



# **Business Model Ecosystems**

*and their Implications for Sustainability*

**Niklas Happerschoß**

**Supervisor: Prof. Christine B. Meyer**

Master thesis, M.Sc. in Economics and Business Administration,  
Strategy and Management.

**NORWEGIAN SCHOOL OF ECONOMICS**

This thesis was written as a part of the Master of Science in Economics and Business Administration at NHH. Please note that neither the institution nor the examiners are responsible – through the approval of this thesis – for the theories and methods used, or results and conclusions drawn in this work.

---

# Table of Contents

<b>Bibliography .....</b>	<b>4</b>
<b>Abbreviations .....</b>	<b>5</b>
<b><i>Executive Summary.....</i></b>	<b>6</b>
<b>1. Introduction.....</b>	<b>7</b>
<b>1.1 Subject of Research and Research Questions.....</b>	<b>7</b>
<b>1.2 Purpose of Research .....</b>	<b>8</b>
<b>1.3 Methodology .....</b>	<b>10</b>
<b>2. Background Literature.....</b>	<b>12</b>
<b>2.1 Sustainability in a Business Context.....</b>	<b>12</b>
<b>2.2 Business Model.....</b>	<b>13</b>
<b>2.3 Business Model Innovation .....</b>	<b>16</b>
<b>2.4 Value Chains and Networks.....</b>	<b>17</b>
<b>2.5 Ecosystems.....</b>	<b>18</b>
2.5.1 Biological Ecosystems .....	19
2.5.2 Social Ecosystems .....	19
2.5.3 Business Ecosystems.....	20
<b>3. Synthesis of Sustainability, Business Model and Business Ecosystems .....</b>	<b>26</b>
<b>3.1 Sustainable Business Models.....</b>	<b>26</b>
3.1.1 Sustainable Business Model Innovation.....	27
3.1.2 The Circular Economy .....	28
<b>3.2 Business Model Ecosystems .....</b>	<b>30</b>
3.2.1 Boundaries of a Business Model Ecosystem.....	38
3.2.2 Managing Business Model Ecosystems .....	42
3.2.3 Innovating Business Model Ecosystems .....	52
<b>3.3 Sustainable Business Ecosystems.....</b>	<b>54</b>
3.3.1 Interconnection of Ecosystems.....	55
3.3.2 Implications of Sustainable Business Ecosystems .....	57
3.3.3 Who is Responsible for Sustainability?.....	60
<b>3.4 Sustainable Business Model Ecosystems.....</b>	<b>62</b>
<b>4. Conclusion &amp; Implications .....</b>	<b>67</b>

---

<b>4.1</b>	<b>Future Scope of Study .....</b>	<b>69</b>
	<b><i>References</i>.....</b>	<b>70</b>

---

## Bibliography

Figure 1. Search results of the topic 'sustainability' sorted by years. ....	9
Figure 2. Mapping of search results of the topic 'business ecosystem' by research areas.....	10
Figure 3. The business model: creating, delivering and capturing value. ....	15
Figure 4. Business Model Canvas Composition .....	16
Figure 5. Search results of the topic 'business ecosystem' sorted by years .....	21
Figure 6. Possible Combinations of Concepts and resulting Research Fields .....	26
Figure 7. A traditional linear value chain.....	28
Figure 8. The circular economy - an industrial system that is restorative by design. ....	29
Figure 9. Types of Strategy .....	35
Figure 10. Business Model Ecosystem .....	37
Figure 11. Elements of an ecosystem construct .....	38
Figure 12. Visualization of a Business Ecosystem .....	39
Figure 13. The layers of the business ecosystem .....	40
Figure 14. Viable Ecosystem Strategies.....	51
Figure 15. Interconnections of Ecosystems.....	56

## Abbreviations

BMI	Business Model Innovation
BMES	Business Model Ecosystem
CGT	Cooperative Game Theory
Non-CGT	Non-Cooperative Game Theory
NRBW	Natural-Resource-Based View
SMBMES	Sustainable Business Model Ecosystem

## **Executive Summary**

Stand-alone strategies do not work anymore, instead business models have to fit into their business ecosystem to co-create and co-capture value. This thesis deals with the modern concept of business model ecosystems and how they can be managed and innovated. Also, this thesis aims to draw conclusions about the implications the business model ecosystem has for sustainability.

Conclusions are derived by drawing from the scientific findings in the form of a synthesis of the concepts 'business models' and 'business ecosystems'. Moreover, the findings are synthesized and analyzed with respect to sustainability.

In this thesis, it was assessed that the business ecosystem constitutes an own instance and requires its own business model to manage the value co-creation and co-capture. Business model ecosystems have been defined as stories of how the business ecosystem works. The business model ecosystem describes a system of how the modules of a business ecosystem are linked together, considering all kinds of interactions. A good business model ecosystem must have a logic (who needs to be included), structure (who hands off to whom), and governance (who sets the rules).

It can be concluded that participants of business ecosystems have to cooperate as well as compete to maximize value co-created and co-captured. This holds true for financial but also for social and environmental values. Therefore, the business model ecosystem also constitutes a powerful framework for business ecosystems to become more sustainable by managing value flows across the triple bottom line.

Business ecosystems provide its members access to new knowledge, resources and opportunities for business model innovation. The innovation of a single business model can change the entire value flows of an ecosystem. However, that requires the community to be open, transparent and trustful. Moreover, the business ecosystem requires a common vision and common values. On this basis, the actors can cooperate to materialize a common value proposition.

# 1. Introduction

## 1.1 Subject of Research and Research Questions

The subjects of research of this thesis are business ecosystems, business models and sustainability. The focus lies on the combination of those concepts which are namely: sustainable business models, business model ecosystems, sustainable business ecosystems and sustainable business model ecosystems.

Lindgren (2016) coined the term business model ecosystem, which represents a modern approach to apply the business model to the aggregated level of the business ecosystem. This approach, however, is not methodologically sound, yet. Since this thesis aims to contribute to this current strand of research, the concept of business model ecosystems will represent the heart of this thesis. Furthermore, its implications for sustainability are highlighted with respect to sustainable business model ecosystems and how the concept applies to those business ecosystems in particular. This includes common concepts such as the circular economy their relation to the business model ecosystem.

To engage in this discussion, first, a definition of the term business model ecosystem is required in order to differentiate it from traditional business models. Furthermore, to manage business ecosystem it is required to define their boundaries to draw valid conclusions for the following research questions: What do business model ecosystems implicate with respect to managing and innovating business ecosystems and what does this, in turn, implicate for the businesses participating in business ecosystems?

Subsequently, this thesis deals with the importance of business ecosystems for sustainability and the question of how all of the discussed ecosystems are intertwined with each other. Lastly, it will be discussed whether the concept of business model ecosystems is applicable to sustainable business ecosystems, how thinking in terms of business ecosystems might change the perception of sustainability and how it could aid businesses in the process of becoming more sustainable.

## 1.2 Purpose of Research

A company is a fictional concept and plays an important role in our society. As a legal person, it holds certain rights but also several liabilities. However, in the real world, it often feels like the obligations of companies are the only a fictional part of this story - at least regarding social and environmental liabilities. Too often, laws and regulations are set as a benchmark instead as of a minimum, and moral obligations are being ignored. Although the awareness for environmental and social issues is continuously increasing, the general conditions which set the framework for economic activities are, altogether, changing, too slowly. Considering that with the upcoming climate crisis we are facing one of the biggest challenges mankind has ever faced, it cannot be done enough to prevent it.

The climate can be considered a public good and the need for action is clouded by a classical prisoner's dilemma, in which the optimal choice for the entire world population is foiled by the individual's self-interest. This can even be scaled up to the political decisions on a national level. To achieve the optimal outcome, all governments have to pull together and fight climate change altogether. However, each government considered by itself is better off by not choosing to act and rather let the rest of the world take up the challenge because they could profit from their effort without sharing the costs (Shi-Lling-Hsu, 2010). Unfortunately, if every government acts only on its own (short-term) advantage, mankind will fail miserably at this challenge of unity. This very argumentation chain can be made analogously for any instance – for individuals and also for companies.

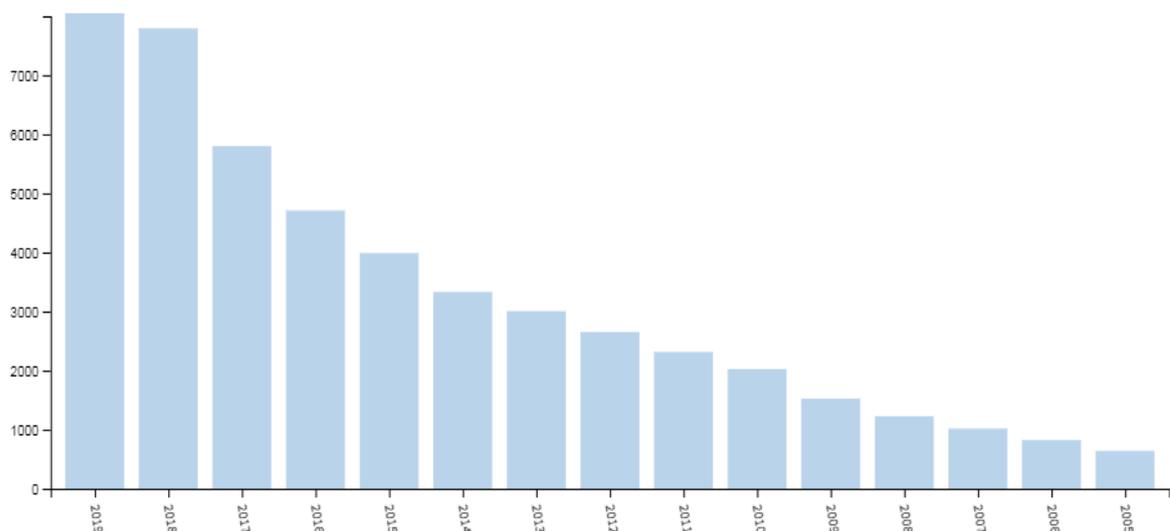
Economic growth became an illusion because it is limited through “social organization on environmental resources and by the ability of the biosphere to absorb the effects of human activities” (World Commission on Environment and Development, *From One Earth to One World*, 1987, Section 3, Article 27). Temporary economic growth exceeding those limits is unsustainable and it is foolish to strive for it blindly without considering social and environmental sustainability. Yet, a society which can manage to overcome the upcoming challenges is on the way to a new era of sustainable economic growth shaped by social justice and a healthy environment.

