (2014), three different environmental strategy patterns were identified. In all patterns, international stakeholders, customer, suppliers and partners influenced the original initiative to shape the strategy towards sustainability. Once motivated by desire to preempt future environmental regulation, the investments were only incremental and lead to improving stakeholder relationships, process innovations and, also negatively to increased costs. Compliant behavior by the companies were driven by stricter rules, decelerating the development of CES. (Papagiannakis et al., 2014) Then again, in the case when the motivator for environmental investments is values and attitudes, significant investments were made and actions for diffusion and integration made, leading to not only stakeholder integration, but also reputation and process innovations. In the most successful pattern of the case study, also product innovations were an outcome, leading to more decisions to invest more in product stewardship with the motivation to enhance stakeholder integration and reputation even more. This in turn generated a creation of R&D department and environmental learning, which accelerated environmental investment decisions even further. (Papagiannakis et al., 2014)

As other positively associated factors towards corporate environmentalism strategies, regulation, public concern, top management commitment and long-term focus stand out. Additionally, industry factors have an effect on the relationship between corporate environmentalism and its antecedents. (Banerjee, 2002) Drivers for ecological responsiveness in strategy renewal include stakeholder pressure, economic opportunities and ethical motives, developed based on the leadership corporate values. Other motivations that induce corporate ecological responsiveness are legitimation, competitiveness and ecological responsivity. Motivations were influenced by the context, including field cohesion, issue salience and individual concern. Cohesion consists of proximity and interconnectedness, issue salience consists of certainty, transparency and emotivity, and finally, individual concern consists of ecological values and discretion. (Bansal & Roth, 2000)

In the context of an environmentally oriented marketing strategy, similar drivers emerge once again. External to the company, the regulatory intensity, customer environment sensitivity, competitive intensity and market opportunity attractiveness drive the strategy.

In terms of internal factors, managerial sensitivity, power base of converts, specialization, centralization and formalization of the company define the so-called environpreneurial marketing strategy (Menon & Menon, 1997)

Within the ecological and environmental literature, climate change has deserved special attention. In the literature overview of Damert and Baumgartner (2018), internal factors are having the greatest impact to *climate change responses* of companies. These internal factors cover organizational attributes, climate issues' integration to risk management, management characteristics such as board structure, chief executives' educational background and work diversity, business motivations and financial performance. (Damert & Baumgartner, 2018) More specifically, managerial skills and employees' awareness of environmental issues drive action. Damert & Baumgartner (2018) found that it could be beneficial to have the responsibilities internally clear and involve the entire organization, educate workforce and provide outcome-based remuneration for managerial incentives (Damert & Baumgartner, 2018). According to Kolk & Levy (2001), the senior managers who have the responsibility for climate-related strategy know each other well and have regular meetings in different conferences and negotiations. Regular meeting leads to an increased likelihood that the managers tend to form similar perspectives to the issues at hand. (Kolk & Levy, 2001)

As for the findings of Damert & Baumgartner (2018), when it comes to external drivers, regulation, stakeholders, shareholder and customers are first to be named in the literature to tackle the climate change. As climate change is a global challenge, regulations and stakeholders are exposing especially the multinational companies (Damert & Baumgartner, 2018). Not only just the stakeholders, but also their closeness to the company has a role to play (Haddock-Fraser & Fraser, 2008). However, the common understanding in the literature is that the strictness of home country's policy regime does not associate with the implementation level of the response strategies to climate change, nor does the degree of internationalization of the company. Even if the regulation itself would not be efficient, it is recommended for supporting climate strategies uptake indirectly by influencing customer behavior and creating pressure to the companies. Companies interacting more with end customers tend to be more active in their climate actions, most likely because being exposed to their environmental pressures. (Damert & Baumgartner, 2018) Furthermore, tendency to pressure exposure is typically larger for companies that are bigger in size, thus they are driven more with climate pressures (Bansal, 2005).

The global issues of corporate environmentalism and ecological responsiveness as well as climate change have received lots of attention in the recent past of strategy literature. That is to be followed by *environmental sustainability strategy* stream. The variety of

sustainability-oriented strategic choices is expanding (Schrettle et al., 2014) compared to the somewhat standardized set of either not implementing sustainability, prioritizing environmental requirements or seeking sustainable innovation within the supply chain (Van Bommel, 2011). For instance, sustainability strategy can be built on resource productivity, legal compliance, environmental cost leadership and eco-oriented products (da Rosa et al., 2013; Van Bommel, 2011)

Sustainability strategy can be approached through the lens of innovation (da Rosa et al., 2013). Innovation is often a driver of strategic renewal (Van Bommel, 2011) and performing eco-innovation activities is a method of implementing environmental issues of corporate sustainability, especially the environmental aspects, in the organization (Paraschiv et al., 2012). Sustainability and innovativeness go often hand in hand; innovation is considered essential for business sustainability in multiple contexts, such as ecological, social, economic or cultural. (Barbieri et al. 2009) The integration of sustainability and innovation is essential for minimizing environmental impacts and ensuring environmental preservation with products and processes (da Rosa et al., 2013). Consequently, as da Rosa et al. (2013) state, a sustainable innovation strategy can be formulated with a product, a process or both. The selection of sustainability strategy is probably aided by an existing sustainability-oriented innovation management process. (da Rosa et al., 2013) It is to be noted that the choice of sustainability strategy is influenced by the characteristics of innovation operations (da Rosa et al., 2013) and innovation (Van Bommel, 2011).

There are plenty of more factors that have been suspected and studied to have an impact on the strategic renewal towards environmental sustainability. Just like in corporate environmental strategies, in the exact context of sustainability, industry and stakeholder initiatives are present. (Van Bommel, 2011) Seeking social approval can be one of the reasons why companies start seeking environmental change in their strategies (Bansal, 2005). Market environment and its multiple stakeholders have a driving effect as well. If a certain company is the first to introduce a sustainability move and succeeds, it forces the rest to follow in the same direction. In addition to market drivers, regulation, social values and norms drive the strategic renewal for sustainability. (Schrettle et al., 2014)

According to the most authors of this literature review, regulative actions, including environmental legislation can have a positive influence on strategy shaping. Regulation is giving the companies a signal about potential improvements on technologies and resource utilization. It does support the awareness on environmental issues, as well as reduces uncertainty on the value of environmentally friendly investments. Lastly, regulation has its reinforcing effect on innovations when acting as a buffer and protector of

completing innovation schemes that otherwise would be hindered due to the market competition. (Porter et al., 1995) However, some have doubted the role of regulation; despite strong incentives for going green, compliant actions do slow down the transition process towards sustainability (Papagiannakis et al., 2014). Regulation is recommended to give space for companies to choose their own industry-based implementation approach, reduce uncertainty as much as possible in all levels of regulation process and above all, promote continuous improvement (Porter et al., 1995).

As for internal strategic drivers, ethical business policies and practices are considered the most important for stimulating environmental action by the companies, second most important are the environmental management systems. The least important are environmental certifications. (da Rosa et al., 2013) The practices, operations, products, organization and general guidelines such as code of conduct define the company's internal capabilities for sustainable renewal (Van Bommel, 2011). However, Morioka et al. (2018) found that taking sustainability indicators into use is not enough by itself. They do require to be associated with clear corporate sustainability goals and priorities. (Morioka et al., 2018)

It is suggested for companies to have cross-departmental cooperation and enable learning, adapting and experimenting possibilities, which can be facilitated by adequate leadership. Responsible leadership is a means of implementing organizational sustainability. (Paraschiv et al., 2012) Being result-driven and keeping in mind the external orientation and transparency, leaders can facilitate innovation in the implementation of a sustainability strategy (Barbieri, 2017; Van Bommel, 2011), enabling the strategic renewal for sustainability to take place. To support strategic decision-making, the size of the company, past performance and current environmental actions should considered (Schrettle et al., 2014). The implementation of organizational sustainability is based on sustainable organizational culture and organizational change (Paraschiv et al., 2012).

The most recent sustainability-related paradigm, *circular economy,* has brought new winds to the way strategic renewal can be considered and driven. Businesses and public organizations have both become interested in the circular economy strategies as they promise resource effectiveness by redesigning practices. Circular economy is based on business models that define a competitive strategy through the product or service design, the pricing for it, production costs and the value proposition to differentiate from other companies, and how the company positions in its value chain within the value network (Rasmussen, 2007). When creating a circular economy strategy, the key is to aim for closing the loops and leakages with technological, social or organizational solutions. For

limited resources, this means normally a choice between four strategical options: maintaining products, reusing and redistributing products, refurbishing and remanufacturing products or recycling components and materials. (Jørgensen & Remmen, 2018)

Jørgensen & Remmen (2018) present a method for planning the circular economy strategy. They call this method a circular economy journey, starting with mapping the initial circular economy options with either product lifetime extinction, product refurbishment or material recycling. In the mapping stage, the roles of different stakeholders, such as customers, suppliers and users are observed in relation to the environmental concerns in innovation, among other factors. The initial identification phase is followed by further analyses with a more detailed view. After the analyses have been conducted, it is time to explore possibilities how to potentially change the product or service and redesign them. Redesigning can be done in three ways: redesigning services, products, users, service or infrastructure; redesigning the value chain relations regarding either suppliers of customers and users; redesigning the organization internally by planning of tasks, competences, structures and technologies, especially in relation with the two first options of redesigning. Finally, in the last step of circular economy journey, the changes are implemented in all redesigning levels that have been discussed in analysis step. (Jørgensen & Remmen, 2018) The process can also be presented in a simplified form, in which there are only mapping step, analyses step and impact step (Jørgensen & Remmen, 2018), which resemble again the general strategy process steps in Figure 2.

In the circular economy literature, internal drivers include company culture, team commitment, networking and support from the demand network. External enablers are local government support, legislation and geographical proximity. Out of these, Mattos & Albuquerque's (2018) findings highlight especially legislation, organizational structure, new organizational processes and having an independent business unit in a large company to focus on circular economy. (de Mattos & de Albuquerque, 2018)

Another way of dividing the strategy drivers is that of hard and soft factors, hard ones being technical, economic, financial or market based and soft ones institutional, regulatory, social or cultural. Technical drivers facilitate the resource optimization and development of sharing solutions with the customers. Economic, financial and market drivers are related to the trends on the demand and supply sides of business. As for soft drivers of institutional and regulatory factors, the increasing importance is on environmental legislation, standardization and waste management directives. Lastly, concluding with the social and cultural drivers, the connected social awareness, environmental understanding and preferences of customers shape the renewal for circular economy. (de Jesus & Mendonça, 2018)

3. ECOSYSTEM APPROACH TO STRATEGIC RENEWAL

This chapter is presenting the current ecosystem paradigm by guiding briefly through the main developments of ecosystem literature and discussing the main characteristics and lifecycle of business ecosystems. Further, the study takes an ecosystem approach to identify drivers for strategic renewal. Ecosystem actors and other drivers, which influence the strategic renewal of individual companies, are discussed at the end of the chapter before concluding the synthesis of the entire literature review.

3.1 Towards the understanding of ecosystems

Already back in 1984, Freeman suggested that management of stakeholders would provide a solution to the growing need of new strategy approaches. The constructed classical framework, stakeholder theory, become very popular afterwards. Stakeholder theory considers stakeholders as any individuals or groups affecting or having the ability to affect the achievement of organization's objectives. (Freeman, 2010) The implementation of stakeholder theory become also rather common as a part of environmental analysis, executed on a generic level in the early steps of strategy process (Freeman & McVea, 2005). As a next step in building a better understanding of company's environment, the identification of stakeholders is followed by developing relationships and finding mutually beneficial solutions with them (Savitz & Weber, 2006).

The relationships have typically been researched from the perspective of a so-called focal firm, the one central to a variety of stakeholders. The interconnected relationships between stakeholders and the focal firm have been researched widely under multiple theoretical streams all along from value chains, nets, systems (Adner, 2017), platforms and networks to the particular interest of this study, ecosystems (Möller & Halinen, 2017). The relationships between stakeholders become especially interesting when the connections are formed not only directly with the focal firm, but also between the stakeholders themselves. Value chain perspective was to open this research avenue (Porter, 1991), defining value chains as a flow of capital and information and the product chain with up and downstream flows (Jørgensen & Forman, 2009). Afterwards, academic discussion has expanded to consider the surrounding actors more deeply than only a chain. According to Möller & Halinen (2017), strategic nets emerged alongside strategizing in the beginning of the millennial, with interest in the types of nets (Möller & Halinen, 2017). Nets

are formed through stakeholder relationships (Möller et al., 2005), which tend to connect the organizations and their competences horizontally (Herrala et al., 2011).

Since then, the development of net research has evolved towards networks, and the term network has stabilized in the literature. Literature, again, is fragmented to for instance strategic, value and business nets and networks, as well as innovation, regulatory and local networks (Jørgensen & Forman, 2009). To provide some examples of the different network types, an innovation network is said to be based on development of new processes, products and services, including other players in the value chain (Jørgensen & Forman, 2009), whereas business networks are defined as ecosystems that are organized around a 'keystone species' and characterized multiple loosely interconnected actors who depend on each other for mutual effectiveness and survival (Iansiti & Levien, 2004). Despite the use of term ecosystem in the latter definition, it is not to be mixed with the upcoming discussion of true meaning of ecosystems. An alternative for the innovation and business networks is a regulatory network, which includes public authorities and civil society organizations who directly or indirectly formulate the business environment. Lastly, there are local networks, for which local natural resources, infrastructure, staff, local regulation are playing a role in the value chain. (Jørgensen & Forman, 2009)

Despite the fragmentation of literature, networks do always have the same characteristics, no matter what type of networks they are. These characteristics include subject, objective, resources, composition, organizational structure and culture, context and outcomes. (Kahle et al., 2018) The variety of different net and network types provided by academics can be placed in a value system continuum, which varies from a stable and well-defined value system all the way to emerging value systems and radical changes. However, a more detailed division of strategic net types can be done with division to vertical, horizontal and multidimensional value nets or networks. Vertical value nets aim for increasing the operational efficiency of the value system. Vertical value nets include supplier nets, channel and customer nets and vertically integrated value systems. Horizontal value nets cover a wider range of both actors and net types. Among horizontal value system actors, government agencies, industry associations, research institutes, universities and competitors are typically involved. Horizontality comes to life in competition alliances, capability access alliances, market and channel access and cooperation alliances and so-called networking forums. Lastly, multidimensional nets include core and hollow organizations, complex business nets and new value-system nets. (Möller et al., 2005)

The development of theories throughout the decades is shifting to the point where the conceptual focus within industrial marketing and management research is changing from

networks to ecosystems. Network literature is interested in how dyadic with other companies within the network can benefit companies, whereas ecosystem research is focused on the focal offer and its value proposition. Then again, strategic networks form inter-organizational structures through alliances, whereas ecosystems are formed interactively with respect to the focal value proposition by relevant actors and activities. (Kapoor, 2018) Ecosystem as a concept has been used more and more throughout the thirty past years: between 1992 and 2018, over 300 articles have been produced, with two-thirds taking place during the last five years (Bogers et al., 2019). The shift has indicated a rise in connectivity, interdependence and co-evolution within the ecosystemic actors, technologies and institutions (Phillips & Ritala, 2019), opening the existing understanding of networks to even broader reflections and research.

Hand in hand with the increased popularity of ecosystems, they are often taken as a sort of buzzword (Kapoor, 2018), which creates increasingly various inconsistent concepts to describe different kinds of structures and processes namely called ecosystems (Kaiser & Landau, 2019). Similarly to network research, the literature of ecosystems has scattered to identify different types of ecosystems, such as business ecosystems, technology ecosystems, entrepreneurial ecosystems, knowledge ecosystems (Thomas & Autio, 2019), innovation ecosystems (Granstrand & Holgersson, 2019), industrial ecosystems, economies as an ecosystem, digital business ecosystems or as a social ecosystems (Peltoniemi & Vuori, 2004).

The ecosystem paradigm originates from applying biological and ecological logic to the business environment. According the original interpretation of Moore (1993, p. 26), an ecosystem is *an economic community supported by the organisms of the business world, a foundation of interacting organizations and individuals.* The economic community is dedicated to produce value in the form of goods or services for the customers, who belong to the same ecosystem. (Moore, 1996) This approach of Moore represents an ecosystem that is nowadays often specified as a business ecosystem. The actors within the ecosystem are further defined as keystones, dominators and niche players depending on the role they adapt to. (Iansiti & Levien, 2004; Moore, 1996) The keystones are the ecosystem leaders whose vision of roles and structure for ecosystem is followed (Adner, 2017). Ecosystem actors co-evolve in their roles and capabilities, typically along with the keystones, who are valued by the community (Moore, 1996).

More recently, Adner (2017) clarifies ecosystem to be *an alignment structure of multilateral set of partners, which need to interact for materializing the focal value proposition* (Adner, 2017, p. 40), the definition applied in this study. Another and one of the most recent study for defining ecosystems is the attempt of Bogers et al. (2019, p. 2), naming

ecosystem as *an interdependent network of self-interested actors jointly creating value*. The definition is built upon 17 other definitions from academics in the field. (Bogers et al., 2019) They claim that the definition of for example Adner (2017) is more suitable in a subset of ecosystem research, whereas theirs is concise and precise while maintaining over-arching perspective needed for the nature of ecosystem research (Adner, 2017).

As the phenomenon of ecosystems is relatively new in literature, along the definitions, multiple conceptualizations have emerged. Some of the most interesting and widely spread approaches are provided by Adner (2017) and Aarikka-Stenroos & Ritala (2017). The first conceptualization of ecosystem-as-affiliation views ecosystems as communities of associated actors defined by their platform affiliations and networks. The other view is that of ecosystem-as-structure, for which ecosystems are configurations of activity, defined by value proposition (Adner, 2017). Additionally, ecosystem can be considered as an additional layer to the existing network frameworks such as the one presented by Möller & Halinen (Möller & Halinen, 1999), composed of embedded networks with constantly evolving boundaries, or alternatively, as a new perspective which influences at the level of networks, nets and their relationships. Especially the latter perspective has overarching implications on the management of business networks within the ecosystem. (Aarikka-Stenroos & Ritala, 2017)

Despite different ways of interpreting ecosystems, it is agreed that they do consist of a similar set of basic elements. Nucleus, or the keystone actor (Iansiti & Levien, 2004; Moore, 1993), is the key element at the center of the ecosystem for building the basis for the focal value proposition of the ecosystem (Kaiser & Landau, 2019). Activities specify the actions that are undertaken to materialize the value propositions. In business ecosystems, activities involve both cooperation and competition, which take place simultaneously (Peltoniemi & Vuori, 2004). Actors are the entities taking an action or multiple actions in the ecosystem. Multiple actors can also take up only one action together. (Adner, 2017) As examples for the actors, stakeholders such as companies, universities, research centers, public sector organizations are named among other ecosystem influencers (Peltoniemi & Vuori, 2004). Each ecosystem actor brings varying perspectives, problems and risks to the ecosystem (Singer, 2009). The access is also a common characteristic, describing the ease to which new actors may enter the ecosystem. Mapping where ecosystem actors stand in their action-taking, there are positions, which also characterize who controls who. Governance presents the degree to which the actors and their actions are being under control and formalization. (Kaiser & Landau, 2019) Lastly, there are links that specify transfers across actors. Content-wise the transfers may vary

from materials, information, influencing or funds. Links may also not have a direct connection to the focal actor of the ecosystem. (Adner, 2017) The links and interaction between the actors is sometimes referred to as relationship dimension of ecosystems (Kaiser & Landau, 2019). The nature of ecosystems is complementary, meaning that no value is created until all components comprising the ecosystem are present (Jacobides et al., 2018).

The generalizable ecosystem elements are all tied to conceptual, structural and temporal dimensions. Conceptual dimension reflects boundaries and perspectives on the ecosystem, whereas structural dimension is interested in hierarchies and relationships. The last dimension, temporality, is the most interesting one in the scope of this study. It includes dynamics and co-evolution which occur during the lifecycle of the ecosystem. (Phillips & Ritala, 2019) The interdependent dynamics of ecosystem actors can be of cooperative, competitive or coopetitive nature (Bogers et al., 2019).

3.2 Evolution of ecosystems

Ecosystems' evolution over time is typically examined as an ecosystem lifecycle. The stages of lifecycle are rather simple, divided traditionally in four: birth, expansion, leadership and self-renewal. (Moore, 1993) In the emergence of a new ecosystem, actors tend to take certain roles in leadership, value creation, value support and entrepreneurial ecosystem. Actors in leader roles attract and link partners to the common platform, because alone they would not be able to engender an ecosystem. (Dedehayir et al., 2018) At the early stage of ecosystem development, companies have an opportunity to take a shaping approach to the whole industry if its environment is unpredictable and malleable enough. This kind of environment has unexploited potential, is shapeable through collaboration, has shapeable regulations and is lacking a dominant player or platform. Suitability of the industry is emphasized even more with accelerating technological change. These circumstances take typically place in either freshly disrupted industries, emerging markets or a young and dynamic industry. While operating in such an unpredictable and malleable environment, a company must both explore options over time and make investments to shape selected options and to ensure success. This, however, is quite impossible without collaborating with other ecosystem actors. (Reeves et al., 2012)

Birth as the first stage of ecosystem lifecycle is challenging for the need to define a value proposition together with key stakeholders, customers and suppliers (Moore, 1993). Ecosystem strategy is needed to align the partners by first identifying the existing gaps and then creating conditions to fill them (Adner, 2017). The value offer is worked on together,

but leaves the individual companies struggling to protect their ideas and tie up key players to themselves (Moore, 1993). This is referred to as engagement in the three-step model of Reeves et al. (2012), which they call a shaping strategy (Reeves et al., 2012).

The second stage, expansion, brings the designed value proposition to the markets. To scale up, cooperation is needed with ecosystem actors, but still the need of defeating alternative ideas is present. In other words, the ecosystem has to compete against other ecosystems in order to take the control of strategic markets. The third stage, leadership, provides a shared vision for the existing active ecosystem actors to continue improving the value proposition. The third stage requires maintaining strong bargaining power towards the key players within the ecosystem, instead of the previous major competition against other ecosystems. (Moore, 1993) Ensuring the leadership position is in accordance with the recommendation of Adner (Adner, 2017).

Similarly to the expansion and leadership stages of Moore (1993), Reeves et al. (2012) discuss orchestration and evolving an ecosystem by scaling and keeping its flexibility (Reeves et al., 2012). Orchestration capabilities influence new business openings through radical innovations and relate to future-oriented value production (Möller et al., 2005). While orchestrating the ecosystem, the central company needs to build a platform to facilitate the ecosystem actor interactions and to lock in ecosystem actors and value within ecosystem. The platform can be either digital or non-digital, and aims for driving the evolution of the ecosystem rather than strictly managing it. (Reeves et al., 2012)

Last stage of the lifecycle model of Moore (1993) culminates in the self-renewal, originating from the innovators who bring new ideas to the existing ecosystem. The challenge in the last stage is to prohibit the innovators to create a competing new ecosystem and to retain the key customers while figuring out the new value proposition. The last stage can, naturally, end in the death of the ecosystem in case the renewal fails. (Moore, 1993) It is claimed that ecosystem success depends on the goals of ecosystem actors, the interdependence between them and the attributes of their network. The goals vary depending on the ecosystem roles and type of actor. (Bogers et al., 2019)

To avoid the death and remain healthy, robustness, productivity and niche creation are presented as three critical health measures. Robustness highlights the ability to persist the environmental changes, whereas productivity is an ability to transform technology and raw materials into new products with lower costs. Niche creation allows differentiation and supports diversity in the ecosystem. (Iansiti & Levien, 2004) The diversity of response options is handled through resilience and governance. Governance is necessary coordination of actor interaction to maintain the ecosystem output process. On the

other hand, response diversity enhances ecosystem's abilities to adjust to changes in demand and to generate a variety of offerings. (Thomas & Autio, 2019)

Naturally, ecosystems develop and change during their lifecycle in more complex ways than just the four discrete stages presented by Moore (1993). In practice, the stages blur *in the complex interplay between competitive and cooperative business strategies* (Moore, 1993, p. 76). The rate of change is depending on the lifecycle and type of ecosystem, eventually leading to larger impacts, such as co-evolution (Phillips & Ritala, 2019), a synonym to Moore's (1993) complex interplay.

Because of the nature of ecosystems, temporal dimension in particular, spatial and temporal co-evolution is occurring between the ecosystem actors (Aarikka-Stenroos & Ritala, 2017). When a company evolves, it affects the evolution of other companies within the ecosystem. This co-evolutionary means strategy-wise that once one company changes its strategy, other companies in the ecosystem will strongly be influenced by the move and likely to adapt their strategies accordingly, making ecosystem co-evolution an interesting area for managers. (Peltoniemi & Vuori, 2004) Co-evolutionary logic gives a broader outlook on the network boundaries and composition, allowing the investigation of increasingly interconnected actors, technologies and institutions. Consequently, managerial focus needs to be enlarged from the evolution of business networks to system co-evolution. (Aarikka-Stenroos & Ritala, 2017) There are multiple perspectives to co-evolution that scholars have identified. For example, the co-evolution of ecosystem and the business models of ecosystem actors explains the reasoning for actors to join, stay and leave the ecosystem at a specific point of time. Other academics have researched the internal competition driving the ecosystem co-evolution, as well as the external factors to influence co-evolution within system. (Thomas & Autio, 2019) The driving forces for ecosystemic co-evolution originate from internal or external factors (Thomas & Autio, 2019), within the ecosystem or as cross-level evolution (Rosenkopf & Nerkar, 1999).

In addition to co-evolution, the development of business ecosystems is channeled through self-organization, emergence and evolution. Self-organization refers to a process for novel structures or features to arise within the system without a controller to intervene. The process is ongoing and contributes to the novelty of the ecosystem. As the ecosystemic interactions bring actors together voluntarily, self-organization takes place rather freely in a preferred design, despite possible intervention of the government. Emergence results from the self-organization, whereas adaptation is linking the emergent properties to the environment. Lastly, evolution of the ecosystem concerns the long-term achievements of the emergent properties. (Peltoniemi & Vuori, 2004)

3.3 Ecosystem strategies

Ecosystem literature is interested in discovering how the links between ecosystem actors and their activities influence the value proposition of the focal offer, and further, how this value proposition influences companies' strategies and ensures their competitiveness (Adner, 2017). To succeed in the adaptation process between the external and internal sides of the organization (Miles et al., 1978), a company can choose to combine multiple strategy approaches. The mix-matching can be done through relying on external ecosystem, which leads to a mixed set of strategy approaches for the ecosystem actors. (Reeves et al., 2012) Especially, if a company operates in a turbulent environment with complex relationships, it needs an ecosystem strategy (Iansiti & Levien, 2004). An ecosystem strategy considers ecosystem structure, ecosystem roles and ecosystem risks (Adner, 2017). Illustrating the variety of ecosystem strategies, Olsson and Bosch (2017) identified the total of 15 strategic choices in their profound study: in innovation ecosystems, the strategies vary among the ways how the strategic partners are picked and with who the value is co-created, whereas in differentiating ecosystems, implemented strategies resemble incremental change and radical change. (Olsson & Bosch, 2017)

Successful ecosystems allow companies to create value that would not have been created by a single firm of the ecosystem alone (Adner, 2006). In other words, the strategic choices are means to coordinate and align the interdependent activities within the ecosystem. Focal company can consider strategic alignment activities through firm boundaries, balance of cooperation and competition as well as the focal offer itself (Kapoor, 2018) The alignment structure refers to the positions and flows of ecosystem actors, agreed mutually to a certain extent. This is the company goal to be pursued by an ecosystem strategy (Adner, 2017). The value within ecosystem is reinforced and increased along with the membership and diversity in the ecosystem boundaries (Singer, 2009). Ecosystem-based strategy tends to allow faster innovation at a lower cost and risk from the perspective of one ecosystem participant, letting the ecosystem to grow and adapt quickly to changes. Additionally, ecosystems benefit from lock-in and network effects, and typically have the capacity to take over the entire market alone. (Reeves et al., 2012)

Creation of an efficient ecosystem strategy requires a clear understanding of relevant pieces and boundaries of dependence and independence (Adner, 2017). The companies can decide upon innovating within one component or across multiple components. The first, an improving strategy, leads to choose partnering for improving the identified bottleneck component without involving other ecosystem components to investigation. The latter strategy, co-innovating strategy, allows the ecosystem actors to innovate across the component boundaries. The improving strategy is more attractive to the dominant

actors, whereas co-innovating is recommended for those in a less dominant role. The weakest actors rarely benefit from either of these ecosystem strategies. (Hannah, 2018)

Ecosystem-as-affiliation encourages to increase the number of ecosystem actors in to increase expected power in the center of the platform or as the focal actor. This leads to bargaining power and enhanced system value through direct and indirect network externalities. This approach may also release the likelihood of new interactions between partners and combinations to increase the overall value creation of the system. A different approach of ecosystem-as-structure starts with defining the value proposition and then starts building the set of actors needed to accomplish the value proposition. Thus, the latter ecosystem strategy does not value the number of ecosystem actors but their quality over quantity. (Adner, 2017) Setting aside the discussion of number of ecosystem actors, with no doubt other ecosystem actors are needed for sharing the risks, contributing to complementary capabilities and building fast new markets (Reeves et al., 2012).

A firm can adjust its ecosystem strategy by choosing a role based on its internal will or the business context, choosing between niche, keystone or physical dominator role. Niche strategy suits a turbulent situation in which to strengthen own capabilities, whereas keystone refers to a firm being in the center of a complex network, operating in turbulent environment and with complex relationships. Keystone capitalizes the ecosystem's capability to react in disruptions. Physical dominators operate in mature industries with complex relationships, which ultimately turn into new ecosystems once the current ecosystem strategy as physical dominator is no longer valid for them. (Iansiti & Levien, 2004)

The actual process of building an ecosystem strategy is typically reviewed in literature from the perspective of a focal firm. To successfully choose an ecosystem shaping strategy, a company must have an excellent timing and the ability to orchestrate the ecosystem. Orchestrating is enabled only with adequate influence, gained for example by disruptive innovating. Having an open organizational culture enhances trust among the ecosystem actors. Information acts as a facilitator of the interaction, enabling external innovations in addition to the internals. In the end, the success of ecosystem shaping strategy is typically measured in the growth and profitability of the ecosystem, while the most common trap remains in the over-management of the ecosystem. (Reeves et al., 2012) The contractual hazards can be minimized, for example, by vertical integration strategy that helps managing the ecosystemic interdependencies (Adner & Kapoor, 2010).

To build an ecosystem strategy, the first step for a focal firm is to set expectations and objectives and proceed with screening the risks from perspectives of both the focal firm

as well as interdependence and integration risks. With interdependence risks, the difficulty is the coordination of complementary innovators, and with integration risks, the focal firm has to concern the solution to be adopted by the complete value chain. (Adner, 2006) For business ecosystem success, pioneering visions should be shared by all ecosystem actors, composed by an ecosystem leader (Stead & Stead, 2013). Thus, the focal firm needs to engage the ecosystem actors with a shared vision, emerged either singularly or collaboratively. Ecosystem actor interests should be mapped and evaluated focusing on how they contribute to and influence each other while performing in the ecosystem (Reeves et al., 2012). Additionally, the core values, boundaries, platforms and relationships are shaped by the focal firm. The leading strategic role acts as a hub in the network of interactions, which is providing space for value sharing opportunities and sustained competitive advantage for the niche actors of the ecosystem. (Stead & Stead, 2013)

Not only does the focal firm but also the other ecosystem actors create their own ecosystem strategies. For creation of sustainability-based business ecosystems, however, Stead & Stead (2013) argue that only the leader and niche players are significantly valuable for building the needed types of relationships. The smaller actors taking a niche role are sort of self-contained modules which are aligned around the shared vision of the ecosystem. The importance of niche players in developed markets is in strategies for innovation, specialization and differentiation. In sustainability-oriented ecosystems, they slow the entropic flow, promote eco and socio-efficiency, product stewardship, sustainable consumption and sustainable business models. However, in undeveloped or developing markets the niche actors' strategies build economic, human and social capital in the value chain and promote stakeholder engagement, collective partnerships, co-producing and co-creating. (Stead & Stead, 2013)

3.4 Ecosystem approach to drivers of strategic renewal

This study adopts an ecosystem approach to identify external drivers for strategic renewal. As noticed in the strategy literature review in chapter 2, various stakeholders are often named as drivers for sustainable transitions in strategic renewal processes. All sustainability actions should be encompassing the direct and indirect stakeholders in order to meet their needs in the present as well as the future (Schrettle et al., 2014), which makes developing relationships and finding mutually beneficial solutions (Freeman, 2010; Savitz & Weber, 2006) naturally applicable to sustainability strategizing (Morioka et al., 2018). In this study, stakeholders equal ecosystem actors in the frame of the dedicated ecosystem approach. Ecosystem actors are business, economics and institutional parties that have an interacting and interdependent nature. Ecosystem context

highlights the increasingly interlinking of actors, also outside the business boundaries and the industry. (Russo-Spena et al., 2017) This section investigates how ecosystem actors influence strategic renewal through the co-evolution of ecosystems.

An ecosystem approach typically proves powerful in influencing firm-level, firm relationships, industry-level and the level between industries (Agarwal & Helfat 2009). In firm level, top management of focal firm has expectations from various levels of ecosystem actors (López-Toro et al., 2016; Savitz & Weber, 2006; Schrettle et al., 2014). The individual environmental concerns of ecosystem actors emerge from inside and outside the focal firm. Internal concerns include the importance of the issue, its personal relevance and personal interests, level of worrying and feeling connected with the nature. External ecosystem actor concerns include dealing with consumer products as opposed to pollution, handling environmental pollution and facing economic trade-offs. (Banerjee, 2002)

When it comes to important ecosystem actors, suppliers, customers, users and competitors have a somewhat classical role (Porter, 1991). However, in the context of strategy and especially strategic renewal towards sustainability, a remarkably wider range of ecosystem actors are concerned. The literature overview of ecosystem actors driving the strategic renewal towards sustainability is presented below in Table 3.

***Table 3**. Ecosystem actors driving strategic renewal towards environmental sustainability*

CATEGORY	ECOSYSTEM ACTORS	AUTHORS
Shareholders	Investors & Shareholders	Savitz & Weber 2006
Customers	Customers	Berry & Rondinelli 1995
	Clients	Savitz & Weber 2006
	Consumer interest groups	Menon & Menon 1997
	Service users	López-Toro et al. 2016
	Consumers	Burritt et al. 2018
Policy & policymakers	Politicians	Savitz & Weber 2006
	Prosecutors	Savitz & Weber 2006
	Lawyers	Savitz & Weber 2006
	Governments	Banerjee 2002; Burritt et al. 2018
	Policymakers	Banerjee 2002
	Future environmental regulation	Jørgensen & Remmen 2018
	Regulatory bodies	Menon & Menon 1997
	Ministry offices	López-Toro et al. 2016
	Legislation	López-Toro et al. 2016
Media	Media	Savitz & Weber 2006
NGOs	NGOs	Jørgensen & Remmen 2018; Kolk & Levy 2001; López-Toro et al. 2016; Burritt et al. 2018
Partner companies	Business companies	Banerjee 2002
	Subsidiaries	Kolk & Levy 2001
	Industry players	Bocken et al. 2014
	Informal & formal private sector	López-Toro et al. 2016
Other organizations	Public health organizations	Savitz & Weber 2006
	Industry associations	Kolk & Levy 2001
	Other organizations	Menon & Menon 1997
	Intergovernmental organizations	Burritt et al. 2018
	Advocacy groups	Banerjee 2002
Public	Public	Banerjee 2002
	Community groups	Savitz & Weber 2006
	Local communals	Berry & Rondinelli 1995
	Citizens	Jørgensen & Remmen 2018
	Municipality	López-Toro et al. 2016
Other	Environment	Berry & Rondinelli 1995
	Environment interest groups	Berry & Rondinelli 1995
	Engineering students	Bocken et al. 2014
	Intermediaries	De Silva et al. 2018

The literature review of driving ecosystem actors of strategic renewal towards sustainability enabled identifying a large variety of ecosystem actors. They are categorized by their actor type in shareholders, customers, policy and policymakers, media, non-governmental organizations, partner companies, other organizations and public as the main categories of ecosystem actors (Table 3).