“As companies have accelerated innovation in their own businesses, they have discovered that they can't change the world alone” (Moore, 2006, p. 32). What they have not discovered yet, however, is how to organize themselves in an effective way to tackle the imminent

issues. This conclusion is supported by a survey by Kiron et al. (2015) which found that 90% of the responding managers agree to the statement that their business needs collaborations to be able to address issues of sustainability. However, less than 30% of those managers state that they are already engaging in successful sustainability collaborations.

*“To assess the sustainability efforts of companies properly, we must look at entire ecosystems of companies and their collaborative efforts for doing business more sustainably. Such collaboration requires that they are willing to open up their business models to each other and work together in ways that make the whole more than the sum of its constituent parts” (Jørgensen & Pedersen, 2018, p. 121).*

Over the last few years, the concepts of sustainability, ecosystems and business models have increasingly spiked in interest. Figure 1 illustrates the search results of the keyword ‘sustainability’ in Reuters’ web of science. The search results of the terms ‘business model’ and ‘business ecosystem’ show similar results (cf. figure 5 in chapter 2.5.3). If mapped with respect to the area of research, all three search terms show increased interest in business and management studies as well as in environmental science. Figure 2 illustrates one of those mappings of the search term ‘business ecosystem’. The search terms ‘sustainability’ and ‘business model’ lead to similar results.



*Figure 1. Search results of the topic 'sustainability' sorted by years. Own figure, data from Web of Science, <https://apps.webofknowledge.com/>*

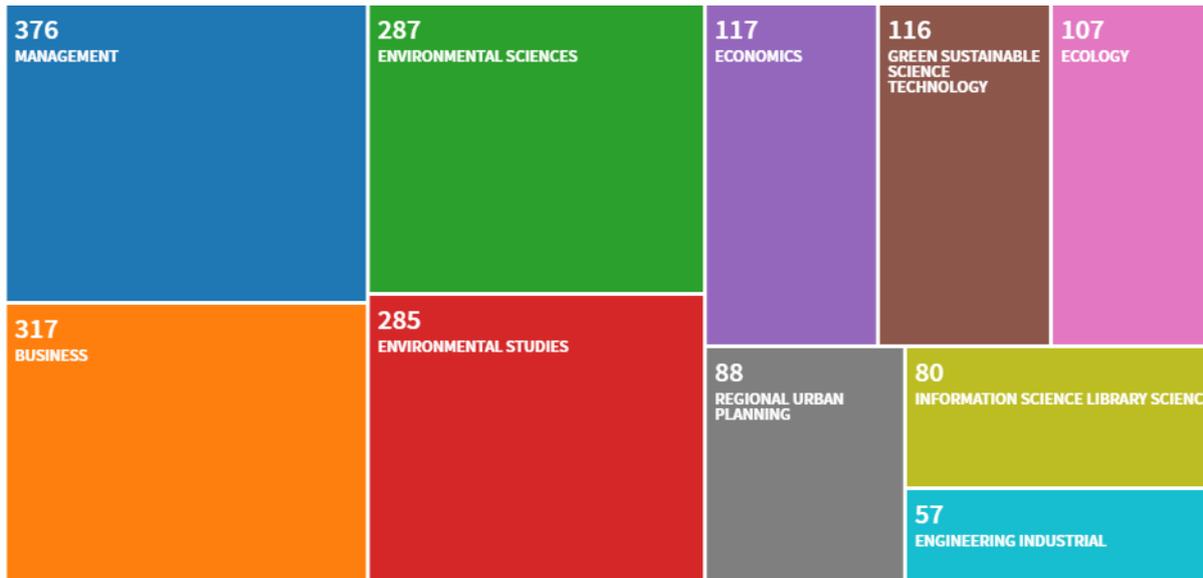


Figure 2. Mapping of search results of the topic 'business ecosystem' by research areas. Own figure, data from Web of Science, <https://apps.webofknowledge.com/>

Despite its importance and increasingly received attention, business ecosystems are neither understood nor managed well enough (Iansiti & Levien, 2004). For this reason, the purpose of this thesis is to take part in the change of mind within the business world; to raise more awareness of the symbiosis of the environment, the society and the business environment. Additionally, it aims to criticize the strategic thinking of businesses and give an impulse towards a more sustainable way of thinking by starting to focus on the business ecosystem instead of considering one's own business as an isolated bubble.

### 1.3 Methodology

The methodology applied in this thesis is not built on empirical research but is instead formed on inductive reasoning. This thesis is based on a synthesis of two modern approaches, namely business models and business ecosystems. In addition, these approaches are analyzed and synthesized with respect to sustainability.

First of all, a theoretical background of the fundamental theories about each concept is presented to provide a foundation for an in-depth discussion. Due to the limited scope of this

work, the introduction into the theory is by no means all-encompassing but is meant to set the point of departure for the following discussion. Some concepts and specific literature will be revisited in more detail in the discussion section. Moreover, some more specific literature is not introduced until the discussion section.

The discussion takes the form of an argumentative synthesis drawing from the scientific findings of the different dimensions, combining them in a way to build a new whole and thereby providing a new way of perception for sustainability, business models and business ecosystems as a united system. Therefore, this thesis required the methodology of a synthesis because a lot of research already exists which allows drawing conclusions for the relevant research questions of this thesis. However, the relevant literature is not found within one research subject but is scattered across the discussed concepts, mainly dealing with the relevant concepts more implicitly than explicitly. In addition, no uniform vocabulary has been established, yet. Therefore, a structured literature review would be misleading. Last but not least, this thesis aims to combine prescriptive and descriptive approaches which means that it will argue how the world ought to be based on how the world really is.

## 2. Background Literature

To establish theoretical support for the reasoning of this thesis, the fundamental concepts will be defined, and controversies will be elucidated in the following paragraphs. First, the basic concepts which constitute the foundation for the following discussion are presented. This chapter is logically structured from more basic to more specific concepts, however, this does not represent an order in relevance. The chapter starts with the concept of sustainability, is followed by the business model concept and ends with different ecosystem theories. The named concepts are backed up by related subjects that are either more specific theories of great importance or are simply helpful for better understanding of the concepts.

### 2.1 Sustainability in a Business Context

Although it is not a new concept, sustainability remains a very controversial issue in current times. A part of this controversy can be attributed to the conceptual confusion of this issue. Authors use the term ‘sustainability’ to refer to different phenomena (Lozano, 2008).

However, the definition of the Brundtland Commission for sustainable development is widely recognized, and therefore also constitutes the foundation of this thesis. The Brundtland Commission defines sustainable development as “the ability to [...] [meet] the needs of the present without compromising the ability of future generations to meet their own needs” (World Commission on Environment and Development, 1987, Chapter 2, p. 1).

The classic shareholder view sets financial performance as the most important and often sole goal of a business and measures performance exclusively in monetary output. Most importantly, a sustainable business is based on stakeholder principle and acknowledges that an enterprise does not solely account for the generated shareholder value but holds a responsibility towards all other persons or groups that are directly or indirectly affected by the company’s actions or have any interest in its activities. In short: towards everyone who has a stake in the firm (Freeman, 2004).

A sustainable business adds new perspectives as it considers more output factors besides the financial one. The additional factors can be summarized in the triple bottom line: people,

planet, profit. Thus, an enterprise has to account for environmental and social performance on top of the financial performance (Elkington, 1998) A sustainable business does not replace the traditional model but rather goes beyond it. Economical sustainability is the major prerequisite for business – regardless of its nature. Despite the first intuition, the threefold focus does not necessarily decrease the shareholder value. On the contrary, many studies suggest that accounting for the triple bottom line has a positive effect on financial performance (Orlitzky, Schmidt, & Rynes, 2003). Some research even focuses on increasing financial performance *through* the triple bottom line (Hart & Dowell, 2011). In contrast, this thesis supports the focus on maximizing financial performance *while* maximizing environmental and social performance at the same time.

On the one hand, an absolutely sustainable business is a business that has at least a neutral impact on all three levels of the triple bottom line. On the other hand, a relatively sustainable business is one which is more sustainable in relation to its competitors, including relevant substitutes. The concept of relative sustainability is very important since the output throughout the triple bottom line can be measured and compared, although it is difficult to compare different dimensions of the triple bottom line with one another. Consequently, one sustainable business can be more sustainable than another and even an enterprise that is not absolutely sustainable might be relatively more sustainable than others (Bjørn & Hauschild, 2013).

## 2.2 Business Model

According to Jensen (2013), there is no universally accepted definition of the term business model, but one of the most precise ones originates from Mayjo and Brown (1999): “Business models refer to the design of key interdependent systems that create and sustain a competitive business”.

The following three definitions by Magretta and by Zott and Amit are of great importance for the reasoning of this thesis and will be discussed and analyzed in chapter 3.2.

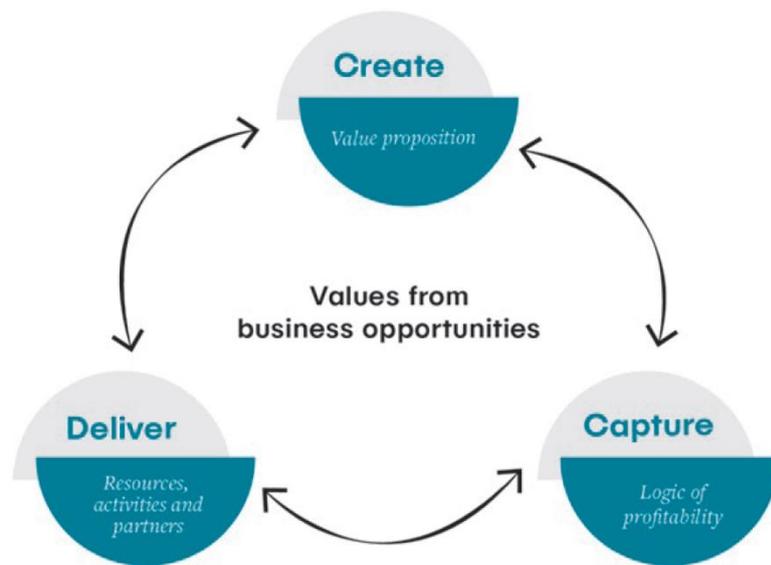
Magretta (2002) states that business models are “stories that explain how enterprises work” (p. 87) and that furthermore “[b]usiness models describe, as a system, how the pieces of a

*business fit together. But they don't factor in one critical dimension of performance: competition" (p. 91) "a good business model has to satisfy two conditions. It must have a good logic – who the customers are, what they value, and how the company can make money by providing them that value. Second, the business model must generate profits" (Magretta, as cited in Nielsen et al., 2018, p. 53).*

*"The business model is a structural template of how a focal firm transacts with customers, partners, and vendors; that is, how it chooses to connect with factor and product markets. It refers to the overall gestalt of these possibly interlinked boundary-spanning transactions." (Zott & Amit, 2008, p. 3)*

*"[W]e conceptualize a firm's business model as a system of interdependent activities that transcends the focal firm and spans its boundaries. The activity system enables the firm, in concert with its partners, to create value and also to appropriate a share of that value." (Zott & Amit, 2010, p. 216)*

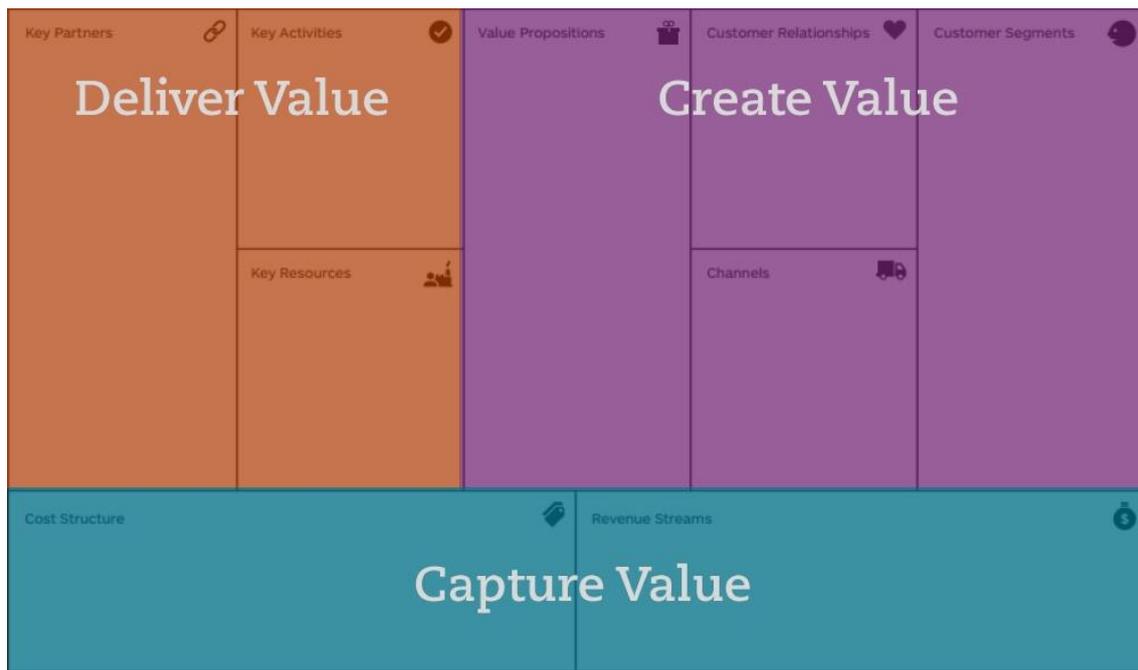
In summary, the business model is the framework through which a strategy is implemented. Within this thesis, the term business model will be challenged from different perspectives, whereby no definition holds the truth alone. Nonetheless, many arguments are in need of a specific framework for illustration to aid better understanding. In those cases, the framework of Osterwalder and Pigneur (2010) is used, as it allows an abstract as well as a more detailed point of view on the same case. According to Osterwalder and Pigneur (2010) "[a] business model describes the rationale of how an organization creates, delivers, and captures value" (p. 14). Teece (2010) almost congruently defines business models as "the benefit the enterprise will deliver to customers, how it will organize to do so, and how it will capture a portion of the value that it delivers" (p. 179). Those three parts are the major elements of how a business model can be defined at its core.



*Figure 3.* The business model: creating, delivering and capturing value. Reprinted from RESTART, by Jørgensen and Pedersen, 2018, p. 59.

To describe a business model in more detail, Osterwalder and Pigneur (2010) have developed a business model canvas through which a business model can be visualized and analyzed or new business models can be developed. It is based on the concept of creating, delivering and capturing value as can be seen in figure 3. Furthermore, figure 4 depicts how the separate points can be unraveled into more detail as, for example, creating value splits into a value proposition, customer relationships, customer segments and channels.

The business model canvas is a powerful tool to explore greater depths of a specific business model, to work with it in practice and to develop a better understanding of the composition of a specific business model. It is important to note that in essence, both models describe the same content. However, to work on an abstract level, the summary of a business model through the three major points – creating, delivering and capturing value -is sufficient to discuss the essence of a business model from a scientific point of view. This is because it grasps the true meaning even if it does not describe it in complete detail. Nevertheless, a more detailed perspective will become necessary at a later stage of this thesis.



*Figure 4.* Business Model Canvas Composition. Reprinted from Strategyzer AG, retrieved from <https://www.plusacumen.org/files/business-model-canvasjpg>

In addition to the business model canvas, there are also other frameworks to illustrate the business model. Other frameworks include the ROCV (Demil & Xavier, 2010) and the STOF model (Bouwman, Faber, Haaker, Kijl, & de Reuver, 2008). The latter, for example, focuses more on the interdependencies of the different domains within a business model. Nevertheless, the business model canvas is by far the most widespread concept of all. The business model itself can constitute a designated attribute of a firm and thus a great business model can constitute a sustainable competitive advantage over the firm's competitors (Massa, Tucci, & Allan, 2017).

## 2.3 Business Model Innovation

Business model innovation (BMI) is the continuous adaptation of the architecture of how a business creates, delivers and captures value (Teece, 2010). Therefore, BMI constitutes a dynamic process of changing activity-system elements of the business including the adoption

of new activities, new ways of linking activities and new ways of governing activities (Zott & Amit, 2010).

Incremental improvements in technology do not always need BMI, but the more radical the innovation, the more likely it becomes (Teece, 2010). However, incremental improvements can lead to specification, refinement and/or adaptation of the business model (Morris, Schindehutte, & Allen, 2005). The necessity of BMI evolves from the awareness that a business model has as much impact on the success of a business as the technology. In other words: “[A] mediocre technology pursued within a great business model may be more valuable than a great technology exploited via a mediocre business model” (Chesbrough, 2010, p. 354). However, this also implies that BMI does not necessarily follow technological innovation, but can also add value to the system by itself without any technological advances.

## 2.4 Value Chains and Networks

The value chains and network are related concepts to the business ecosystems and constitute essential background theory to understand the business ecosystem in general, how the concepts relate and what differentiates them.

The value chain represents the stages of production as an ordered series of activities. These activities create values and reach from the resources to the customers, connected in a linear sequence. All other functions that are not present in the linear production process are considered support functions (Porter, 1985). The linear thinking of the value chain has shaped our thinking of value creation, especially in manufacturing industries. However, business models became more and more complex and less linear, especially through globalization and digitalization (Peppard & Rylander, 2006). Therefore, “today’s dynamic and complex environment requires a higher level, network view of inter-organizational exchanges at both the conceptual and practical level” (Biem & Caswell, 2008, p. 1).

A value network is one way to picture the more complex level of cooperation and to analyze it as well as to model it. It can be considered an intermediate step to the business ecosystems. Like the value chain, the value network is performance-oriented, but no longer linear. A

value network can be considered as a multidimensional network of nodes linked to each other. The nodes represent different businesses creating value individually and the links represent their activities towards the network, including the exchange of tangible, but also intangible goods and services (Parolini, 1999; Allee, 2003).

The strength of a value network lies within the cooperation of its members because the value of a value network is not just the sum of its components, but it also creates value through the cooperation itself (Fjeldstad & Haanæs, 2001). Hence, cooperation is one of the major attributes of a value network. Motivated by the outlook on increased profits, companies organize themselves around the customers' needs to maximize the customers' value through their cooperation within a network. Each participant becomes part of the network because of their unique skills that increase the overall value of the network (Haglund & Helander, 1998).

In summary, the value network is still focused on the value creation from resources to the end customer, but in a multidimensional way in contrast to the linear fashion of the value chain. In contrast to the linear model, the value network accounts for different connections to other members and aspects of the business network, above all in nature of alliances (Peppard & Rylander, 2006). A commonality between the two concepts is that they are strategically and consciously managed to gain a competitive advantage.

## 2.5 Ecosystems

Today the term "ecosystem" is widely spread and used in different settings. There are, for instance, biological-, social-, economical-, business-, industry- and digital ecosystems. In general, they are all just analogies for a characteristic system which they all have in common. This system has originally been derived from the (natural) biological ecosystem (Peltoniemi, 2008). On the one hand, the term ecosystem is derived from the biological ecosystem. On the other hand, many definitions of biological ecosystems describe the system with too much specificity to draw a generic understanding. Therefore, some selective definitions are chosen and analyzed in order to eventually modify them into a more generic way to foster an abstract reflection on this issue.

### **2.5.1 Biological Ecosystems**

The Cambridge Dictionary (2014) defines an ‘ecosystem’ as “all the [...] things in an area and the way they affect each other and the environment“. These interactions and dependencies amongst the different species can become very complex (Peltoniemi, 2008). Furthermore, The World Resource Institute (2000) describes an ecosystem as a constantly changing system that is influenced by natural forces which interact with the system and might change as well. The Ecosystem evolves and shapes around its circumstances. This process is very sensitive, which means that slight differences in the circumstances can have enormous differences in outcome (World Resources Institute, 2000). Thus, each ecosystem represents a solution to very specific circumstances. Additionally, the ecosystem is constantly evolving, not just by adapting to natural disturbances but also by changing through competition and cooperation amongst and between species (World Resources Institute, 2000).