Company responsibility is wider required by not only customers (Berry & Rondinelli, 1998; Savitz & Weber, 2006) and company investors and shareholders (Savitz & Weber, 2006), but also politicians (Savitz & Weber, 2006), media (Savitz & Weber, 2006), local community groups (Berry & Rondinelli, 1998; Savitz & Weber, 2006), prosecutors (Savitz & Weber, 2006), lawyers (Savitz & Weber, 2006), public health organizations (Savitz & Weber, 2006), environmentalists (Savitz & Weber, 2006), environmental interest groups and environment itself (Berry & Rondinelli, 1998), citizens, non-governmental organizations and future environmental regulation (Jørgensen & Remmen, 2018). The list is complemented by adding governments, policy makers, advocacy groups, business companies and the public around the globe (Banerjee, 2002).

Company's decision-making process is influenced by environmental political interactions, related to the attempts by regulatory bodies, consumer interest groups and other organizations (Menon & Menon, 1997). Multinationals developing a strategy need to base the development process on a broad set of inputs from interactions with subsidiaries, industry associations and NGOs. They highlight that the intense interactions within the ecosystem actors of the industry has been one of the most important strengthening factors in their strategy making. (Kolk & Levy, 2001) Industry players as well as engineering students have been emphasized in the research of Bocken et al. (2014) in order to enhance sustainability business models, whereas López-Toro et al. (2016) mention service users, community-based organization, NGOs, informal and formal private sector, municipality, ministry offices, legislation (Bocken et al., 2014; López-Toro et al., 2016). Lastly, Burritt et al. (2018) name governments, NGOs, intergovernmental organizations and consumers as the most typical ecosystem actors that criticize and challenge multinationals to develop more sustainable long-term plans (Burritt et al., 2018).

Some ecosystem actors accelerating the transition towards sustainable socio-technical systems may take a role of an intermediary, who is not directly involved but has an indirect impact in the sustainability transition within the ecosystem; within innovation research, innovation intermediaries are often defined as organizations that generate value to other system actors of innovation (De Silva et al., 2018). An intermediary can be a

base participant or partner, as for example a research organization, a regulator or industrial organization (Makarov & Ugnich, 2015). Process intermediaries influence specific processes or transitions within experimental projects (Kivimaa et al., 2019). Intermediaries are able to support the success of an ecosystem by increasing trust between ecosystem actors (Majava et al., 2016). Intermediaries have a role to play in driving the ecosystemic co-evolution as a supporting dynamic, which is important in regulating the growth and stability of the ecosystems (Thomas & Autio, 2019). On the contrary, in certain ecosystem strategies, focal firms are emphasized to drive the effective market mechanisms instead of the intermediaries. (Reeves et al., 2012)

3.5 Synthesis of the literature review

Both theory sections of this study represent fragmented research fields, but for opposing reasons. Strategy literature is a relatively old and much researched stream, whereas ecosystems have emerged as a new paradigm only recently and thus lack conceptual consensus. This literature review results in a theoretical framework which combines the interrelated concepts (Martins et al., 2014) of strategic renewal process and business ecosystem, presented below in Figure 3.

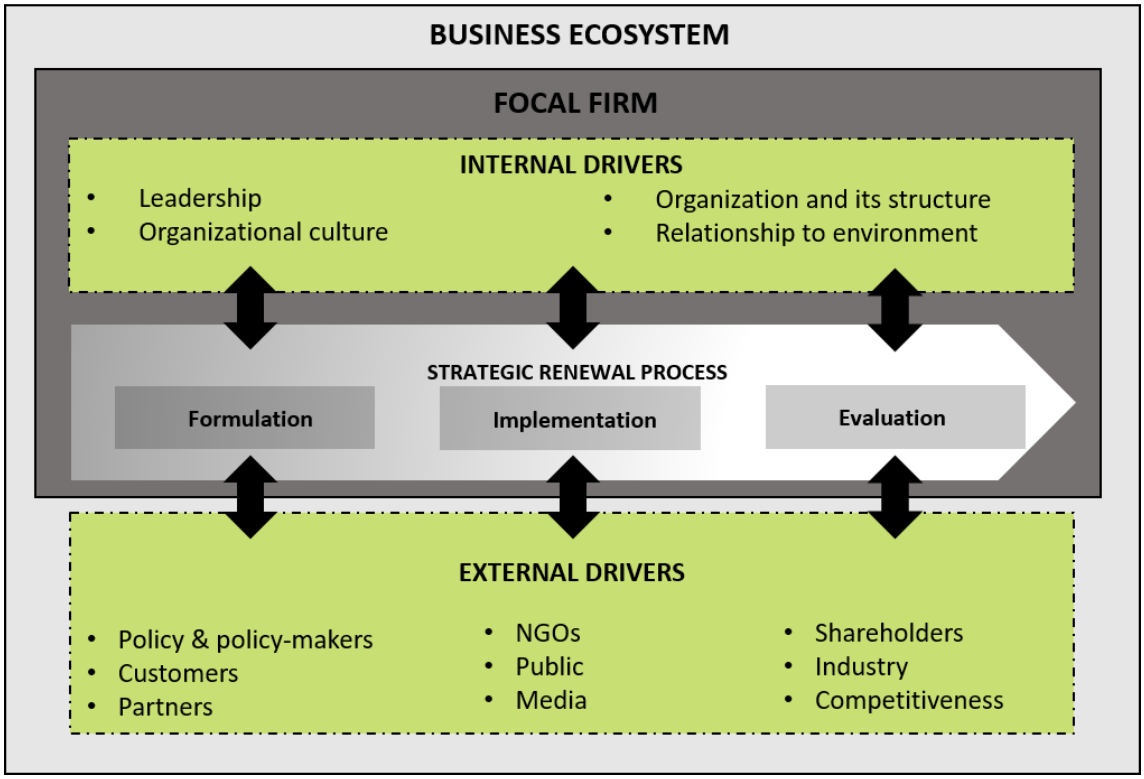

Figure 3. *Integrative framework of strategic renewal process towards environmental sustainability and its emerging drivers within the business ecosystem*

The process of strategic renewal is encompassed by its business ecosystem, where various internal and external drivers are emerging and influencing the course of strategic renewal process. In Figure 3, these drivers are placed in two boxes, internal ones including leadership, organizational culture, organization and its structure and relationship with nature. The external drivers include multiple ecosystem actors, their attributes, strategies and relationships (Farjoun, 2002), technical, political, social, market (Agarwal & Helfat, 2009; Thompson et al., 2014, p. 838) and regulative changes (Porter et al., 1995) in the environment. Despite the strategy literature being fragmented in responses to environmental threats and opportunities all the way from environmental responsiveness to circular economy, the approaches have in common the need of considering ecosystem actors. As shown in Figure 3, ecosystem actors driving the strategies towards sustainability include policy and policymakers, customers and partners, NGOs, public and media, shareholders, industry and competitiveness, among many other drivers mentioned in the business ecosystem and strategy literature.

Ecosystem paradigm studies the focal offer and its value proposition (Kapoor, 2018), extending the perspectives from network approach in new ways. Ecosystem is an additional layer to the embedded networks that enables the actors to interact to aim for reaching their strategic aim. (Aarikka-Stenroos & Ritala, 2017) Ecosystems have several competing definitions among which this study uses a definition of Adner (2017) considering business ecosystem as an alignment structure of multilateral set of partners, which need to interact for materializing the focal value proposition (Adner, 2017).

Based on the literature review, the temporal dimension seems to bring strategic renewal processes, business ecosystems and drivers together. Strategic renewal process is strongly dependent on the temporal dimension, as the strategic decisions take place over time under the current circumstances and based on the decisions made in the past (Garud et al., 2010). Temporality of business ecosystems is highlighting the dynamics and co-evolutionary nature in the business ecosystem lifecycle, to which ecosystem actors need to adjust their strategies. Vice versa, the strategic changes of individual ecosystem actors may make the business ecosystem around that specific actor to evolve (Peltoniemi & Vuori, 2004). The evolution of business ecosystem is investigated in this study adapting to the frames of Moore (1993), taking into account that the complex nature and interplay of the interdependent business strategies still blur the theoretical stages of evolution (Bogers et al., 2019; Moore, 1993) The drivers emerge from the business ecosystem at a certain moment of the co-evolutionary process and influence the development of strategic renewal during the different process steps. Strategic renewal

can also influence the emerging drivers in a continuous interplay. This is demonstrated in Figure 3 with black bidirectionally arrows.

Every actor has its own ecosystem strategy (Adner, 2017) that seeks alignment and co-ordination of interdependent activities in the encompassing business ecosystem (Kapoor, 2018). This strategy is a process (Martins et al., 2014) influenced by the changes of other ecosystem actors' strategies (Peltoniemi & Vuori, 2004) and other internal and external drivers of the ecosystem (Thomas & Autio, 2019). Ecosystem actors can make strategic decisions among, for example, orchestrating and shaping the ecosystem themselves (Reeves et al., 2012), improving the ecosystem bottleneck and co-innovating across the boundaries (Hannah, 2018), or specializing and differentiating in the business ecosystem as a niche player (Stead & Stead, 2013). The strategic options vary not only based on the actors' role within the ecosystem, but also by the type of ecosystem they are involved in (Holmström Olsson & Bosch, 2017). In any context, the strategy of an ecosystem actor should consider ecosystem structure, actors and risks in its alignment (Adner, 2017) for the ecosystemic value creation (Adner, 2006) during strategic renewal.

In order to implement sustainable strategies, business ecosystems offer excellent structures (Stead & Stead, 2013). These structures are increasingly shaped by various drivers, often actors whose visions of a more sustainable future unite new business ecosystems. Therefore the capabilities to sense, seize and reconfigure the strategy for example by orchestrating the business ecosystem are those especially important to a sustainability based strategy (Mousavi & Bossink, 2017). Drivers within the business ecosystem are supporting both the transition of business ecosystems and individual strategies, which both co-evolve during the strategic renewal towards sustainability. This study applies an approach of drivers that emerge within the ecosystem to investigate the strategic renewal process towards sustainability within its business ecosystem.

4. RESEARCH METHODOLOGY

This chapter is discussing the research methodology needed to explore how the process of strategic renewal towards environmental sustainability is co-evolving with its business ecosystem**.** First, adapted research design and strategy are presented. They are followed by arguments for the case selection and clarifications on the data gathering and analysis process. In the end of this chapter, the validity and reliability of selected approaches are evaluated.

4.1 Research design and strategy

The purpose of this research is to both discover the events in the researched phenomenon and to deliver insights to the topic, indicating exploratory nature, as well as gaining an accurate profile of the researched situations with a descriptive approach (Saunders et al., 2009). To best answer the research questions, a combination of these research approaches is applied, remaining the emphasis on exploratory research.

Qualitative research design is suitable for this research thanks to its abilities to describe real life, form a big picture of the research target and reveal new information in an explorative way (Hirsjärvi, 2009, pp. 161–166). Furthermore, it helps the researcher to make sense of the subjective meanings related to the phenomenon that is being studied (Saunders et al., 2009). It also serves the investigation of the different dimensions of ecosystems (Phillips & Ritala, 2019), which is one of the main interests of the research.

As the research aim focuses on the strategic renewal process towards sustainability and its co-evolution with the encompassing business ecosystem, the research has to be able to consider the change over time and adopt a holistic view on the ongoing processes. These needs recall applying a case study strategy, for it has the ability to describe, understand, predict and/or control an entity, such as an organization (Woodside & Wilson, 2003). Furthermore, once a research intends to study theoretical findings in real-life context while focusing on describing one or a few well-defined targets, a case study approach is recommended (Eriksson & Koistinen, 2005).

To best benefit from the case study strategy, single-case approach and holistic case approach were purposively combined. This combination is suited when the nature of the case is somehow special (Saunders et al., 2009). To examine how the process of strategic renewal towards environmental sustainability is co-evolving with its business eco-

system, the most convenient case study approach is a longitudinal case study. A longitudinal case study approach is identifying and explaining patterns in the changing process, with the ability of shedding light on multiple sources and loops of causation (Pettigrew, 1990), along with processual case approach that integrates understanding of how past history shapes the organization and how the interaction of agents and contexts occur over time in a cumulative way. (Pettigrew, 1997, p. 339) In particular, strategy process research calls for detailed longitudinal field work to avoid making unknowing assumptions, as well as to create a complete picture, avoid simplifying the case and understand the process and its boundaries completely (Chakravarthy & Doz, 1992). Thus, longitudinal approach is chosen for this single case study thanks to its nature of providing long-term in-depth insights (Miles et al., 1994; Yin, 2012) and therefore tracking the strategic renewal towards sustainability in the case.

4.2 Case selection

Purposive sampling method is typically used and suited for qualitative studies (Wu Suen et al., 2014). Reasons to choose purposive sampling were to ensure a unique and rich case and to gather information from carefully chosen representatives within it. Selecting such an information-rich and special case, the study is sampling particularly an extreme case. Extreme cases provide an opportunity to learn from unusual success or failure. Being unusual means that the case contains lots of information because it illuminates both the unusual and the typical. (Patton, 2014, pp. 277–278) Sampling an extreme case with unusual success story of strategic renewal towards sustainability is considered the most valuable approach to provide rich insights to research questions of this study.

The sampled extreme case responds to a certain set of selection criteria. Firstly, the case demonstrates an unusual success in strategic renewal over time. The strategic renewal process as well as its outcomes shall be outstanding. Furthermore, the outcomes should be sustainability or circular economy oriented to meet the research questions and interests of CICAT2025 program. Secondly, the chosen case company has a focal role in its ecosystem in order to provide a fruitful focal view on the business ecosystem of the study. Thirdly, the selected case needs to allow a good access to both past and current data, on the organizational level as well as on the individual level. This criterion is set because the access issues are often a time-consuming problem in in-depth qualitative research that needs to be considered (Patton, 2014). Case access is even more difficult to gain once the research topic handles a sensitive topic (Okumus et al., 2007): strategic renewal is not necessarily a painless transformation process for the case organization that they want to discuss openly. Thus, the selection criteria highlight good access to

data, both inside and outside of the case company. Additionally, the chosen case company is not only successful with its strategic renewal in the past but shows good grasp on it also real-time. This is because study findings can be biased by the prior knowledge on the strategic change outcomes. Even though historical knowledge of strategy development is necessary in strategy process research, it is even better to investigate the strategic change processes real-time to gain insights on the natural ongoing field settings. (de Ven, 1992)

The chosen case company, Neste Oyj responds to these criteria in an excellent way. Neste Oyj, former Neste Oil, is further referred to as Neste when not needed to highlight the ending of its name. The early strategic shift in the beginning of 2000s' has provided Neste its current position as the renewable fuel market leader, with more and more customers interested in a more sustainable way of consuming fuels (Schildt 2019). This is a very radical turnaround strategic change for a company especially in oil and energy industry, which makes the case extreme (Patton, 2014). Applying sustainability management to a single business case is complex (Burritt et al., 2018), not to mention the oil and energy industry. Additionally, when speaking of a multinational, adapting to a climate-based strategy is even more complex because of a wide range of dispersed uncertainties and conflicting pressures (Kolk & Levy, 2001). These challenges in this extreme case are providing a promising setting for finding interesting results in the frames of research questions, to be discovered with the selected longitudinal single-case approach.

4.3 Data gathering

Data gathering for the longitudinal single case study included accessing the case company and data early in the study, obtaining baseline information while creating a retrospective case history of the context and events until present and collecting data from a real-time study (de Ven, 1992). In the literature, several studies underlie a mixture of qualitative methods, such as interviews, archival data and observations in order to examine contemporary processes in an in-depth manner (Mackay & Chia, 2013). In particular, business ecosystem research requires interdisciplinary perspective and support of multiple methods (Kapoor, 2018) and sources (Basole et al., 2015). Consequently, this study uses both primary and secondary data to form a complete picture of the strategic renewal and business ecosystem co-evolution over time and to create a recommended retrospective case history (Chakravarthy & Doz, 1992; de Ven, 1992). Thanks to the very satisfying case company access, this possibility was harnessed in the study by combining interviews, group discussions, annual reports and secondary data, concluded below

in Table 4. These data sources are each presented in more detail in sub-sections 4.3.1 to 4.3.4.

Table 4. *Overview of the data sources*

DATA TYPE	DATA AND AMOUNT OF DATA
Interviews	Top management interviews (6)
Group Discussions	Group discussion for 7 top management interviewees (1) Group discussion for 12 members of Neste strategy team (1)
Annual Reports	Case annual reports 2005-2018 (14)
Secondary Data	Trade journal articles (7) Magazine and newspapers articles (8) Theses (2) Case company blog posts and news (18) Case company videos (16) Case company presentations (3) Other related websites (17)

To allow comprehensive understanding of the strategic renewal of the purposively sampled extreme case, longitudinal data gathering is based on multi-sourcing during the researched time period from 2000 to 2019. Interviews were conducted between June and October 2019 and group discussions conducted in December 2019 and January 2020. Annual reports and multi-sourced secondary data were collected between February and August 2019 and revisited during the interviewing as well as analysis of data to confirm the coherence of collected information. Annual reports and secondary data were principally used to form strategic renewal timeline and business ecosystem maps. Interviews and group discussions have been chosen as a data gathering method to deepen the understanding of the underlying issues in the strategic renewal towards sustainability. The main data sources and supplementing data sources for each research question are concluded below in Table 5.

Table 5*. Main data sources and supplementing data sources per research question*

NO	RESEARCH QUESTION	MAIN DATA	SUPPLEMENTING DATA
RQ1	*What critical incidents and eras take place in strategic renewal process towards environmental sustainability?*	Annual reports Interviews Secondary data	Group discussions
RQ2	*How does the business ecosystem evolve during the strategic renewal process towards environmental sustainability?*	Annual reports Secondary data	Interviews Group discussions
RQ3	*What are the drivers identified within the business ecosystem during the strategic renewal process towards environmental sustainability?*	Interviews Group discussions	Annual reports Media sources

4.3.1 Interviews

Top management of the company is the most acknowledgeable of the past and ongoing process of strategic renewal. It is difficult to understand the change process fully without understanding the managerial perspective (de Ven, 1992). Consequently, interviewing is a good data gathering method. Moreover, interviewing is one of the recommended approaches to data gathering especially in ecosystem research (Phillips & Ritala, 2019). For qualitative data gathering in the interviews, a non-probability sampling approach was chosen so that the most relevant persons from the case company top management level would be reached across functions.

Especially in large corporations, gaining access may cause issues, as the top managers of today value their time highly (Okumus et al., 2007), are very busy in their work and not so easy to reach. Therefore, a combination of purposive sampling and snowballing sampling methods was adapted. Purposive sampling was more specifically about expert sampling, which is needed when acquiring different experts, which in this case refers to top managers from different company functions. (Mujere, 2016) Snowball method is especially recommended when the target population is difficult to reach, and such is the case with busy and distant top management level of a large company (Saunders et al., 2009, p. 303). Sampling was conducted as follows: first one top manager of the research population was identified and reached out to. The first interview gave leads to more top managers. Eventually, already identified interviewees were used to find further interviewees until a suitable sampling size was reached. (Mujere, 2016) This snowballing method was helpful for getting references from other top managers to reach more interviewees, who tend to be occupied with their work and difficult to access. Finally, an exceptionally good access was gained as a combination of hard work and good luck with sampling. Only very few contents were sensitive and thus not communicated to the researcher on purpose despite the sensitive topics discussed in the interviews.

Interviews were conducted in a semi-structured way, which is very well suited for exploratory research thanks to the ability to gain insights to the research topic (Saunders et al., 2009). This type of interview is about interaction between interviewee and interviewer in a situation where the phenomena discussed is familiar to both, but the specific form of questions has not been set completely. (Hirsjärvi, 2009, pp. 204–205) The questions were grouped in a thematic manner beforehand, which enables reacting flexibly during the interview. Consequently, interviews enabled deeper understanding of the research topic and rich data collection by building on top of the previous questions and allowing the interviewer to ask follow-up questions. Semi-structuring is recommended also for questioning complex and open-ended topics. (Saunders et al., 2009)

Interviewing tends to open organizational access more efficiently than questionnaires, as the interviewee is not required to write anything and they can, instead, focus on reflecting the topic (Saunders et al., 2009). To gain as open access to the research data in the company as possible, it is important to motivate the members of the case organization. Consequently, the research questions needed to be designed carefully to address the important research questions (de Ven, 1992) but framed so that they are interesting for the approached top managers (Saunders et al., 2009). With semi-structured interviews, this meant selecting the discussed themes carefully and in coherence with the theoretical framework identified from academic literature in the field. The themes encompassed the story of Neste with its main milestones and main ecosystem actors during the story. During the story, the questions emphasized the importance of different drivers, such as changes in the business ecosystem, the actors in business ecosystem, technological change and regulation changes. The complete interview structure is available in appendix A. However, is to be noted that the themes evolved depending on the expertise of the interviewed person. The interviewees had the chance to get the interview themes in advance if they wanted, which allowed them to prepare mentally to discuss the topics around the research questions.

The research reached 6 interviewees in total, which is a very good number in top management level. The interviews took on average one to two hours. Interviews 2 and 6 were conducted by one researcher, otherwise there were two researchers present. See below the Table 6 for a summary. To clarify the case of interviewee 7, the person was only invited to group discussion 1. During the interviews, as recommended for researchers, the audio was recorded and notes were taken (Saunders et al., 2009). The recording was transcribed afterwards by an external transcriber. All the interviews took place at the headquarters of Neste at Keilaniemi in private meeting rooms or at the café.

***Table 6**. Interview data*

NO	DATE	DEPARTMENT	LEVEL	DURATION
I1	26.6.2019	Research & Technology	Vice President	1h 56min
I2	19.9.2019	Renewables platform	Top management	1h 6min
I3	23.9.2019	Marketing	Top management	1h 44min
I4	2.10.2019	Sustainability & Public Affairs	Senior Vice President	51min
I5	2.10.2019	Public affairs; Feedstock regulation	Top management	1h 9min
I6	3.10.2019	Communications	Top management	44min
I7	N/A	Sales	Top management	N/A

4.3.2 Group discussions

After having conducted all the interviews and analyzing their results, a collective group discussion was arranged. All the interviewees were invited to join in the discussion. From six interviewed people, all except I1 and I6 were available to participate. In addition, one additional top manager from sales department was invited (I7), as the person was willing to join the interview round but could not do so due to scheduling issues. The collective group discussion of 1.5 hours took place on Friday the 13th, December 2019, and was facilitated by presenting a slideshow of the preliminary research findings, including figures 4-8. In addition to the top managers of Neste, two additional researchers of Tampere University participated in the session.

The verifying comments from the group discussion provided detailed updates to the preliminary findings. On Monday 27th of January 2020, the updated slideshow of preliminary findings was presented to the strategy team of Neste. The present team concluded 12 people, and the presentation was held in English. The same two external Tampere University researchers joined the group discussion as in the previous one. Both group discussions were recorded with suitable equipment and transcribed by external transcribing company.

The intention of the group discussions was to go through the preliminary findings that were constructed based on the analysis of interviews, annual reports and secondary data. Both sessions were intended to validate and deepen the understanding of the preliminary analyzed findings by providing the interviewees as well as the strategy team a possibility to discuss them together. These interactive discussions facilitated new emerging perspectives and ideas to be considered in the research, including results and discussion sections of this study as well as managerial implications for companies renewing their strategies towards sustainability.

4.3.3 Annual reports

Annual reports were suitable for building up the understanding regarding the first two research questions, mainly to form the process of strategic renewal and map the business ecosystem evaluation. Because the annual reports played a remarkable role in the data gathering, they are considered as one of the primary sources of data despite their usual consideration as a solely secondary data source. The annual reports cover a time period of 2005-2018 because during this time period, they were well accessible and publicly available online.

Companies do explain reasoning behind their investment decisions in renewable energy in the annual reports (Chaiyapa et al., 2018), which is why the openly accessible annual reports of Neste were an excellent database supplementing the other data sources. While recognizing their possible limitations, their usage is still recommended (Chaiyapa et al., 2018).

4.3.4 Secondary data

Secondary data from publicly open data sources was used in order to avoid retrospective bias and to deepen the overall understanding on the in-depth analyzed case study. It is argued that secondary data is an advantage because it can be evaluated already before its use (Saunders et al., 2009). Order-wise the familiarization of secondary data began before the interviewing and finished before the second interview. Typically used in both descriptive and explanatory researches, secondary data was seen as an appropriate data source in this research. Especially promising for the use of secondary data is the feasibility of longitudinal studies and potential to lead to unforeseen discoveries. (Saunders et al., 2009, pp. 325–331) As Saunders et al. (2009) recommends, it was kept in mind that the secondary data may contain some bias, but it can still support meeting the research objectives (Saunders et al., 2009).

The research on secondary data was conducted in a comprehensive way, covering the following document based compiled data: trade journals, magazine and newspaper articles, theses, case company blog posts and news, case company videos, case company presentations and other related websites. Table 4 concludes the secondary data sources and shows them in numbers.

4.4 Data analysis

The data analysis section presents the analysis process and tools. Data-driven thematic analysis was applied to processing all the multi-sourced data. For answering research question 1 and mapping the critical incidents and eras of the strategic renewal towards sustainability, critical incident technique was chosen. Furthermore, an ecosystem mapping technique was applied in order to map the ecosystem evolution as requested by research question 2.

4.4.1 Data-driven thematic analysis

Thematic analysis is considered as a systematic, accessible and flexible approach to qualitative research. Thus, it was a suitable and overarching method for processing all

the primary and secondary data. As choosing purely deductive or inductive approach can be problematic for the scope of analysis, thematic analysis allows to move between these two approaches. (Saunders et al., 2009) For these reasons, a data-driven thematic analysis was applied to the analysis phase of the study.

As Saunders et al. (2009) recommends, the data analysis began with becoming familiar with the data (Saunders et al., 2009). Next, primary data was coded in order to group the qualitative themes with a text editing program. Code names derived from the data with an open coding technique. The focus remained on data content instead of linguistic features. To search for key topics and themes as well as recognizing relationships between them, a summarizing Excel sheet was created with the themes as columns and rows as interviewees.

The same approach of concluding findings in an Excel sheet was implemented also for annual reports and secondary data. This conclusive Excel spreadsheet was constructed as a timeline, which was very useful especially for answering research questions 1 and 2. To recognize the most important themes in the perspective of research objectives, both conclusive Excel spreadsheets of different data sources were evaluated with critical incident technique, explained in 5.4.2.

Lastly, the analysis themes were refined as recommended (Saunders et al., 2009). The themes derived from different data samples were compared and used to formalize the final set of changes over time, as needed for meeting the research objectives. Overall, the analysis process was not perfectly linear; instead, multi-sourced data was revisited during the process to refine the final themes.

4.4.2 Critical incident technique

In order to answer to the first research question of the critical incidents and eras during the strategic renewal, as well as to map the business ecosystem for the second research question, critical incident technique was applied. Critical incident technique (CIT), developed almost 60 years ago in 1954, is a natural retrospective, qualitative procedure to facilitate investigating remarkable occurrences, including events, incidents, processes or issues (Gremler, 2004). Recognizing remarkable occurrences, in turn, can lead to catalyzing discoveries and innovation. These occurrences are called critical in the sense that they have been significant for the individual concerned, either in a positive or negative way. (Hughes et al., 2007)

As for benefits of CIT in this study, it suits the qualitative research setting well. It is recommended in the use of individual interviews as it is able to give real-life insights with

immediacy and significance (Hughes et al., 2007), with a greater focus on context (Bott & Tourish, 2016) and freedom of respondent not to limit to any frames and respond in high detail (Gremler, 2004). CIT interviews enable linking context, strategy and outcomes, defining efficient frames of research (Hughes et al., 2007). As CIT is useful when broad understanding of a little-known phenomenon is created (Gremler, 2004), it remains flexible and gives space for discoveries not defined in the existing literature (Bott & Tourish, 2016; Hughes et al., 2007). Lastly, CIT provides a rich set of data that generates an accurate record of events. (Gremler, 2004) Even if CIT lacks a strong theoretical underpinning, it can still be an advantage for developing conceptual frames. (Hughes et al., 2007)

CIT is well implemented in inductive data analysis as a classification process. (Hughes et al. 2007). In order to create a classification system that provides insights of the frequency and patterns of effects on the researched subject, the researcher must consider the general frame how to describe the incidents as well as the inductive evolvement of main and subcategories. (Gremler, 2004)

In this research, the identification of critical incidents was done in the scope of research questions, limiting to the incidents relevant in the strategy process related to NExBTL and sustainability issues. The dataset was analyzed, and classification of emerging themes was done in a data-driven way with CIT. The critical incidents emerged in a data-driven way, encompassing strategic moves and investments, technology and research, regulation and society as well as programs and strategic partners. The critical incidents were mapped on a timeline based on these data-driven categories by their year of appearance, not in more detail. However, the regulation incidents often did not have a year of initiation, which is why they were placed on the timeline based on the year they were first mentioned in annual reports. Identifying the critical incidents enabled distancing certain eras throughout strategic renewal. Thus, critical incident technique supports not only finding the critical incidents of Neste's strategic renewal towards sustainability, but also the eras of strategic renewal and main developments in the encompassing business ecosystem.

4.4.3 Ecosystem mapping technique

Typical for qualitative studies, data for this research provided a great variety of details going on in the business ecosystem setting. These details are considered important because they bring account of the context (Bell et al., 2018). For ecosystem research, an overview of ecosystem history and its key events is recommended, and preferably complemented with longitudinal modelling (Phillips & Ritala, 2019), which was provided in

answering to research question 1. Regarding research question 2 about ecosystem evolution, the data was analyzed with a dedicated ecosystem mapping technique. Applying a mapping approach to an ecosystem supports the identification of key events and structural changes that drive the ecosystem transitions. (Phillips & Ritala, 2019)

Neste's business ecosystem was mapped in a relationship mapping software Kumu, suitable for modeling the structure of ecosystems with all the actors and connections. The multi-sourced data of business ecosystem actors, gathered mainly from annual reports and secondary data, was inserted to the software manually, totaling 588 items. The data included different business ecosystem actors of Neste, which were categorized in a data-driven way. No direct data reference to the business ecosystem actor type was needed, instead the idea level deriving from the data was enough for categorizing the actor types. In the cases of having a business ecosystem actor representing multiple ecosystem actor types, the classification was done is a way that the major type determined the color and an additional connection showed the connection to the other ecosystem actor type. Categorizations were colored with their individual colors. The names of categories, as well as Neste in the middle were modified by size to stand out in the map. Collaborating ecosystem actors are connected on the business ecosystem map.

To produce the business ecosystem maps, tagging and filtering tools of the software proved useful. Therefore, the business ecosystem actors, categorized and connected in the software, were first tagged manually with their years of appearance. To analyze the data in the business ecosystem map, the tags were filtered based on the identified eras, which were found based on the findings of the first research question. This tracked the temporal evolution of the ecosystem (Phillips & Ritala, 2019). Business ecosystem maps are still photos of the newly emerging ecosystem actors for each era, to be compared with each other by the differences and similarities.

The tagging of business ecosystem actors was based on all years of appearance found from the data. Once using a tag filter, the business ecosystem actor only appeared in the map in the era when it was first mentioned in the data, thus had its first tag. This kind of filtering system results to the fact that an ecosystem actor did not show during the later eras, even if it would still contribute to the business ecosystem; in other words, the map is not accumulative. When analyzing the maps for findings, it is thus to be acknowledged that each business ecosystem map is reflecting only the emergence of new ecosystem actors. Showing only the new ecosystem actors per era is making the differences between eras more visible. However, some of the actors do not have a tag, as they are present along the whole process without a doubt. As an example, the shareholders such as the state of Finland is present all along. It is to be noted that these "tagless" ecosystem

actors show on the map in each of the eras. To be best able to compare the business ecosystem maps, the results part of research question 2 presents both the business ecosystem maps of each eras with their newly emerged ecosystem actors, as well as the map without tagged business ecosystem actors and the map with all the accumulated actors throughout the strategic renewal process (Figure 6).

4.5 Methodological validity and reliability

The potential reliability and validity flaws of the methodology must be considered to ensure the quality of the study. Reliability is seen as the ability to repeat the same study with the same methodology and resulting in the same sort of findings. Validity refers to the ability to measure and explain the researched phenomena as intended in an objective setting. (Hirsjärvi, 2009, pp. 226–228) Validation is a process to verify the data, analysis and interpretation to establish their authenticity and credibility (Saunders et al., 2009). Reliability and validity depend mostly on accessibility and researcher's own evaluation, which focused on the assessment of the reputation of the data sources and methods of data collection. As all the data was collected by the researcher and did not originate from an external database, it was most suited for aiding reaching research objectives of this study. (Saunders et al., 2009)

Reliability issues concern normally participant error, participant bias, research error and researcher bias, whereas validity issues encompass face, construct, content and predictive validity (Saunders et al., 2009, pp. 202–207). Threats to validity were intentionally minimized using two general validation techniques; data triangulation and validation of the interview participants. First, data triangulation establishes validity and credibility; the conducted multi-sourcing of data complements the flaws of each of the data source that they would suffer from alone. Second, participant validation technique was implemented to decrease the effect of misinterpretation in interviews (Gremler, 2004).

The interviewees were informed of the results and invited to discuss them together in the group discussion. These group discussions with interviewees and strategy team played an important part in not only ensuring high validity of results, but also their attention to correct detail. This was especially valuable for checking that the research interpretations of the most critical incidents (RQ1) and identified drivers (RQ3) were in accordance with the perceptions of interviewees and the strategy team. Hence, the two group discussions deepened the rich set of results and allowed the researcher to verify the results before proceeding with them in the research process.

After group discussions, the comments were processed and integrated into the final version, which again was sent to the participants for final comments. (Saunders et al., 2009) The interviewees had the full right to see the findings before their publication to ensure the researcher having correctly interpreted the data. Announcing this procedure ensured a more trustworthy atmosphere and better access to data already during the interviews.

Interviewing can provide high levels of validity if conducted carefully, but also cause biases within interviewer or interviewee. The interaction during interview impacts the collected data and allows building confidence during the interview, which allows insights to the discussed topics. Audio recording and notes both do support avoiding biases in the analysis. However, audio recording can lower reliability in case the interviewees hold back because of staying too aware of it. The exceptionally good access was highly valued throughout the research process and maintained by appropriate researcher actions and behavior to ensure the best possible data gathering opportunities. When it comes to reliability, semi-structured interviews do not necessarily even intend to be repeated as they reflect the personal reflections at the time of collection. (Saunders et al., 2009)

The number of interviews in top management level is very satisfactory. To reduce validity risks, the interviewees were selected across the company functions. As for sampling, sampling error risks may threaten the validity and reliability issues. Sampling error can take place in two major ways: through bad luck, or by sampling bias of the researcher. Both case selection and interviewee selection can be impacted by this. However, even if the purposive sampling is prone to researcher's subjective selection, this is not considered to be a weakness for qualitative research design. Snowballing sampling causes the sampling error to be impossible to determine in case it occurs. Also, as snowballing technique can make it difficult to identify the correct units of population, the sample is not necessarily representative for the whole population. (Mujere, 2016) This risk was reduced by attaining interviews from top managers across case company functions.

The interviews were conducted in the speakers' native language, minimizing the risk of linguistic misunderstandings. Another group discussion was held in English, which might have increased the risk of some participants not completely understanding the discussion and prohibited them from contributing in the session. The external transcription company was ensuring that the transcriptions were prepared with sufficient time and level of carefulness.

The thematic analysis is based on the subjective interpretations of the researcher. Thus, once constructing the strategic renewal process map, business ecosystem maps and driver classifications, classification choices were made in a data-driven way, which still

remains subjective (Gremler, 2004). Critical incident analysis, despite its benefits for this research, has received some criticism in terms of reliability and validity. In this study, it was noted that the interviewees were not always able to remember specific incidents, and in many cases, they had not been working at the company during the entire time span of the longitudinal study. These notifications have also been recognized in the literature; CIT is sometimes limited in generalizability, subjectivity of analysis phase and possible limitations of data. For instance, the respondents might not remember or want to explain the correct incidents, nor the research be able to interpret them correctly. (Hughes et al., 2007) These issues were relieved in the research by multi-sourcing of CIT data, which enabled the interviews to focus on more in-depth questions rather than spending time trying to memorize critical incidents and their dates.

5. RESULTS

This section presents the results of the study. First, the case company and its industry are introduced properly. Then, the research questions are answered one by one based on the dataset analysis.

5.1 Introduction to Neste Oyj and its industry

Case company selected for this study is Neste Oyj. Neste, founded in 1948 (Lipponen 2018) is traditionally known as an oil refining company, focusing on producing, refining and marketing oil, providing engineering services and licensing new technologies in production. Nowadays Neste is the world's largest renewable diesel producer, using waste and residues in refining processes. Currently, Neste is expanding its business from renewable transportation fuels to aviation and plastic industries. The company is listed in Helsinki Stock Exchange, the major owner of the company is the state of Finland with 50,1% and its headquarters are located at the capital region of the country. (Neste Oyj 2019b) Neste has been very successful in many aspects of its strategic renewal throughout the past decades, both in grasping opportunities and surviving challenges. Consequently, Neste meets the case selection criteria and offers an interesting and unique research environment for investigating how the process of strategic renewal towards environmental sustainability is co-evolving with its business ecosystem.

The traditional fossil-based oil and energy industry is threatened by sustainability megatrend, being among the first to be targeted by wide sustainability pressures. Differentiating perspectives on long-term economic advantages in this kind of situation can lead to various ways of constructing a corporate strategy and diversifying business portfolio towards renewable solutions in oil and energy industry (Chaiyapa et al., 2018). As companies tend to vary in their strategies towards the call for sustainability under the complex set of uncertainties (Kolk & Levy, 2001), so has also Neste, with exceptional success. Since its foundation, Neste has pioneered in niche focus and high quality: Neste has always been guided by technological knowledge, feedstock competences, analytics and digitalization, which have made it possible to pioneer in the different niches (I1). As an example, Neste was the first to bring low sulfur products to Finnish markets, followed by being the first to bring unleaded petrol to markets (I3; I4).

Oil industry with its traditionally non-differenced primary products is typically capital-intensive (Bansal, 2005). Furthermore, oil and energy industry is traditionally having a high

level of cohesion and interaction among different companies (Adelman, 1987). The expertise of oil and energy companies is based on geology, chemistry, large-scale continuous process operations and management of vertically integrated supply chains. Due to the global oligopolistic nature of the industry, companies tend to prevent competitors' attempts to gain undue advantage by copying their moves, whereas on the other hand, senior executives of these companies meet frequently and are able to form a shared perspective on the oil and energy industry. (Kolk & Levy, 2001)

When it comes to sustainability, oil and energy companies typically have a negative image (Adelman, 1987). Even if some of the oil giants had worked on similar sustainable solutions like Neste already before the recession of 1980s, they could not scale up like Neste (I4) and settled with producing bulk. In the 2000s', legitimation, among other drivers, has been motivating oil and energy companies to take more environmental action (Bansal & Roth, 2000). Oil and energy companies' respond has not, however, included much of resource allocation towards political efforts, but instead to the investments in low-emission technologies with more short-term approach, such as diesel cars and fuel cells. (Kolk & Levy, 2001) Neste as a small player in the bulk-based oil and energy industry managed to avoid the competition by renewing its strategy towards sustainability-oriented niche business very early on. In this niche, it has been able to build its own business ecosystem around renewable fuels and become the ecosystem leader. Sustainability is incorporated deep in the organization of Neste, and they keep improving the traditionally weak image of an oil and energy industry company (Adelman, 1987).

Exceptionally for a company in oil and energy industry, Neste has made a remarkable turnaround in its strategy. Nowadays Neste is visioning of leading the way towards a sustainable future together (I3). Working towards the vision, Neste has approximately 5 000 employees operating in 15 countries (Lehmus 2018). Currently Neste has grown its annual revenues to almost 15 000 million euros with an annual profit of over 1 400 million euros. Neste is breaking the records with improved business and profitability due to increasing both sales and margins during 2018. Renewable energy sources have grown to be its largest business with a return on capital of 52 % (Eskola 2019). Neste has been ranked as the best performer in oil and energy industry in multiple rankings in consecutive years, including both Forest Footprint Disclosure and Global 100 list, among many other trophies and nominations acquired during the past decade. (Neste Oyj 2019b)

Sustainability and circulation of carbon dioxide have become a part of Neste's core. The cornerstone of the expansion to renewable fuels business has been the NExBTL technology (Neste Oyj 2019c), with which the fatty acids of the feedstock, including vegetable oils and waste animal fat, are turned into hydrocarbon (HVO) in the NExBTL process.

Once Neste's renewable products are used, CO_2 emissions are released in the nature. However, the released CO_2 binds to the same amount of plants that are, in fact, photosynthesized by the plants from which the feedstocks for renewable fuel production are originating. (Neste Oil 2007) Therefore, both renewable fuels and renewable feedstocks are cycling the same carbon dioxide in a circular way (Neste Suomi 2019). Additionally, even if Neste has fossil fuels in its portfolio, they can also create feedstock flows for the use of renewable business in for example bio plastics (I1):

"We do not aim for creating a carbon-free world, but a world in which the amount of carbon is not increasing; it is circulating instead." (I1)

For the NExBTL production, Neste collects over 10 different feedstocks around the world. Feedstocks are first purified and then processed in refineries that have the technical capability to utilize 100% waste and residue fats and oils to produce fuels. The technology enables using the fuel with the full concentration percentage or mixing with fossil diesel without restrictions. (Neste Oyj 2019d) The NExBTL product family of four, Neste MY Renewable Diesel, Neste MY Renewable Gasoline, Neste MY Renewable Propane and Neste MY Renewable Jet Fuel, reduce greenhouse gas emissions by 90% over the fuels' lifecycle compared to fossil fuels. (Lehmus 2018)

5.2 RQ1: What critical incidents and eras take place in strategic renewal process towards environmental sustainability?

Neste's strategic renewal process is evaluated by dividing the analyzed time period into eras, generalized in Figure 4. The figure is directly to be followed by Figure 5, which presents the more detailed development of strategic renewal with the critical incidents. The most critical incidents, marked with blue-colored symbols, ere the most influential in defining the era changes (Figure 5). To provide specific explanations of each of the critical incidents of strategy process timeline Figure 5, a concluding table is presented in appendix B. Furthermore, Figure 5 is explained in detail in the following subsections from 5.2.1 to 5.2.5, which each begin with a short era summary and are followed by explaining all the critical incidents of the era.

Figure 4. *Eras of Neste's strategic renewal process towards environmental sustainability*

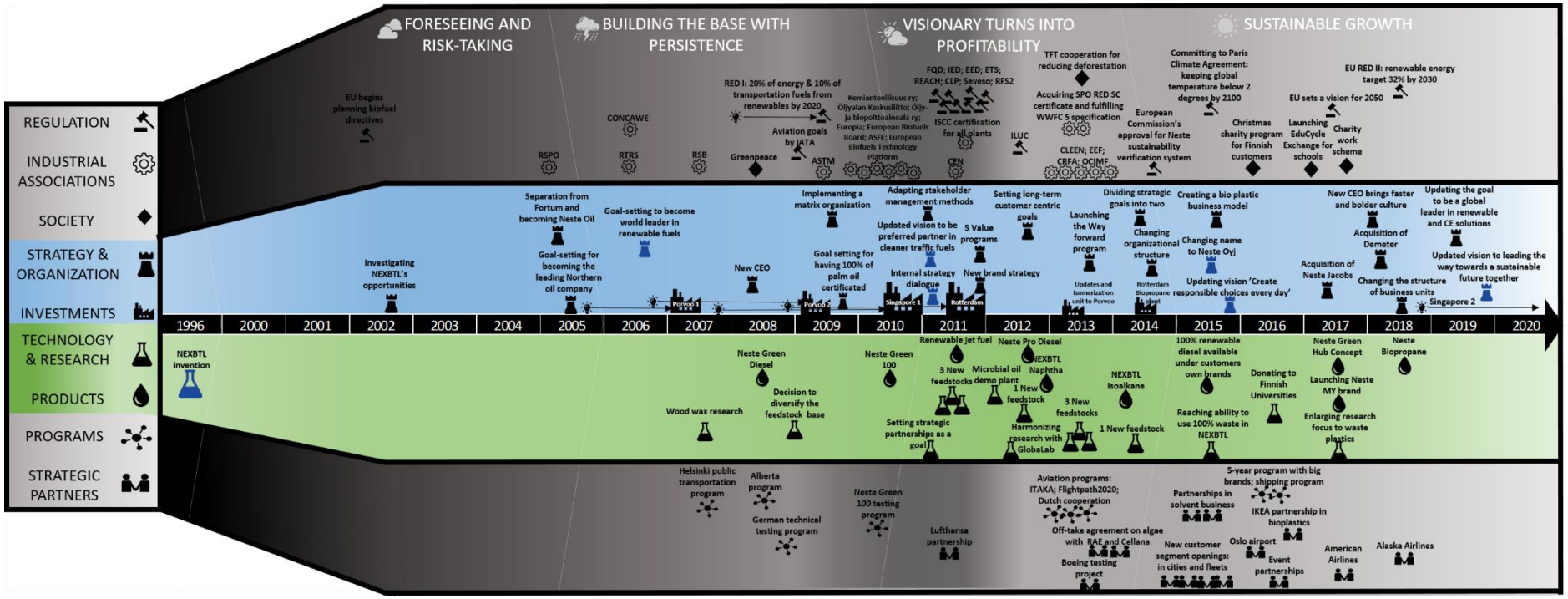

***Figure 5**. Critical incidents in Neste's strategic renewal process towards environmental sustainability*

5.2.1 Late 90s: Invention of NExBTL

Neste's path for renewable business had been paved in the 90s by the decisions to drop oil field shares and focus on providing added value through refining the feedstock (I1). Neste's portfolio used to be way larger than it is nowadays, including for example solar power. For that, Neste was too much ahead of its time and Neste did not own the technology itself. After the Soviet Union collapsed, the ending bilateral contract was posing a threat visible in the environment. A critical incident initiating the later NExBTL process was to acquire a business leader from competitor Shell who had a vision and risked his career to claim that Neste has such great machinery it should block the competitors with a quality-based strategy. This vision was shared by more and more other leaders as the time passed. Finland as a small country with high salary costs and fixed costs represents a location where added value needs to be gained from the refined products. (Group discussion 2)

Even if Neste is traditionally known for its strong technology-based competences and background (I1; I2; I4), the story of renewable fuels officially starts in 1996, when just a couple of Neste laboratory workers in the technology center invented the technology of NExBTL (I4). Thus, a few individuals stood out in the early phase, including the research manager, and encouraged these young people in the technology center to look beyond the horizon in their research (Group discussion 2). During the decade, Neste had already investigated the growth path of traditional biodiesel production but was not satisfied with its quality (I1). The method for traditional biodiesel is to take rapeseeds, more precisely their fatty acid methyl ester (I3), and turn them into ester biodiesel with esterification process, resulting typically in some remarkable quality issues (Neste Oil 2008). However, the NExBTL technology is different; instead of esterification it is about hydro-treated vegetable oil (I3). The invention is the core component of the currently ongoing strategic renewal, maintaining technical top quality in Neste's core.

The new technology enables using different vegetable oils and waste animal fat as feedstock in the making of renewable biofuels, bio hydrocarbons, with hydrogenation process that produces much better-quality products. (Neste Oil 2007), and functions as a way to differentiate from the much-competed fossil fuel industry (Group discussion 2). The NExBTL process itself is rather simple by its chemical foundation, but it is much harder to implement in industrial scale and when using more unclean feedstocks in the process (I2). Being the first in its field, the new technology did not have markets or regulation, and therefore was not seen suitable for commercialization. However, the research manager told the inventors to keep the idea safe by patenting it (I4; ID1 in appendix B).

5.2.2 2000–2005: Foreseeing and risk-taking

The first identified era of Neste's strategy process is characterized by foreseeing and risk-taking. This era takes place between 2000 and 2005 and consists of critical incidents ID2-ID6 in appendix B, further described in this section. Foreseeing applies to both regulative and market changes, enforced by the slowly growing public interest in environmentally friendly consuming. As some of the most critical incidents for the first era, European Union began working on the first biofuel directives, Neste set a goal of becoming a world leader in renewable fuels and decided to invest in its first renewable fuel production plants in Porvoo. First moves of being involved in the public environmental discussion were also taken during this era. The era is summed up with the growing need of creating new ways of business thinking, which also required a bold risk-taking attitude from the individual managers of Neste.

In the beginning of the millennium, European Union started working on the biofuel directives that encourage its member countries to rise the share of traffic biofuels to 5,75% until the end of 2010. Also, many European countries have added tax incentives to further support the progress in the biofuel industry. (Neste Oil 2006) This regulative progress seems to be one of the reasons why in 2002, the patented NExBTL technology was brought back to Neste's research tables (I1). The interest in environmental issues had risen among public (Neste Oil 2006), and so had the interest of Neste board and managerial level as well, emerging in around 2003–2005. Meanwhile, during that time period Neste separated from Fortum and became Neste Oil (ID22). Bio-based business was seen more potential than before despite still lacking the regulation and markets (I4). When considering new business opportunities, it was important to remain flexible and not to expect the customers to change their current facilities or engines for the new products (I1). The flexibility was one of the benefits of NExBTL once considering its commercialization.

The initial goal of Neste was to go global with commercializing the NExBTL products because the problems intended to solve with NExBTL products are global as well (I4). Climate change awareness gave input to the strategy process already back then, even if the public discussion was not yet as active as it is nowadays (I6). Partly because of the increasing public discussion, responsibility was considered as a necessity in order to keep business ecosystem actors. Not only keeping them, but also acquiring new business ecosystem actors was in Neste's interest, especially for finding investor partners for the new renewable fuel plants. In 2005, Neste began applying for industrial round

tables, starting with the Round Table of Palm Oil, in order to be involved in discussion regarding its most used renewable feedstock by the time. (Neste Oil 2006)

In 2005, Neste set its aim to become the leading northern European oil company (Neste Oil 2006). The same year, without having any demo plants, which traditionally are a norm in the oil industry, the board decided to build the first NExBTL plant in Porvoo in 2005 (I1) and launched the construction work right after the decision (Neste Oil 2006). Because of Neste's subsidiary Neste Jacobs, the competences in modelling a plant were high and the risk of scaling directly up could be taken even without building the demo plant first (I1). Once Neste management started to consider this big leap, it had to predict the market and regulation changes which were still ongoing. With the leaps Neste had to take – and keeps taking – in business, interviewee 2 highlights the ability to adjust to new businesses and think differently:

"Once we started with renewable business, we could not copy paste our ways of working from fossil sector." (I2)

5.2.3 2006–2010: Building the base with persistence

Based on the data, the second era is characterized by maintaining the persistent attitude while building the base for more sustainable business. As the previous era highlighted the need of foreseeing, risk-taking and new ways of thinking, the next steps were taken by updating the strategy and setting new goals in terms of sustainable business. The era was not easy for Neste's renewable business for financial and brand reasons. During the era, the board showed extraordinary persistence in their risk-taking investments in Porvoo, Singapore and Rotterdam, despite being questioned by external NGOs as well as even internally by own personnel. While the NExBTL production in the built plants was not yet profitable, the era was dedicated to building new competences and preparing for the eras to come by for example being involved in multiple technical testing and research programs. This section describes in more detail the critical incidents from ID7 to ID33 of appendix B.

Neste was facing some financial struggles in 2006 and re-considered its strategy. The board considered Neste's values; responsibility, cooperation, renewal and productivity, meanwhile it wanted to cherish the legacy of Neste. Eventually, CEO suggested updating the vision to becoming a world leader in renewable fuels, even if the whole business was not profitable at the time. Thanks to the risk-taking ability and persistence of the board, the idea was not given up, even when the global recession was adding challenges later in the era. (I4) The strategy was slightly updated the next time in 2009, including the goal

of certificating 100% of the palm oil, which was the main feedstock for NExBTL fuels back then.

Along with the new strategy, a new approach to the organizational structure was needed. Therefore, the newly elected CEO Matti Leivonen (Neste Oil 2009) wanted to turn Neste into a matrix organization. This meant in practice that the previous five business areas turned into three: oil products, renewable fuels and wholesales of oil. Seven support functions were centralized. (Neste Oil 2010) The updated strategy was the starter of redeeming the strategic goals during 2010–2013 to increase profitable growth and product efficiency. Scenario tools were used to follow-up the implementation of the strategy. (Neste Oil 2011) Besides the bold steps towards renewable business, a strong will to invest in technology was ever present, supporting the strategy-shift and establishing renewables as its own business unit (I4). The technological advancement had also been noticed externally, as Neste got awarded with Biofuels Technology Innovation Award (Neste Oil 2010). Interviewee 4 reflects on the large changes that happened in short time:

"At that point, we were just building the production plants and wondering how the production started flowing." (I4)

The first Porvoo plant started operating in 2007 and soon after the same year, Neste decided to have another one built next to it (Neste Oil 2008). The renewable business kickstarted closer to the end of the era, at around 2009 (I2) when both plants were operating, but not profitably (Neste Oil 2010). That caused speculation both internally and externally, and even the banks considered the risky situation carefully before allowing loans to Neste (I2). The new operating plants were a good encourager for Neste to start accumulating different competences in the bio fields in a cross-disciplinary way (I4). Within only few months after both Porvoo plants were running in 2007 (Neste Oil 2008), and still being unprofitable (I4), a bigger investment decision for Singapore plant was made (I1). Neste was still, despite the Singapore investment, looking actively for more investment opportunities. As an example, Neste and Austrian OMV were considering having a joint plant for renewables. (Neste Oil 2008) However, as the collaboration with Austria OMV did not progress, Neste chose to build its fourth renewable plant in Rotterdam (Neste Oil 2009). Investing in Singapore and Rotterdam with a tight schedule meant that Neste tied a couple of milliards of euros for a few years in its investments (I4), as Singapore plant was ready to operate only in 2010 and Rotterdam in 2011 (Neste Oil 2012). That did not cease Neste from seeking capacity growth, and it kept investigating further opportunities in Porvoo and Imatra areas (Neste Oil 2011). The global financial

crisis hit in 2009, just after the large investment decisions were made. Despite the financial challenges, the high quality and brand was considered important to maintain (I1).

Interest towards bio and renewable fuels increased towards the end of decade by both customers and traditional producers, who even risked over-supply. On the contrary, fossil fuel interest decreased. (Neste Oil 2011) In 2007, the public debate accelerated encompassing the actual environmental and ethical benefits of biofuels. The foresights for biofuel demand was estimated to be exponential. (Neste Oil 2008) As a response to the development of global demand, Neste's first renewable product provided to markets was Neste Green, launched to customer markets in 2008, which contains a minimum of 10% renewable diesel processed with NExBTL technology (Neste Oil 2009). Neste brought bio-based house heating oil to Finnish markets in 2009 (Neste Oil 2010). Also, new business opportunities in aviation business were approached through patenting the first tryouts of NExBTL aviation fuels. (Neste Oil 2009) Neste had top technology and products and pioneering sustainable development models (Neste Oil 2010), as well as top-class global feedstock operations and motivated, technologically capable staff (Neste Oil 2011).

During the era, Neste was actively testing the abilities of its products, even before they were allowed to the customer markets. For instance, in 2007 Neste began a 3-year-trial of renewable fuels with city of Helsinki, its public transport (Neste Oil 2008), VTT and local university, which rose lots of interest externally and got Neste invited to present the results in loads of conferences and seminars around the world (I4). In 2008, another large-scale collaboration for testing the renewable products was launched in Alberta in cooperation with Canadian government and Shell Canada among other business ecosystem actors. The same year, Neste started taking part in CONWACE research projects. (Neste Oil 2009) Another collaboration to test renewable fuels was implemented in 2010 with German car producers, local administration, university and German rapeseed producer association UFOP (Neste Oil 2011). The results from testing programs were spread and public discussion encouraged by participating in academic conference participations and meetings with car producers (I4). All in all, Neste had over 20 universities and research centers as its partners in 2008 (Neste Oil 2009). Therefore, it is no wonder Neste's research unit stretched out to new feedstocks and use of NExBTL technology in new business areas and the era was dedicated for new competence building (I4). In 2008, 80% of all research and development investments were directed to renewable research (Neste Oil 2011) and reducing the emissions of NExBTL products was managed to drop to 40-80% compared to previous estimations of 40-60% (Neste Oil 2010).

By that time, only palm oil was used as a renewable feedstock (I5). During the era, starting around 2007, Neste began to focus on expanding its feedstock base (Neste Oil 2007) by putting more efforts into R&D (I1). There were multiple reasons behind this decision: the availability, price, lifecycle and origins influence the choices of feedstock, as noted by a bio oil researcher in the annual report (Neste Oil 2008):

"The demand of feedstock is a large challenge now and in future." (Neste Oil 2008)

It was evaluated that other feedstocks would be needed in addition to palm oil (I5), for example to decrease dependency of imported raw oil and opportunities to use local farmers instead (Neste Oil 2007). Larger feedstock base would reduce the risk of price and availability dependency and the imago risks associated with the used feedstock (I1). In addition to reducing costs, other factors supporting the expansion of feedstocks include growing global demand, knowing the customers, markets and logistics operations and strategically positioned production sites (Neste Oil 2008). To choose the feedstocks, Neste must consider the price, availability and easiness of use (I2) as well as the motivations of the customer (I5). As examples of extending the feedstocks, microbial and algae feedstocks, which had been researched for commercialization for a long time, were investigated even further (I5).

Will to expand the feedstock base lead to seeking for new cooperation opportunities. In 2007, cooperation with Stora Enso was established to research the possibilities of wood waste as a NExBTL feedstock (Neste Oil 2008). Interviewee 2 reflected that maybe the feedstock strategy had been planned from the beginning in a way to start with technically easier feedstocks and move towards more difficult feedstock options (I2). Another possible reason for feedstock expansion is the increased power of external actors of the business ecosystem such as NGOs and discussions in both industry and public. (Neste Oil 2008) To be involved in the increasing discussion in the related fields, Neste joined year by year first the Round Table of Palm Oil as the first energy company in 2006 (Neste Oil 2007), Round Table of Responsible Soy in 2007 (Neste Oil 2008) and Round Table of Sustainable Biomaterials (Neste Oil 2009).

In 2006, the fragmentation of local regulation in different countries started to show (Neste Oil 2007) while the consistency of political statements increased on a global level (Neste Oil 2011). EU made decision on ambitious biofuel goals and determined rules to follow when defining the value of biofuels and their feedstocks. (Neste Oil 2007) Neste was on that same path even before the regulation, meanwhile following the recommendations of OECD, UN and ILO on the way. (Neste Oil 2008) In 2008, European Commission initiated a new directive on the biofuels and renewable energy, renewable energy directive

RED I, which commits the member states to increase the share of renewable energy to 10% in transportation by 2020. That directive would also affect the goal and requirement setting of car taxes to favor diesel. (Neste Oil 2009) The directive was passed in EU in summer 2009, and was intended to be fully integrated on national level of EU member countries by 2010, which is three years later than Neste already had its first plants running (I5) and after Neste had made decisions to invest in the Singapore and Rotterdam plants (Neste Oil 2010). The directive's requirements encouraged customers to use Neste's products. However, the customers kept mostly using NExBTL fuel as a blender with fossil fuels. (I4)

National requirements and interpretations vary country by country (I5), which requires quick decision-making. The directive was implemented with various country-level mandates in the EU the member countries. In some of the countries, the regulation forces blending the renewable oil into the fossil-based oil (I6), whereas in some of them, Neste's products were not accepted in the markets at all, which is a definite hygiene factor of commercialization (I5) and makes influencing policymakers necessary (I6). Therefore, ever since the publishing of RED I in 2009 Neste has had to stand up for its right to provide sustainable solutions in its way by making many complaints of the EU countries actions in 2011.Some of these lawsuits of Neste's own initiative are still ongoing in order to get approval for NExBTL products to the markets. (I5) On the contrary, for many countries the directive implementation on a national level demanded even larger share of renewables than the minimum level of RED I had required. For example, in Finland a goal of 20% renewable energy usage was set for 2020 and traffic fuel producers demanded to include biofuels in their portfolio progressively. (Neste Oil 2009)

In 2009, the trends in regulation focused more on aviation. For example, Air Transport Association set a goal for 20% aviation fuels to be from renewable sources by 2017 (Neste Oil 2010). Also, EU notified aviation and included it in the emission market system (Neste Oil 2011). Meanwhile in the US, the former tax incentive was outdated, leading to a temporary decrease in demand. In US markets a Renewable Fuels Standard (RFS-2) was in action and Canada was planning to set a national requirement of 2% biodiesel usage, which both increased the expectations of renewable fuels demand in the American markets. On the other hand, EU set custom requirements for US' export oil in 2009. (Neste Oil 2011) Despite the right direction of global regulation, the general atmosphere at Neste was not very satisfied with the evolution of regulative environment by the time, especially because of the national implementation of RED I in EU member countries. As interviewee 2 concludes:

"If I think of the atmosphere in the company around 2009, I believe nobody felt like regulation was strongly supporting the business we were building." (I2)

During the era, many competitors still used the old-fashioned and more quality-wise problematic processing method of traditional biofuel; obviously, Neste had to work hard to keep the intellectual property rights of its advanced NExBTL technology (I5). However, some competitors acted also as partners during the period, including for example ST1 partnering in a VTT fuel program together with Neste (Neste Oil 2010).

Interviewee 2 estimated the renewable business to show some promising, kickstarting signs in 2009, after the launches of Porvoo plants and Neste Green Diesel, which naturally led to enhanced marketing efforts (Neste Oil 2009). In 2009, functioning networks and society took more role in Neste's strategy than earlier (Neste Oil 2010). The car manufacturer cooperation and visiting conferences to spread knowledge on NExBTL technology and the commercialized products is a good example of Neste's increased operations in the networks. Interviewee 4 concludes:

"I remember we were collaborating a lot with different car manufacturers in various projects around 2006-2007. It was very global, including Japan, USA and Europe when we were taking the product to the markets." (I4)

During the time period, Neste was involved in multiple industrial associations in order to cooperate in sustainability and responsibility issues. Neste took part in Finnish industry networks like Kemianteollisuus ry and Öljyalan keskusliitto, as well as European equivalents like European oil refining industry-political association Europia, CONWACE, European biofuels board, ASFE and European biofuels technology platform. (Neste Oil 2011) Neste partnered also with DHL, Daimler, Austrian OMV (Neste Oil 2010) and Lutfhansa. (Neste Oil 2011) Neste implemented a stakeholder survey in 2010 for ensuring its responsible actions. Neste believed that making long-term contracts with partners was a good practice, enabling to offer knowledge and services for them to develop their functions (Neste Oil 2011).

On the other hand, not all business ecosystem actors seemed to understand the benefits of Neste's technological pioneering, but instead, some NGOs like Greenpeace activated against Neste around the same time as a new product, Neste Green Diesel, was launched (I3). The strong pressure and accusing actions against Neste's choice of feedstock, palm oil, were symptoms of a realized imago risk, which hit worse than expected. NGOs were driving the public opinion, which is often not based on facts (I3) and had a lot of screen time in media. Some journalists are very professional but not all understand completely what Neste's technology and products are about and drive their own agendas

without considering proper facts. (I1) Neste handled the difficult situation by deciding to meet and discuss the shared concerns together with NGO representatives (I3; I4). Neste was open about the environmental issues it tried to tackle and encouraged discussion in the public (Neste Oil 2015), once NGOs were demanding responsibility in the company's actions (Neste Oil 2013). The time period when especially Greenpeace was paying the most attention to Neste was also the same when the share of palm oil as a feedstock was the highest in Neste's production (I4).

To be better involved in the collective environmental actions in its ecosystem, Neste become a member of an alliance to opposite deforestation of rainforests (Neste Oil 2010). Even if NGO collaboration increased and WWF, IOI and RSPO had supporting statements in the Neste annual report of 2009 (Neste Oil 2010), the period of hard pressure from NGOs' side continued at least until 2011. The large public debate between Neste and NGOs was one of the most remarkable incidents in the era (group discussion 2), causing the brand image to suffer, feedstock expansion to be encouraged (I1) and the whole strategy to be questioned even by own personnel (group discussion 1). However, the problematic setting rather increased Neste's efforts to work harder towards the environmental goals (I2) and to look for new openings and solutions (I5).

5.2.4 2011 – 2014: Visionary turns into profitability

For Neste, the third era contained many strategically important critical incidents (ID34-ID78 in appendix B). After a strategy dialogue of personnel, new updates were made along with the new vision. For better meeting the requirements of updated strategy, organizational structure change took place. While renewing the organization, R&D was still regarded crucial for success. Feedstock base increased fast thanks to the work of not only this era, but also the accumulated knowledge especially from the second era. Along new feedstocks, many new products emerged during the era. Lastly, the era continued with cooperativeness with NGOs and industrial associations, an approach that had been a good practice already in the previous era.

During the third era, world economy started to revive from the global recession. Still the fear of euro crisis was present in the beginning of the era, which affected the oil markets. (Neste Oil 2012) Remarkable megatrends for the era were technological advancements and digitalization (Neste Oil 2015), climate change, unsustainable demand of natural resources and emission reduction (Neste Oil 2015), growing demand of energy, energy safety and increasing awareness of environmental issues in Europe (Neste Oil 2013),

also on the individual level of people (Neste Oyj 2016). Among these, digitalization's role grew alongside with the environmental awareness of individuals.

The two last eras were calmer than the first two in terms of investments (I1). After Rotterdam and Singapore plants were built and had a theoretical capacity of 2 million tons per year, they received an ISCC certificate by 2011 (Neste Oil 2012). The new large-scale plants required more time for production optimization (I1), and many question marks remained regarding the feedstock flows (I1; I2). In 2014, Neste decided to expand Rotterdam plant with a bio propane plant (Neste Oil 2015). In 2013, Neste outsourced its shipping functions to better focus on the implementation of new sustainability-based strategy (Neste Oil 2014).

Back in 2011, financial situation and becoming profitable with NExBTL products was a big challenge. The problems with public image, and NGOs as well as the global recession shadowed Neste's progress. (Groups discussion 1) There were still doubts and ongoing debate in Neste whether the large-scale investments for renewable production had been a large mistake, as the first profitable year for the renewable business was only in 2012 (I1; I6). However, the NExBTL renewables strategy remained very important for Neste. The growth of renewable business, even though not yet profitable, was highlighted more and more in official stakeholder reporting (I6), including annual reports.

As a continuation for scenario work of 2010, the era began with an internal strategy dialogue, which gathered opinions from approximately 1000 Neste workers (I3). The rising themes, such as biomaterials, communications and interactions, internationalization and stakeholder cooperation sparkled five new value creation programs and an updated vision for the company. The newly established value creation programs were profitable growth, productivity, renewable feedstocks, customer orientation and winner culture (Neste Oil 2012), of which the last was dropped two years later (Neste Oil 2014). In accordance with the updated vision to *be the most wanted partner in renewable solutions of cleaner transportation*, Neste directed its strategic actions to enlarging customer base globally, developing its supply chain, outsourcing some non-core operations (for instance the Polish gas stations) and keeping its constant willingness to develop technology, organization and staff alike. (Neste Oil 2012)

More updates followed. First, long-term customer centric goals were set in 2012 (Neste Oil 2013), and Way forward program was launched in 2013 (Neste Oil 2014). Way forward aimed for evaluation of human resource processes, improving internal collaboration and sharing responsibility to match the new ways of work at Neste. In the spirit of Way forward, for example the rewarding system of leaders was updated so that rewarding

was based on sustainability measures. This was done in accordance with the organizational structure change of 2014, which clarified and streamlined the management of the businesses, enforced reacting to the changes in markets and enhanced customer orientation, meanwhile reducing the number of workers. In the new organizational structure, the Production and Logistics sectors were merged into the Oil Products and Renewable Products business areas. (Neste Oil 2015)

As the internal strategy dialogue was very successful, it was repeated on an annual basis. Continuously looking for ways to improve responsibility issues, which were also brought up in strategy dialogues, Neste created its own responsibility scheme, which was accepted by European Commission in 2014 (Neste Oil 2015). Neste focused on keeping the strategic goals measurable and reaching high (Neste Oil 2014), while giving customer orientation more emphasis (Neste Oil 2015). The strategy was divided into two main areas: being the leading fuel solution provider in Baltic Sea and growing in global renewable energy markets (Neste Oil 2015).

Along with the strategy dialogue, also a large marketing research was launched in 2011. Marketing was one of the centralized functions in the previous era's organizational change, and it had to re-consider its role in the new organization and in marketing renewables. The marketing research in 2011 was very large, considering both internal and external as well as qualitative and quantitative data. As a combined result of both marketing research and strategy dialogue, a more emotional marketing approach was seen crucial and more sustainability-oriented leadership called for. As a critical incident for marketing strategy, the top management gave a mandate to radically change the old long-term brand. (I3) Shifting to a more emotional direction was a big investment for a company traditionally leaning on facts and rational explanations of technology (I1). The marketing strategy was planned in 2012 and implemented afterwards. In addition to being emotional, marketing emphasis remained on quality instead of, for example, price or service leadership. The implementation of marketing strategy follows the same process as the overall strategy, starting with a promise and following with redeeming it. First, a new brand identity was launched with an emotional, new kind of Neste campaign with Buzz Aldrin. Buzz Aldrin campaign made promises to the public, to be redeemed within weeks after launching the campaign with a new product launch. Meanwhile, an internal video was launched to enhance the personnel engagement to the same message that was shared externally. (I3)

Market acceptance was difficult to gain, as NExBTL technology is complicated for customers to understand, the regulation hinders the market entries (I5) and media often

gives black-and-white information on the products (I1). It was a challenge of the era, continuing from the past, to communicate how Neste products differed from others, in order to capture the markets. Also, the price was a hindering factor at least when it comes to aviation markets: even if Neste could already offer commercialized jet fuels, by the time Neste's renewable jet fuels remained too expensive for airlines. (I1) Therefore, the new approach to marketing was worth a try and turned out successful.

During the period, Neste brought many new products to markets, such as lamp oil and several other smaller scale products (Neste Oil 2012), Neste Pro Diesel with 15% renewable sources in 2012 (I1), NExBTL Naphtha for B2B markets to be used as a feedstock for producing bioplastics (Neste Oil 2013) and Neste Futura (Neste Oil 2015). New market entries with the different products were done, often starting with Finnish customer markets and expanding to Baltics, for instance. By 2015, Neste was producing 100% renewable fuels to several B2C markets such as Sweden, Austria and California. In 2013 Neste reached the strategic goal of using 100% certified palm oil, which was set back in 2009 (Neste Oil 2014; Neste Oil 2010).