One could picture an ecosystem through nodes and small sub-systems, representing individuals and species. Each node or sub-system of the ecosystem interacts with a number of other nodes and is, therefore, linked to them, together forming the ecosystem. Ecosystems can be divided into different categories and groups, however, all ecosystems are tightly linked to each other into one continuum – the biosphere, the sum of all ecosystems (Peltoniemi, 2008; World Resources Institute, 2000).

### **2.5.2 Social Ecosystems**

Whereas the biological ecosystem is relatively straightforward and scientists agree on the term and broadly on the definition, the social ecosystem is more controversial. Many different definitions include various aspects of the ecosystem and emphasize different links and actions which supposedly define a social ecosystem. Mitleton-Kelly (2003), for instance, includes businesses, consumers, cultural and legal institutions. In this chapter, the different ecosystems and their differences are emphasized. Thus, the focus lies on the distinguishing characteristics separating the social ecosystem from other ecosystems which are discussed. In the discussion, similarities, dependencies, and relations of different ecosystems will be highlighted in more detail.

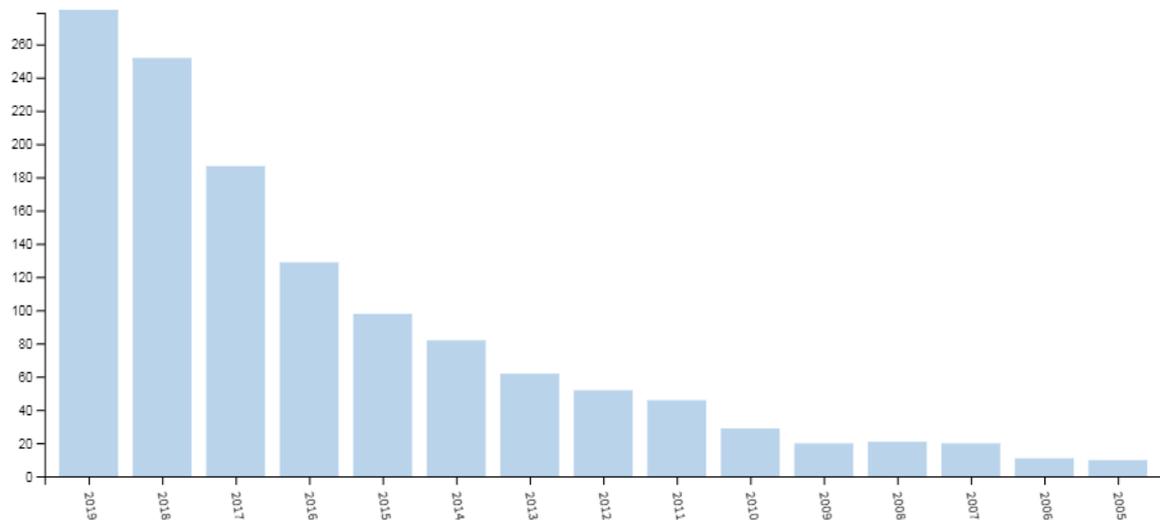
Although the term social ecosystem exists in the literature (Mitleton-Kelly, 2003), a more common term in social science is merely ‘social system’, which in essence refers to the same concept (Kroeber & Parsons, 1958; Etzioni, 1968; Parsons, 1972). Even the frequently used term society is equivalent to a social ecosystem (Parsons et al., 1976). Albeit less common in the literature, in the following the term ‘social ecosystem’ is used to emphasize the similarities of the concept to the other ecosystems that are discussed and to foster a clear argumentation for a better understanding.

A social ecosystem is a network of interactive relations of individuals, in which the individuals influence each other (Etzioni, 1968). The network is based on communication and the actions of the individuals. Social ecosystems are entangled with one another and individuals can be part of different social ecosystems. Although countries, families, football teams, schools as well as church congregations differ to a great extent, they are all examples of social ecosystems (Beegle & Loomis, 1957). Even if excluded for a better understanding, ethics, institutions, (political) administrations, businesses are all examples of subsystems and can be part of social ecosystems (Luhmann, 1982).

### **2.5.3 Business Ecosystems**

The business ecosystem is a growing field of research that increasingly gained relevance over recent years. The development of the term business model is illustrated in figure 5, showing the search results of the term ‘business ecosystem’ sorted by years.

Since the business ecosystem is an essential part of this thesis, it will be illustrated in more detail. Like any other ecosystem, the business ecosystem consists of interacting individuals and organizations. The main difference between the various types of ecosystems is the kind of individuals or organizations which are interacting and their goals. In the business ecosystem, multiple enterprises, their customers, competitors, labour unions and other stakeholders build an economic community (Moore, 1996). Those communities organize themselves partially in an intentional and partially in an accidental manner, producing goods and/or services for their customers who are themselves members of the business ecosystem (Moore, 1998).



*Figure 5.* Search results of the topic 'business ecosystem' sorted by years. Own figure, data from Web of Science, <https://apps.webofknowledge.com/>

The value network shares some similarities with the business ecosystem. Although the value network, just like business ecosystems, consists of interacting individuals and organizations, the two differ in several aspects. First, the value network is primarily a result of cooperation, whereas the ecosystem does not identify through cooperation alone but through other interactions like competition and co-evolution as well (Moore, 1996). Second, the value network has a narrower focus in regard to its members than the business ecosystem. Third, in contrast to the value network, the business ecosystem cannot be planned and managed completely. Therefore, the value chain, value networks and alliances overall, are all planned actions in which all interconnections are entered voluntarily. Although a business can choose to operate within a certain business ecosystem or not, it cannot necessarily choose all its interactions and connections within the ecosystem, especially with respect to indirect interactions.

One could argue that in addition to single businesses and their business models, value chains and value networks can also be parts of an ecosystem, and they represent a specific method of cooperation within an ecosystem. In particular, if a business ecosystem includes the traditional manufacturing process, they can still often be depicted in terms of a value chain,

however, they are not isolated but rather entangled with the rest of the business ecosystem. Additionally, the business ecosystem also includes rather indirect roles like companies which produce essential equipment, financial institutions, schools and universities, media, competitors and complementors, and many more. Hence, the ecosystem is a much more complex system (Moore, 1993, 1996; Iansiti & Levien, 2004).

The business ecosystem is a very novel concept and there remains much uncertainty about the nature and the boundaries of the object of research (Adner, Oxley, & Silverman, 2013). Although they do not define clear boundaries, Iansiti and Levien (2004) used very powerful examples to picture business ecosystems and how they affect everyday life:

*“Consider the world around us. Dozens of organizations collaborate across industries to bring electricity to our homes. Hundreds of organizations join forces to manufacture and distribute a single personal computer. Thousands of companies coordinate to provide the rich foundation of applications necessary to make software operating systems successful.”* (Iansiti & Levien, 2004, p. 2)

In contrast to other concepts such as clusters, industries or value chains, the concept of business ecosystems rejects geographical borders. Through modern communication tools, lower transportation costs and globalization, in general it has constantly become easier to build business ecosystems across the world (Moore, 1996). With regard to Iansiti and Levien’s (2004) example of the personal computer business ecosystem, it is evident that, in contrast to biological and social ecosystems, business ecosystems have no geographical boundaries. The manufacturing and distribution of all the components is certainly a global operation, however, where or what are the boundaries of the business ecosystem then? Besides the conclusion that defining the boundaries of business ecosystems is a near-impossible task, the existing literature offers no answer for that question as yet (Adner et al., 2013). Therefore, this question has to be addressed in more detail in the discussion in chapter 3.2.1.

The business ecosystem and the biological ecosystem are often treated as an analogy. For example, Moore (1993) used the analogy when he derived the business ecosystem from the biological ecosystem. Koenig (2012) opposes the analogy of the two concepts, arguing that different ecosystems exist in different milieus that are not comparable and the fact that business ecosystems compete with each another is not congruent with the analogy to

biological ecosystems. Without evaluating Koenig's critique, the analogy still represents a valuable source to better understand the business ecosystem, its participants and their actions. Firstly, competition and cooperation are both common concepts in the ecological as well as in the business context. Nevertheless, it is important to note, that not only businesses compete within an ecosystem, but also business ecosystems compete against each other (Hearn & Pace, 2006).

Secondly, the biological ecosystem underlies natural forces which can constantly change. Similarly, the business ecosystem underlies external forces including 'P'olitical, 'E'conomical, 'S'ocial, 'T'echnological, 'L'egal and 'E'nvronmental forces. The reason the first letters are in capital letters and apostrophes is that the named forces constitute the PESTLE-analysis which is a common tool to analyze how external forces affect an industry (Yu, Li, & Zhao, 2011; Perera, 2017). Those forces can change just like they do in the biological ecosystem. The political environment, for instance, might change after an election if a new government is elected that has a completely different agenda than the previous, war breaks out, or international relations change. Another example could be an economic change in the environment through a change in inflation or exchange rates, especially if the business ecosystem operates internationally.

Thirdly, the parts of a biological ecosystem underlie permanent change; species evolve, mutate and potentially vanish. The same happens within business ecosystems, where business models represent different species which live within it. New business models can enter the ecosystem or even extinguish permanently, new co-operations may be formed and above that, a new business ecosystem can evolve or whole business ecosystems can renew themselves or even die (Moore, 1993).

Most companies have multiple business models, but even if a business has just one business model, it usually is invested in multiple business ecosystems and very frequently also in competing for business ecosystems at the same time (Lindgren, 2018). In fact, competing for business ecosystems share a surprisingly high number of identical agents (Gueguen & Isckia, 2009). Although this seems confusing at first, it makes sense considering that many business ecosystems recruit their professionals from the same elite universities. Thus, those target universities are important parts of many business ecosystems. This is analogous to the social ecosystem in which people are parts of different social ecosystems. One might be part of a

family, a football team, a church congregation and many more at the same time. The same is true for businesses.

A great example to clarify this controversy is Corning, a business specialized in manufacturing chemically strengthened glass called “Gorilla Glass”. Corning does not focus on just one business ecosystem with their product but rather supplies many different companies. Gorilla Glass is, for instance, used in most smartphones, tablets, wearables and some laptops from different brands (Corning, 2019, a). In conclusion, Corning with its business model is not just part of different business ecosystems but also of competing ones. Narrowing the focus, Corning’s business model is part of 15 competing smartphone ecosystems (Corning, 2019, b). Yet, not just specialized businesses operate in different business ecosystems. Although they are themselves keystone players of competing business ecosystems, Samsung, LG and Toshiba are at the same time important suppliers for Apple’s supply chain as well (Apple Inc., 2019, a).

Another important factor that defines a business ecosystem is modularity in finding a coherent solution for the end customer. Thus, the different actors act largely independently of each other and can compete for those modules, for example in design and price. This holds true as long as the respective company operates its modules and follows predefined rules. This group of independent businesses is dynamic, which means that the structure of modules and also companies occupying a module can change over time (Jacobides, Cennamo, & Gawer, 2018).

Most definitions of ecosystems set the affiliation as a core attribute (Adner, 2017) as, for example, the following: “*An ecosystem is a set of actors with varying degrees of multilateral, nongeneric complementarities that are not fully hierarchically controlled*” (Jacobides et al., 2018, p. 2264). Apart from the fact that this definition focuses on the factor of ‘non-generic complementarities’, which is also highly controversial, it also focuses on the network of the actors instead of the purpose of the network. Adner (2017), in contrast, sets the value proposition, and how the network of partners aligns itself for it to materialize, in the middle of the business ecosystem: “*The ecosystem is defined by the alignment structure of the multilateral set of partners that need to interact in order for a focal value proposition to materialize*” (Adner, 2017, p. 40).

Although Adner's approach of setting the focal value proposition into the center of the business ecosystem is of merit, it is highly limited by the alignment of partners, because not all interactions within an ecosystem are aligned and not all participants are partners. In contrast to the value network, the business ecosystem is also defined by other interactions such as competition. Therefore, the following modified definition is proposed:

*The business ecosystem is defined by the structure of the multilateral set of actors that need to interact in order for a focal value proposition to materialize.*

Mostly congruent to the proposed definition, Adner (2017) defines the structure of a business ecosystem in the following four points:

*“1. Activities, which specify the discrete actions to be undertaken in order for the value proposition to materialize.*

*2. Actors, which are the entities that undertake the activities. A single actor may undertake multiple activities; conversely, multiple actors may undertake a single activity.*

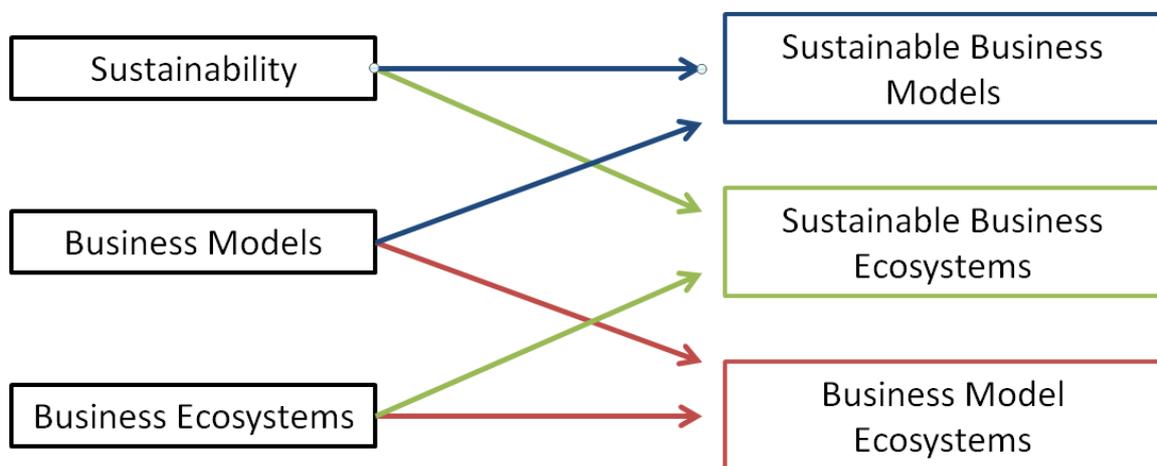
*3. Positions, which specify where in the flow of activities across the system actors are located and characterize who hands off to whom.*

*4. Links, which specify transfers across actors. The content of these transfers can vary—materiel, information, influence, funds. Critically, these links need not have any direct connection to the focal actor.” (p. 43)*

Although Adner's definition differs in important points from the definition for this thesis, the detailed description of the structure holds true and provides solid guidance for the structure of a business ecosystem.

### 3. Synthesis of Sustainability, Business Model and Business Ecosystems

The goal of this chapter is to construct a synthesis of business models, business ecosystems and sustainability. While the synthesis leads to the merge of all three theories, there is also great importance in the combination of each two of those concepts. The resulting theories of those research fields form an important basis for the following discussion. Figure 6 displays the possible combinations and the resulting research fields.



*Figure 6.* Possible Combinations of Concepts and resulting Research Fields. Own Figure

Therefore, the discussion is structured into four chapters. The first three will discuss the three combinations pictured in figure 6 separately. In the fourth chapter, all concepts will be combined into a new whole.

#### 3.1 Sustainable Business Models

Of the concepts pictured in figure 6, the sustainable business model (SBM) is the most established and most common concept. Furthermore, this concept does not constitute the

major focus of this thesis, therefore SBMs are not discussed in the same granularity as the other concepts.

An SBM could be conceptualized as a narrative of sustainability practices and represents an “ideal type” (Stubbs & Cocklin, 2008). Clearly, the SBM is a fusion of the neoclassical business model with sustainable virtues. As described in chapter 2.1, the SBM is based on the stakeholder approach and focuses on value creation along the triple bottom line. The strongest characteristic defining an SBM is the intention of doing business because it embodies the strategy and purpose of a company. To not just account for the triple bottom line but to truly build the company’s purpose around the social and environmental performance alongside economic performance is what defines an SBM (Stubbs & Cocklin, 2008). Nevertheless, it cannot be stressed enough that financial viability is an important requirement that has to be taken into account, even in such an “ideal type” (Schaltegger, Lüdeke-Freund, & Hansen, 2011). An SBM without accounting for sustainability is a conservative business model but an SBM which is not financially viable will eventually go bankrupt.

### **3.1.1 Sustainable Business Model Innovation**

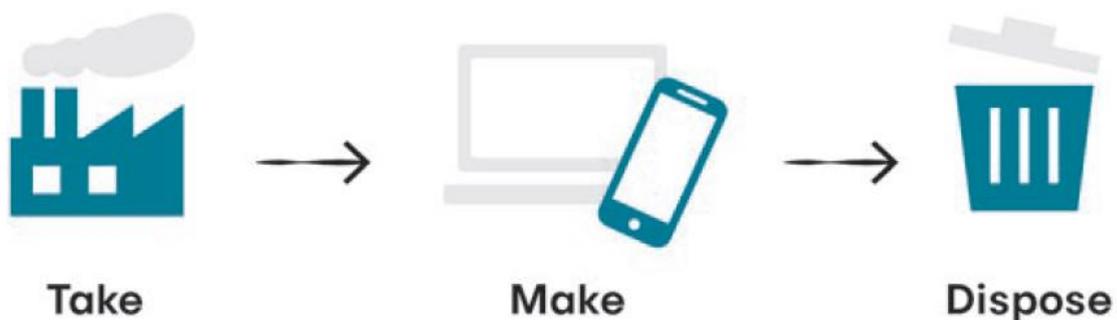
There is no single right way to transform a business model into an SBM, but instead many different approaches that have to be put into action selectively and often even in combination. Technological innovations towards more sustainability are usually of incremental nature and are associated with a long-term horizon to achieve significant change. Therefore, BMI is necessary to achieve strong results against sustainability targets in a shorter time without being dependent on technological progress (Rashid, Asif, Krajnik, & Nicolescu, 2013). A business model can be innovated in every aspect of the business model canvas, and therefore in any way of how a company creates, delivers or captures value (Zott & Amit, 2010). It can, therefore, be more effective than process or product innovation (Lindgardt, Reeves, Stalk, & Deimler, 2009).

In chapter 2.1, an important distinction was made between absolute and relative sustainability. Picking up on Stubbs and Cocklin’s (2008) idea of the SBM as an “ideal type”, business model innovation is striving to increase relatively more sustainability.

Therefore, not only unsustainable business models can be innovated, but also already absolute sustainable business models can become even more sustainable.

### 3.1.2 The Circular Economy

Notwithstanding the fact that there is no defined way to innovate a business, certain trends have emerged that tackle today's problems in a highly effective way. The circular economy, for instance, challenges the linear economy that has dominated our thinking since the third industrial revolution. Although the linear economy enabled a quickly ascending way to higher levels of prosperity, it is one of the biggest reasons for our current sustainability problems (Jørgensen & Pedersen, 2018). As shown in figure 7, the linear value chain is based on the logic to "[t]ake, make and dispose" (Stahel, 2016).