Despite the certification of palm oil, the strategic interest remained in renewable feedstock research, for which Neste acquired a loan of 50 million from the Nordic Investment Bank (Neste Oil 2012). Also, strategic research partnerships were set as a goal (Neste Oil 2012). The efforts in feedstock base enlargement started to show during this era (I2). The motivation to grow the feedstock base for NExBTL process had been clear already in the past era, and now it began paying off. In 2011 Neste increased the number of different feedstocks that can be utilized in industrial NExBTL process from five to eight; Neste added one new feedstock in 2012 (Neste Oil 2013), three in 2013 (Neste Oil 2014) and one more in 2014 (Neste Oil 2015). Collaborations helped to research the new feedstock opportunities, for example Neste collaborated with Raisio and Boreal Plant Processing to investigate rape seed's possibilities (Neste Oil 2012), and in solvent business Neste partnered with Total Fluids and HSC Group (Neste Oyj 2016).

Neste was actively researching the possibilities in aviation business and jet fuels. Soon after the first round of regulation was shaped and issues with Greenpeace dealt with, many customers contacted Neste for collaboration (I5). Among them, Lufthansa was acquired as a strategic partner to develop jet fuels. As a result of cooperation with Lufthansa, Neste had achieved a ready product for aviation in 2011. (I1) Because of the past negative brand image of palm oil, Lufthansa wanted camelina oil as their feedstock (I5). In addition to the cooperation with Lufthansa, multiple research programs were im-

plemented regarding the commercialization of jet fuels. One of the biggest research programs of the era was that of Flightpath 2020. Flightpath 2020 was an advanced biofuels program together with European Commission, Airbus, leading European aviation airlines, other biofuel producers and NGOs. Aviation markets were also showing their potential, as for example in 2014 Boeing tested Neste's jet fuel with a concentration of 15%. However, the financial constraints and lack of communication resources still hindered them from acquiring Neste products instead of regular jet fuel (I6). Keeping an eye on new business opportunities, customers were invited to collaborate in the creation of new plastics and other oil-based materials (Neste Oyj 2016).

Partnerships in other research projects were made. As an example, long-term algae research advanced with Finnish SYKE as well as abroad in programs in Australia and the Netherlands. (Neste Oil 2014) ITAKA program was another aviation-focused research program taking place during the era in Europe. (Neste Oil 2014) The Netherlands was a place for multiple programs of Neste and its business ecosystem actors. NExBTL usage in shipping business researched already in 2011 (Neste Oil 2012), was continued in cooperation with Rotterdam harbor, Rotterdam climate initiative and local authorities. In 2013, a Dutch initiative of aviation greening, Bioport for jet fuels in the Netherlands, combined Dutch minister of employment, environmental national secretary, KLM, SkyNRG, Schiphol airport and Rotterdam harbor. Other European research programs were for instance Carbon Disclosure Project (Neste Oil 2015), cooperation with Raisioagro for the use of thatch as a feedstock, and the ongoing German program with universities, research centers, car producers and other industry partners since 2010 (Neste Oil 2011). Neste collaborated with many more research partners, programs and consortiums, such as Raisioagro, Lappeenranta University of Technology, Queensland university, VTT's TransEco and TransSmart. (Neste Oil 2014)

As the research efforts of the era demonstrate, Neste continued the paved path of the previous era to build a large variety of different skills for its employees (I4). In 2011, Neste re-organized its research units and formed so-called GlobaLab to harmonize its work methods and share the best practices among them. Additionally, Neste invested in its direct competence portfolio by purchasing the majority of its subsidiary Neste Jacobs, a company specialized in engineering solutions, technology and project management enhancement. (Neste Oil 2012)

During the third era, more attention was paid to the business ecosystem actors. For example, Neste took care of good contacts to its plant neighbor's and neighborhoods

(Neste Oil 2014). In 2011, Neste aimed for creating an annual stakeholder plan and constructed a stakeholder advisory board (Neste Oil 2012). A stakeholder criticality matrix was in use and available in the annual reports to map the importance of various business ecosystem actors (Neste Oil 2015). Also, an internal stakeholder tool base was established (Neste Oil 2013). As reputation is considered very important in NGOs' eyes (I3) and cooperation valued, new programs for NGOs and inter-governmental organizations were established in 2011 (Neste Oil 2012).

In 2011, remarkable supplier contracts were established (Neste Oil 2012) and number of small farmers increased remarkable from around 9 000 to more than 54 000 (Neste Oil 2014). New supplier collaborations were established, for example off-take agreements with alga suppliers Cellana and RAE were undersigned in 2013 and 2014 (Neste Oil 2014; I5). By 2014, Neste had 38 suppliers for waste and residue, among which 8 provided palm oil (Neste Oil 2015) and 15 fish and animal waste (Neste Oil 2014). Other remarkable suppliers were Wilmar, Golden Agri, Asian Agri and IOI Group. (Neste Oil 2014) Neste had the approach of training, auditing and meeting with sourcing partners (Neste Oil 2014) and their own personnel (Neste Oyj 2016) in the spirit of developing long-term relationships (Neste Oil 2011). Suppliers' interests differ a lot depending on their background. The small players are typically not interested in making detailed agreements with Neste as for them the waste is only hindering own business. This kind of players need support in integrating sustainability perspectives in their operations, whereas some of the suppliers are originally motivated to partner because of sharing the vision of Neste. It requires a careful optimization to decide how much information and training the suppliers with different interests and sizes should be provided. (I2)

During the time period, in Europe, many competitors had started to invest in new, more advanced refineries (Neste Oil 2013). Some of the most remarkable competitors abroad were Dynamic Fuels and Diamond Green Diesel from US markets and the multiple traditional bio diesel producers; in Europe, ENI and UPM as well as local Finnish competitors in B2C including ABC, ST1 and Teboil (Neste Oil 2013; Neste Oil 2014; Neste Oil 2015). The traditional biofuel production increased clearly in Argentina and South-East (Neste Oil 2012). Even lawsuits were raised in the US for patent infringement against Dynamic Fuels and Tyson Food Inc. Competition did not only limit to customer markets, but also to gaining adequate number of feedstocks.

Despite the competition, Neste started to find itself in a good market position, being able to choose its customers. Even if diesel production is a relatively small share of entire global fuel business, the growth for Neste within the diesel business sector was very fast

(I1). In 2013, Neste had a customer base of almost 50 European customers in 10 countries, which increased the following year to 15 (Neste Oil 2015), including customers in North American and Asian countries. Especially American markets were at a point of breakthrough in 2013. (Neste Oil 2014) and new end-customers were identified among mine industry and event organizing sector (Neste Oil 2015). Some of the new customers, such as Google, UPS, San Francisco and Oakland were widely known (Neste Oyj 2016). It is to be noted that certain customers have clear requirements towards the feedstocks used in oil production, demanding for example only super localized feedstocks for use (I2), whereas some others want to avoid palm oil for because of the NGO related brand issues of the previous era, like Lufthansa did (I5). The bad imago resulted from the beliefs that someone in the end of the supply chain was destroying rainforests (I5), and this supposition was spread out to customers too, as some of them wanted to avoid the brand risks of palm oil for their own business. The share of palm oil in NExBTL production turned down the following years thanks to the extended feedstock base. Furthermore, used palm oil was certificated later on (I1) Thus, the NGO discussion was not hindering Neste, but instead, it encouraged to work harder for the sustainability goals (I2).

Regarding other NGOs, Neste partnered with TFT to reduce rainforest deforestation (Neste Oil 2014) and received their first evaluation report the following year (Neste Oil 2015). Neste worked together with NGOs to meet their expectations, for example in oil protection activities (Neste Oil 2015) and workshops together with Neste and its suppliers (Neste Oyj 2016). Neste also achieved a new RSPO certification called RSPO-RED Supply Chain certificate in 2013 as the first company in the world. Despite advancing in its sustainability issues, Neste was still having indirect problems caused by some of the NGOs. For example, in 2013 Greenpeace accused Neste's supplier Wilmar to cause deforestation (Neste Oil 2014). Also, Finnwatch pointed out improvement points in the small farmers' facilities that Neste had as suppliers (Neste Oil 2015).

During the era Neste reached out to relevant ongoing discussions through many channels. It worked actively to cooperate with different energy and chemistry industrial associations, of which there were more than 15 memberships or other collaborations, such as taking part in workshops by the end of the era (Neste Oil 2014). These included for example EBB, CONWACE, Europia, ASFE, CLEEN, EEF, CRFA, CEN, ASTM, OCIMF, Öljy- ja biopolttoaineala ry, Cleantech Finland, Climate Partner Network of Helsinki, Climate and environment programs responsible care and Climate Leadership Council, which involved Sitra, Fortum, KONE, Outotec, Caverion and ST1 (Neste Oil 2015). The collaborations were a means to get approvals for own products and standards, such as

that of aviation standard prepared for ASTM in cooperation with Boeing (Neste Oyj 2016).

In addition to investing in production plants, research and marketing efforts, Neste did an investment in GreenStream Climate Opportunity in 2011 (Neste Oil 2012) to gain emission rights to. Emission regulation and energy efficiency were more and more pressured by policymakers as in the course of the era, regulation started to emphasize requirements instead of incentives. (Neste Oil 2015) Meanwhile regulative pressures increased, individual sustainability goals of Neste's customers were set high. For instance, in Finland, Ministry of Economy and Employment, Ministry of Environment and several soil companies decided to increase the share of bio-based feedstocks in heating oil together (Neste Oil 2012). One of the major regulative incidents, RED I of EU launched in 2009, was not the only regulative issue for countries, and Neste, to prepare for, but also FQD, IED, EED, ETS, REACH, CLP, Seveso and RFS2 all contributed to the regulative environment of renewable energy production (see appendix B for details) (Neste Oil 2012). In America, US legislation progressed with a planned goal of 20% renewable use in transportation by 2022 and Environmental Protection Agency of US worked on the new regulation, whereas in Canada the planned 2% bio obligation was being implemented nationally. (Neste Oil 2012)

In the previous eras, the problems regarding market acceptance were related to understanding the technology and differences compared to the traditional biodiesel production. As a new challenge in addition to the previous one, the whole era was dedicated for battling the hierarchy thinking of waste. This means that energy production, also including fuel production of Neste, is considered to be of lower value than another use of waste. (I5) In 2012, European commission received a propose to divide biofuel obligations based on their production feedstocks, differing whether it is plants or waste (Neste Oil 2013). Also, the definition of biofuels caused troubles, as American and European definitions differed. As the regulative environment turned more complex, Neste kept attending the regulative discussion and industrial associations' discussion in for example European Committee for Standardization (CEN) and American Society for Testing and Materials (ASTM) (Neste Oil 2012). For policymakers, understanding the discussed terms is important and clarifications needed, for example in the discussion of recycling versus occupation. (Neste Oil 2015)

5.2.5 2015 – 2019: Sustainable growth

The last era is characterized by managing sustainable growth after having built a solid base and finally become profitable after some difficult times. For the last investigated era, the critical incidents include changing the name from Neste Oil to Neste Oyj, a decision for the largest investment in Neste's history, product branding under own trademark, acquisition of Demeter and EU vision statement for year 2050 (ID79-ID101 in appendix B). Neste is supporting the growth of renewable business in multiple ways, for instance with more integrative communications as well as cooperation with NGOs. The regulation keeps shaping in both global and national levels, but more important for the era are the pioneer customers who drive the change of entire business ecosystem by partnering with Neste without waiting for the regulation to oblige that.

For the last studied era, the megatrends in the society remained very much the same as they had been in the previous one. The biggest emphasis of megatrends was on the climate change and carbon emission reduction, which shape the demand in the markets. For example, the Intergovernmental Panel on Climate Change put more pressure on taking environmental action (Neste Oyj 2019a). The development of technology and digitalization creates new business opportunities (Neste Oyj 2016; Neste Oyj 2018a), and to involve its business ecosystem actors in taking advantage of the digitalization trend, Neste wanted to encourage all of them to collaborate in the digitalization of its supply chain. For energy companies especially, the energy safety and reduction of raw oil in the processes remains a trend to follow. (Neste Oyj 2018a)

By the end of the last researched era, Neste was the leading global player in the renewable fuel business and successful in global sustainability rankings (I1), at least one year ahead of competitors (I5). Neste stays committed to follow the goals of sustainable development, set by the United Nations, as it wants to be a pioneer in offering more responsible and renewable solutions (Neste Oyj 2017), even if those possibilities among the new renewable plastic business remain still rather unknown by many of the business ecosystem actors (Neste Oyj 2019a). It is important for Neste to be considered as something more than just an oil refiner (I4). Neste was picked for the Sitra list of most interesting circular economy companies in 2016 (Neste Oyj 2017). The importance of circular economy thinking rises during the era in the business ecosystem (Neste Oyj 2018a) In general discussion, the term can be misunderstood because of not knowing all the background facts (I3) and because circular economy is not easy to define (I4). The popularity of circular economy is emphasized by China's decision to not accept European plastic waste anymore (I1). Later during the era, Neste's focus on communicating the circular

economy aspect of its renewable business become more visible (Neste Oyj 2018a), even if the technology has supported circular economy in principle all along (I1). Alongside with the circular economy, the importance of business ecosystems was growing towards the end of the era (Neste Oyj 2019a).

Neste's strategic development during the era of sustainable growth focused on redeeming the promises that had been given already in the strategy work of the previous era. One of the most remarkable changes related to strategy was the change of company name from Neste Oil to Neste Oyj. The rationale behind this decision was the shift strongly and visibly towards renewable biofuel production and bio-based chemistry products from being just an oil company. New vision was set in 2015 along the decision to change the name, stating Neste to create responsible choices every day. (Neste Oyj 2016) The change was literally immediate, as the logos were taken away right after the name vote of shareholders, highlighting the importance of change as a critical incident (I3). Creating a healthier planet for our children was the end goal, enforced with even more creative marketing platforms than earlier. New marketing projects such as *Journey to zero* involved new collaborations. For instance, for *Zero island* project, Neste collaborated with Fortum, Wallas, Helsinki city and Metsähallitus to build a carbon neutral building Nolla. (I3) Only recently, Neste has considered circular economy, too:

"When thinking of the enablers of this [strategic] transition, circular economy has emerged to our strategy only recently." (I1)

When the new CEO Peter Vanacker started in his position in 2018, the energy levels of the company culture seemed to grow strongly (I2). Having a non-Finnish CEO is something new for Neste, a traditional Finnish company founded already in 1948 (I1). The way of action reflected the slogan, "faster and bolder" (I2). The organizational structure was changed in only 100 days after the new CEO entered Neste. The old business unit of renewables split into polymers & chemicals, road transport, aviation and production to enable more focus on each of the areas and take more actions in developing them. (I1) It is not enough that Neste is relatively the most sustainable energy company, but instead, it should keep challenging itself and be one of the first to reduce fossils (Group discussion 2). The potential of Neste's renewables has now been proven and the growth is very rapid for now:

"One of the questions to solve currently is how to maintain the expertise and spirit gained through the past eras while scaling up in such a pace." (I2)

Neste was redeeming its promises from the past eras by offering more and more renewable solutions, including renewable diesel, renewable aviation fuel, renewable solvents

and feedstocks for bio plastic production (Neste Oyj 2017). Offerings for customer markets increased step by step. First, some of Neste's renewable fuels were offered to Swedish, Austrian and Californian customer markets (Neste Oyj 2016) and Neste Pro diesel was brought to Baltic countries (Neste Oyj 2017). In 2017, Neste re-branded the 100% renewable diesel as Neste MY (Neste Oyj 2018a). It was first launched to Finnish markets, followed the next year by openings in Sweden and Latvia (Neste Oyj 2019a). By that time, Neste was the biggest bio-based fuel provider in the markets with a global share of 60%. (Neste Oyj 2019a) Internationalization of Neste is still needing a lot of efforts. (I1) After the vision and name change Neste aimed more strongly to the US markets with its marketing. Global focus, influencer marketing and word-of-mouth were used in Neste's advantage, as marketing focused more and more on differentiating solutions and competences. (I3) Additionally, a new business model for bioplastic production and partnerships were also implemented in 2015 (Neste Oyj 2016). Neste's marketing changed towards storytelling and followers shared the content they found interesting. One of the most successful campaigns was *Everybody dies but not everybody lives* in 2016, implemented together with a youtuber Prince EA, *Pre-order the future* and *The only way is forward*. This was a totally unconventional way of doing marketing as an oil company (I3).

After a rather long break, it was only closer to the end of the era when Neste started considering new larger investments in production plants. Many countries wish that Neste would set up more plants in their countries in order to support their national economy. For Neste, that would ease the market entries. (I5) Finland as a geographical area would not have been adequate for successfully implementing a circular economy based strategy because circular economy is about global markets and benefits from scaling up the circulation (I4). Therefore, the locations of Neste's plants had to be global in order to make sensible business. For new production plant investments, the options varied between Singapore (Neste Oyj 2018a) and America. (I5) Finally, Singapore was chosen for the destination of the largest individual investment in Neste's history, planned to open the production line in 2022. The plant will increase Neste's production capacity of renewable products with 1.3 million tons a year, meaning that the total capacity by 2022 shall be 4.5 million a year. (Neste Oyj 2019a; Eskola 2019) Other investment projects included the merger of Porvoo plants and the acquisition of a pre-handling plant of renewable feedstocks in Sluisk, the Netherlands (Neste Oyj 2018a). Also, in 2018 Neste decided to open the world's largest renewable propane plant in Rotterdam (Neste Oyj 2019a). Lastly, regarding investments, Neste bought its subsidiary Neste Jacobs and changed its name to Neste Engineering Solutions after 14 years of being a minor owner. Major

ownership of Neste Engineering Solutions supported Neste's growth strategy and operative efficiency with its expertise in engineering, project management and technology competences. (Neste Oyj 2018a)

As for technological progress, by 2015 Neste reached the technical ability to produce NExBTL diesel from only waste and residue (Neste Oyj 2016). Neste's research efforts have been on waste feedstocks (I4), and later during the era, the focus of research efforts has been on the bio plastic and polymer industry. New testing projects with circular economy approach were launched (Neste Oyj 2018a), and the use of liquid waste plastics was researched for the use of bio-based fuels (Neste Oyj 2019a). Neste has made a promise to use one million tons of waste plastic by 2030 in its processes (I5), and already by now 80% of NExBTL is produced with waste feedstocks (I4).

As for internal research efforts, the new CEO has showed encouragement to keep working with the feedstock base and its enlargement, as it is recognized as a key strategic interest of Neste (I1). While new feedstocks are taken into use, a new office has been opened in Shanghai to manage the feedstock acquisitions and handling (I4). Also, more human resources have been allocated towards feedstock research (I2), to move more upstream and to focus on smaller and technically more demanding (I1) feedstock streams by volume (I5). All the feedstocks have some cons, and some of them are directly out of question at the moment (I5). Not just own strategic interest of Neste but also the choices and wishes of industrial customers and distributors affect the feedstock variety (I2).

Neste considers the strong technological competences to have a central role in supporting circular economy and bio economy (Neste Oyj 2019a). To strengthen the competences, Neste looks for partnerships. Partnerships can provide global knowledge or necessary equipment. (I2) Nowadays Neste has partner laboratories all around the globe depending on the supply chain and optimal locations (I1), as well as multiple universities who act as not only research partners but also opinion influencers (I3). The partnerships with universities are important to Neste. In 2015, Neste established collaboration called NEWWave program with Aalto EE to develop its strategy further and implicate it towards growth (Neste Oyj 2016). The next year, Neste made a large donation to four Finnish universities to support the local education system (Neste Oyj 2017). As for Finnish university collaboration, Lappeenranta University is collaborating with Neste in the footprint assessment program of VTT (Neste Oyj 2019a). Cooperation with universities abroad have also been cherished. As an example, Neste partnered with Delft University to de-

velop environmental impact assessment of renewable products (Neste Oyj 2017). Strategic research partnerships do not limit to universities and research institutes. In 2018, Neste partnered with many new research focused companies, such as Clariant, Air BP, ReNew ELP and Licella to develop more innovations (Neste Oyj 2019a) in the profitable use of cellulose and alga in the future (I5). It is to be noted that not only Neste, but also its customers have attended research projects to support their sustainability efforts. (Neste Oyj 2018a).

During the era, Neste continued taking part in various research programs. For example, Neste joined Sitra's smart & clean foundation, VTT's Carbon footprint development program and the consortium of resource experts (CORE), which brought together Demeter, Proforest and Rainforest Alliance to support the transparency of supply chains. (Neste Oyj 2017) In 2018, Neste joined a large 5-year program that involved widely known brands such as Unilever, Pepsicon, Cargill, Danone and palm oil suppliers such as Golden Agri and Musim Mas (Neste Oyj 2019a). Neste even begun collaboration with Finnish Meteorological Institute to evaluate data on air quality, observed with an EU satellite (Neste Oyj 2019a). Even if shipping has not been the primary focus of Neste's business divisions, a new program in 2018 involved ship owners, machine manufacturers, industrial business ecosystem actors, members of International maritime organization IMO and International Bunker Industry Association to decrease the emissions of shipping with NExBTL. The plastic and polymer business has progressed during the era, and in 2018, Neste and IKEA already worked on the commercialization of bio-based plastic products together. (Neste Oyj 2019a) Neste's new business openings in plastics and chemicals are not as dependent on regulation as the fuels are (I2).

Hand in hand with the increasing importance of various business ecosystem actors, the annual reports have been highlighting ecosystem thinking during the last era. Ecosystem thinking, partnering and sharing same values bring the business ecosystem actors together with Neste (I3). Neste has been reaching out to the business ecosystem actors in its communications and marketing channels, which has been enhanced with data diagnostics possibilities and digitalization. Data enables picking the target groups more carefully but brings the new challenge to choose the most important ones. (I6) For Neste, the marketing target group has been young people, policymakers and influencers (I3), whereas in communications, the target has been to openly partake in political discussion as well as engage media representatives and public with interest in circular economy (I6). The methods of interaction have moved from reporting and providing announcements to having own platform of communications and being involved in public discussion

about interesting related content, not just Neste's own solutions. It is important to consider what kind of language is used so that business ecosystem actors can find the content and understand it (I3). Neste wants to stay relevant in general climate change discussion by focusing firstly on listening the audience. Neste's purpose has been communicated to business ecosystem actors all along, but only within the past year there has been significant response to it; it is important to get the big masses to think and move. (I6)

Collaborations have an important role play not only when investigating the feedstocks, but also in the feedstock supply chains. At Neste, value chain management is combined with research and development efforts in a successful way. (I1) This has required the willingness of suppliers to collaborate. However, some of the suppliers are not interested in the business with Neste, but instead, just want to get rid of the side feedstock flow that is not relevant for their own processes. On the other hand, for some of the suppliers, the shared values and vision is the thing bringing them to collaborate with Neste. Neste has been working to educate and train the suppliers about sustainability issues. This has encouraged Neste to reflect on their complete value chain and impacts of suppliers on the whole process. As a result of successful supplier collaboration, Neste has not only ensured the availability of different feedstocks that meet the customer requirements, but also developed the variety of feedstocks available. In addition to the feedstock variety, then again, is the fact of negotiating the feedstock prices in a way that the certain feedstock is profitable to use. (I2)

Market awareness of Neste's products has been a challenge and very important target for Neste's communications throughout the researched eras (I6). Neste's products are often dependent on feedstock demands, as for example kosher and halal can hinder from choosing animal-based residue as feedstocks (I5). Along with the increasing number of ecosystem actors, especially customers started to appear during the era (Neste Oyj 2018a), because of the change in their perceived customer value and rise in awareness (I4). The interest of the public is shifting from the price to the content that the product can offer (I1).

As the customer interest in California grew in the last era, Neste decided to renew its distributor system in the area by partnering with four new fuel distributors, IPC USA, Ramos Oil Company, Van De Pol Petroleum and Western States Oil Co (Neste Oyj 2018a). Neste changed the branding strategy so that the fuels kept Neste name and branding instead of gaining a new brand from the distributor (I1). The customer base widened more within the era. The majority of Neste's customers represent oil companies,

re-sellers, other whole sellers such as professional traffic companies and municipalities, industrial chemistry companies, original equipment manufacturers and big brands (Neste Oyj 2017; Neste Oyj 2018a). Sometimes Neste does not know to what purpose customers are using the fuel and the customer can be a broker as well (I5). The most important customers are the pioneers (I6) who encourage the change towards sustainability with their own visionary, without waiting for the regulation to be prepared by policymakers (I1). Neste began developing more collaborative customer schemes to work on the oil-based materials that its customers produce (Neste Oyj 2016). As an example, Neste collaborated with IKEA and Avantherm to produce more ecology-friendly products (Neste Oyj 2017) and Sveaskog started testing Neste MY isoalkanes (Neste Oyj 2018a).

One of the important customer segments is cities, of which many new were acquired during the last era, including Oakland, San Francisco (Neste Oyj 2016), San Sacramento (Neste Oyj 2017), Porvoo, Espoo and Stuttgart (Neste Oyj 2018a) and Lidö, San Leandro, San Diego, Pittsburgh, Pasadena, Härmä and Åland (Neste Oyj 2019a). Partnerships with cities may include shared climate promises, which is the case with Helsinki city (Neste Oyj 2019a). Behind the decisions of cities to acquire Neste products is the will of public voters. Cities do also benefit regarding their emission reductions goals in case a large local player like an airport chooses Neste products. (I1) Other new partnerships with customers include Google (Neste Oyj 2017), Lassila&Tikanoja, UFF (Neste Oyj 2018a), Valtra (Neste Oyj 2019a), some fleets (Neste Oyj 2019a), as well as transportation companies like UPS (Neste Oyj 2017), DB Schenker (Neste Oyj 2018a) and fuel transport specialists Fuel Delivery Services, WestCAT and Ecology (Neste Oyj 2019a). The customer portfolio of Neste was also supplemented by event management sector. Neste has been serving customers in many large-scale events, such as American Superbowl, Finnish summer events like Neste Rally (Neste Oyj 2018a), Weekend festival (Neste Oyj 2017) and Elfwegentocht in the Netherlands (Neste Oyj 2019a).

Aviation business, researched widely already back in 2011, got a new boost in the latest era. Neste had prepared an aviation fuel standard together with Boeing and sent it for approval to ASTM in 2015 (Neste Oyj 2016). In the era, public discussion and end-customers put more pressure on airlines in terms on sustainability requirements (I3). Additionally, the worst financial times for airlines were managed by the time (I6), so some airports have started to show interest in providing Neste's renewable solutions to airlines, among the first ones the Oslo airport in 2016 (Neste Oyj 2017), Dallas Fort Worth International airport, Finavia airports in Rovaniemi, Kuusamo, Ivalo and Kittilä (Neste Oyj 2019a) and Helsinki-Vantaa airport to provide the transportation renewable fuels (Neste

Oyj 2018a). In 2017, Neste developed a Neste Green Hub model to serve more comprehensively the airports as customers (Neste Oyj 2018a). First potential customer for the Green Hub solution was Geneva airport, but due to the decision of local authorities, the collaboration initiative was cancelled (Neste Oyj 2019a). Also, airlines show direct interest to NExBTL fuels. Among them, American airlines (Neste Oyj 2018a) and Alaska airlines have collaborated with Neste (Neste Oyj 2019a). In general, aviation business sector shows more business potential to Neste than before (I1), because the sustainability issues in aviation are encouraged by the public discussions. This encouragement was lacking back in 2011 when the first try-outs with Lufthansa took place. Neste's growing aviation business first needed its own team in 2017 and nowadays it is upgraded to its own business line (I6), demonstrating the fast growth in aviation business.

As the public discussion among climate change and environmental issues have been an ever-increasingly important topic during the era, Neste kept actively attending the discussion. As an example, the hot topic from the previous eras, sustainability of the palm oil production has been worked on for over ten years. That has resulted in 20% certification of all palm oil produced in the entire world, which would most likely not have happened without Neste's active requirements for certificated palm oil in its own production. (I5) Neste joined the climate partner network of Helsinki in 2015 (Neste Oyj 2016) and took part in multiple professional associations. For example, Neste chaired the Advanced Biofuels Association (ABFA) in the US (Neste Oyj 2017). Neste worked in cooperation with the Consortium of Resource Experts, CORE, to shape guidelines for prevention of deforestation. To better report on its own actions, Neste collaborated in CDP Forests program of Disclosure insight action. (Neste Oyj 2018a)

Neste's continued believing that taking care of the supplier personnel is an action of responsibility (Neste Oyj 2016). To hear out the opinions of suppliers and NGOs, as well as to create a common understanding among the parties, Neste kept organizing common workshops with these business ecosystem actor groups (Neste Oyj 2016). To answer to the risen sustainability questions, Neste was the first oil company to publish a transparent crude palm oil dashboard online to represent its palm oil supply chain (Neste Oyj 2017), followed the next year by ethics online, a channel for any business ecosystem actor to use for reporting on ethical mistakes in Neste's network (Neste Oyj 2018a). As the actions of suppliers matter in the transparent supply chain, Neste had to end one major partnership in 2016 with IOI group after they had lost their RSPO certification (Neste Oyj 2017). After IOI group regained the certification, it was accepted as Neste's partner again (Neste Oyj 2018a). In 2018, Neste joined a SUSTAIN program to create a transparent platform of supply chain responsibility together with its suppliers, such as Apical and

Asian Agri. By 2018, Neste had 53 renewable suppliers (Neste Oyj 2019a). An interesting but natural move for ensuring the development of the long collaboration from the past years (I2) was the acquisition of Demeter, a large animal waste provider of Neste (Neste Oyj 2019a).

During the last era, Neste took more actively part in charity and interesting societal projects that concerned various societal issues. Maybe the most visible charity scheme has been the so-called ham trick, created in 2016 in collaboration with Lassila&Tikanoja and repeated the following years to gain visibility for sustainability issues within the Finnish B2C markets (Neste Oyj 2017). Furthermore, Neste launched a charity work model to enable its employees to do charity work during working days, which has led to voluntary working at SOS Child Village, Finnish Salvation Army among other NGOs (Neste Oyj 2018a). In 2018, this charity scheme involved 749 Neste workers who engaged in 84 different charities (Neste Oyj 2019a). To enhance the conditions in the supplier countries Neste created small farmer programs (Neste Oyj 2018a), took part in Unicef program focusing on palm oil farming families, an Indonesian program to research the working conditions and societal impacts through the palm oil workers (Neste Oyj 2017) and UN's farming associations' (FAO) Bioplat project (Neste Oyj 2019a). Some programs were implemented in collaboration with the suppliers, such as the Asia Group Scheme in Malaysia and another scheme in Indonesia with Golden Agri Resources and palm smallholders (Neste Oyj 2019a). Based on the open voting of public audience and a jury (I3), Neste also expanded its influence regarding sustainability and climate issues by launching an educative program EduCycle, which involved some politicians and children in 20 partner schools (Neste Oyj 2018a). EduCycle was later sold to Syrawise (I3).

During the era, the political environment was even more concerned with the ecological goals than before and was indirectly affected by large political actions like Brexit (Neste Oyj 2017) and authorities providing conflicting information on climate issues, like Mr. Trump becoming the president of US (I3). These political changes can affect for example the decisions of production plant locations (I5). The pressures for environmentally friendly regulation were visible in America and Europe alike, leading to shape more goals on the global level regarding the climate change and emission reduction (Neste Oyj 2019a). In 2016, EU initiated a new directive to increase the share of renewable energy progressively to 27% by 2030. Additionally, in the US, a more specific directive for diesels in EU and decisions on supporting biofuels took place. Other directives that Neste must consider are Fuel quality directive (FQD) (I5) and Indirect land use change (ILUC) directive, which deals with the effects of biofuel production on soil, got accepted after some debate on declining use of vegetable oil. (I5; Neste Oyj 2017) Even if the obligations

have increased (Neste Oyj 2018a), there still is need for more political support to shape the markets (Neste Oyj 2019a). This need has partly been answered by big international agreements. In 2015, the pledge of Paris climate agreement was undersigned by Neste, showing the support for the directive (Neste Oyj 2016). In the regulative environment of bio-based fuels, one of the biggest changes was the publication of EU's vision for 2050, *a clean planet for all*, by European Commission and the EU directive of renewable energy for years 2021-2030 and EU RED II (Neste Oyj 2018a). RED II directs the EU member countries to target 32% renewable energy consumption by 2030. Some countries have their own national regulation that is even more strict than that of the global level. For example, Sweden aims for being fossil free by 2045 (I3; Neste Oyj 2019a) and Norway as a non-EU country has addressed progressive aviation regulation to increase renewable fuel usage by 2030.

5.3 RQ2: How does the business ecosystem evolve during the strategic renewal process towards environmental sustainability?

The second research question considers the temporal changes within Neste's business ecosystem and its actors over time. The same division into eras that was introduced in Figure 4 is used in the analysis of the business ecosystem evolution. The constructed business ecosystem maps excited the group discussion 1:

"Interesting how it shows the increasing complexity and how we prefer working in networks and with partnership contracts, which are increasing for now. There have been these eras with road transportation ecosystem, now maybe aviation ecosystem and next emerging the plastic ecosystem." (I4)

The business ecosystem maps of each era are presented in Figure 6 and analyzed more in detail in the subsections 5.3.1.-5.3.4. Especially the accumulated map shows how complex the combination of business ecosystem actors and their links can be. According to group discussion 1, the business ecosystem mapping presents an interesting approach to show the business ecosystem evolution over time (I4). However, it leaves multiple aspects out of its scope or if otherwise controversial with the primary data. Firstly:

"What is not visible in this map in terms of the ecosystem and circular economy is the increase in waste and residue feedstocks." (I5)

As the feedstock streams are going towards smaller and smaller streams, the number of suppliers would have expected to rise over time, not linearly but in some other way (I2). There is an enormous number of suppliers (I3), but the number, not to even mention the

feedstock type bought from which supplier, cannot be fully communicated in the annual reports because of their strategic role (I5). Overall;

“It can be difficult to interpret from the maps that many of our businesses functions in a way that we cannot act alone.” (I3)

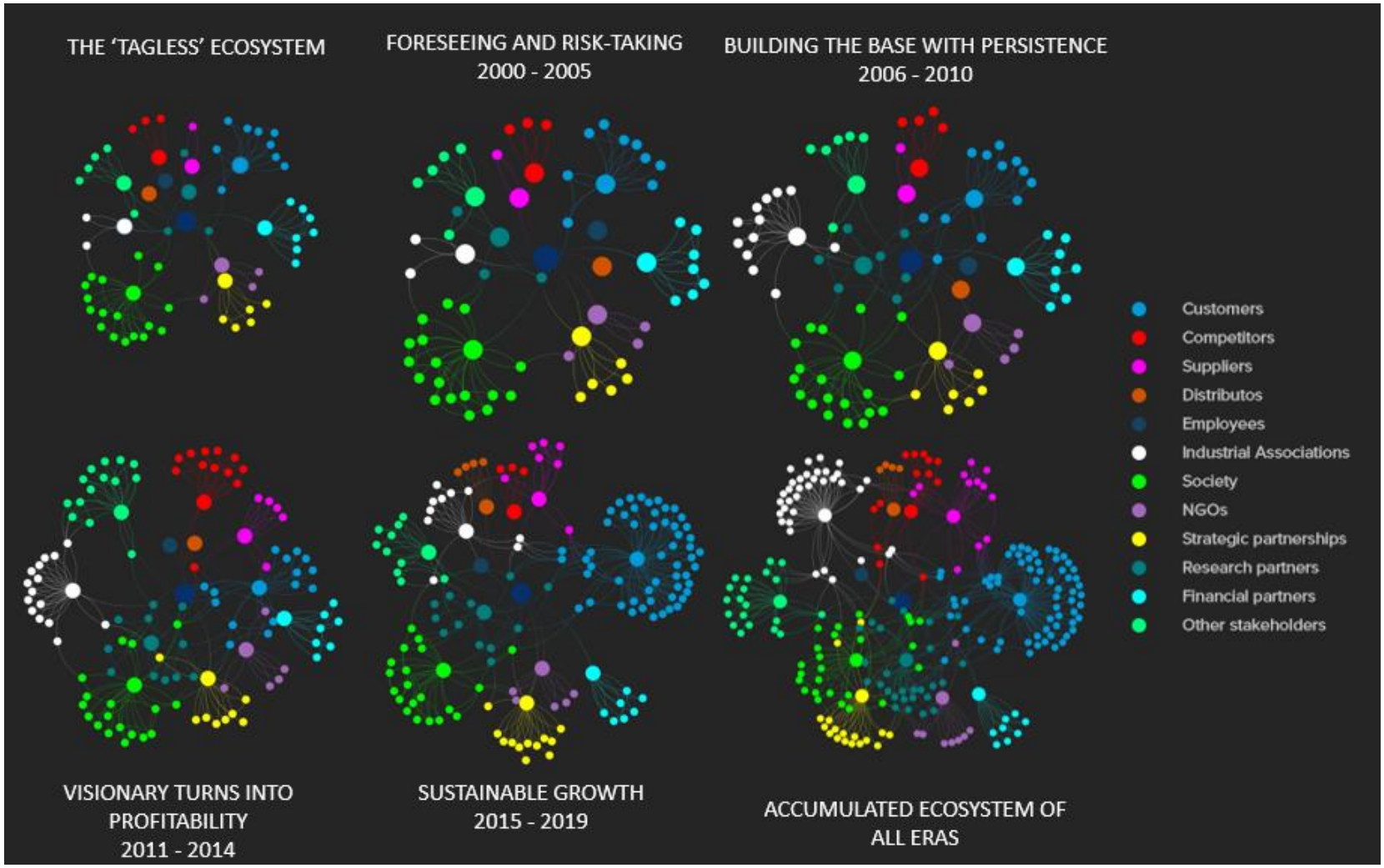

Figure 6. *Neste's business ecosystem evolution during the eras of strategic renewal process*

5.3.1 2000–2005: Foreseeing and risk-taking

The first of the investigated eras in the beginning of the millennial shows the rather traditional stakeholder map of Neste; almost all of the business ecosystem actors here did not have a specific year of appearance, and hence, the tagless business ecosystem map and the business ecosystem map of first era of strategic renewal are almost the same. As an example of these tagless business ecosystem actors we have various shareholders, employees, government and administrative bodies under the society label. In the first era the communications on sustainability issues are still rather limited within the annual reports compared to the upcoming eras, which explains the lack of tags.