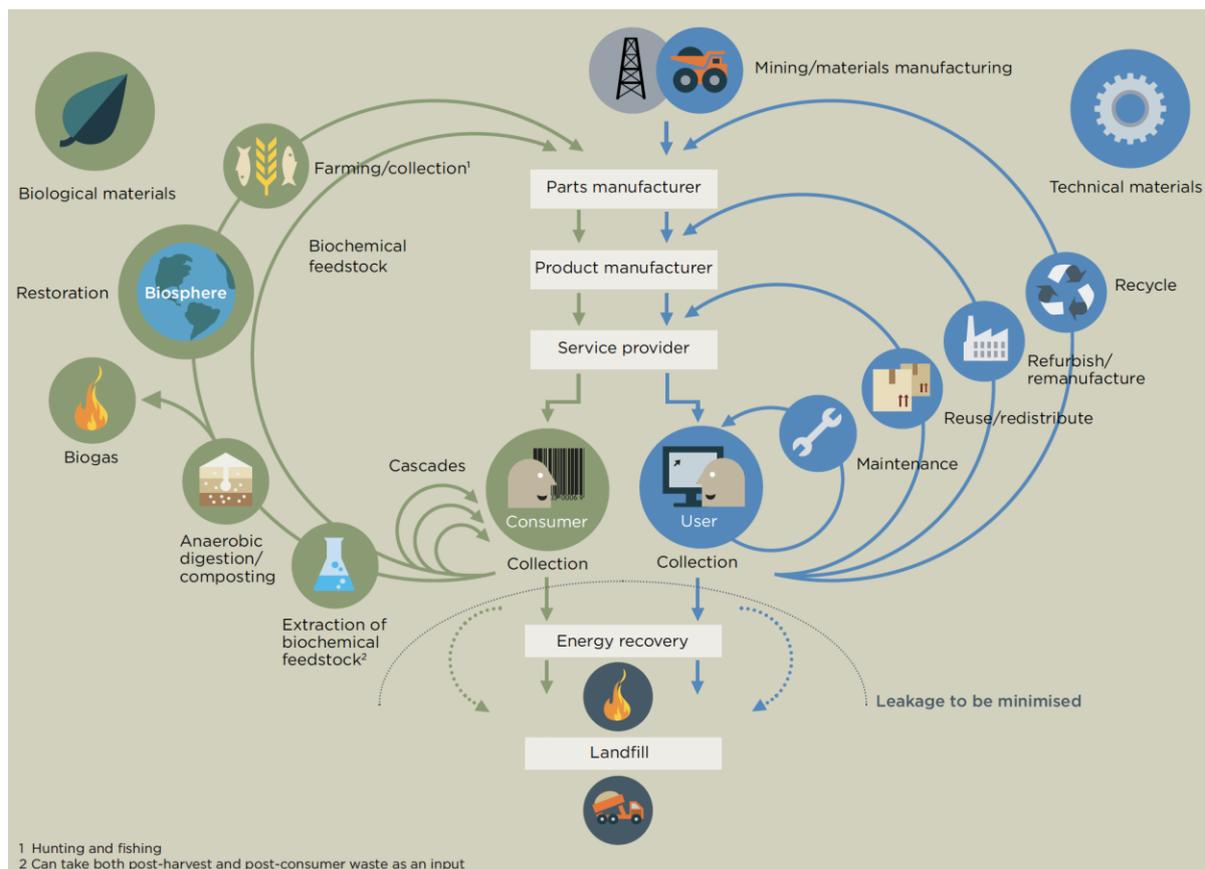


*Figure 7.* A traditional linear value chain. Reprinted from “RESTART“, by Jørgensen and Pedersen, 2018, p. 106.

The reason why the concept of the linear value chain is maneuvering us into a catastrophe is simply that it is not sustainable. Many resources, for example, oil and noble earths are finite and others which regenerate themselves require a balance to do so, such as fish stocks that can be overfished. There is a risk of complete depletion of major resources. Additionally, an incredible amount of waste is harming the environment and society (Jørgensen & Pedersen, 2018). Perhaps the production process is much simpler and more straight forward in a linear value chain, but it is much less energy efficient to extract new resources instead of reusing recyclable resources. The transformation from a linear into a circular economy would have a huge impact along the triple bottom line: Potentially 70% of greenhouse emissions could be

prevented, employment could be increased by 4% and furthermore, there is a huge profit potential for the companies within the circular economies which have adapted (Ellen MacArthur Foundation, 2015).

Renewable resources which are used must be kept in balance with nature in a circular economy (McDonough & Braungart, 2010). “Circular business models thus can enable economically viable ways to continually reuse products and materials, using renewable resources where possible” (Bocken, de Pauw, Bakker, & van der Grinten, 2016, p. 308). Instead of becoming waste, resources are reused as often as possible. The first step on that path is to redesign products to use fewer resources and to be able to extract the valuable resources easily and restart the cycle again. Apple, for instance, redesigned its products to use fewer resources overall and to disassemble old products efficiently to reuse as many resources as possible (Apple Inc., 2019, b).



*Figure 8.* The circular economy - an industrial system that is restorative by design. Reprinted from “Towards the Circular Economy“, by Ellen Macarthus Foundation, 2014, p. 15

However, in the long run, companies have to transition their business models to SBMs which are characterized by being restorative and regenerative (McDonough & Braungart, 2010). The characteristics of those SBMs include, but are not limited to reparation, reselling, renting, or sharing of products (Jørgensen & Pedersen, 2018). In Figure 8, the theory of the circular economy is pictured in detail. The cycle is divided into a biological and a technical part, but both cycles are about minimizing waste. In the biological cycle, the objective is to keep the resources within the cycle for as long as possible – to let them “cascade”. Resources within the technical cycle on the other side are to be maintained, reused, refurbished and recycled as often as possible. The key essence is to keep reducing waste of valuable resources by changing the flows of those resources. (Ellen MacArthur Foundation, 2014). Bocken et al. (2016) describe three methods to achieve that: slowing, closing and narrowing the loop. They define those processes as follows:

*“(1) Slowing resource loops: Through the design of long-life goods and product-life extension (i.e. service loops to extend a product’s life, for instance through repair, remanufacturing), the utilization period of products is extended and/or intensified, resulting in a slowdown of the flow of resources.*

*(2) Closing resource loops: Through recycling, the loop between post-use and production is closed, resulting in a circular flow of resources. [...]*

*(3) Resource efficiency or narrowing resource flows, aimed at using fewer resources per product.” (p. 309)*

## 3.2 Business Model Ecosystems

*“Stand-alone strategies don’t work when your company’s success depends on the collective health of the organizations that influence the creation and delivery of your product. Knowing what to do requires understanding the ecosystem and your organization’s role in it” (Iansiti & Levien, 2004, p. 1)*

*“A business that takes an action without understanding the impact on the ecosystem as a whole is ignoring the reality of the network environment in which it operates.”*

(Iansiti & Levien, 2004, p. 8)

Iansiti and Levien’s statements show clearly that by focusing merely on yourself and your own business model, one does not achieve much anymore. Any company and organization depends on its surroundings and its ecosystem(s). That does not just hold true for economic success but also for social and ecological goals. For this chapter, the latter two are ignored but will be picked up again in chapter 3.5.

Our linear thinking is holding us back in our perception of a business. Industries have to be reevaluated in order to exploit the potential of the business ecosystems in which they are operating (Peppard & Rylander, 2006). Recapping the business model definitions of Zott and Amit (2008, 2010), one can observe that they already defined the linkages to the value network as an essential aspect of the business model.

*“The business model is a structural template of how a focal firm transacts with customers, partners, and vendors; that is, how it chooses to connect with factor and product markets. It refers to the overall gestalt of these possibly interlinked boundary-spanning transactions.”* (Zott & Amit, 2008)

*“[W]e conceptualize a firm’s business model as a system of interdependent activities that transcends the focal firm and spans its boundaries. The activity system enables the firm, in concert with its partners, to create value and also to appropriate a share of that value.”* (Zott & Amit, 2010)

Zott and Amit (2008, 2010) already recognized the importance of transactions with stakeholders. Additionally, they highlight the way in which a company interacts and links with those stakeholders. Furthermore, in 2010 they have already considered that a company does not create value on its own but rather “in concert with its partners” and that a business model has to capture a share of this value. Thus, Zott and Amit (2008, 2010) already include the value network in their business model definition.

Biem and Caswell (2008) described the value network as “a structure where value is created, recognized, and captured” (p. 3) which is very close to Osterwalder and Pigneur’s (2010) definition of business models: creating, delivering and capturing value. The main difference

in the attempt of Biem and Caswell is to transfer the approach of a business model from one business unit to a bigger structure. They set the focus on the value for the end customer throughout the whole network, which is either the aggregated customer's value or in other words a market segment. Although this is implicitly true, for many dynamics within a network and ecosystem, the single values of the provided services in any form cannot be ignored. The implicit truth can easily be explained inductively: If one business tries to maximize the value for its customer, it will make use of services which will do so. If this premise holds true for the whole network, the whole network will organize to maximize the value for the end customer. The value propositions of a network and accordingly also of an ecosystem can be differentiated between the aggregated business intent of the value network and the single business intent of one node (Biem & Caswell, 2008).

Although, as described in chapter 3.5, the concept of a value network is closely related to business ecosystems, there are some important distinctions. Magretta (2002) mentions in his definition of a business model one important factor that is missing: "Business models describe a system, how the pieces of a business fit together, but they don't factor in one critical dimension of performance: competition". Furthermore, the focuses of business ecosystems are set much more broadly and include many other aspects. Indirect agents beyond the close value network have to be included, for instance, financial institutions, universities, media, complementors and many more (Moore, 1993, 1996; Iansiti & Levien, 2004). In addition, the fact that businesses usually have business models in multiple business ecosystems was elucidated in chapter 2.5.3. This might hold true for value networks as well, but not in such an extensive way.

The transformation of perception from value chain to the business ecosystem is similar to the step from the single business perspective to the value chain view. The focus shifts more and more to multidimensional systems (Adner et al., 2013) which require different kinds of strategies, communication and management to be successful. Businesses have to free themselves from thinking in the bubble of their own business model and accept that their business model is part of (multiple) business ecosystems. They are linked with potentially hundreds and thousands of other agents across different business ecosystems on which they are, in part, dependent. Consequently, they have to "understand that strategy extends beyond outsmarting the competition to novelty in thinking about the marketplace and how to deliver value for customers, taking into account the ecosystem in which competition unfolds" (Zahra & Nambisan, 2012, p. 228). Business ecosystems have to develop a common strategy for the

business ecosystem and even a framework of how to implement that strategy. The businesses within the ecosystem need a story of how they intend to work together and combine their business models. They need a business model for their business ecosystem – a business model ecosystem (BMES).

Lindgren (2016) coined the term BMES in 2016, but neither the term BMES nor the concept is currently generally accepted in the literature. Lindgren (2016) found that “[t]oday, the focus of the [business model] seems to be changing and shifting towards a more holistic [business model] discussion taking in the [business model’s] relations to other business models and the [business model’s] environment – leaving the basic [business model] dimensions and constructions behind although it has not completely been defined” (p. 78). This is consistent with our analysis. To reshape the literature and to separate the two concepts, Lindgren summarizes the interaction of business models under the term ‘BMES’ to separate it from the basic business model concept. Lindgren describes characteristics, boundaries and dimensions of BMES but unfortunately fails to provide a clear definition. The closest statement to a definition is: “[T]hose ‘ecosystems’ where the [business model] really operates and works as a value-adding mechanism – objects or species” (p. 61).