In the beginning, the amount of industrial associations, research partners, strategic partners and customers is still very low compared to the upcoming eras. Especially the industrial associations and research partners are low in numbers. On the contrary, the number of societal business ecosystem actors seems to be rather large because of their stable nature, as this section includes multiple administrative business ecosystem actors. The structure of business ecosystem is rather simple and resembles a stakeholder map. The connections between business ecosystem actor groups are rather rare compared to the upcoming eras.

5.3.2 2006–2010: Building the base with persistence

The second era focuses on building the needed business ecosystem for the upcoming eras. During the era, the first remarkable renewable fuel related regulation was put into action. As can be seen on the business ecosystem map, the regulative changes had required Neste to expand its business ecosystem in terms of various industrial associations, for example round tables, which multiplied during the period. Taking part in discussions was also required because of the emerging problems with public image and NGOs like Greenpeace. This brought NGOs to a bigger role, slightly visible in the business ecosystem map, even if their number as business ecosystem actors did not increase remarkably.

The number of research partners and new research programs for renewable fuels is increasing in the second era. This is a result of shifting strategically towards the renewable business, but also because of facing the needs to expand the raw feedstock base for NExBTL production, partly due to the increased public discussion boosted by the NGOs. Overall, the era is bringing more new actors to Neste's business ecosystem compared to the first era.

5.3.3 2011–2014: Visionary turns into profitability

The era of early 2010's, Visionary turns into profitability, was a very active period regarding the evolution of business ecosystem. The markets began opening and some new customers arrive to the business ecosystem map. Along with new customers, new competitors are more recognized in the annual reports of Neste, as their number is approximately doubled and at their highest peak during the investigated eras. The number of research partners seems to remain rather same with a slight increase compared to the previous period. However, the number of new research programs increases the most during this era. The widening feedstock base and business areas are bringing new suppliers to partners of Neste. The number of industrial associations increases slightly during the period. Also, more new NGOs are engaging in Neste's business ecosystem than earlier. The most increase in numbers can be seen in strategic partnerships and other business ecosystem actors.

The structural change of business ecosystem over time reflects the complexity of the business ecosystem actor roles. Interestingly, the location of research partners on the map is moving era by era towards society and strategic partnerships. Meantime, many customers move towards NGOs in the third era.

5.3.4 2015–2019: Sustainable growth

The last era faces a great increase of customers, which is in accordance with the customer centricity and experience emphasis that Neste has been working on (I7, the group discussion 1). These customers have a pioneering role:

"Certain customers are making decisions on their own without waiting for the regulation to change -. This has changed within the past five years; there are more and more customers like this." (I1)

As a result, also the number of distributors increases. Additionally, the customers do have more connections to other actor groups of the business ecosystem than before. However, the interviewees in the group discussion 1 found controversial that the number of competitors is decreasing during the last era, taken their gut feeling of the competition having increased. The reason might be the following:

"It is rather natural that we are not telling in our annual reports how the competitors have new plants operating." (I5)

The efforts in new research partnering seem to increase slightly, even if the number of research programs drops a little. On the other hand, many new strategic partnerships

emerge compared to previous eras, which seems to be very remarkable for this era. The number of new industrial associations is dropping from the previous period, during which their emergence was at its largest. As a comment from group discussion 2:

"I think the last era kind of highlights how we steer the business with very much focus on the branded product and really looking for customers, which it's reflecting back to the distributors, -- kind of logical that they come up quite strong in there." (Group discussion 2)

Looking at the structure of business ecosystem, the last era is bringing more connections in between the customers and industrial associations, while the research partners are moving away from them, towards the strategic partnerships and society. The connections between business ecosystem actor groups seem to be slightly more versatile in the last era than in the previous ones.

5.4 RQ3: What are the drivers identified within the business ecosystem during the strategic renewal process towards environmental sustainability?

Many drivers emerged during Neste's strategic renewal towards sustainability. The research approach to recognizing emerging drivers starts with identifying and collecting drivers from interviews with data-driven approach. To categorize the driver findings, they are divided into internal and external. Internal drivers include organizational structure, organizational culture, competences and leadership. External drivers conclude market development, regulation, collaboration, society and other drivers. The summaries of drivers, their targets, consequences and case examples are presented at the end of each sub-chapter in Table 7 and Table 8.

5.4.1 Internal drivers

Neste has a strong growth ambition, thanks to the mission to fight the climate change, the will to get carbon to circulate globally (I1) and the accelerating speed of action in the new fast and bold spirit (I2). Growing in renewable fuel business has required multiple internal drivers, summed up in Figure 7. Green color is indicating how much the driver was highlighted in the interviews: the darker the green, the more the driver was discussed. The darkest shade of green means that the driver was discussed a lot in interviews, the lightest shade of green that the driver was just mentioned in a few interviews and the green between these two options is for drivers that were discussed to medium extent. The drivers are organized in the figure by their color, not the order in text. It is to

be noted that the division of categories is not as discrete as it is presented here; for example, the qualities of leadership and competences impact the organizational culture, and vice versa.

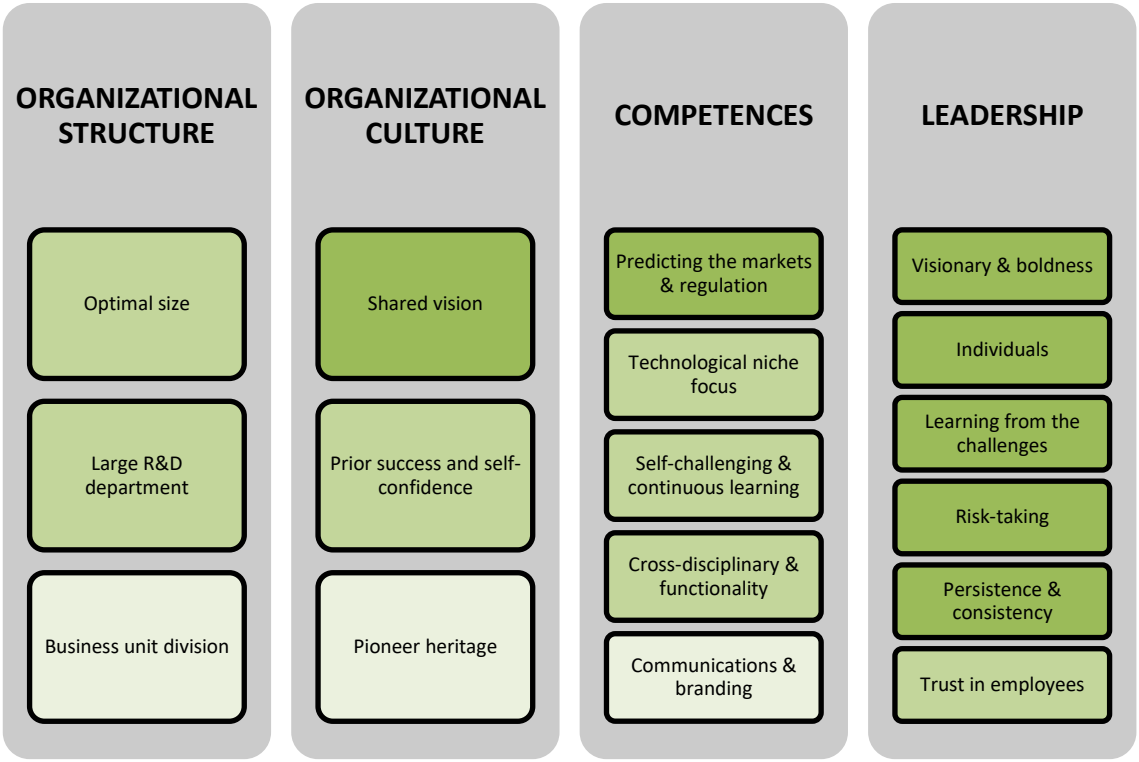

Figure 7. *Internal drivers of Neste's strategic renewal towards environmental sustainabilitv*

Organizational Structure

Some of the identified drivers are related to the organizational structure of Neste. First, Neste's benefit has been the *optimal size*. According to interviewee 4, smaller size compared to the competitors has enabled Neste to more flexibly develop new technologies and commercialize them than larger corporations in the industry; some larger companies had already worked on similar technologies but had to give them up during financially difficult times because of their relatively small role within a large corporation (I4). Neste as a smaller ecosystem actor in the business ecosystem of oil and energy industry has actively been looking for ways to differentiate, which was a reason to invest in R&D. Additionally, smaller size compared to the industry standards encouraged Neste to look for opportunities within internal and external collaboration (Neste Oil 2008), which is a driver itself. In other words, as Neste is not a very large oil and energy company, it has always needed to consider partnerships to help progressing in its strategy implementation.

Neste has adapted to the changing environment many times by implementing an organizational change (I4). In practice, organizational change deals with *business unit divisions*, which also included people leaving the company. Interviewee 2 explains the difficulty to work in renewable business when even internally questioned:

"During the difficult years, it was often hard to believe in what we were building in Renewables with so much criticism coming our way both internally and externally." (I2)

One of the critical incidents to change the business unit division was the strategy dialogue, which identified the will and expectations of employees towards the company (I3). The organizational change and new division of businesses has enabled the business units to develop more strongly than they would have developed without becoming their own entities (I6), which has been a driving force of strategic renewal towards the renewable businesses. Alongside with the renewed business units of renewable businesses, for example the regulation unit has become strong and uses two-sided interaction with policymakers. (I2)

Along with the organizational changes, also research and development unit has grown (I1). Neste has a rather *large R&D unit* within the company with 800-900 employees (I1), which has driven technological advantages and supported the strategy in enlarging to new renewable businesses. The success of Neste in renewables is partly explained by the knowledge and capabilities of innovation and technology and long experience in them (Neste Oyj 2019a). Neste has managed to invest heavily in research and business development throughout the years (Neste Oyj 2018b; Neste Oyj 2019c). Own inventions and technology build opportunities, which proved to be even bigger than expected. Because of these opportunities, Neste's strategic renewal needs to further consider renewables and services. (Group discussion 2) Having many people working in R&D unit is important, reflected in group discussion 2:

"In the end, I am talking about people. People invent the new machines, find new markets and so on." (Group discussion 2)

According to preliminary results that were discussed in the group discussions, one driving factor behind risk-taking first seemed to be that Neste is a state-owned company, so it has a better back-up than companies normally do have when taking risks (I1). This was, however, questioned in the group discussion 1. The majority of Neste shares are owned by the state of Finland, but the group discussion 1 revealed that the ownership is not affecting its success:

"Namely, Neste has been a state-owned company, but I think Neste would have been as successful if it were a similar company with similar size." (I4)

Organizational Culture

"A company having local markets and being majority government owned; maybe it's not the natural place where you would expect great, world changing innovation and risk-taking to take place. The cultural element, together or maybe as part of the risk management, [influences the] risk-taking willingness at that point when these big investments were made –. The [organizational] culture develops along [the decisions]." (Group discussion 2)

Neste has managed to create a strong organizational culture (I2). Organizational culture consists of many abstract and intangible things, which are driving the strategic renewal of Neste. First, there has been a fundamental shift of mindset inside Neste to consider environment as decision criteria instead of just burning the oil to emissions (I1). The courage of being the pioneer in the sustainable direction has changed attitudes and opened the track for other companies to do the same. This has required hard work and ability to take risks (I1), and Neste was ready to do so as it trusted its own vision (I3). Neste's mission and *shared vision* bring all the workers, as well as many business ecosystem actors, together with Neste (I3). Strong shared values attract also collaboration from outside the organization within the business ecosystem, which is more discussed in 5.4.2. Neste has managed to bring the personnel together with strongly communicated messages, even in difficult times. These messages have conveyed the shared vision that aligns with personal values of the employees, strengthened by the renewed marketing strategy (I3):

"I see characteristic the boldness and the ability to see opportunities where others see challenges. We dare with our own vision and insights, even if others would put us down, we trust our competencies to take us towards our vision. This type of courage has enabled us to boldly build a new marketing strategy and brand. It has been an internal stimulus for our organizational culture. Without these characteristics this kind of success story would not have happened." (I3)

While the business was making losses each month worth many millions, the supporting organizational culture was based on the *pioneer heritage*, persistence and determination. The first of these drivers relates the most to the organizational culture, the two latter ones are analyzed among leadership drivers. Neste has a long history of being the pioneer in the markets, and this heritage has been kept alive in the renewal of strategy process. (I4) First with renewable fuels, then with jet fuels and most recently with the

plastics and chemistry Neste is renewing its approach through the technology, which builds the base and acts also in this case as the starting point for the whole strategic renewal (Group discussion 2). Thus, pioneer heritage drives the courage to look beyond and predicting the changes in the business ecosystem.

Thanks to its pioneer heritage, Neste does things differently. This is very motivating for employees; a work community that is constantly able to evolve is very inspirational and encourages to stay longer in the company. (I3) The fast growth and progress have given long-term employees the feeling of being able to accomplish anything. Especially those who have been through the difficult times of Neste, the followed success is very motivating. (I2). Thus, the *prior success* along with the pioneer heritage is strengthening the belief in the strategic renewal towards sustainability as well as *self-confidence* to believe in its own competences.

Competences

Neste has had competences in understanding the market development and *predicting the markets and regulation* already before the emerging markets existed, which has been one of the core competences throughout Neste's journey (I2). The opening of renewable markets was partly predicted in the first era (I2), but Neste's own innovation action, organizational adaption and resourcing lead towards the emergent markets, too (I4). Hard work in background research helps the bold decision making (I3). Neste has invested in building the competence of predicting market changes (I2):

"It is part of our core competence to stay updated on the situation in our end markets, and that is not a small task." (I2)

In the deep core of Neste is the know-how of creating added value (I4) by being a technical pioneer (I3). Rather than settling to be a traditional technology-based company, the focus on *technological niche* has benefitted Neste. (I4). A strategy should not underrate the importance of the heritage and how the ongoing business is supporting the renewal towards a new one (Group discussion 2), and along its strategy renewal process, Neste has been very competent in finding its niche with the technological assets it has built over time. This is important especially in the oil and energy industry, in which the investments are very large and expensive. Thus, the driver is not technology per se, but more the ability to find a technological niche (I4, Group discussion 1).

Neste has had the courage not only to challenge the markets, but also to challenge its own internal actions; in other words, the internal mindset in different organizational levels has been *self-challenging*. This mindset is supported by openly sharing the information

of how the results of work affect the whole value chain, which makes the individual workers to understand the importance of their work efforts. This is combined with proudness to be part of Neste's important mission. (I2) While challenging itself, Neste has been able to *continuously learn* during its path.

Neste has had the ability to change and to adapt organizationally, very much because of its great *cross-disciplinarily and cross-functionality* within the company. When needing to expand its variety of feedstocks, Neste managed to do so partly because of having acquired specialists from different fields with different kinds of competences, such as bio energy and internationalization, (I4) and had them working together in a cross-disciplinary way. In addition to the engineering background, Neste needs people who understand people and people who understand service creation (Group discussion 2). The internal collaboration is highlighted in the statement of Ulla Kiiski, the inventor of NExBTL technology:

"I would never call this my breakthrough alone. None of us achieves anything on our own. We need each other's views and skills." (Sandelius 2019)

Circular economy requires technologies in order to be able to scale up and become cheaper to implement (I4). For scaling up the renewable production, Neste demonstrated high competences when not needing to build demo plants (I6). To maintain the technological quality, which has always remained at the core of Neste's products (I3), Neste has managed to set the cross-functional goals in harmony in the production plants (I1). Neste's shared vision is so strong that it enables harmonizing goals between different functions (I2). Internal trainings and cross-functional collaboration are ways to create new kind of skillsets and team spirit (I2) and being successful together is partly because of the harmonized goals between the different functions. (I1) The different functions collaborate to support each other. For example, Neste's marketing team gets insights from other relevant parties within the company to be able to ensure the best quality of marketing communications (I3).

One of Neste's most remarkable competence-based drivers has been the know-how of *branding* and communication of value for the business ecosystem actors (I1). The scope of branding and communications expands to the own personnel, who have needed internal strengthening for instance once the NGO dispute was going on and made some question their work at Neste. Nowadays personnel can be part of the brand work themselves, because they are trained to work as brand ambassadors if they please (I3). The renewal of marketing strategy was a showcase of branding and communications competences, which drive the strategic renewal further.

Leadership

The actions of Neste top management have been excellent in supporting the strategic renewal towards sustainability. Neste managers have a lot of *trust in their employees* and has given freedom in the execution of the strategy (I2). The given mandate to the employees has driven new openings, including no less than the very first invention of NExBTL in the 90s (Group discussion 2). The leaders giving the mandate to the employees were a key driver according to the group discussion 2:

"It starts with the trusted people who are left alone, a big enough group, who can build the knowledge and the self-esteem. -- The most crucial thing was to let people be together for long enough time, smart people, give them money and time to go, go there, much beyond the horizon and then let them do their thing." (Group discussion 2)

Having trust in the employees is related to the fundamental boldness of the leaders. *Boldness and visionary* of the leaders have been drivers for strategic renewal to be ambitious enough to succeed. Before making the bold decisions, the board had to spend a lot of time to share understanding of the key strategic issues, such as the feedstock base, the market situation and working environment of the employees (I4). This, combined with the existing visions of the leaders, was a driver to renew the strategy process towards sustainability (I3).

It appears that certain *individuals* within the organization are driving the strategic renewal with their own example and ways of showing the risk-taking and visionary. Still, even if there have been many strong individuals and personalities influencing the strategic renewal, interviewee 4 estimates that no one has taken the role of decision maker alone. (I4) During the mapped strategy process, these impactful individuals are often CEOs of Neste:

"Then we happened to have Risto Rinne as a CEO at the time when the first plans were invested in – he was the type of personality who liked new things and who was very optimistic about new technology and the ways to first do the engineering thing and then see how the markets would react." (Group discussion 2)

The executive board and top management make the strategic decisions and take the lead in strategy implementation. To do so, they have been bold and taken risks with long-term vision and faith in it, without being scared. (I4) Despite these leadership drivers, Neste's success did not occur overnight, meaning that leaders of Neste needed a lot of *persistence and consistency,* so-called Finnish Sisu, to follow the path (I1). The board showed extraordinary visionary and faith in their decisions and kept the direction even

when questioned by both external and internal business ecosystem actors (I3). The risks were very large indeed, but Neste's board was not showing signs of being afraid (I6). Thus, *risk-taking* is also a driver launching the strategic renewal. These qualities have been exceptional within the leaders of Neste and driving the entire strategic renewal. Lastly, once some of the taken risks occurred, the leaders of Neste managed *to learn from challenges*. As an example of this is the case of NGOs targeting Neste because of their doubts on the palm oil sustainability (Case ID15), which was solved by the leaders to attain a collaborative and dialogical way to approach the NGOs (I5).

The emerged internal drivers for strategic renewal towards sustainability are concluded below in Table 7 with case examples and case ID's that refer to appendix B.

***Table 7**. Summary of internal drivers for strategic renewal towards sustainability with case examples (Case IDs refer to appendix B)*

CATEGORY	DRIVERS	WHAT DOES IT DRIVE?	CONSEQUENCES	CASE EXAMPLE	CASE ID
ORGANIZATIONAL STRUCTURE	**Optimal size**	Testing more freely new technologies (small enough) while still having a stabile corporate environment (large enough)	Nurturing new business opportunities in the niche (sustainability field) from the developed technology	Neste is a relatively small oil company. Its existence has been ensured by being able to find small niches that have been too small for large companies but suitable for a company like Neste. (I4)	N/A
	Business unit division	Accelerating the ongoing sustainable business by giving more internal focus to it	Visible promotion of sustainable business in the eyes of external ecosystem actors. More resources and focus as well as reporting liability to the new units	The organizational change and new division of businesses has enabled the business units to develop more strongly than they would have developed without becoming their own new entities (I6).	103
	Large R&D department	Large R&D drives the development of quality technologies	Using NExBTL technology in new business fields gives competitive advantage in the markets	Neste's R&D department is extremely strong compared to company's size. (I1)	N/A
ORGANIZATIONAL CULTURE	**Shared vision**	The cooperation inside the organization and between business ecosystem actors	Harmonized goals between internal functions, alignment of personal values, building a business ecosystem around a focal value proposition	Pioneering customers, such as cities and big brands like IKEA, want to cooperate with Neste because of working with the same values and share Neste's vision.	86
	Pioneer heritage	Together with visionary encourages to strive for new market openings and self-challenging attitude for renewing strategies	Internal drive to become the market leader in renewable fuels	Neste is repeatedly the first to advance in terms of sustainability. Heritage is encouraging new openings in aviation and plastics business	103
	Prior success & self-confidence	Increases employee motivation and gives the courage for persistence for the taken visionary decisions during strategic renewal	Supports the organizational culture, encourages to strive for new challenges and to make difficult decisions and progress with the core competences	The fast growth has made long-term employees proud of their work and given the feeling of being able to accomplish anything (I2). Concretely sign of this progress is the name change to Neste Oyj.	80
COMPETENCES	**Predicting markets & regulation**	Enables to react faster to the upcoming changes in the environment	A pioneer position in the markets, building up new competences to meet market requirements	The decision to build strategy on NExBTL was much based on the predictions of opening markets, which proved successful afterwards	3
	Technological niche focus	Activation of the differentiation approach for strategic decision-making	Leading to select a strategy based on NExBTL technology	Neste has always been guided by technological knowledge, which has made it possible to pioneer in different niches (I1). The niches are better served by organizational structure changes.	107
	Self-challenging & continuous learning	Driving the internal competences and new ways to benefit from NExBTL. Along with pioneer heritage, self-challenging drives to look beyond existing business opportunities	Challenging the current state and actions; New ways of using NExBTL have enabled using a wide range of feedstocks and expand to new businesses	"*We were developing new competences in the beginning, 2005-2015, which were not directly involved with oil refining.*" (I4) Continuous learning leads to new feedstocks, e.g. camelina, jatropha and soy oils.	52
	Cross-disciplinary & -functionality	Cross-disciplinary and cross-functional working methods have unified the goals of different internal functions of Neste	Unified goals within the organization have supported the understanding of common goals, vision and cooperation between different functions	*"We could see that the traditional oil refining is not enough. We got here biologists, social scientists and agriculture specialists. -- An imperceptibly, we accumulated deep competences in many related fields and readiness to discuss them."* (I4)	N/A
	Communications & branding	Brings together Neste employees internally and relevant business ecosystem actors by communicating the together generated value	Attracting new partners and customers with shared vision. Making the focal value proposition interesting in the eyes of ecosystem actors	As a combined result of both marketing research and strategy dialogue, an emotional marketing approach become crucial. It was successfully implemented through branding competences. (I3)	50
LEADERSHIP	**Trust in employees**	Activates new approaches and activities to current ways of doing the work by giving workers a mandate to execute it their own way	New approaches, creativity, culture of trust throughout organization levels	The research manager of Neste in late 1990s' gave a mandate to his young researchers to 'look beyond and do their thing', resulting in invention and patenting of NExBTL technology (Group discussion 2).	1
	Boldness & visionary	Activates strategic renewal at its early phase by seeing beyond the current business ecosystem	Prohibits from giving up the strategy in difficult times, enables predicting the market change	The decision-makers of early phase showed extraordinary visionary when investing in the first production plants (I2).	5
	Individuals	Supporting the early strategic renewal by the individual presence; Accelerates the development of new kind of atmosphere and culture within the organization	Leading the change with example. Increases the motivation of workers and brings the unifies by shared vision	Peter Vanacker becoming a CEO in 2018 brought a remarkable change in the organization with his leadership example and 'faster and bolder' culture.	103
	Persistence & consistency	Maintains the course of strategic renewal even in difficulties	Enabled long-term planning of the strategic renewal	Not giving up strategic renewal even in difficulties such as the accusations of NGOs during the second era.	15
	Risk-taking	Risk-taking has been the cornerstone driving the initiating decision to choose renewing the strategy	Even if never being able to predict the future, risk-taking enables progressing boldly towards the vision	"If you want to stand out, you need to do a bit differently from others." (I3) An example was to build Porvoo 1 without a demo plant.	5
	Learning from challenges	Challenging situations are forcing to gain new skills	Surviving a challenge gives a positive impact to keep continuing towards the same vision. The gained skills may prove useful in the future, too	Neste learned to negotiate and cooperate with NGOs. Sharing the same goals, cooperation with NGOs has been helpful to make Neste's actions more sustainable.	15

5.4.2 External drivers

Multiple external drivers influenced Neste's process of strategy renewal. In the beginning fewer of them in numbers had a strong influence on the strategic direction, but later the external drivers from business ecosystem have increased in number, a finding supported by the results on research question 2. Figure 8 presents the emergence of external drivers from the case. As in Figure 7, green color is indicating how much the driver was highlighted in the interviews. The darkest shade of green means that the driver was discussed a lot in interviews, the lightest shade of green that the driver was just mentioned in a few interviews and the green between these two options is for drivers that were discussed to medium extent.

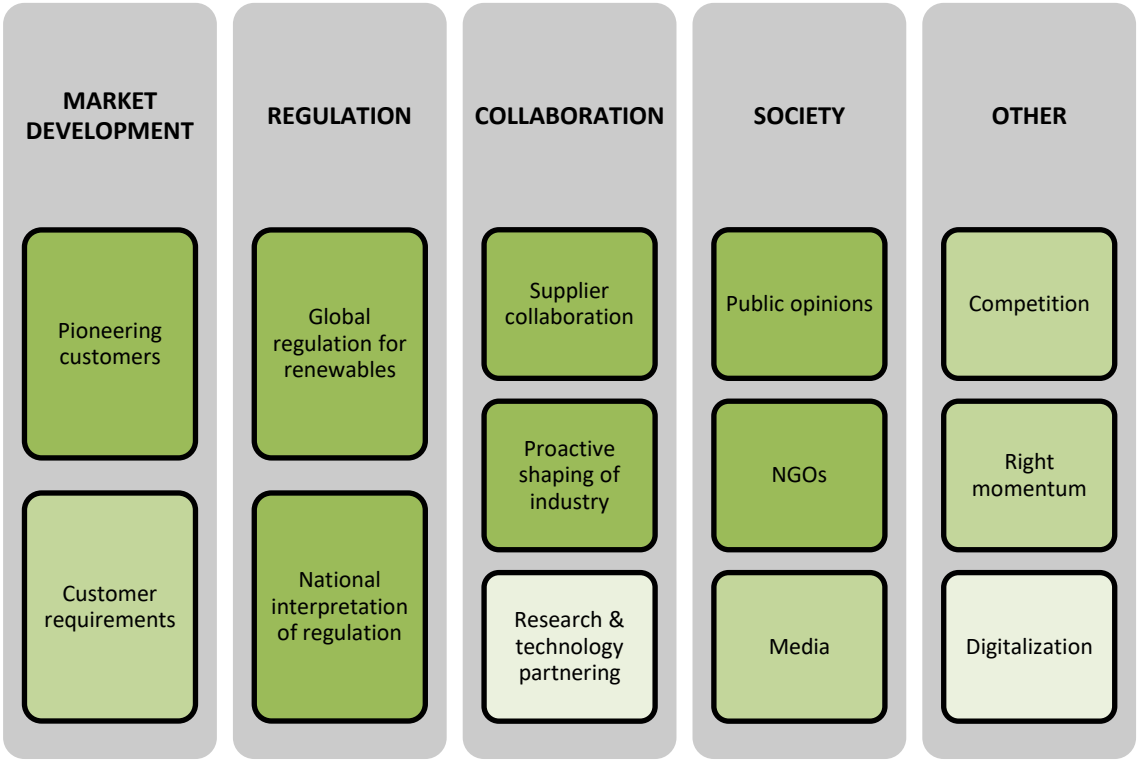

***Figure 8**. External drivers of Neste's strategic renewal towards environmental sustainabilitv*

Market Development

First external driver is the market development, including pioneering customers and customer requirements. First of them refers to the new customers to appear to the markets, whereas the latter one refers more to the existing customers to drive the actions of Neste towards a more sustainable direction.

Needless to say, the emergence of new market opportunities has been a driver for strategy renewal. According to the previous executive vice president of renewable products Kaisa Hietala, the NExBTL platform that has been built during many years, with new markets, customer segments, new geographies and value itself (Neste Oyj 2015a). As soon as the new market opportunities were predicted, Neste chose to investigate the strategy based on NExBTL technology. New markets provide an incentive for Neste just like in any other industry. Emergence of new markets has needed both a bit of luck as well as willingness to work for building the markets:

"'All along the way, you need also a good pinch of luck that market development is actually going a certain way and you are able to benefit from that. -- Of course, it requires the spirit to be willing to build out these markets, even if they are not existing." (Group discussion 2)

Market development has been possible partly because of the regulative incentives and restrictions, but also because of the *pioneering customers*. These pioneers have had the desire to find new, more sustainable solutions for their operations already before the regulation has required that (I5). This kind of customers in the Neste case are for example the city of Helsinki (Neste Oil 2008), Lufthansa (Neste Oil 2012) and IKEA (Neste Oyj 2018a), but the variety includes cities, event organizers and fleets, too. For instance, IKEA is partnering with Neste because it wants to have 100% of its plastics in home furnishes renewable or recycled by 2020 (I1). Accelerating Neste's work, these customers are so-called early birds to capture value provided by Neste's NExBTL products. As the senior Vice President in Strategy and Ventures concluded in 2015, the growth is heavily based on the close cooperation with Neste customers (Neste Oyj 2015b). The pioneering customers and Neste typically share the shared values and therefore a more strategic kind of cooperation is a natural way to work together for reaching the common goals (I3). Not only companies and public organizations, but also certain countries are being pioneers in sustainability, as their regulation exceeds that of the globally set environmental goals. This may happen both if the regulation does not exist globally or is still under progress. (I5) For example, Sweden aims for being fossil free by 2045 (I3).

On the other hand, the *requirements of customers* drive Neste's strategic actions. This has especially affected Neste's dedication for NExBTL feedstock expansion. Customer requirements can come from, for example, the preferences to use local feedstocks, avoid feedstocks that have a negative association related to them, or even not to collide with the normative or religious restrictions of using meat as a feedstock (I5). As an example, Lufthansa did want camelina oil because it had a neutral connotation and included less

brand risk than for example palm oil by the time (Case ID37). Customer requirements have shaped Neste's research efforts and driven the movement towards a larger variety of sustainable feedstock options. Interviewee 7 commented on the customer requirements as a driver for strategic renewal in the group discussion 1 as follows:

"The growth, learning and optimization of our global supply chain is closely related to the decision to widen the feedstock base. We separated the production plants based on what feedstocks they could use and end markets to serve. This was done because of the customer requirements, and when more feedstocks were available, sustainability was promoted with certifications, which provided market acceptance." (I7, Group discussion 1)

Collaboration

Collaboration with the business ecosystem actors drives Neste's strategic renewal. Already back in 2005, internal and external cooperation was seen as the key to make use of scarce resources of a relatively small oil company (Neste Oil 2008). As Ulla Kiiski, inventor of NExBTL, says:

"Climate change has no borders. Collaboration shouldn't, either." (Sandelius 2019)

Thus, for Neste, partnering is a key factor in the business:

"Partnerships on different fronts are a part of looking for new opportunities and doing it fast." (Group discussion 2)

The need for partnerships is highlighted even more during the last decade. *Partnerships and supply chain management* are sources of future opportunities (I5). Like the pioneer customers, the partners typically have a fundamental vision that goes along with Neste's, striving for a more responsible and sustainable business. This is well summed up by interviewee 3:

"We are looking for partners that share the same values and same common goal. We believe the impact is larger once these kind of actors and networks are brought together. If the partner also gains in this cooperation, that is not a loss for us." (I3)

External drivers have included *proactive shaping of industry* through collaborations. Already in 2015, it was important to make sure that future collaborations are one of Neste's competitive advantages (Neste Oyj 2015b). Additionally, as the Senior Vice President in Innovation Lars Peter Lindfors continues, Neste is constantly looking for new entrepreneurial partnerships with external business ecosystem actors (Neste Oyj 2019c). Neste has been actively taking a focal role in its business ecosystem while moving strongly towards business ecosystem actors and ecosystem thinking:

"We manage ecosystems with our customers and companies so that we can offer renewable solutions in new business areas." (Neste Oyj 2019a)

To proactively shape the industry, participation in industrial associations and cooperation with regulators act as a surface to share ideas with others involved or interested in the industry. Neste has been very active in taking part in discussion, which often aims for impacting the regulators and common understanding of the topics related to the participants' business. Thus, shaping the industry through collaborations has been a facilitating force for strategic renewal, especially in terms of gaining power in influencing regulation. As an example, Neste joined the Round Table of Responsible Palm Oil to be included in the discussions and to improve its own actions towards sustainability (Case ID 6).

The feedstock base expansion, again, plays a great example. Neste has had to collaborate with a large variety of suppliers to reach out to various new feedstocks. Neste has had the ability to manage the suppliers within business ecosystem and cooperate in an optimized way based on the supplier interests (I2). This has been a positive driver for Neste's strategic renewal; cooperation with suppliers has enabled not only a better access to new feedstocks, but also possibilities to learn from each other and expand the sustainability transition across the supply chain to others who share similar values.

Many of the new feedstocks are a result of *research partnering* between other companies, industrial players or research institutes. Research collaborations drive the strategic renewal by giving new opportunities in feedstocks and products. For example, research collaboration with RaisioAgro to turn thatch into a renewable feedstock of NExBTL (Neste Oil 2014) is looking for new feedstock openings. *Technology partnering* goes often hand in hand with advancing research but is here referred to focusing on testing the technical attributes of products in technical testing programs and support for building new NExBTL plants. Especially technical testing programs have driven the acceptance of regulators and consequently on a longer time span, the markets. Collaborations are an important yet a complicated driver: it is not straightforward to categorize the collaborations, which take place within research, customer and other strategic business ecosystem actor groups. This is because some ecosystem actors have multiple roles at the same time and fall often into multiple categories of collaborations and partnerships.

Society

Fundamental change of *public opinions* has taken place because of the climate change and the desire to control it (I4); environmental threats have risen responsibility awareness of the public. As interviewee 6 notes, the big masses have started to move and Neste wants to be part of the ongoing conversation, staying relevant for the topics but

not pushing its own solutions (I6). Increased awareness and discussion in public has been a strong driver, not only affecting Neste directly but more indirectly, by encouraging Neste's customers, regulators and other relevant business ecosystem actors to increase their sustainability efforts and to perceive Neste from sustainability angle. This, in turn, is supporting openings of new markets, such as aviation business of renewables:

"Nowadays, the climate-related pressures are coming from outside and we have the machinery we know how to use, so we can start looking at aviation fuels -." (Group discussion 2)

The public discussion in society is very much driven by *media*. Some of the journalists may have a more simplistic approach and leave out important facts when reciting Neste's story, but some of them are very competent and professional in their articles. (I1) Various media sources have a lot of power in what they explain to the public and how they drive Neste's strategic renewal towards sustainability.

Public opinions and media can be affected by statements and actions of *non-governmental organizations*. This was the case especially in around 2008 (ID15), once Neste had launched its new Neste Green Diesel and Greenpeace, among few other environmentally oriented NGOs, took Neste as their target. Without doing a very objective background search, the environmental activists made very provocative attacks to Neste facilities. This naturally increased the media attention and raised questions about the sustainability of the complete supply chain of Neste's renewable products. This was a driver for Neste to pay more attention to in its strategic renewal towards sustainability. For Neste, the challenges with NGOs were eventually a rather good thing as they encouraged to progress with the certification process of palm oil and the transparency of the supply chain, which nowadays is available as a dashboard on their website. The impact of NGOs and especially the case ID15 is concluded in group discussion 2 as follows:

"It was a big external, pressure or trigger, to really invest heavily in sustainability and the waste and residue story. – Actually, that turned out to serve us eventually, even though during that time I'm sure it was a very intense situation." (I2)

Regulation

The regulative environment of Neste includes key business ecosystem actors such as local authorities, different organizations and associations, lobbying partners, research institutes, NGOs and OEMs (I5). Regulation provides predictability and secures the markets (I1), which is important for seeing the new market openings and emergence in advance (I6). In fact, regulation is an enabler for the entire business to exist. However,

regulation is not shaped until the value of new regulation is clearly seen by decision-makers. (I4) The changes in regulation can also depend on public opinions and discussion. For example, once acquiring cities as customers, in the end the decision is made by the citizens who vote. (I1)

As environmental issues are global, national level is not enough for making changes in large scale, for example, in taxation (Group discussion 2). Global regulation is a powerful way to wake the society up. (I1), with either incenting or restricting approach. EU has the power to shape industries through regulation, but regulation can also be narrowing the possibilities of development (I6), if the understanding of regulated options is not met. Regulation shaping can take time, especially when regulating on the global level, because familiarizing with the issues and hearing all emerging opinions is time consuming. In particular, *global regulation for renewables* is a positive sign to the entire business ecosystem, encouraging the market opening and increasing the acceptance of reluctant actors. For example, RED I and RED II have had a global impact on the business ecosystem (I5), driving Neste's and its business ecosystem actors' strategic renewal towards sustainability.

Regulative interpretation can vary on a national level, and it is not easy to predict (I1), which makes the strategic renewal more difficult for any actor in the respective business ecosystem. Therefore, it is important to proactively follow regulative changes (I4) and co-shape them before they are interpreted wrong locally. That is why Neste's contribution as a specialist in the discussions of policymakers is needed, as Neste understands the end-product the best (I4). The national acceptance of NExBTL is a more concrete message for the other business ecosystem actors than the global regulation for renewables is. It drives the business ecosystem development and enhances Neste's strategic renewal towards sustainability.

Other Drivers

First of the drivers pawing Neste's way that did not directly fall in any other category is *competition.* Competition is affecting Neste in a quite controversial way: it has been important for the industry to develop (I2) and the regulation to be shaped. No legislator wants to change the regulation for only one business ecosystem actor, but thanks to competition, there are multiple actors in the field encouraging the regulative development work. (I1) The interviewees also considered Neste's business ecosystem to have room for competitors, as climate change causes more challenges than Neste can solve alone (I2; I3; I4). Additionally, it is in Neste's favor if the customers do not have to consider the

supplier risk in case Neste is the only renewable fuel supplier for them (I5). Lastly, collaborating with competitors is also an opportunity that can drive the strategic renewal further (I2). On the cons' side, competition over feedstocks and customers increases. However, for now, the competitors still use older facilities and processes than Neste. Thus, the competitors are not technologically able to process as high quality or as large variety of feedstocks as Neste can (I1).

Digitalization has enabled Neste to progress in its communications, which has helped driving the strategic renewal. Available data and the variety of communication platforms enable Neste to contribute in topical, global discussion. This is very important as the technologically advanced product would not be enough alone without the business ecosystem's acceptance (I6), which in turn can be enhanced with digitalized communications. Digitalization has been an enabler for Neste to shape its communications (I6) as well as sustainability certification systems (Neste Oil 2015). Digitalization is an interesting positive driving force because it has not launched the progress per se but been more of a facilitator during the strategic renewal process.

In addition to all the other drivers taking place in the case, there can be also so-called momentum (I2; I3) involved in the optimization puzzle that Neste is playing (I1; I2). Whether it is about the optimization of supply chain (I2), organization and positions (I6) or the overall picture (I1), Neste has been able to use the right momentum to drive the strategic renewal even further; success is a sum of multiple things which all need to succeed simultaneously (I3).

The emerged external drivers of strategic renewal towards sustainability are presented with case examples below in Table 8.

***Table 8**. Summary of external drivers for strategic renewal towards sustainability with case examples (Case IDs refer to appendix B)*

CATEGORY	DRIVERS	WHAT DOES IT DRIVE?	CONSEQUENCES	CASE EXAMPLE	CASE ID
MARKET DEVELOPMENT	**Pioneering customers**	Activating the sales of new products in the markets	Positive message towards both employees of Neste and other business ecosystem actors, including especially other customers and regulators	For example, the city of Helsinki (Neste Oil 2008) and IKEA (Neste Oyj 2018a) are customers who set their own personal goals which exceed the regulated ones. For instance, IKEA is partnering with Neste because it wants to have 100% of its plastics in home furnishes renewable or recycled by 2020 (I1).	90
	Customer requirements	Activating the feedstock expansion	Feedstock expansion is supporting strategic renewal through sustainability goals and niche orientation as well as impacts Neste's image positively. It also reduces dependency on suppliers and certain feedstocks, and offers customers more options	For example, Lufthansa wanted to use camelina oil in the NExBTL aviation fuel trial of 2011 after the recent public questioning of palm oil feedstock to avoid negative associations of the feedstock.	37
REGULATION	**Global regulation for renewables**	Opening the markets by allowing the use of NExBTL	Either pushing or pulling sustainable choices. Marketing opportunities, acceptance and positive message to the actors of business ecosystem	RED I was one of the first large scale regulative directive in EU to editorialize renewable fuels' role in emission reduction goals which helped Neste to offer NExBTL to new markets.	21
	National interpretation of regulation	National level market acceptance	NExBTL can be promoted and expanded in new market areas in practice; global regulation is not alone sufficient for that	National implementation of EU directives is often hindering Neste from progress even if the global regulation is already accepting NExBTL: some of the countries implement the directive nationally reluctant to NExBTL on purpose to support their local production. (I5)	N/A
COLLABORATION	**Supplier collaboration**	Extending the sustainability transition over the company borders in the supply chain	Better understanding of other's interests and more sustainable practices across the supply chain to work towards a shared vision. Additionally, this improves Neste's image in the business ecosystem	Close cooperation with suppliers has been practiced for example through various workshops (Neste Oyj 2016). Most appropriate case ID relates to an extreme example of having so close cooperation with a supplier (Demeter) that acquisition became a natural strategic move.	106
	Proactive shaping of industry	An overview of the industry development for own decision-making	Strongly echoed interactive messages for shaping the ecosystem via industrial associations and regulators related to industry	Joining the Round Table of Responsible Palm Oil in order to be included in the discussion among the most used feedstock by the time.	6
	Research & technology partnering	Expansion of feedstocks, gaining market credibility for NExBTL	Market credibility supports finding pioneer customers, opening markets and influencing regulation. Feedstock expansion is supporting the sustainability goals and impacting Neste's image positively. It also reduces dependency on suppliers and certain feedstocks	Before NExBTL diesel was standardized for use, Neste launched a technical testing program for its own employees and test drivers. This was used for campaigning the product as well as getting the standardization accepted faster.	33
SOCIETY	**Public opinions**	Positive public image supports the market acceptance of NExBTL	Neste's initial braveness to choose NExBTL based strategy, more motivated employees, accelerated sales and regulation shaping	Public becoming more interested in sustainability questions was one of the signs enabling Neste to predict and invest in NExBTL in the beginning of 2000's.	3
	NGOs	Public visibility and discussion	Both positive and negative associations and image. Collaboration with NGOs towards shared sustainability goals supports the strategic renewal	Greenpeace and other NGOs opposed strongly against NExBTL during the second era by public showcases before Neste discussed with them to directly cooperate for sustainability purposes.	15
	Media	Public opinions towards Neste and NExBTL	Positive messages in media support persistence to keep NExBTL strategy over challenges, more motivated employees, accelerated sales and regulation shaping	Before NExBTL turned profitable, market acceptance was difficult to gain as media often gives black-and-white information on the renewable products. Media has lots of power on how the things are presented (I1), e.g. in Greenpeace occasion.	15
OTHER	**Competition**	Increases internal efforts, regulation and market acceptance	Developing the industry and regulation, progress towards the vision Neste aims for. Customers are better guaranteed to not have a supplier risk. Coopetitive opportunities.	ST1 and Neste worked together in a VTT fuel program (Neste Oil 2010). "We cannot be jealous if some other company wants to work for this good cause. The cause is more important." (I3)	N/A
	Digitalization	Facilitates reaching interested audience via communication channels, enhances business through data	Influencing public image, participating and staying relevant in the public global warming discussion. Data can support the sustainability efforts for example in supply chain	The development of technology and digitalization create new business opportunities (Neste Oyj 2016; Neste Oyj 2018a), such as developing a more digitalized supply chain (Neste Oyj 2018a).	N/A
	Right momentum	Bringing together all needed pieces to success at the right time	Matching the temporality, context and content of strategic renewal and its co-evolving business ecosystem	"Every success story is maybe a sum of two things: hard work and the good luck of being in the right place at a right time." (I2)	N/A

6. DISCUSSION

This chapter is dedicated to reflecting on the research questions under the light of already presented literature review and empirical findings on how the process of strategic renewal towards environmental sustainability is co-evolving with its business ecosystem. Firstly, the chapter deliberates the co-evolution of strategic renewal and the encompassing business ecosystem lifecycle. The co-evolving business ecosystem is rich in drivers, the role of which for the strategic renewal process being discussed further towards the end of this chapter.

6.1 Co-evolution of strategic renewal process and business ecosystem lifecycle

This study considers strategic renewal as a process, which follows strategy process steps of formulation, implementation and evaluation (Andrews & David, 1987; Cohen & Cyert, 1973), with the possibility to drift on the way or not follow as linear pattern as the theory suggests (Farjoun, 2002). In the case, sustainability is showing as a promising direction for strategic renewal that enables taking advantage of the existing skills and previous decisions made in the company. As Neste operates in oil and energy industry, it provided an interesting extreme case to investigate under the sustainability lens. In the respective industry, the investments are large and expensive, and therefore it is not feasible to renew the strategy as flexibly as in some other industries. Thus, the strategies within the respective industry seems to traditionally be somewhat path-dependent due to the expensiveness of both investments in production and human skillsets. Path-dependent nature of the industry makes it more difficult to radically change the strategic direction. However, differing from the path-dependency theory (Garud et al., 2010), Neste has been able to predict and react to the external triggers already before they have occurred in the manner of path-creation.

Looking at the big picture, the strategic renewal of Neste case resembles one large strategy process, as the first two eras focus on strategy formulation, building up to sustainability as a new strategic direction, whereas third and fourth era are mainly responsible for taking on the challenge of strategy implementation. However, formulation and implementation steps seem to coincide during the second era of the strategic renewal process, as the transitions between process steps are not discrete. The last era is showing the

strongest signs of evaluating the ongoing large-scale process of strategic renewal, as Neste is opening a door for building a new business ecosystem through bio plastics and polymers business. Strategic renewal in Neste case has a cyclic nature (Figure 9); the process of strategic renewal does not end where the researched time period ends. Instead of ending, strategic renewal is ongoing and co-evolving with the business ecosystem that has its specific lifecycle stages:

"It [the last step of strategy process] is not an end destination by itself, you also need still new technologies, new research, new avenues of business." (Group discussion 2)

Along the process of strategic renewal, the versatility of the business ecosystem has widened towards the last era of sustainable growth (Figure 6). This finding goes along with the theory of business ecosystem lifecycle (Moore, 1993). The birth of the renewable fuel business ecosystem is taking place in the first era, second era sees the expansion with large investments and wider variety of business ecosystem actors, and the third era leads Neste to capture the leader position of business ecosystem with its powerful vision. It is said that the co-evolution of simultaneous business ecosystem actors' business models and the actual business ecosystem explains why the actors join the business ecosystem, choose to stay and leave at a point of time (Peltoniemi & Vuori, 2004). This applies to the case, where the different actors of the business ecosystem align themselves for materializing Neste's focal value proposition (Adner, 2017). The renewal stage of business ecosystem is taking place in the last era, as Neste is grasping the opportunity to expand into plastic and polymer business. Time will tell if Neste is able to turn its competences in oil refinery into competitive use in the new emerging plastics and polymers business ecosystem, but according to the theoretical background of the study, the currently opening business ecosystem renewal seems to have a perfect timing in the business ecosystem lifecycle.

When looking simultaneously at the strategic renewal process (Figure 5) and the lifecycle of its co-evolving business ecosystem (Figure 6), it can be distinguished that the lifecycle stages of birth and expansion seem to take place within the strategy formulation stage during the strategic renewal. Similarly, the leadership and renewal stages of the business ecosystem lifecycle fall under the implementation and evaluation stages of Neste's strategy process. Based on these remarks, the co-evolution of strategic renewal and business ecosystem lifecycle according to the case findings is presented in Figure 9, where the inner circle represents strategic renewal process and outer circle the simultaneously co-evolving business ecosystem lifecycle. The black arrows that connect the two circles represent the interactive co-evolution, which is continuously taking place between business ecosystem and strategic renewal process.

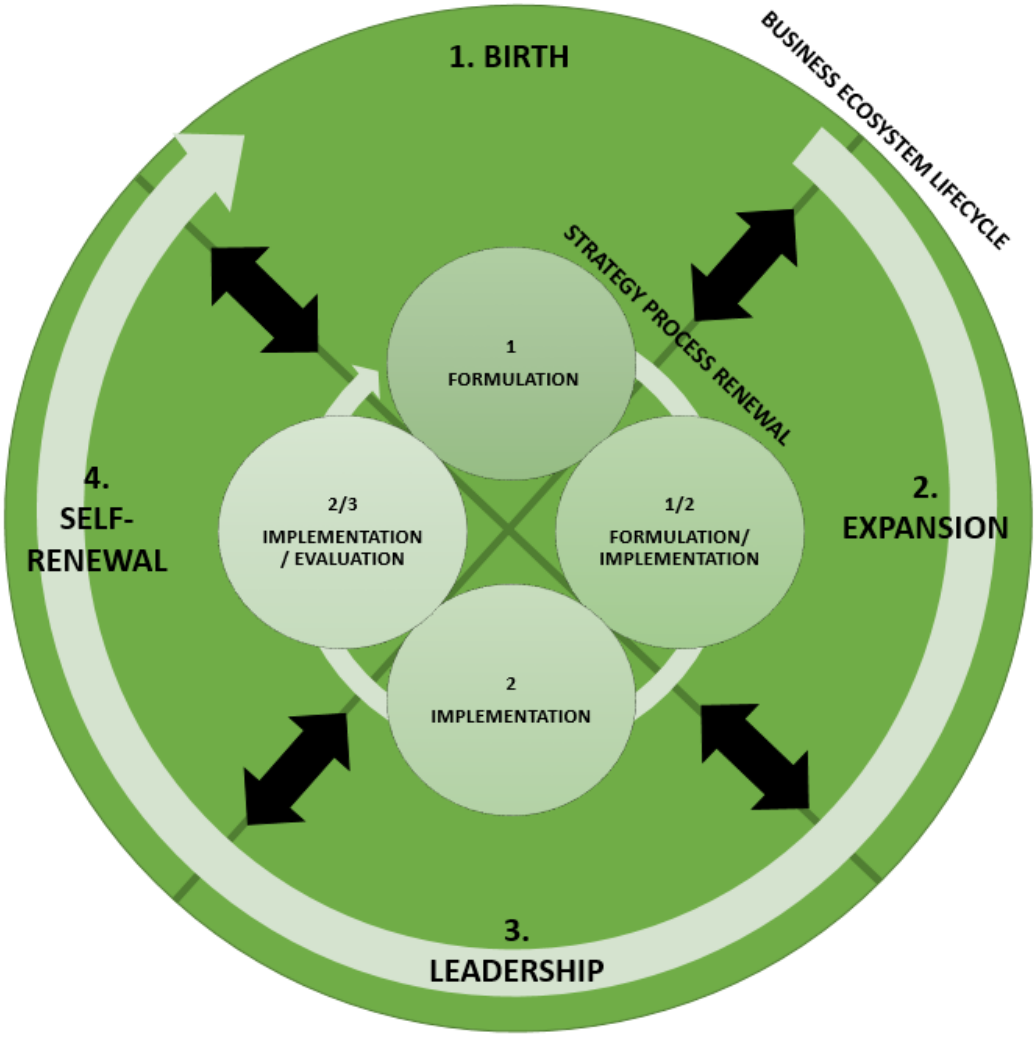

***Figure 9**. Co-evolution of the strategic renewal process and its business ecosystem lifecycle*

6.2 Role of drivers in strategic renewal towards environmental sustainability

Because the process steps during the strategic renewal seem to coincide every now and then and be controversial to interpret (Figure 9), it appears, in fact, that the strategic renewal process is constructed of multiple strategy sub-processes. The results reveal this especially well when examining the moments when Neste is updating its strategy; once the eras change, its strategic direction and vision are typically evaluated and renewed. Hence, strategy evaluation and vision updates are natural and critical actions to take once the process of strategic renewal and its business ecosystem co-evolve towards the next era. Therefore, each era has its own strategy sub-process, which includes strategy formulation, implementation and evaluation in a smaller scale compared to the overall process of strategic renewal (Figure 5). Even if identifying the sub-processes of

strategic renewal era by era is possible, the logical sequence feels difficult to define on a more detailed level than that (Group discussion 2). It is maybe not even necessary in order to renew a strategy process successfully. Instead, group discussion 2 suggests focusing on the drivers of strategic renewal:

"I guess that's the secret at the end of the day; -- Strengthen the internal ones [drivers] and then, make best use of the external ones." (Group discussion 2)

The process of strategic renewal and its sub-processes are constantly influenced by various drivers both internally and externally. First, the drivers are discussed era by era, focusing on the timing of each driver. Along the text, some critical incidents are mentioned in brackets as examples by their IDs from appendix B. Figure 10 concludes the strategy sub-processes and the most influential drivers for each era.

The initial drivers to develop the NExBTL technology already before the strategic renewal was officially launched included trust in employees, optimal size of a company and a relatively large R&D department. The first era of foreseeing and risk-taking allowed the formulation step of strategic renewal to begin. Identifying opportunities and risks of strategic renewal was especially difficult in the first era, as the foresights of the developing business ecosystem were more restricted than in other eras (ID3). Group discussion 2 was highlighting the need of risk-taking driver in initiating the strategic renewal process:

"In the beginning of this [strategic renewal process] you need to have a stronger pioneer spirit and risk-taking, otherwise we would have killed NExBTL before we would have built the first units." (Group discussion 2)

Alongside risk-taking, many other internal drivers played a role in the first era. Those include pioneer heritage, visionary, boldness and individuals who showed the spirit of risk-taking and believing in the ambitious future vision. Key external drivers in the beginning of the strategic renewal process were changes in global regulative environment (ID2) and public opinions which gave signals of new market openings to be predicted. The internal competence of predicting the markets and regulation was driving the eventual decision of strategic renewal towards sustainability. According to the findings, despite NExBTL technology itself not being a driver, the strategic renewal towards sustainability would not have been possible without its existence in the first place. Similarly, without the cross-disciplinary competences, Neste would not have been able to progress as fast to building its first NExBTL plant.

The second era was characterized by the expansion of business ecosystem by making new partnerships (e.g. ID12) and joining many industrial associations (e.g. ID8; ID13; ID26-ID31). The partnerships included technical testing programs (ID11; ID18; ID20),

which also gained public attention. However, challenges with the public opinion and brand image because of NGOs and media were very much influencing Neste (ID15), driving a faster transition towards a more transparent showcase of sustainability in Neste supply chain. Learning from those challenges drive Neste further, as well. For example, the customer requirements encouraged researching new feedstock opportunities. As Neste saw the need of an increasing amount of competences, it had invested in the cross-disciplinary and cross-functional working methods, which were driving the upcoming success of third era with a natural delay. Lastly, the bold decisions to invest in NExBTL production plants (ID10; ID17; ID32) were driven by the strong leadership of Neste, including visionary individuals such as the new CEO (ID19) during the second era and maintaining the persistence and consistency within the chosen direction of strategic renewal. The implemented business unit division was supporting the strategic renewal process (ID23).

By the time NExBTL products finally became profitable, the company had gone through a difficult, even dark period of time. The most important drivers that kept the strategic renewal going despite the difficult times were the strong opinion leaders having faith in the shared vision and the results of strategy dialogue (ID35) that enabled meeting better the expectations of own personnel and fulfill them. For instance, the new ways of branding were implemented successfully (ID50), which is a driver for engaging own personnel and strengthening the organizational culture for the strategic renewal. Seeing the company to turn the difficulties into profitable business was an important experience for the employees, acting as a positive driver for them to gain self-confidence to maintain the chosen direction of strategic renewal. The long persistency paid off thanks to not only internal drivers, but also the pioneering customers who acted as market openers and by their example supported the focal value proposition of the business ecosystem (e.g. ID37; ID71). Even if the global regulation was already developing in the era, its implementation was still varying l in different countries, driving Neste's strategic renewal forward in some, and hindering in some of them (ID38-ID45; ID51; ID73).

The last era for Neste has mostly been driven by pioneering customers (ID86; ID88-ID90 ID98; ID99; ID109) and collaborations (e.g. ID85; ID91), which can also be identified in the business ecosystem maps in Figure 6. These findings go along with the business ecosystem lifecycle (Figure 9), in which by the third era Neste was taking the role of business ecosystem leader. Increased collaborations in the last era include partnerships in new business fields (ID86), aviation (ID 88; ID98; ID109), bio plastics and polymers (ID85; ID90). The new business openings and regulative environment pushing the business ecosystem actors towards more sustainable solutions keep accelerating Neste's

strategic renewal towards sustainability. This development is driven further by Neste's internal business unit re-division (ID107) and various internal drivers. Similar to other eras, individuals have been driving the strategic renewal, this time concretely when Peter Vanacker started in his position and immediately influenced the organizational culture with faster and bolder attitude (ID103). This seems to be the most remarkable internal driver for the last era – the rest of internal drivers are more of the ongoing nature. The shared vision is still an important driver along with visionary and boldness, which enable Neste to explore new openings in renewable plastics and polymers.

Some of the most impactful drivers act as critical incidents and emerge very discretely in the strategic renewal process. This is described in group discussion 2 when discussing the influence of NGOs and Greenpeace during the second era (ID15):

"[It was] not only a driver but one of the main milestones on the way. Really made us to rethink how to build this business." (Group discussion 2)

After evaluating the temporal nature of drivers during the co-evolving strategic renewal process and its business ecosystem above, it is clear that the eras have their own strategy sub-process with their era-specific drivers. Looking at the longitudinally studied time period of Neste's strategic renewal towards sustainability, certain conclusions can be drawn on the role of various drivers (Figure 9). Firstly, in the beginning of the strategic renewal process and business ecosystem birth, internal drivers stand out. Internal drivers such as strong individuals with strong vision encouraged the initiation of strategic renewal, whereas only few external drivers were impactful in the first step of strategic renewal process. Once the business ecosystem evolves to expansion stage and strategic renewal process proceeds towards implementation, the variety of influential drivers increases. Internal drivers focus on maintaining the strategic decisions of the past era and building competences for the upcoming eras to support the strategic renewal. In this second era, competence-building goes hand in hand with research collaborations, and other external drivers focus on public discussion. As the business ecosystem is expanding, it seems logical that public is more concerned in the development of the business ecosystem and driving the strategic renewal of the business ecosystem leader with their pressure. Based on the findings of two first eras, it can be assumed that in the formulation step of the strategic renewal process, more support from internal drivers is needed to choose and maintain the strategic path of sustainability, but they would not activate the strategic renewal process without the predicted external markets in sight.

When business ecosystem lifecycle is moving to the leadership stage, the external pressures stabilize regarding the public image of the business ecosystem leader. Long-

awaited profitability of the renewables gave self-confidence to the business ecosystem leader and enhanced the trust in shared vision, which is very powerful in driving the employees of Neste. New pioneering customers and supporting regulative development appeared, too. Successful alignment with the business ecosystem in the third era can be explained by Neste's adjusted communications to its ecosystem actors. New way of communicating the updated vision and value to ecosystem actors was seen crucial once the value proposition of Neste changed radically in the strategic renewal process. However, it was important to have a strong vision, strengthened first internally, before changing the external communications.

The last era resembles business ecosystem self-renewal and is mostly driven by the enhancing vision for strategic renewal of the new CEO, enlarging to new business ecosystem with pioneering customers and other collaborations. Increasing driving force of collaborations was also visible in the growth of the business ecosystem maps (Figure 6) and aligned with the theoretical business ecosystem evolution of Moore (Moore, 1993). The last era of the co-evolutive strategic renewal and its business ecosystem is also the time for evaluating the overall strategic renewal process towards sustainability (Figure 9), and therefore offers a good chance for doing a similar leap as with from fossils to renewable fuels, to expand to new business ecosystem of plastics and polymers; this explains why the internal drivers identified in the last era resemble those of the beginning of the strategic renewal process. Figure 10 concludes the drivers during the entire strategic renewal process era by era.

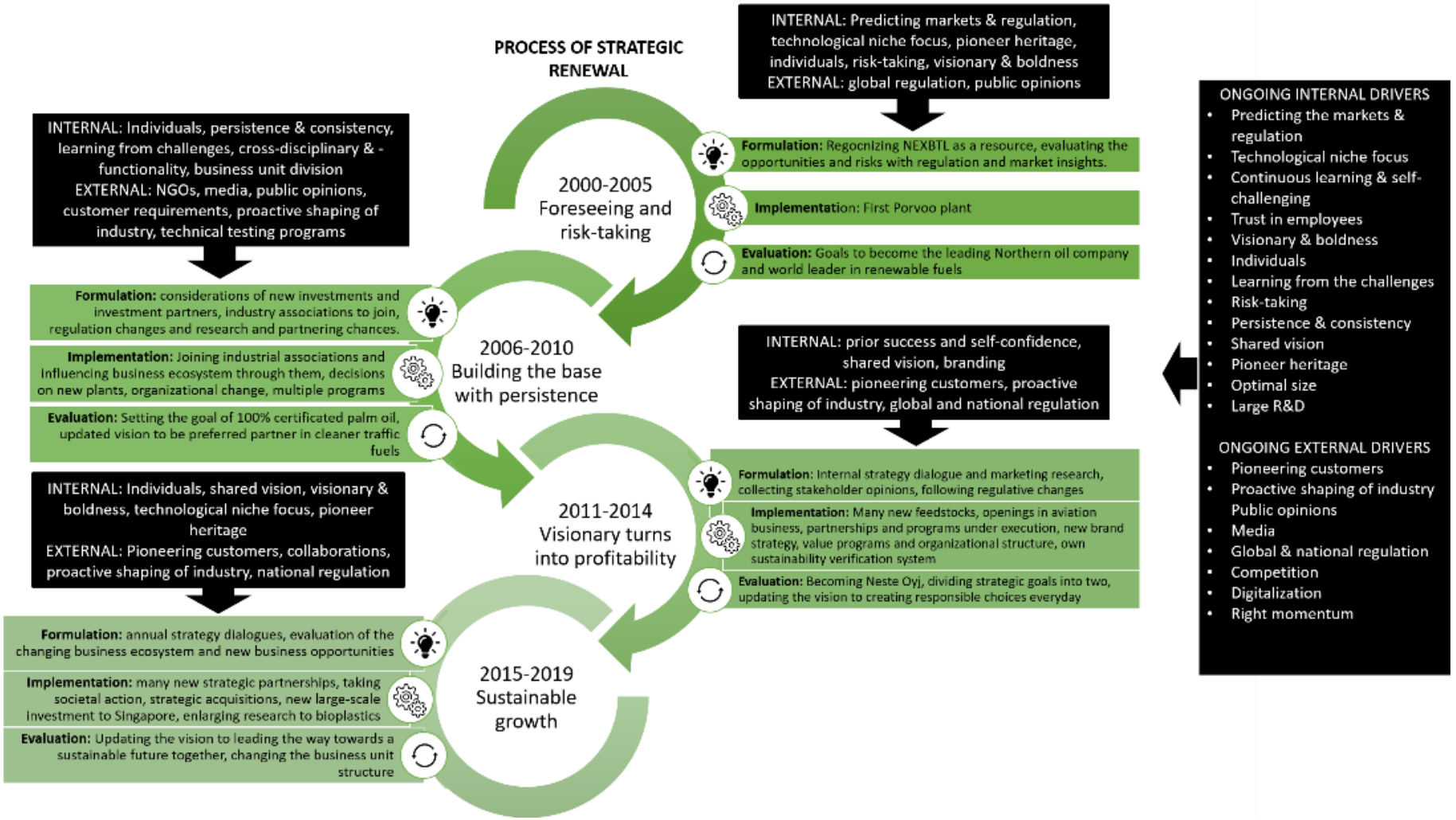

***Figure 10**. Sub-processes and their drivers during Neste's strategic renewal process towards environmental sustainability*

Some of the drivers are not directly connected to a certain era but are influential along the entire strategic renewal process, demonstrating an ongoing nature. Especially internal drivers seem to be more ongoing, as it is typically difficult to define when competences, leadership or organizational culture are exactly changing. Additionally, internal drivers are often closely intertwined. For example, leadership is constantly influencing the organizational culture, and vice versa. Regarding external drivers, new pioneering customers, being involved in the discussion of industrial associations and regulators in proactive shaping of industry, public opinions, media digitalization and right momentum seem to be more of the ongoing type, as they do not either have very discrete moments of occurrence in the strategic renewal process, or are constantly taking place during it. Regulation has rather discrete incidents on the timeline but is considered ongoing in the study because its direction remains the same throughout the strategic renewal process.

Not only the ongoing nature of drivers, but also the interplay of them challenges the interpretation of results. Thus, it is to be noted that the internal and external drivers are not separated from each other, but inter-connected instead; typically, the external drivers provoke the internal reactions, such as changes in organizational culture, which in turn can have a significant effect on the internal processes, and vice versa. For example, when EU set up RED I, it strengthened Neste employees' belief in the shared vision. In other words, drivers are in a constant dialogue with each other and the impact of a driver can take place indirectly, all this happening within the business ecosystem boundaries. It can also be the combination of smaller drivers that activates a major driver, which may seem to have the largest impact, but which would not have emerged without the smaller drivers in the background. This constant interplay of drivers makes defining driver boundaries more difficult. Researching the drivers in this kind of setting is indeed complex:

"It is the whole picture that impacts [the strategy process], right?" (Group discussion 2)

The drivers recognized for strategic renewal in the integrative framework (Figure 3) do mostly apply to the drivers derived from case findings. Leadership, organizational culture and organization and its structure are all well covered in the case. The influence of leadership has been an important, both ongoing and discrete driver in the process of strategic renewal. Both the individuals within the organization and employees' opinions have been heard and considered, of which the latter most remarkably in the strategy dialogue of 2011, resulting in new ways of leading the strategic renewal in a way that felt meaningful for the employees. Furthermore, meaningfulness and strengthened vision supported leading the entire business ecosystem as this happened in the era of ecosystem leadership. Organizational culture is an ongoing driver with multiple nuances. Organizational structure is also influencing the strategy renewal, as Neste has a very large R&D section

and a size that drives for looking for niche solutions to succeed in the markets. The last internal driver from the integrative framework (Figure 3), relationship with the environment, was not tracked directly, but by its nature, it resembles pioneer heritage driver. The difference is that pioneer heritage was not necessarily concerned about environment issues per se but being always the first in the industry with environmentally advancing products for example because of regulative changes.

Similarly, the external drivers found in the literature review were well covered in the case. The ones with less direct attention in the case findings were shareholders, industry and competitiveness. The industry was discussed in the context of proactive shaping through collaborative actions in industrial associations and with regulators, and through new competitors in the industry. Then again, competitiveness came up in the interviews, but was not included as a driver per se, as it was considered self-evident for any case of strategic renewal and thus not tracked when constructing the driver categorizations. Even if the findings of varying drivers did not provide very unexpected results, they validate the existing theory and provide an interesting observation that the importance of various drivers differs in the business ecosystem lifecycle and influence the strategy sub-processes of each era (Figure 10): a strong influence in the early stage of business ecosystem evolution and strategic renewal process comes from strong individuals trusting their vision. This vision, in turn, is a result of the pioneering views on the business ecosystem's evolution. These individuals would not have had the courage without having the ability to predict the upcoming change of business ecosystem, including opening markets and regulative environment. Later in the strategy process implementation, in other words the last two eras of business ecosystem lifecycle, the need of external drivers increases along the number of external partnerships, which is visible also in the growth of the business ecosystem maps (Figure 6) and theoretically explained by the evolution towards the leadership stage of business ecosystem lifecycle (Moore, 1993).