The first step to describe a BMES is as the aggregated business models of its agents including all the value which they create and capture as a unit. As Lindgren (2016) described, there is far too much confusion about the differentiation between the business model and the business ecosystem. Therefore, in this thesis, the value of the whole business ecosystem will be defined as the overall value. However, because of the multidimensional connections of the business models and their interactions, the value of the business ecosystem exceeds the aggregated value of the business models.

$$V_{BE} > \sum V_{BM}^1$$

As a result, business ecosystems are not just the aggregated values of the business model, since the business ecosystem creates value on its own through the interconnection and links

---

<sup>1</sup> Explanation of abbreviations in equations:

V: value

BM: business model

BE: business ecosystem

BMES: business model ecosystem

on an aggregated level. This concept goes hand in hand with Jacobides et al.'s (2018) concept of value co-creation and co-capture. This additional value exceeding the aggregated value of the business models arises from the BMES. Accordingly, the equation is as follows:

$$V_{BE} = \sum V_{BM} + V_{BMES}$$

However, this equation falls short, as soon as one realizes that business models do not have an individual value without the ecosystem they depend on. Nevertheless, one can assume that an ecosystem is not dependent on any of its members and constitutes an own instance (Demil, Lecocq, & Warnier, 2018). The premise of independence, however, might not hold true if one of a business ecosystem's actors has enormous market power or owns a critical resource or technology, for example, in a platform business ecosystem (cf. chapter 3.2.2).

The BMES inevitably brings up the issue of the business ecosystem strategy.

*“[The] key distinction between competitive strategy and ecosystem strategy lies in the explicit consideration of actors who lie off the critical path to the end consumer: participation (who needs to be included), structure (who hands off to whom), and governance (who sets the rules)” (Adner et al., 2013, p. x).*

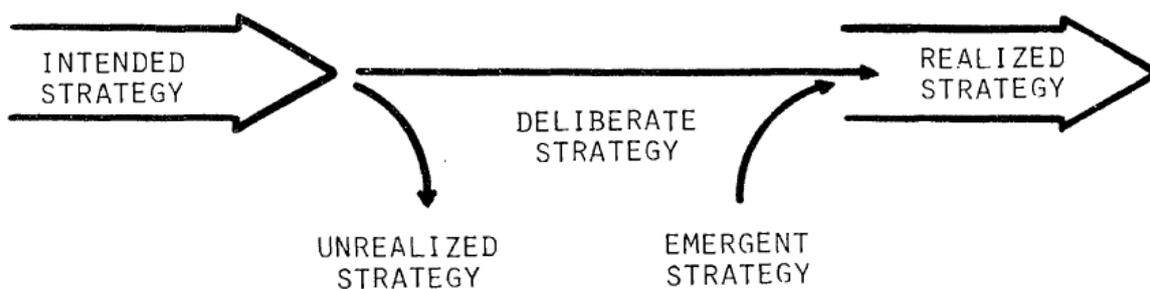
However, one could define ecosystem strategy from two different points of view. The first approach is to define ecosystem strategy from a single business perspective; how the business model is positioned and acts in a business ecosystem. The other option is to define it as the overall strategy of the business ecosystem. In the literature, the first approach is the more common one because the approach to consider the business ecosystem as an independent instance is not yet widespread but essential (Demil et al., 2018). Although Adner (2017) defined the business ecosystem with reference to the value proposition, he defines the ecosystem strategy as the “way in which a focal firm approaches the alignment of partners and secures its role in a competitive ecosystem” (p. 47). Adner took the right step to define the business ecosystem as an independent network but then falls back into old habits when he defines the business ecosystem from a business perspective instead of in perspective of an independent system which can have a strategy.

Through the merger of the business model definition and the derivation of the overall value of the business ecosystem, the BMES can be defined. Analogous to the business model definition, the BMES represents a framework through which a strategy is implemented.

Furthermore, the strategy of a business ecosystem embodies the strategy of how the single modules are linked to co-create and co-capture value.

*BMES are stories of how the business ecosystem works. The BMES describes a system of how the modules of a business ecosystem are linked together, considering all kinds of interactions. A good BMES must have a logic (who needs to be included), structure (who hands off to whom), and governance (who sets the rules).*

A legitimate objection is that it is very uncommon for a business ecosystem to have a common strategy. As stated in chapter 2.6.3, business ecosystems organize themselves partially in an intentional and partially in an accidental manner. Even if all business models are designed independently, they still function as an integrated whole. (Pidun, Reeves, & Schüssler, 2019). This approach fits very well with the general understanding of deliberate and emergent strategies. Initially, one has an intended strategy which is rarely congruent with one's realized strategy, because new information is revealed over time and one has to intuitively adapt to changes in previous assumptions or to the interference of external forces. The part of the intended strategy that is realized is called deliberate strategy, whereas the intuitive and unplanned part is called emergent strategy – resulting from intuitive actions and decisions (Mintzberg & Waters, 1985). The process from the intended strategy to realized strategy is illustrated in figure 9.



*Figure 9.* Types of Strategy. Reprinted from “Of Strategies, Deliberate and Emergent”, by Mintzberg & Waters, 1985, p.258

The BMES is, as discussed, partially intentional and partially accidental. Those two parts are equivalent to the deliberate and emergent strategy. Consequently, in a pragmatic view, the BMES is the result of all the single decisions that business models make in regard to the

business ecosystem, whether or not those decisions are planned. Therefore, one can manage BMES through developing an intended strategy, ensuring that the business ecosystem follows it and managing ad hoc decisions as a community – managing the emergent strategy. The issue of managing a BMES is picked up again in chapter 3.2.2.

The proposed definition of BMES aims to clarify the meaning of the term itself. However, it does not constitute a specific framework that could be implemented. Viswanadham (2017), on the other hand, approached BMES from a more pragmatic point of view. He defines BMES through

*“eight main components which are the customer value proposition (CVP), profit formula, partner network, the other four business model pillars include supply/service chain processes; key resources; delivery mechanisms and institutional and social constraints and, finally, the operational governance” (p. 983).*

Figure 10 illustrates the center of Viswanadham’s framework and thus only illustrates his concept partially. It can be concluded quickly that this approach is too complex for a thorough comprehension considering the complexity of a business ecosystem and the complexity of managing one. Furthermore, just as Adner (2017), Viswanadham (2017) defines the BMES from a single business model perspective. This approach is not generally false. It provides a great in-depth view of the functioning of a BMES, but from a different angle than previously proposed.

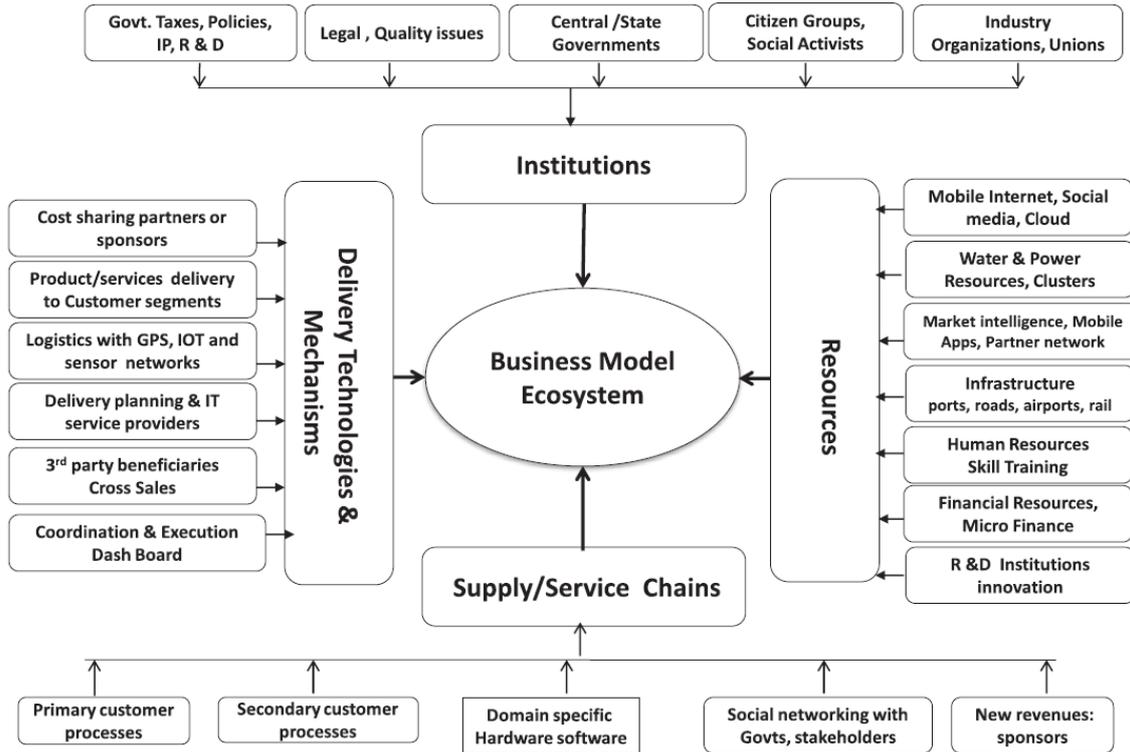
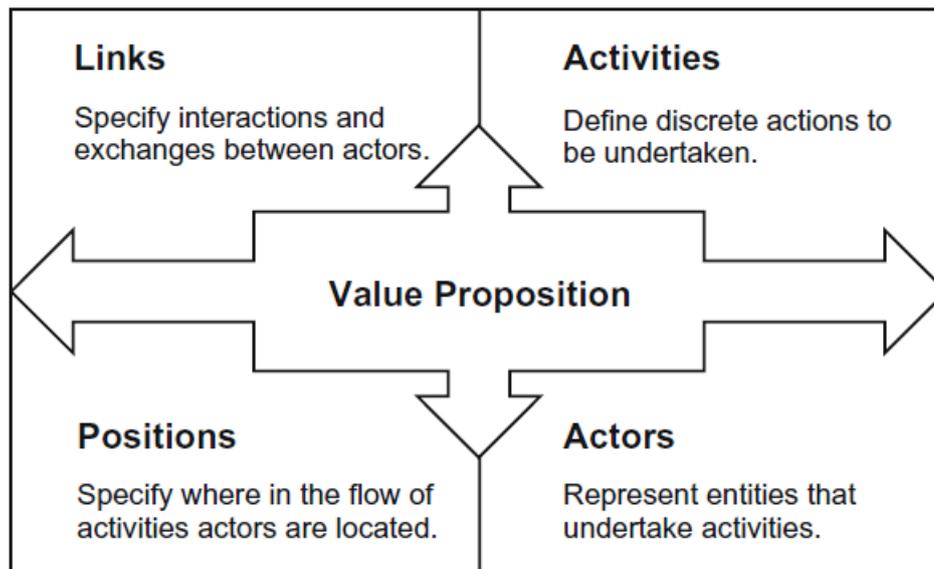