The case is not only showing how strategic renewal process is driven in general, but more in detail, it is a case of renewal towards sustainability. The Neste case of strategic renewal towards sustainability has involved maybe even more business ecosystem actors as drivers than regular strategic renewal, because the regulation and markets have been built from zero with careful, longitudinal work. The progress of strategic renewal has been rather slow, because the public has questioned the sustainability aspects of the new product. Slow change is natural also because of the fundamental level of change within the organization, which requires adjustments in multiple organizational levels. Despite the strategic renewal and business ecosystem evolution being slow, the positive feedback loop seems to be important for strategic renewal towards sustainability. In the

case, the feeling of success once renewables turned profitable the first time is a positive feedback that encourages continuation on the chosen strategic path. In other words, prior success as a driver for positive feedback loop encouraged pursuing the opportunities of strategic renewal further (Papagiannakis et al., 2014). To get into the loop, Neste still needed extraordinary courage, risk-taking and persistence, among other internal drivers. Therefore, strategic renewal towards sustainability needs internal strength before the positive feedback loop can begin accelerating the strategic renewal process. Citation of interviewee 4 sums this up nicely:

"After a certain step the progress begins to feed itself, but as it won't be automatic, it has to be kept going." (I4)

Based on the findings, sustainability as a direction of strategic renewal is very much based on the vision, which may require risk-taking and boldness, among other drivers. Typically, certain individuals inside the organization are driving the renewal towards sustainability because they believe so strongly in what they are striving for. These internal drivers stand out in the sustainability context of strategic renewal. In terms of external drivers, sustainability megatrend is encompassing the entire society and concerning many business ecosystem actors. As the awareness and worrying on the individual level increases, the global movement begins. Sustainability awakes emotions among a lot of people and makes the big crowds to think and move, which is first of the distancing phenomenon for a strategic renewal towards sustainability in particular (I6). Public opinions are the indirect driver for many other emerging drivers, such as the pioneering customers and regulators, who are among the most important direct drivers for sustainability oriented strategic renewal.

7. CONCLUSIONS

7.1 Meeting the objectives

The purpose of this study was to investigate how the process of strategic renewal towards environmental sustainability is co-evolving with its business ecosystem**.** For addressing the issue, a single case study was conducted with longitudinal and multi-sourced data. Data analysis with strategy process and business ecosystem mapping techniques enabled gaining versatile insights into the emerging drivers that influence strategic renewal towards environmental sustainability and its co-evolving business ecosystem.

First research question was interested in the critical incidents and eras that take place during the process of strategic renewal towards environmental sustainability. The analysis of the rich, longitudinal data with critical incident technique enabled mapping the critical incidents and eras during the strategic renewal process of the case company. The most critical incidents determined the edges of eras. Eras were named foreseeing and risk-taking 2000–2005, building the base with persistence 2006–2010, visionary turns into profitability 2011–2014 and sustainable growth 2015–2019 (Figure 4; Figure 5). Based on the findings of critical incidents, each of the eras have their own strategy subprocesses, which are constructed of the steps of strategy formulation, implementation and evaluation (Figure 10).

Second research question concerned business ecosystem's evolution during the strategic renewal process. The carefully processed data from mainly annual reports and other secondary sources, complemented with interviews and group discussions, was manually inserted into the ecosystem mapping software Kumu to create business ecosystem maps for each era of the strategic renewal process (Figure 6). Most clearly emerging business ecosystem actor group is that of customers, expanding in the last era, whereas the number of new competitors unexpectedly decreases in the last era. The changes in emerging business ecosystem actor groups are mostly not very radical in the mapping visualization but show the direction and constant growth of the business ecosystem evolution during the longitudinal process of strategic renewal.

Before answering the third research question, it was first necessary to understand the overall process of strategic renewal towards environmental sustainability and the overview of the evolution of its encompassing business ecosystem during the strategic renewal process. Thus, based on the first two research questions, the study proceeded to

the last one with an aim to identify the drivers that emerged from the business ecosystem during the strategic renewal towards sustainability. Main data sources for this question were interviews and group discussions. A vast number of driver findings can be divided into internal and external, as well as direct and indirect. Leaning to the first categorization, the found internal catalysts include competences, leadership, organizational culture and organizational structure (Figure 7), whereas the external ones consist of market development, collaboration, society, regulation and other drivers (Figure 8).

Overall, the setting and careful analysis of research questions enabled to form an overall understanding on how the process of strategic renewal towards environmental sustainability is co-evolving with its business ecosystem**.** Visualized in the discussion chapter, the co-evolution of strategic renewal and business ecosystem lifecycle creates an interesting avenue for future research to confirm the suggested co-evolving cycle of the two simultaneous processes (Figure 9). Drivers are influencing this interplay with their varying timings along the co-evolutionary processes, meanwhile they remain prone to the changes within the business ecosystem. Thus, the study provides many insights to strategic renewal towards environmental sustainability while taking into account – and taking advantage of – the simultaneously co-evolving business ecosystem.

7.2 Theoretical implications

This study contributes to the existing strategic renewal, sustainability transition and business ecosystem literature by providing empirical insights to the co-evolving strategic renewal process and its business ecosystem lifecycle in sustainability context. The temporal nature of strategy processes (Burgelman et al., 2018) and structuring strategic change processes over time have been lacking understanding (Mackay & Chia, 2013). By demonstrating a highly detailed timeline with 20 years of strategic renewal process, this study provides insights to the temporal and processual nature of strategies, confirming the cyclic nature of strategic renewal process. The empirical, longitudinal insights of the study develop particularly our understanding of strategic renewal processes towards sustainability (Banerjee, 2002; Papagiannakis et al., 2014) and the drivers influencing this transition. The case provides lots of findings regarding drivers, and the existing literature benefits from such a contextual detail. In addition to supporting the existing driver findings in literature, the study shows findings on the temporality of drivers process transitions, analyzing what direct and indirect drivers are influential in which phase of the ongoing process and how their roles and the business ecosystem evolve over time within the transition (Kivimaa et al., 2019).

The purposively selected longitudinal in-depth single case from oil and energy industry adds to the lacking knowledge of strategic renewal and its influencing drivers in different industries (Schrettle et al., 2014; Tsujimoto et al., 2018). This study meets the wishes of Aarikka-Stenroos & Ritala (2017) to provide a more extensive empirical study to understand the coevolutionary phenomena and ecosystem processes empirically (Aarikka-Stenroos & Ritala, 2017). Not only strategy and strategic renewal, but also environmental sustainability and business ecosystem research can take advantage of the study findings by comparing them to other cases of strategic renewal with and without the sustainability context. Particularly regarding ecosystem literature, the need of empirical data from various industries (Aarikka-Stenroos & Ritala, 2017; Abrahamsen et al., 2016; Banerjee, 2002) is addressed with a careful research design that supports understanding the dynamics and co-evolution of the case business ecosystem, strengthened further by the longitudinal nature of the extreme case (Aarikka-Stenroos & Ritala, 2017; Tsujimoto et al., 2018). Complementing the lack in literature to understand transitions from microprocesses into macroprocesses in business ecosystems (Mackay & Chia, 2013), the study maps the macroprocess of strategic renewal and its sub-processes.

In particular, the role of business ecosystem actors as drivers in strategic renewal towards sustainability has been an area of interest in previous studies (Banerjee 2002). Longitudinal examination of institutions, regulators and influencers in this study responds to Adner's (2017) proposed research agenda. Overall, the elements of ecosystem-as-a-structure approach of Adner (2017) are further progressed in this study; it seems indeed that strong interactions between ecosystem strategies and competitive strategies are ongoing in the ecosystem constructed around a focal value proposition. Thus, this study supports Adner's view on conceptualizing business ecosystems as structures. (Adner, 2017) Additionally, by choosing business ecosystems as the main unit of analysis, the study strengthens the concept under the joyful scale of different ecosystem approaches.

Lastly, this study benefits business ecosystem research with methodological perspectives for ecosystem research. In order to realize the potential of ecosystem research paradigm and understand the business activities within ecosystems, the development of research and data collection methods is necessary (Aarikka-Stenroos & Ritala, 2017). To respond to the issue, the study applied Kumu software in an attempt to investigate the computational social science methods called for in the academia (Aarikka-Stenroos & Ritala, 2017; Phillips & Ritala, 2019).

7.3 Practical implications

This study helps top managers to understand how a business ecosystem is co-evolving with their strategic renewal processes and what drives those processes towards sustainability. For companies located in Finland, which is known and profiling to be a pioneering innovation country with high education level and information intensity, the national environment is particularly advantageous for companies aiming to be pioneers in a developing business areas once they understand the drivers with which to achieve and preserve a pioneer status. Sustainability is a promising avenue for companies to pursue in order to find new business and market opportunities. It is time to shift the old-fashioned managerial mindsets of seeing sustainability as an expenditure to identifying opportunities in the emerging sustainability transition; as seen in the study, the persistent strategic actions towards this direction are a valuable investment in competitive advantage over time, even if strategic renewal towards sustainability may look too challenging during the early steps of the process.

Consequently, managers who consider taking environmental action on a strategic level benefit from familiarizing with the results of this study. Empirical evidence provides insights to both external drivers, such as business ecosystem actor pressures and regulatory environments, as well as internal drivers, such as the importance of organizational resources and governance that influence the implementation of a strategy (Damert & Baumgartner, 2018). Furthermore, these insights are useful to policymakers who intend to accelerate the strategic renewal within individual companies towards sustainable strategic choices; especially the cooperative and open communications between regulators, standardizing bodies and the experts of industry is to be applied in other business ecosystems. The analyzed findings provide a reference for various industries to compare with once renewing strategies towards sustainability. Key managerial contributions of this study are concluded below one by one.

1. *Top managers are recommended to consider strategic renewal as a cyclic process that co-evolves with its business ecosystem*

First practical implication for managers is to consider strategy as a cyclic process, which may contain sub-processes and that evolves over time in sync with its business ecosystem. Identification of the cyclic strategy process steps enables managers to accelerate strategic renewal towards sustainability in the increasingly dynamic business ecosystems. Acknowledging that strategic renewal process is taking certain steps and evolving over time as a vicious cycle, top managers are better able to map their current state in the process. Based on the identified state of the strategic renewal process, managers

are able to notice to which drivers to pay most attention to at the time and predict the continuation of the renewal process. Ecosystem approach benefits managers specially to recognize more extensively external drivers that emerge throughout the co-evolution of the business ecosystem instead of limiting to, for instance, observing drivers within networks.

2. *In the beginning of strategic renewal process towards environmental sustainability, internal drivers are in a dominant role for striving for predicted market opportunities*

A company that is renewing its strategy towards sustainability is prone to many challenges. These challenges might be internal, external or both at the same time like in the studied case. Either way, internal drivers seem to have an important role in tackling these early-emerging challenges. Among many drivers emerged from the case, managers can learn that especially risk-taking, visionary, persistence and predicting competences of the leaders are driving the strategic renewal process especially in its formulation step, during which the business ecosystem is still being born and expanded. Particularly, certain individuals tend to stand out and drive the renewal with their own visions in the companies. They are impactful because in order to survive the difficult times of formulating a new strategy, a company must rely on risk-taking of its managers, as well as on their capabilities to predict market and regulation changes. However, it is to be noted that even if internal drivers are in a dominant role, their activation is depending on whether positive signs of market opportunities are visible and predictable in the business ecosystem or not.

3. *To support the strategic renewal process with ecosystem actor engagement, it is important to first build strong vision internally by involving the entire organization in the strategy work*

According to the study findings, engagement of business ecosystem actors is supporting the strategy process renewal, but it is largely dependent on the shared vision around the focal value proposition of the business ecosystem. The strength of this shared vision underlies in the focal firm; if the vision is not strong internally, it is not attractive to external ecosystem actors either. For enhancing the internal vision, a company must enable its employees to partake in the strategy work to create a powerful and influential vision that unifies the organization as well as attracts new actors to join the business ecosystem. Thus, a strong internal vision is a key for engaging ecosystem actors also outside the organization’s boundaries to support the strategy process renewal. The company unifying actors with its strong vision is also a likely candidate to take the ecosystem leader

position. Engaged actors align themselves in the business ecosystem in a way that supports the focal value proposition, constructed around the vision that they all believe in.

4. *Communications with ecosystem actors play a significant role once renewing the value proposition along strategic renewal process towards environmental sustainability*

Strategic renewal towards sustainability is often shifting the value propositions of companies within the business ecosystem. New value propositions of ecosystem actors, especially the ecosystem leader, may influence the focal value proposition. Once the value proposition of a company is changed, the newly created value needs to be communicated with a suitable approach to other ecosystem actors. Particularly, if a company holds an ecosystem leader position while renewing its value proposition through strategic renewal, it is likely to influence the focal value proposition of the entire business ecosystem. Thus, conveying the message of changes in ecosystem leader's value proposition is critical in order to re-align the entire business ecosystem around a renewed focal value proposition. As an example in the case findings, Neste shifted to emotional branding and marketing once it chose the path of renewable business. Because the importance of collaborations as drivers for strategic renewal is only increasing during the entire business ecosystem lifecycle, communicating the value to other ecosystem actors is increasingly important throughout the duration of business ecosystem lifecycle. Certainly, communications between ecosystem actors play also an important role once other ecosystem actors than the leader renew their value propositions.

5. *To ensure a successful strategic renewal process, a company must proactively steer its business ecosystem and its actors through collaborations*

Successful strategic renewal is largely depending on the alignment within business ecosystem. Thus, proactive steering is in favor of shaping the business ecosystem to match the renewing strategy. Companies can collaborate with NGOs, regulators, pioneering customers and research partners among other ecosystem actors to shape the business ecosystem towards a direction that supports its own strategic renewal. Especially in an undeveloped business ecosystem, a company can be a pioneer and take an ecosystem leader position if it steers the encompassing business ecosystem in a proactive way. To build a strong business ecosystem, proactive steering occurs on a basis of mutual benefits. For example, Neste collaborates with regulators to shape the direction of upcoming regulation, while for regulators, understanding Neste's perspective on the practical effects of existing, updated and newly emerging policies on complex business ecosystems enables more effective regulation that drives companies' strategic renewal towards sustainability as well as much-needed new sustainable innovations.

7.4 Assessing the quality and limitations of the study

The quality of the results is on a very satisfying level thanks to the purposively chosen extreme case, which is very fruitful in providing a robust base for more focused future studies. However, the study acknowledges certain issues regarding the quality and limitations.

Firstly, the research is limited by its design to be a single-case study, sampled purposively based on prior knowledge of the success of the case company. Limiting to a single case is risky and limits the generalizability of the results, as they may not allow creating a complete picture of the entire company, but misleading statements in the interpretation of findings was avoided by a longitudinal observation of the changes within the renewable energy business strategies (Chaiyapa et al., 2018). Consequently, future research suggestions (section 7.5) take this limitation into account.

Being a longitudinal research, high research commitment and access to the case company was needed (de Ven, 1992) This study succeeds in accessing the case company as well as the top management interviewees exceptionally well; the number of interviews was limited to six, but this is considered very satisfactory because the interviewees represented company top management. In order to increase the generalizability of the results, the research succeeded to conduct multiple interviews across functions within the case company as proposed by Saunders et al. (Saunders et al., 2009). The access to case organizations, even their top management as in this case study, is typically good in Finland, because it is a small country with appreciation towards openness and education.

Not only was the access to interviews satisfactory, but also the interviewee engagement level during the interviews. Regarding the reliability of semi-structured interviews, it is to be acknowledged that the content of the interviews was adjusted with the expertise of the researcher as well as the natural flow of discussions, which enabled gaining a better overall picture of the case company than a pre-determined set of questions. The top managers were open and willing to share also the downsides along the strategic renewal process, which made it possible for the researcher to understand all the nuances of the case despite their sensitive nature. Thus, the commitment and engagement of interviewees increased the quality of the study.

Data sources had their limitations in the study. As for issues with secondary data, annual reports are limited by their role as a communicational tool of the company towards its various ecosystem actors. Therefore, they are not presenting for example all the business ecosystem actors by name and at the correct time they become involved with Neste. This kind of preciseness would have been beneficial for the methodological

choice of mapping the business ecosystem with Kumu mainly based on annual report and secondary data. Some of the strategic partnerships are concerned secret and not revealed in the openly accessed annual reports and secondary data sources. Because the annual reports of Neste tend to present information highlighting the positive angles, they have changed their structure and content of the annual reports over the selected research period, which makes the emphasis of data interpretation to switch easily. The data from interviews and group discussions supplements the secondary data regarding the first two research questions in order to decrease the misinterpretation of annual reports and increase the validity with data-triangulation. However, the multi-sourcing of data required criticality in interpreting the different perspectives from different data sources and enabling the interviewees to comment on the results before their publication.

The findings were constructed in a data-driven way. This might have led to neglecting some important theoretical aspects of strategic renewal and business ecosystem literature. Thus, when comparing the results with theory, it is to be kept in mind that there is the possibility of having filtered out some relevant literature during the comprehensive literature review due to the risk of human error. Future research may revise the related theory field in more detail, especially regarding internal drivers, as the dedicated ecosystem approach in this study emphasized the external drivers in the literature review.

7.5 Proposals for future research

Proposals for future research do lean on the interesting observations of this study as well as the limitations described above. Firstly, future research is encouraged to gain more empirical insights on the researched themes of under-researched intersection of strategic renewal and co-evolving business ecosystems. For that purpose, in-depth single-case studies are a suitable option especially when the longitudinal approach is to well preserved. For deepening the understanding of the empirical cases, increasing the number of primary data interviews is also to be considered, especially if the interviewees are not representing top management level.

The focal firm approach within a business ecosystem could be investigated further by conducting dyadic interviews with the focal firm's partners to gain insights of the relationships between the ecosystem actors (Abrahamsen et al., 2016). Overall, it is encouraged that ecosystem actors would gain more attention in the context of reaching sustainability goals (Banerjee, 2002). Based on this research, deeper understanding of business ecosystem actor relationships, their structures and nuances would increase the understanding of how a business ecosystem engages its actors and how the focal firm can best collaborate with them to achieve shared goals of the business ecosystem.

As this study was limited by the single-case design, to gain more of the empirical insights called for in the literature, a multiple-case design would also be beneficial for the future research agenda for comparing different industries and to increase the generalizability of the results (Abrahamsen et al., 2016; Banerjee, 2002; Möller & Halinen, 2017; Papagiannakis et al., 2014; Schrettle et al., 2014). Also, different countries could provide interesting contexts for comparing the increasing amount of empirical results by their geographical context (Schrettle et al., 2014).

This study shows how the conceptual level of the researched phenomena, especially business ecosystems, still needs further investigation to be completely understood. The scope of research analysis in literature should be extended to business ecosystem processes and their visualization to go beyond the currently limiting network boundaries. This, in turn, requires developing new methods, such as ecosystem mapping softwares, to better understand ecosystem-based business and carefully planned research design with empirical methods to investigate business ecosystem dynamics and co-evolution. The right timing of strategic actions within the eras of business ecosystem lifecycle and strategic renewal is to be researched further for building up to the overarching understanding of this kind of co-evolution.

Some of the preliminary findings were already rising interest among group discussions conducted in the study, encouraging the future research arena go deeper into the found drivers, especially the role of size and ownership as drivers for strategic renewal. It is suggested that influential drivers are further researched especially from the perspective of their interrelations; often, one driver is not enough by itself, but a combination of drivers is needed for strategic renewal process to advance. Thus, some of the drivers for strategic renewal processes towards sustainability seem to have a role of an intermediary or catalyst instead of being a direct driver. Agreeing with Kivimaa et al. (2019), the future research could go deeper in evaluating intermediaries as drivers; what the intermediaries do in different phases of a process and how their roles change temporarily (Kivimaa et al., 2019). More empirical evidence to support the driver findings of this case is welcomed to validate the findings especially in environmental sustainability context. Additionally, some of the drivers can have a hindering or otherwise negative role for the strategic renewal process while activating another part of it. Future research agenda could revise the negative perspectives of identified positive drivers, as well as purely hindering forces, which were excluded from the scope of this research. An example of the two-edged drivers is given by interviewee 5:

“Regulation both creates markets but also leaves room for varying interpretations. Thus, it creates market barriers, protectionism and discrimination.” (I5)

The research gives a case example of strategic renewal towards sustainability from the environmental angle, excluding purposively economic and social sustainability (Elkington, 2013). It would be interesting for future research to see how these excluded aspects of sustainability are intertwined in the strategic renewal towards sustainability. Furthermore, the findings of this study remain applicable to strategic renewal settings other than sustainability. The findings can be validated further to evaluate the role of sustainability in the strategic renewal processes and distinct how the drivers may differ compared to other strategic renewal processes without the sustainability direction.

REFERENCES

Aarikka-Stenroos, L., Jaakkola, E., Harrison, D., & Mäkitalo-Keinonen, T. (2017). How to manage innovation processes in extensive networks: A longitudinal study. *Industrial Marketing Management*, 67, pp. 88–105. https://doi.org/10.1016/j.indmarman.2017.09.014

Aarikka-Stenroos, L., & Ritala, P. (2017). Network management in the era of ecosystems: Systematic review and management framework. *Industrial Marketing Management*, 67, pp. 23–36). http://www.sciencedirect.com/science/article/pii/S0019850117306545

Abrahamsen, M. H., Henneberg, S. C., Huemer, L., & Naudé, P. (2016). Network picturing: An action research study of strategizing in business networks. *Industrial Marketing Management*, 59, pp. 107–119. http://www.sciencedirect.com/science/article/pii/S0019850116300104

Adelman, M. A. (1987). The economics of the international oil industry. *The international oil industry*, pp. 27–56. Springer.

Adner, R. (2006). Match your innovation strategy to your innovation ecosystem. *Harvard Business Review*, *84*(4), pp. 98–107.

Adner, R. (2017). Ecosystem as Structure: An Actionable Construct for Strategy. *Journal of Management*, *43*(1), pp. 39–58. https://doi.org/10.1177/0149206316678451

Adner, R., & Kapoor, R. (2010). Value creation in innovation ecosystems: How the structure of technological interdependence affects firm performance in new technology generations. *Strategic Management Journal*, *31*(3), pp. 306–333.

Agarwal, R., & Helfat, C. E. (2009). Strategic renewal of organizations. *Organization Science*, *20*(2), pp. 281–293. https://doi.org/10.1287/orsc.1090.0423

Andrews, K. R., & David, D. K. (1987). *The concept of corporate strategy* (Vol. 101). Irwin Homewood, IL.

Banerjee, S. B. (2002). Organisational Strategies for Sustainable Development: Developing A Research Agenda for the New Millennium. *Australian Journal of Management*, *27*(1_suppl), 105–117. https://doi.org/10.1177/031289620202701s11

Bansal, P. (2005). Evolving sustainably: A longitudinal study of corporate sustainable development. *Strategic Management Journal*, *26*(3), pp. 197–218. https://doi.org/10.1002/smj.441

Bansal, P., & Roth, K. (2000). Why companies go green: A model of ecological responsiveness. *Academy of Management Journal*, *43*(4), pp. 717–736. https://doi.org/10.2307/1556363

Bansal, T., & Song, H.-C. (2017). Similar But Not the Same: Differentiating Corporate Sustainability from Corporate Responsibility. *Academy of Management Annals*, *11*, pp. 105–149. https://doi.org/10.5465/annals.2015.0095

Barbieri, J. C. (2017). *Gestão ambiental empresarial*. Editora Saraiva.

Barney, J. (1991). Firm resources and sustained competitive advantage. *Journal of Management*, *17*(1), pp. 99–120.

Basole, R. C., Russell, M. G., Huhtamäki, J., Rubens, N., Still, K., & Park, H. (2015). Understanding business ecosystem dynamics: A data-driven approach. *ACM Transactions on Management Information Systems*, *6*(2), pp. 1–32. https://doi.org/10.1145/2724730

Bell, E., Bryman, A., & Harley, B. (2018). *Business research methods*. Oxford university press.

Ben-Menahem, S. M., Kwee, Z., Volberda, H. W., & Van Den Bosch, F. A. J. (2013). Strategic renewal over time: The enabling role of potential absorptive capacity in aligning internal and external rates of change. *Long Range Planning*, *46*(3), pp. 216–235. https://doi.org/10.1016/j.lrp.2012.09.012

Berry, M. A., & Rondinelli, D. A. (1998). Proactive Corporate Environmental Management: A New Industrial Revolution. *The Academy of Management Executive (1993-2005)*, *12*(2), pp. 38–50. http://www.jstor.org/stable/4165456

Bocken, N. M. P., Short, S. W., Rana, P., & Evans, S. (2014). A literature and practice review to develop sustainable business model archetypes. *Journal of Cleaner Production*, *65*, pp. 42–56. https://doi.org/10.1016/j.jclepro.2013.11.039

Bogers, M., Sims, J., & West, J. (2019). What Is an Ecosystem? Incorporating 25 Years of Ecosystem Research. *Academy of Management Proceedings*, *2019*(1), 11080. https://doi.org/10.5465/ambpp.2019.11080abstract

Bott, G., & Tourish, D. (2016). The critical incident technique reappraised: Using critical incidents to illuminate organizational practices and build theory. *Qualitative Research in Organizations and Management: An International Journal*, *11*(4), pp. 276–300.

Burgelman, R. A., Floyd, S. W., Laamanen, T., Mantere, S., Vaara, E., & Whittington, R. (2018). Strategy processes and practices: Dialogues and intersections. *Strategic Management Journal*, *39*(3), pp. 531–558. https://doi.org/10.1002/smj.2741

Burritt, R. L., Christ, K. L., Rammal, H. G., & Schaltegger, S. (2018). Multinational enterprise strategies for addressing sustainability: The need for consolidation. *Journal of Business Ethics*, pp. 1–22.

Chaiyapa, W., Esteban, M., & Kameyama, Y. (2018). Why go green? Discourse analysis of motivations for Thailand's oil and gas companies to invest in renewable energy. *Energy Policy*, *120*, pp. 448–459. https://doi.org/10.1016/j.enpol.2018.05.064

Chakravarthy, B. S., & Doz, Y. (1992). Strategy process research: Focusing on corporate self-renewal. *Strategic Management Journal*, *13*(S1), pp. 5–14.

Cohen, K. J., & Cyert, R. M. (1973). Strategy : Formulation , Implementation , and Monitoring. *The Journal of Business*, *46*(3), pp. 349–367.

da Rosa, L. A. B., Kneipp, J. M., Bichueti, R. S., Gomes, C. M., & Zamberlan, J. F. (2013). The Innovation Process and the Development of a Sustainability Strategy. *Latin American Business Review*, *14*(3–4), pp. 289–308. https://doi.org/10.1080/10978526.2013.837628

Damert, M., & Baumgartner, R. J. (2018). External pressures or internal governance – What determines the extent of corporate responses to climate change? *Corporate Social Responsibility and Environmental Management*, *25*(4), pp. 473–488. https://doi.org/10.1002/csr.1473

Das, S. S., & de Ven, A. H. (2000). Competing with new product technologies: A process model of strategy. *Management Science*, *46*(10), pp. 1300–1316.

David, P. A. (2001). Path dependence, its critics and the quest for 'historical economics.' *Evolution and Path Dependence in Economic Ideas: Past and Present*, *15*, p. 40.

de Jesus, A., & Mendonça, S. (2018). Lost in Transition? Drivers and Barriers in the Eco-innovation Road to the Circular Economy. *Ecological Economics* 145, pp. 75–89. http://www.sciencedirect.com/science/article/pii/S0921800916316597

de Mattos, C. A., & de Albuquerque, T. L. M. (2018). Enabling factors and strategies for the transition toward a circular economy (CE). *Sustainability (Switzerland)*, *10*(12), p. 4628. https://doi.org/10.3390/su10124628

De Silva, M., Howells, J., & Meyer, M. (2018). Innovation intermediaries and collaboration: Knowledge–based practices and internal value creation. *Research Policy, 47*(1), pp. 70–87. https://doi.org/10.1016/j.respol.2017.09.011

de Ven, A. H. (1992). Suggestions for studying strategy process: A research note. *Strategic Management Journal*, *13*(1), pp. 169–188.

De Wit, B., & Meyer, R. (2010). *Strategy: process, content, context: an international perspective*. Cengage Learning EMEA.

Dedehayir, O., Mäkinen, S. J., & Roland Ortt, J. (2018). Roles during innovation ecosystem genesis: A literature review. *Technological Forecasting and Social Change*, *136*, pp. 18–29. https://doi.org/10.1016/j.techfore.2016.11.028

Dyllick, T., & Hockerts, K. (2002). Beyond the business case for corporate sustainability. *Business Strategy and the Environment*, *11*(2), pp. 130–141. https://doi.org/10.1002/bse.323

Elkington, J. (2013). Enter the triple bottom line. In *The triple bottom line* (pp. 23–38). Routledge.

Eriksson, P., & Koistinen, K. (2005). *Monenlainen tapaustutkimus*. Kuluttajatutkimuskeskus Helsinki.

Eskola, H. (2019). Nesteen tuloksenteko on jo häikäisevää. Kauppalehti. Available at: https://www.kauppalehti.fi/uutiset/analyysi-nesteen-tuloksenteko-on-jo-haikaisevaa/8ad01cae-6ab6-4dfb-a77f-c94c3d760150 (Accessed: 15.8.2019)

Farjoun, M. (2002). Towards an organic perspective on strategy. *Strategic Management Journal*, *23*(7), pp. 561–594. https://doi.org/10.1002/smj.239

Freeman, R. E. (2010). *Strategic management: A stakeholder approach*. Cambridge university press.

Freeman, R. E. E., & McVea, J. (2005). A Stakeholder Approach to Strategic Management. *The Blackwell handbook of strategic management*, pp. 189–207

Gadde, L.-E., Huemer, L., & Håkansson, H. (2003). Strategizing in industrial networks. *Industrial Marketing Management*, *32*(5), pp. 357–364.

Garud, R., Kumaraswamy, A., & Karnøe, P. (2010). Path dependence or path creation? *Journal of Management Studies*, *47*(4), pp. 760–774. https://doi.org/10.1111/j.1467-6486.2009.00914.x

Geissdoerfer, M., Savaget, P., Bocken, N. M. P., & Hultink, E. J. (2017). The Circular Economy – A new sustainability paradigm? *Journal of Cleaner Production*, *143*, pp. 757–768. https://doi.org/10.1016/j.jclepro.2016.12.048

Ghemawat, P. (2002). Competition and Business Strategy in Historical Perspective. *Business History Review*, *76*(1), pp. 37–74. https://doi.org/10.2307/4127751

Granstrand, O., & Holgersson, M. (2019). Innovation ecosystems: A conceptual review and a new definition. *Technovation*, p. 102098. http://www.sciencedirect.com/science/article/pii/S0166497218303870

Greiner, L. E. (1998). Evolution and revolution as organizations grow. *Harvard Business Review*, *76*(3), pp. 55–64.

Gremler, D. D. (2004). The critical incident technique in service research. *Journal of Service Research*, *7*(1), pp. 65–89. https://doi.org/10.1177/1094670504266138

Haddock-Fraser, J., & Fraser, I. (2008). Assessing corporate environmental reporting motivations: Differences between “close-to-market” and “business-to-business” companies. *Corporate Social Responsibility and Environmental Management*, *15*(3), pp. 140–155. https://doi.org/10.1002/csr.147

Hannah, D. (2018). Collaborative strategy and value capture in innovation ecosystems. *Academy of Management Proceedings*, *2018*(1), pp. 11498.

Hax, A. C., & Majluf, N. S. (1988). The Concept of Strategy and the Strategy Formation Process. *Interfaces*, *18*(3), 99–109. https://doi.org/10.1287/inte.18.3.99

Herrala, M., Pakkala, P., & Haapasalo, H. (2011). Value-creating networks – A conceptual model and analysis. *Research Reports in Department of Industrial Engineering and Management*, *4*, pp. 25.

Hirsch, P. (1991). *Areas of agreement and common ground., A presentation made at the Minnesota Conference on Strategy Process Research, Minneapolis, MN*. October.

Hirsjärvi, S. (2009). *Tutki ja kirjoita* (kuvittaja Sinivuori Eila (ed.); 15. uud. p). Tammi.

Holmström Olsson, H., & Bosch, J. (2017). From ad hoc to strategic ecosystem management: the “Three-Layer Ecosystem Strategy Model” (TeLESM). *Journal of Software: Evolution and Process*, *29*(7), pp. 1–24. https://doi.org/10.1002/smr.1876

Hughes, H., Williamson, K., & Lloyd, A. (2007). Critical incident technique. *Exploring Methods in Information Literacy Research*, *28*, pp. 49–66.

Hutzschenreuter, T., & Kleindienst, I. (2006). Strategy-process research: What have we learned and what is still to be explored. *Journal of Management*, *32*(5), pp. 673–720. https://doi.org/10.1177/0149206306291485

Iansiti, M., & Levien, R. (2004). Strategy as ecology. *Harvard Business Review*, *82*(3), pp. 68–81.

Jacobides, M. G., Cennamo, C., & Gawer, A. (2018). Towards a theory of ecosystems. *Strategic Management Journal*, *39*(8), pp. 2255–2276. https://doi.org/10.1002/smj.2904

Jørgensen, M. S., & Forman, M. (2009). Environmental Management in Product Chains. In *Supply Chain Management and Knowledge Management* (Issue 2002, pp. 288–306).

Jørgensen, M. S., & Remmen, A. (2018). A Methodological Approach to Development of Circular Economy Options in Businesses. *Procedia CIRP*, *69*(May), pp. 816–821. https://doi.org/10.1016/j.procir.2017.12.002

Kahle, J., Risch, K., Wanke, A., & Lang, D. J. (2018). Strategic networking for sustainability: Lessons learned from two case studies in higher education. *Sustainability (Switzerland)*, *10*(12), pp. 1–24. https://doi.org/10.3390/su10124646

Kaiser, S., & Landau, C. (2019). Understanding the Ecosystem-a Holistic Framework of Business and Innovation Ecosystem Components. *ISPIM Conference Proceedings*, *June*, pp. 1–12. The International Society for Professional Innovation Management (ISPIM).

Kapoor, R. (2018). Ecosystems: broadening the locus of value creation. *Journal of Organization Design*, *7*(1), p. 12. https://doi.org/10.1186/s41469-018-0035-4

Kivimaa, P., Boon, W., Hyysalo, S., & Klerkx, L. (2019). Towards a typology of intermediaries in sustainability transitions: A systematic review and a research agenda. *New Frontiers in*

Science, Technology and Innovation Research from SPRU's 50th Anniversary Conference, *48*(4), pp. 1062–1075. https://doi.org/10.1016/j.respol.2018.10.006

Kolk, A., & Levy, D. (2001). Winds of Change: Corporate Strategy, Climate change and Oil Multinationals. *European Management Journal, 9*(5), pp. 501–509. http://www.sciencedirect.com/science/article/pii/S0263237301000640

Kunisch, S., Bartunek, J. M., Mueller, J., & Huy, Q. N. (2017). Time in strategic change research. *Academy of Management Annals*, *11*(2), pp. 1005–1064. https://doi.org/10.5465/annals.2015.0133

Langley, A., Smallman, C., Tsoukas, H., & Van De Ven, A. H. (2013). Process studies of change in organization and management: Unveiling temporality, activity, and flow. *Academy of Management Journal*, *56*(1), pp. 1–13. https://doi.org/10.5465/amj.2013.4001

Lehmus, P. (2018) From fuels to plastics and vice versa – exploring new opportunities. SmartCHEM Summit. Available at: https://www.slideshare.net/TurkuSciencePark/petri-lehmus-neste (Accessed: 5.6.2019)

Lindroos, J.-E., & Lohivesi, K. (2006). *Onnistu strategiassa*. Helsinki: WS Bookwell Oy.

López-Toro, A. A., Rubio-Romero, J. C., Suárez-Cebador, M., & Arjona-Jiménez, R. (2016). Consideration of stakeholder interests in the planning of sustainable waste management programmes. *Waste Management and Research*, *34*(10), pp. 1036–1046. https://doi.org/10.1177/0734242X16657606

Mackay, R., & Chia, R. (2013). Choice, Chance, and Unintended Consequences in Strategic Change: A Process Understanding of the Rise and Fall of NorthCo Automotive. *The Academy of Management Journal*, *56*(1), 208–230. https://doi.org/10.5465/amj.2010.0734

Majava, J., Kinnunen, T., Foit, D., Kess, P., & others. (2016). An intermediary as a trust enabler in a spatial business ecosystem. *International Journal of Innovation and Learning*, *20*(2), pp. 199–213.

Makarov, S., & Ugnich, E. (2015). Business-catalysts as drivers of regional innovation systems. *Foresight Russia*, *9*(1), pp. 56–67. https://www.scopus.com/inward/record.uri?eid=2-s2.0-84946194164&doi=10.17323%2F1995-459X.2015.1.56.67&partnerID=40&md5=2cb603754e13e44225148af2fafd6a74

Martins, T. S., Kato, H. T., Martins, R. D. R. R., & Da Silva, E. D. (2014). An Analytical Framework for Miles and Snow Typology and Dynamic Capabilities. *Revista Ibero-Americana de Estratégia*, *13*(1), pp. 22–33. https://doi.org/10.5585/riae.v13i1.1934

Menon, A., & Menon, A. (1997). Enviropreneurial marketing strategy: The emergence of corporate environmentalism as market strategy. *Journal of Marketing*, *61*(1), pp. 51–67. https://doi.org/10.2307/1252189

Miles, M. B., Huberman, A. M., Huberman, M. A., & Huberman, M. (1994). *Qualitative data analysis: An expanded sourcebook*. Sage.

Miles, R. E., Snow, C. C., Meyer, A. D., & Coleman Jr, H. J. (1978). Organizational strategy, structure, and process. *Academy of Management Review*, *3*(3), pp. 546–562.

Miller, K. D., Gomes, E., & Lehman, D. W. (2019). Strategy restoration. *Long Range Planning*, *52*(5), p. 101855. http://www.sciencedirect.com/science/article/pii/S0024630118300177

Mintzberg, H. (2000). *The rise and fall of strategic planning*. Pearson Education.

Mintzberg, H., Ghoshal, S., Lampel, J., & Quinn, J. B. (2003). *The strategy process: concepts, contexts, cases*. Pearson education.

Möller, K., & Halinen, A. (2017). Managing business and innovation networks—From strategic nets to business fields and ecosystems. *Industrial Marketing Management*, 67, pp. 5–22. http://www.sciencedirect.com/science/article/pii/S0019850117307174

Möller, K. K., & Halinen, A. (1999). Business Relationships and Networks: Managerial Challenge of Network Era. *Industrial Marketing Management*, *28*(5), pp. 413–427. https://doi.org/10.1016/S0019-8501(99)00086-3

Möller, K., Rajala, A., & Svahn, S. (2005). Strategic business nets—their type and management. In *Special Section: Inter-organisational research in the Nordic countries*, *58*(9), pp. 1274–1284. http://www.sciencedirect.com/science/article/pii/S0148296304000487

Moore, J. F. (1993). Predators and prey: a new ecology of competition. *Harvard Business Review*, *71*(3), pp. 75–86. http://blogs.law.harvard.edu/jim/files/2010/04/Predators-and-Prey.pdf

Moore, J. F. (1996). *The death of competition: leadership and strategy in the age of business ecosystems*. HarperCollins.

Morioka, S. N., Iritani, D. R., Ometto, A. R., & De Carvalho, M. M. (2018). Systematic review of the literature on corporate sustainability performance measurement: a discussion of

contributions and gaps. *Gestao e Producao*, *25*(2), pp. 284–303. https://doi.org/10.1590/0104-530X2720-18

Mousavi, S., & Bossink, B. A. G. (2017). Firms' capabilities for sustainable innovation: The case of biofuel for aviation. *Journal of Cleaner Production*, *167*, pp. 1263–1275. http://www.sciencedirect.com/science/article/pii/S0959652617315901

Mujere, N. (2016). Sampling in Research. *Mixed methods resaerch for improved scientific study,* pp. 107–121. IGI Global. https://doi.org/10.4018/978-1-5225-0007-0.ch006

Neste Oil. (2006). Vuosikertomus 2005. Helsinki, Neste Oil Oyj.

Neste Oil. (2007). Vuosikertomus 2006. Helsinki, Neste Oil Oyj.

Neste Oil. (2008). Vuosikertomus 2007. Helsinki, Neste Oil Oyj.

Neste Oil. (2009). Vuosikertomus 2008. Helsinki, Neste Oil Oyj.

Neste Oil. (2010). Vuosikertomus 2009. Helsinki, Neste Oil Oyj.

Neste Oil. (2011). Vuosikertomus 2010. Helsinki, Neste Oil Oyj.

Neste Oil. (2012). Vuosikertomus 2011. Helsinki, Neste Oil Oyj.

Neste Oil. (2013). Vuosikertomus 2012. Helsinki, Neste Oil Oyj.

Neste Oil. (2014). Vuosikertomus 2013. Helsinki, Neste Oil Oyj.

Neste Oyj. (2015a) Neste's strategic objective: Global renewable growth 2015. Available at: https://www.youtube.com/watch?v=aDuql4Qhc8Y (Accessed 19.8.2019)

Neste Oil. (2015b). Vuosikertomus 2014. Helsinki, Neste Oil Oyj.

Neste Oyj. (2016). Vuosikertomus 2015. Helsinki, Neste Oyj.

Neste Oyj. (2017). Vuosikertomus 2016. Helsinki, Neste Oyj.

Neste Oyj. (2018a). Vuosikertomus 2017. Helsinki, Neste Oyj.

Neste Oyj. (2018b). Neste 70 vuotta: suomalaisesta öljynjalostajasta maailman suurimmaksi uusiutuvan dieselin tuottajaksi. Available at: https://www.neste.com/fi/tiedotteet-ja-uutiset/renewable-solutions/neste-70-vuotta-suomalaisesta-oljynjalostajasta-maailman-suurimmaksi-uusiutuvan-dieselin-tuottajaksi (Accessed 6.5.2019)

Neste Oyj. (2019a). Vuosikertomus 2018. Helsinki, Neste Oyj.

Neste Oyj. (2019b). Tietoa meistä. Available at: https://www.neste.com/fi/konserni/tietoa-meista (Accessed: 15.8.2019)

Neste Oyj. (2019c). Innovation explained by Neste. Available at: https://www.youtube.com/watch?v=L_R8FYX1ZXw (Accessed 15.8.2019)

Neste Oyj. (2019d) NExBTL technology is our own innovation. Available at: https://www.neste.com/corporate-info/who-we-are/research/nexbtl-technology (Accessed 20.8.2019)

Neste Suomi. (2019) Hiilen hyödyntäminen. Available at: https://www.youtube.com/watch?v=AS8un-omx2A (Accessed 16.6.2019)

Nicholas, L. (2009). The Link between Leadership, Strategic Management and Firm Performance: A Critical Literature Review. *Journal of Business and Organizational Development*, *78*(3), pp. 467–469.

Okumus, F., Altinay, L., & Roper, A. (2007). Gaining access for research. Reflections from Experience. *Annals of Tourism Research*, 34*(1), 7–26.* https://doi.org/10.1016/j.annals.2006.07.006

Orsato, R. (2002). Posicionamento Ambiental Estratégico. Identificando Quando Vale a Pena Investir No Verde. *Revista Eletrônica de Administração*, *8*(6), pp. 11–45.

Papagiannakis, G., Voudouris, I., & Lioukas, S. (2014). The road to sustainability: Exploring the process of corporate environmental strategy over time. *Business Strategy and the Environment*, *23*(4), pp. 254–271. https://doi.org/10.1002/bse.1781

Paraschiv, D. M., Nemoianu, E. L., Langa, C. A., & Szabó, T. (2012). Eco-innovation, responsible leadership and organizational change for corporate sustainability. *Amfiteatru Economic*, *14*(32), pp. 404–419. http://sfx.nelliportaali.fi/nelli34b/?url_ver=Z39.88-2004&rft_val_fmt=info:ofi/fmt:kev:mtx:journal&genre=article&sid=ProQ:ProQ%253Aabiglobal&atitle=ECO-INNOVATION%252C+RESPONSIBLE+LEADERSHIP+AND+ORGANIZATIONAL+CHANGE+FOR+CORPORATE+SUSTAINABILITY&title=Amf

Patton, M. Q. (2014). *Qualitative research & evaluation methods: Integrating theory and practice*. Sage publications.

Peltoniemi, M., & Vuori, E. (2004). Business ecosystem as the new approach to complex adaptive business environments. *Proceedings of EBusiness Research Forum*, *2*, pp. 267–281. http://citeseerx.ist.psu.edu/viewdoc/download?doi=10.1.1.103.6584&rep=rep1&type=pdf

Pettigrew, A. M. (1990). Longitudinal Field Research on Change: Theory and Practice. *Organization Science*, *1*(3), pp. 267–292. http://www.jstor.org/stable/2635006

Pettigrew, A. M. (1997). What is a processual analysis? *Scandinavian Journal of Management*, *13*(4), pp. 337–348. https://doi.org/https://doi.org/10.1016/S0956-5221(97)00020-1

Phillips, M. A., & Ritala, P. (2019). A complex adaptive systems agenda for ecosystem research methodology. *Technological Forecasting and Social Change*, *148*. https://doi.org/10.1016/j.techfore.2019.119739

Porter, M. E. (1991). Towards a dynamic theory of strategy. *Strategic Management Journal*, *12*(2 S), pp. 95–117. https://doi.org/10.1002/smj.4250121008

Porter, M. E. (2008). *Competitive strategy: Techniques for analyzing industries and competitors*. Simon and Schuster.

Porter, M. E., der Linde, C., & Van Der Linde, C. (1995). Toward a new conception of the environment-competitiveness relationship. *Journal of Economic Perspectives*, *9*(4), pp. 97–118. https://doi.org/10.1257/jep.9.4.97

Priem, R. L., Butler, J. E., & Li, S. (2013). Toward reimagining strategy research: Retrospection and prospection on the 2011 amr decade award article. *Academy of Management Review*, *38*(4), pp. 471–489. https://doi.org/10.5465/amr.2013.0097

Rasmussen, B. (2007). Business Models and the Theory of the Firm. *Pharmaceutical Industry Project*, pp. 1–11. http://www.cfses.com/documents/pharma/32-Business_Models_Rasmussen.pdf

Reeves, M., Love, C., & Tillmanns, P. (2012). Your strategy needs a strategy. *Harvard Business Review*, *90*(9), pp. 76–83.

Rosenkopf, L., & Nerkar, A. (1999). On the complexity of technological evolution: exploring coevolution within and across hierarchical levels in optical disc technology. In J. A. Baum & B. McKelvey (Eds.), *Variations in organization science: In honor of Donald T. Campbell* (pp. 169-184). Thousand Oaks, CA: SAGE Publications, Inc. doi: 10.4135/9781452204703.n10

Russo-Spena, T., Tregua, M., & Bifulco, F. (2017). Searching through the jungle of innovation conceptualisations: System, network and ecosystem perspectives. *Journal of Service Theory and Practice*, *27*(5), pp. 977–1005. https://doi.org/10.1108/JSTP-10-2015-0224

Sandelius, N. (2019) The Brave and the innovative: History maker Ulla Kiiski. Neste blog 12.11.2019. Available at: https://www.neste.com/corporate-info/news-inspiration/articles/the-brave-and-the-innovative-history-maker-ulla-kiiski (Accessed 13.12.2019)

Saunders, M., Thornhill, A., & Lewis, P. (2009). *Research methods for business students*. Prentice Hall: London.

Savitz, A., & Weber, K. (2006). *The Triple Bottom Line How Today's Best-Run Companies Are Achieving Economic, Social, and Environmental Success— and How You Can Too*.

Schildt, M. (2019). He loivat nahkansa. *Ekonomi*, *2,* pp. 8 – 10.

Schmitt, A, Barker III, V. L., Raisch, S., & Whetten, D. (2016). Strategic Renewal in Times of Environmental Scarcity. *Long Range Planning*, *49*(3), pp. 361–376. https://www.scopus.com/inward/record.uri?eid=2-s2.0-84941695949&doi=10.1016%2Fj.lrp.2015.08.004&partnerID=40&md5=9ef3697607538a27a207eef384709ef7

Schmitt, Achim, Raisch, S., & Volberda, H. W. (2018). Strategic Renewal: Past Research, Theoretical Tensions and Future Challenges. *International Journal of Management Reviews*, *20*(1), pp. 81–98. https://doi.org/10.1111/ijmr.12117

Schrettle, S., Hinz, A., Scherrer-Rathje, M., & Friedli, T. (2014). Turning sustainability into action: Explaining firms' sustainability efforts and their impact on firm performance. *International Journal of Production Economics*, *147*(PART A), pp. 73–84. https://doi.org/10.1016/j.ijpe.2013.02.030

Sharma, J. (2000). Managerial Interpretations and Organizational Context as Predictors of Corporate Choice of Environmental Strategy. *Academy of Management Journal*, *43*(4), pp. 681–697.

Singer, J. G. (2009). Ecosystem-centered business strategy. *2009 3rd IEEE International Conference on Digital Ecosystems and Technologies, DEST '09*, pp. 686–691. https://doi.org/10.1109/DEST.2009.5276680

Stead, J. G., & Stead, W. E. (2013). The Coevolution of Sustainable Strategic Management in the Global Marketplace. *Organization and Environment*, *26*(2), pp. 162–183. https://doi.org/10.1177/1086026613489138

Teece, D. J., Pisano, G., & Shuen, A. (1997). *DYNAMIC CAPABILITIES AND STRATEGIC MANAGEMENT*. *18*(7), pp. 509–533.

Thomas, L., & Autio, E. (2019). Innovation Ecosystems. *SSRN Electronic Journal*, *November*. https://doi.org/10.2139/ssrn.3476925

Thompson, J. L., Scott, J. M., & Martin, F. (2014). *Strategic management 7th edition*. Cengage.

Tsujimoto, M., Kajikawa, Y., Tomita, J., & Matsumoto, Y. (2018). A review of the ecosystem concept — Towards coherent ecosystem design. In *Technological Forecasting and Social Change* (Vol. 136, pp. 49–58). http://www.sciencedirect.com/science/article/pii/S004016251730879X

Van Bommel, H. W. M. (2011). A conceptual framework for analyzing sustainability strategies in industrial supply networks from an innovation perspective. *Journal of Cleaner Production*, *19*(8), pp. 895–904. https://doi.org/10.1016/j.jclepro.2010.12.015

Vergne, J.-P., & Durand, R. (2010). The missing link between the theory and empirics of path dependence: conceptual clarification, testability issue, and methodological implications. *Journal of Management Studies*, *47*(4), pp. 736–759.

Woodside, A. G., & Wilson, E. J. (2003). Case study research methods for theory building. *Journal of Business and Industrial Marketing*, *18*(6–7), pp. 493–508. https://www.scopus.com/inward/record.uri?eid=2-s2.0-0242678580&doi=10.1108%2F08858620310492374&partnerID=40&md5=d3356bfa033e20a507256d933deaa0de

Wu Suen, L.-J., Huang, H.-M., & Lee, H.-H. (2014). A comparison of convenience sampling and purposive sampling. *Journal of Nursing*, *61*(3), pp. 105–111. https://www.scopus.com/inward/record.uri?eid=2-s2.0-84906669640&doi=10.6224%2FJN.61.3.105&partnerID=40&md5=6bf05776975731011259b107cec39f3d

Yin, R. K. (2012). *Case study methods.* American Psychological Association.

APPENDIX A: INTERVIEW STRUCTURE

1. **Warm-up**
    a. The background of the interviewee before joining the company
    b. The background of the interviewee at Neste
2. **The story of Neste**
    a. What milestones or turning points Neste has faced during its story towards a more sustainable strategy?
    b. Who have been the most impactful actors in those moments you mentioned?
    c. Are those actors from inside or outside the company?
    d. What kind of stakeholder interaction there has been during Neste's story?
    e. How stakeholder management is approached at Neste?
3. **The drivers of strategy**
    a. What things have enabled the growth of Neste?
    b. Who have enabled the growth of Neste?
    c. What kind of things have encouraged Neste to choose a sustainability and circular economy based approach to its strategy?
    d. How strategic sustainability and circular economy themes are visible in the stakeholder cooperation?
    e. Has there been changes over time in the way that the themes of sustainability and circular economy are taken into account in the stakeholder cooperation?
    f. How impactful [insert: the specialty of the interviewee, e.g. regulation, marketing, etc.] has been in the development of Neste's strategy?
4. **Closing**
    a. Is there anything you would like to add?
    b. Who else would be a suitable person to be interviewed among the Neste managers?

APPENDIX B: DETAILED LISTING OF CRITICAL INCIDENTS* IN FIGURE 5

*The most critical incidents, which are marked with blue color in Figure 5 and were main determinants for the era changes, are bolded. The order of critical incidents is determined only by their year of appearance. Category of strategy & organizations is shortened as strategy & org.

ERA	ID	YEAR	CRITICAL INCIDENTS	CATEGORY	CASE DETAILS
LATE 90S'	1	1996	**Invention of NExBTL technology**	Technology & research	NExBTL differs from the traditional way of producing biodiesel, enabling the product to be used flexibly on its own or as a blend, in normal motors that are currently used in vehicles, without causing harm to the motor.
FORESEEING AND RISK-TAKING - 2000 - 2005	2	2002	European Union begins planning biofuel directives	Regulation	European Union showed that the markets would potentially be shaped in near future thanks to upcoming regulation. This gave direction and interest for the board of Neste. Year of appearance not detailed.
	3	2002	Investigating NExBTL's opportunities	Strategy & Org.	Neste board began evaluating the possibilities of owned NExBTL technology by predicting changes in regulative and market environment.
	4	2005	Separating from Fortum and becoming Neste Oil	Strategy & Org.	Neste was originally part of an energy company Fortum before separation and becoming listed on the NASDAQ OMX Helsinki stock exchange.
	5	2005	Deciding to build Porvoo 1	Strategy & Org.	Seeing the potential of NExBTL technology, the board of Neste decided to build a plant in Porvoo, without demo plants. This was unusual but possible thanks to Neste's and its subsidiary's competences in plant design.
	6	2005	RSPO	Industrial associations	Joining the Round Table on Sustainable Palm Oil.
BUILDING THE BASE WITH PERSISTENCE - 2006 - 2010	7	2006	**Goal setting to become world leader in renewable fuels**	Strategy & Org.	Neste made visible to its ecosystem actors, including own employees, the new strategic direction. New bold and risky goal was built on the expectation to see renewable fuel markets opening.
	8	2006	RTRS	Industrial associations	Joining Round Table Responsible Soy.
	9	2006	CONCAWE	Industrial associations	Joining European association for oil refiner safety, health and environment management.
	10	2007	Building Porvoo 1 and deciding to build Porvoo 2	Strategy & Org.	The first Porvoo plant run only few months and had no time to prove its profitability before Neste decided boldly to build another one. Both Porvoo plants have a capacity of 190 000 tons per year and cost around 100 million euros as an investment.
	11	2007	Research program with city of Helsinki	Programs	The unique three-year-long research program for testing renewable NExBTL fuels with city of Helsinki, the local transportation, VTT and local university gained visibility not only in the industry, but also in academic conferences, where Neste was often presenting the results.
	12	2007	Wood wax research	Technology & research	Planning to have a research demo plant of wood waste together with Stora Enso. The application for a European Commission grant was not approved (2012), hence the plan was never materialized.
	13	2007	RSB	Industrial associations	Joining Round Table on Sustainable Biomaterials.
	14	2008	Neste Green Diesel	Product	The first product of NExBTL product family was launched in 2008. It was well received by markets, until problems with NGOs arose.
	15	2008	Greenpeace	Society	Neste Green Diesel and Neste's renewable production gained attention from NGOs. Especially Greenpeace was strongly opposed to Neste and accused its palm oil based production to cause rainforest deforestation. Neste took the critic well, discussed openly to get all ecosystem actors on the same level of information and began to pay more attention on sustainability issues and NGO collaboration than before.
	16	2008	Deciding to build Singapore 1	Strategy & Org.	Neste board decided to expand renewable production to Singapore. The new investment was bigger than those in Porvoo,

					showed Neste's global orientation and committed it more to the vision statement.
BUILDING THE BASE WITH PERSISTENCE – 2006 - 2010	17	2008	Decision to build Rotterdam plant	Strategy & Org.	Decision to build a fourth NExBTL plant, which had a budget of 670 million euros.
	18	2008	Alberta program	Programs	Neste took part in technical testing project in Alberta during 2006-2009 to try out the endurance abilities of NExBTL fuel in cold environment. The project was sponsored by Shell Canada and governments of Alberta and Canada. NExBTL was doing excellent in the tests.
	19	2008	New CEO	Strategy & Org.	Matti Leivonen become CEO in December 2008 after Risto Rinne.
	20	2008	German technical testing program	Programs	A technical testing program in Germany in which Mercedes Benz was to try 100% NExBTL diesel in its trucks and busses.
	21	2009	Renewable Energy Directive I (RED I)	Regulation	Initiated in 2008, Renewable Energy Directive 1 was the first one to bind EU member countries to a common goal: 20% of used energy and 10% of used energy in transportation from renewable sources.
	22	2009	Aviation goals by IATA	Regulation	International Air Transport Association IATA set a goal for 10% of aviation fuels to originate from renewable raw materials by year 2017, and flights inside EU are included in the emission trading system by 2011. Flights out of EU were included one year later.
	23	2009	Implementing a matrix organization	Strategy & Org.	The whole organization was renewed: instead of the previous five industries Neste now had three business areas (Oil products, renewable fuels and wholesales of oil) and seven common functions, which all work as a matrix. This change includes the centralization marketing, which builds up to the upcoming development of brand marketing
	24	2009	Having a goal for having 100% palm oil certificated	Strategy & Org.	In June, Neste committed to using only certificated palm oil as much as it is available, targeting 100% in use by 2015. Neste developed its own transparency system to evaluate the supply chain of palm oil.
	25	2009	Decision to diversify the feedstock base	Technology & research	Feedstock streams were perceived differently in strategy. Year of appearance not detailed.
	26	2010	Kemianteollisuus ry	Industrial associations	Joining the Safeguarding association for chemistry industry and closely related industries in Finland.
	27	2010	Öljy- ja polttoaineala ry (Previously Öljyalan Keskusliitto)	Industrial associations	Joining Safeguarding association for oil industry in Finland.
	28	2010	Europia	Industrial associations	Joining Safeguarding association for European oil industry.
	29	2010	EBB	Industrial associations	Joining European biodiesel board.
	30	2010	ASFE	Industrial associations	Joining Association of European synthetic fuels.
	31	2010	European Biofuels Technology Platform	Industrial associations	Joining the European Biofuels technology platform.
	32	2010	Singapore 1	Investment	The NExBTL plant in Singapore is ready to. The capacity is 800 000 tons of fuel per year, multiplying Neste's capacity in renewable production. The cost of investment was 550 million euros.
	33	2010	Neste Green 100; Neste Green 100 testing program	Products; Programs	Neste Green 100 diesel, produced completely with renewable feedstocks, to be tested by staff and an external test group; it couldn't be sold in consumer markets until the standardization work was finished.
VISIONARY TURNS INTO PROFITABILITY - 2010 – 2014	34	2011	Rotterdam plant	Strategy & Org.	Rotterdam plant begins operating with a capacity of 800 000 tons per year.
	35	2011	**Internal strategy dialogue**	Strategy & Org.	As a continuation for scenario work (2010), strategy development ideas were collected from over 3000 employees. Over 1000 of them produced over 7000 ideas, such as feedstock expansion and increased collaboration, which were considered in the strategy formulation.
	36	2011	5 value programs	Strategy & Org.	Created for a successful implementation of the strategy, the value programs were profitable growth, productability, renewable materials, customer orientation and winner culture (which was cut down later).
	37	2011	Lufthansa partnership	Strategic partnerships	Creating a commercial, renewable jet fuel with Lufthansa. It had no markets yet because of the fuel price and financial situation of airlines.
	38	2011	FQD	Regulation	Fuel Quality Directive. Requirement for fuel producers to reduce emissions by 6% was in place and under national implementation.
	39	2011	IED	Regulation	Industrial Emissions Directive. National implementation in place. May affect the environmental permissions and terms of new plants.

VISIONARY TURNS INTO PROFITABILITY - 2010 – 2014

40	2011	EED	Regulation	Energy Efficiency Directive. Initiation to precise regulation of energy efficiency. National implementation will show the effects over time.
41	2011	ETS	Regulation	Emission Trading Scheme. Renewed environmental trade directive, implemented nationally. New market era begins in 2013. Some of Neste's plants are affected by reporting requirements of carbon dioxide.
42	2011	REACH	Regulation	The chemical regulation (registration, evaluation, authorization and restriction of chemicals) of EU focuses on the usage and movements within chemical supply chain.
43	2011	CLP	Regulation	Classification, Labelling and Packaging; regulation in EU to renew all chemical classifications and labels.
44	2011	Seveso	Regulation	A Directive aiming to prevent major accidents involving dangerous substances.
45	2011	RFS2	Regulation	Renewable Fuel Standard RFS2 in place, acceptance of raw materials and production chains is progressing gradually.
46	2011	ISCC certification for all plants	Industrial associations	Neste's all plants met the requirements of International Sustainability and Carbon certification.
47	2011	CEN	Industrial associations	Cooperation with European Committee of Standardization.
48	2011	Adapting stakeholder management methods	Strategy & Org.	Creating a stakeholder annual plan and establishing a stakeholder advisory board.
49	2011	**Updated vision to be preferred partner in cleaner traffic fuels**	Strategy & Org.	Vision update.
50	2011	New brand strategy	Strategy & Org.	Shifting brand marketing towards a more emotional approach because of the results in internal strategy dialogue and market research.
51	2011	Renewable jet fuel	Product	NExBTL-based aviation fuel in a 6-month test project with Lufthansa.
52	2011	3 new feedstocks	Technology & research	Camelina oil, jatropha oil and soy oil.
53	2011	Setting strategic partnerships as a goal	Technology & research	A goal of strategic partnerships to support Neste's research efforts.
54	2012	Harmonizing research with Globalab	Technology & research	Harmonizing the activities, developing and implementing best practices and problem-solving in the cooperative research network.
55	2012	ILUC	Regulation	Indirect Land Use Change potentially to be updated for managing risks.
56	2012	Setting long-term customer centric goals	Strategy & Org.	Customer centric goals were updated with long-term perspective. Customer segmentation was developed.
57	2012	Neste Pro diesel	Products	New product was launched in the Finnish customer markets.
58	2012	Microbial oil demo plant	Technology & research	Neste launched the first demo plant in Europe to research the production of microbial oil from the land and forest industry waste.
59	2012	1 new feedstock	Technology & research	Fish oil.
60	2012	NExBTL Naphtha	Products	NExBTL naphtha, suitable for bio plastics production, is added to the product portfolio of renewable fuels
61	2013	Way forward	Strategy & Org.	Way forward program highlighted taking and giving responsibility, cooperation, safety, customer orientation and rewarding of good results. The rationale behind the program was to ensure capabilities in the dynamic environment and to best use the energy of the employees.
62	2013	Aviation programs: ITAKA, Flightpath2020 and Dutch cooperation	Programs	In 2013 Neste strengthened its position in renewable aviation business by taking part in three different aviation greening programs.
63	2013	TFT cooperation for reducing deforestation	Society	Cooperation with the Forest Trust to reduce deforestation and secure responsible feedstock production of palm oil.
64	2013	Acquiring SPO RED SC Certificate and fulfilling WWFC 5 specification	Industrial associations	As the first company in the world, Neste achieved a certificate from RSPO, a proof for the supply chain and use of palm oil to be responsible through its lifecycle at Neste.
65	2013	CLEEN	Industrial associations	Neste joined the Cluster for Energy and Environment.
66	2013	EEF	Industrial associations	Neste joined European Energy Forum.
67	2013	CRFA	Industrial associations	Neste joined Canadian Renewable Fuels Association.
68	2013	OCIMF	Industrial associations	Neste joined Oil Companies International Marine Forum.
69	2013	Updates and isomerization unit to Porvoo	Investment	Porvoo plant is extended by having an isomerization plant, which increases production flexibility by allowing use of high-octane gasoline.
70	2013	3 new feedstocks	Technology & research	Technical corn oil (TCO), spent bleaching earth (SBE) and tall oil pile (TOP)

	71	2013	Boeing testing program	Strategic partnerships	Testing renewable aviation fuels in use. In 2015, the collaboration led the two to prepare a standard application for the product.
	72	2013 /2014	Off-take agreements on algae with Cellana and RAE	Strategic partnerships	Neste made agreements to have an option of buying algae from Cellana (2013) and RAE (2014) to be used as its NExBTL feedstock.
	73	2014	European Commission's approval for Neste sustainability verification system	Regulation	European Commission accepts Neste's responsibility scheme for its supply chain.
	74	2014	Dividing strategic goals into two	Strategy & Org.	New strategic goals: being the leading fuel solution provider in Baltic sea & growing in global renewable energy markets.
	75	2014	Changing organizational structure	Strategy & Org.	Clarifying and streamlining the management of businesses and increasing customer orientation and ability to react to market changes. The change included ending of 250 work contracts. In the new organizational structure, the Production and Logistics sectors were merged into the Oil Products and Renewable Products business areas.
	76	2014	Rotterdam bio propane plant	Investment	Bio propane plant to be built by 2016. Its production is supplied to a Dutch SHV energy, with whom Neste had a strategic partnership.
	77	2014	NExBTL Isoalkane	Products	New isoalkane product is a suitable raw material in chemistry industry.
	78	2014	1 new feedstock	Technology & research	Used cooking oil (UCO).
SUSTAINABLE GROWTH - 2015 - 2019	79	2015	Committing to Paris Climate Agreement: keeping global temperature below 2 degrees by 2011	Regulation	Neste signed the pledge of Paris Climate Agreement of keeping global temperature below 2 degrees by 2011.
	80	2015	**Changing name to Neste Oyj**	Strategy & Org.	Changing the name from Neste Oil to Neste Oyj concretized how the traditional oil company shifted towards sustainability from fossil fuels.
	81	2015	**Updating vision 'creating responsible choices every-day'**	Strategy & Org.	Updated vision was more integrative and abstract, but also more emotional as was wished in the feedback from strategy dialogue.
	82	2015	Reaching ability to use 100% waste in NExBTL	Technology & research	Neste reached the technical ability of using 100% waste and residue feedstocks in the production process of NExBTL products.
	83	2015	Creating a bio plastic business model	Strategy & Org.	Neste developed a new business model based on bio plastics and began negotiations with the world-leading consumer brands in order to replace the fossil-base components in their products.
	84	2015	Sales under own brand name	Products	Instead of losing own brand name in the sales chains, Neste changed the strategy and required its own brand name to be visible.
	85	2015	Partnerships in solvent business	Strategic partnerships	New partnerships were established with Total fluides and HSC Group in renewable solvents in order to develop further solvent business.
	86	2015	New customer segment openings: in cities and fleets	Strategic partnerships	The last era showed an increase in different customer segments, such as cities, city fleets, transportation companies and event managers.
	87	2016	Donating to Finnish universities	Technology & research	Celebrating 100 years anniversary of Finland by donating 1.5 million euros to Finnish universities (Aalto, Åbo Akademi, Lappeenranta university of technology and University of Helsinki).
	88	2016	Oslo airport	Strategic partnerships	Since January 2016 Oslo airport has offered its airlines NExBTL aviation fuel, which results in 47 % smaller greenhouse gas emissions than fossil aviation fuels during the product lifecycle.
	89	2016	Event partnerships	Strategic partnerships	Representations in famous events, e.g. Super Bowl and Weekend Festival
	90	2016	IKEA partnership for bio plastic production	Strategic partnerships	Partnering with IKEA was an important step towards new business opportunities in bioplastics and other bio polymers.
	91	2017	Christmas charity program for Finnish customers	Society	The 'Kinkkutemppu' implemented the first time to increase awareness of circular economy. Neste produced Neste MY from oil delivered from households around Finland. Additionally, Neste donated to charity.
	92	2017	Re-launching Neste MY brand	Products	Neste MY was re-launched as a strong brand for all renewable fuels.
	93	2017	Enlarging focus of research to waste plastics	Technology & research	More research efforts in using waste in bioplastic production. The IKEA cooperation directed to focusing more research efforts to the polymers, which later was separated to its own business.
	94	2017	Launching EduCycle Exchange for schools	Society	An engaging customer vote online lead to creating a gamified learning experience on CE for ten partner schools in Finland and abroad.
	95	2017	Charity work scheme	Society	Neste workers allowed to spend some work hours doing charity.
	96	2017	Acquisition of Neste Jacobs	Strategy & Org.	Buying the majority of long-term subsidiary and changing its name to Neste Engineering Solutions provided expertise in engineering, project management and technology competence, supporting Neste's growth strategy and operative efficiency.
	97	2017	Neste green hub concept	Products	Decarbonizing aviation by creating collaborative platforms for airports, solution providers, airlines, authorities, communities and passengers.

SUSTAINABLE GROWTH - 2015 - 2019	98	2017	American Airlines	Strategic partner-ships	Collaboration with American Airlines to reduce its carbon foot-print and to encourage the aviation fuel standardization efforts of e.g. ASTM.
	99	2018	5-year program with big brands	Strategy & Org.	Cooperative 5-year program with world-wide brands Unilever, Pepsicon, Cargill, Danone and palm oil suppliers Golden Agri and Musim Mas.
	100	2018	Shipping program	Programs	Reacting to ID105, shipping fuel research with ship owners, ma-chine manufacturers, industrial stakeholders and members of international shipping organization IMO and International Bun-ker Industry Association aiming to become a leader in renewa-ble shipping fuels.
	101	2018	EU sets a vision for 2050	Regulation	The key message of the updated vision of EU is that Europe should be climate neutral by 2050 by e.g. investing in technolog-ical solutions.
	102	2018	Renewable Energy Di-rective II (RED II)	Regulation	European union set a new directive for renewable energy usage so that a total of 32% of used energy would be renewable by 2030.
	103	2018	New CEO brings faster and bolder culture and changes the organizational structure	Strategy & Org.	New CEO Peter Vanacker accelerated the speed in working cul-ture, calling it “faster and bolder”, which per se is not new to Neste, but feels highly motivational internally. New business segments were separated to better focus on the future possibili-ties of renewables.
	104	2018	Decision on building Singa-pore 2	Strategy & Org.	After a long break, Neste’s largest investment ever is to build another NExBTL plant in Singapore. The plant will increase Neste’s production capacity of renewable products with 1.3 mil-lion tons a year, meaning that the total capacity by 2022 shall be 4.5 million a year.
	105	2018	IMO’s goal to cut 50% emissions by 2050	Regulation	International Maritime Organization set a goal to reduce the greenhouse emissions of all ships by 50% by 2050. Additionally, the carbon intensity must be reduced by 40% by 2030 and 70% by 2050.
	106	2018	Acquisition of Demeter	Strategy & Org.	As a strategic move to ensure the supply of animal waste and fat within Europe, Neste acquired one of its most important suppli-ers.
	107	2018	Changing the structure of business units	Strategy & Org.	Four business units are in place: renewable products, oil prod-ucts, marketing & services and others. The 7 supporting func-tions remain.
	108	2018	Neste bio propane	Products	Bio propane as a new product.
	109	2018	Alaska Airlines	Strategic partner-ships	Cooperation with Alaska Airlines in designing, creating and tak-ing into use new solutions for renewable fuels in aviation.
	110	2019	Updating the goal to be a global leader in renewable and CE solutions	Strategy & Org.	Goal update.
	111	2019	**Updated vision to leading the way towards a sus-tainable future together**	Strategy & Org.	Vision update.