Figure 10. Business Model Ecosystem. Reprinted from “Performance analysis and design of competitive business models” by Viswanadham, 2017, p. 988

As will be discussed in chapter 3.2.2 in more detail, a distinction can be drawn between decentralized BMES and BMES with a focal firm or platform at its center. Radonjic-Simic and Pfisterer (2018) primarily discuss decentralized BMES in their work, but the core of their framework (cf. Figure 11) perfectly fits all BMES regardless of their structure. Additionally, the framework fits perfectly with the proposed BMES definition. Also, the system focuses on how the structure itself should be aligned, not how a single node should be positioned. The value proposition of the business ecosystem builds the center of the illustration and is surrounded by four elements, namely: links, activities, positions and actors. In combination, they illustrate how value is co-created and co-captured across the business ecosystem (Radonjic-Simic & Pfisterer, 2018).



*Figure 11.* Elements of an ecosystem construct. Reprinted from “A Decentralized Business Ecosystem Model for Complex Products”, by Radonjic-Simic and Pfisterer, 2018, p. 27

### 3.2.1 Boundaries of a Business Model Ecosystem

Before discussing different approaches to ‘managing’ BMES, it is necessary to define its boundaries and thus, those of the business ecosystem. In contrast to the strategy of a single business, which is often criticized for ignoring mutual dependencies, the BMES could be criticized for taking into account too many interrelations, thereby drowning one with information (Adner, 2017). How does one decide which information to consider and which to ignore? There are hardly any approaches to develop a blueprint of a business ecosystem.

It might be an impossible task to draw the precise boundaries of a business ecosystem, for if one looks closely, one will find that a company depends on hundreds, if not thousands of businesses, organizations and individuals (Iansiti & Levien, 2004). Therefore, some of the literature has come to focus only on a narrow part of the ecosystem (Pidun et al., 2019; Jacobides, et al. 2018; Kapoor, 2018). At the most basic level, the main focus lies on the value network extended by its complementors. Demil et al. (2018), for instance, define the business ecosystem as “the part of the environment with which an organization interacts” (p.1220). This definition is flawed since the business ecosystem goes far beyond direct interactions. Some actors are linked to many other participants, while others are linked only

to a few, but they still operate within the same business ecosystem. As shown in figure 12, indirect links have to be accounted for just as much as direct links.

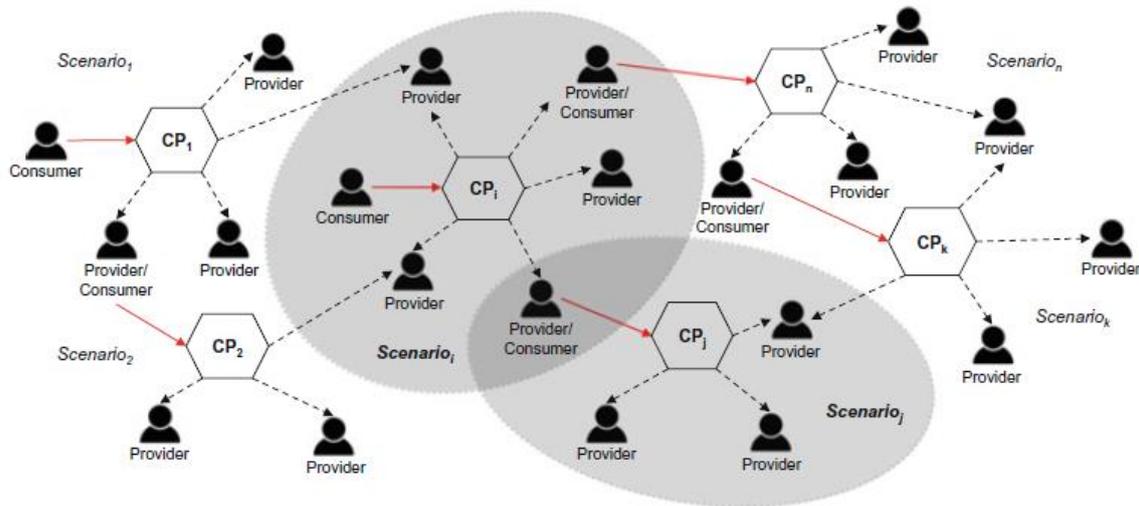
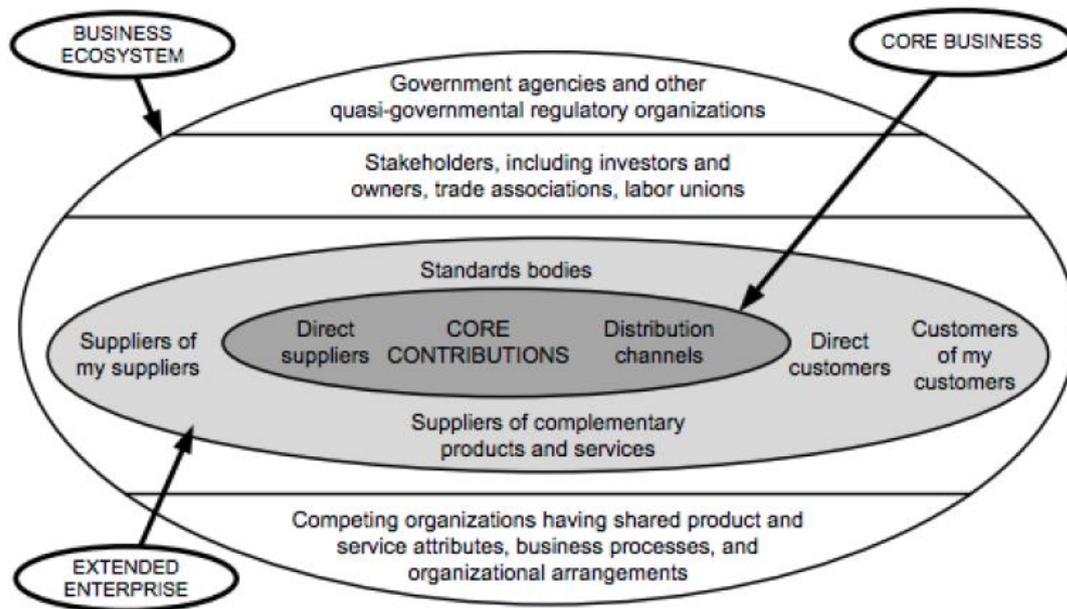


Figure 12. Visualization of a Business Ecosystem. Reprinted from “A Decentralized Business Ecosystem Model for Complex Products”, by Radonjic-Simic and Pfisterer, 2018, p. 29

This is a very important aspect in defining the business ecosystem’s boundaries, especially from the point of view of managing the ecosystem. However, it is not complete because, as mentioned above, the ecosystem goes far beyond a network of complementors and also includes more indirect links, for example, essential suppliers of complementors, the government, labor unions, NGO’s, universities, R&D institutions, and finance institutions. Additionally, the approaches do not differentiate between different kinds of interactions. Moore (1996) already described the business ecosystem in high detail as shown in figure 13. Thus, the approaches do not describe the whole business ecosystem but rather the extended enterprise.



*Figure 13.* The layers of the business ecosystem. Reprinted from “The death of competition: leadership and strategy in the age of business ecosystems” by Moore, 1996

Firstly, one must decide what ecosystem should be described. As already discussed, the value proposition defines the center of the business ecosystem, thus shifting the focus from the links of the business model to the value proposition. However, the ecosystem should not be defined too broadly. Instead, whether it can be narrowed down even more should be evaluated. For example, personal computers might be an overall business ecosystem. On the other hand, one could narrow down the radius and define the ecosystem as the operating system business ecosystem or the computer games business ecosystem. Even a single game like World of Warcraft could be considered an ecosystem. Therefore, instead of strictly defining the boundaries of the business ecosystem absolute, they should be defined in relation to one’s point of view (Lindgren, 2016).

As the example of the computer business illustrated, a business ecosystem cannot be regarded as a single isolated unit, because it is always linked with many other business ecosystems. One requires a personal computer to play computer games and electricity is a necessary condition to use a computer. Therefore, not only the boundaries of a business

---

ecosystem should be defined, but also the links of a business ecosystem to its surrounding institutions, such as complementary or competing business ecosystems.

Jacobides et al. (2018) state that a cup of tea is not a BMES, although the different actors have a common value proposition – the cup of tea. They argue that the cup, the tea and the kettle all function on their own and are not dependent on one another. Further, they argue that the products are generic and not specific. There are innumerable many sorts of teas and the kettle business ecosystem does not have to care about what tea they use. Thus far, Jacobides et al. (2018) are right in the sense that one should differentiate the different ecosystems from one another. However, these ecosystems are also not independent of each other. For example, if the coffee business ecosystem which competes with the tea ecosystem, takes the upper hand in the competition it would certainly hurt the kettle business ecosystem, as well, if people use more coffee machines instead of kettles. Therefore, those BMES are linked together and it can be concluded that generic and related BMES have to be taken into account, which makes the blueprint of a business ecosystem much more complex.

The literature does not effectively bridge the theories of value chains alliances and networks, alliances to business ecosystems, but rather views it as a given and detached theory. In fact, value chains, alliances and networks are all essential parts of the business ecosystem, which builds a framework around those sub-systems and should be included when defining it. Jacobides et al. (2018) for example, discuss when we are expecting to see business ecosystems replacing supply chains, whereas I include within the business ecosystem and argue that both concepts have to be taken together into one framework. Nevertheless, I do agree with Jacobides et al. (2018) to see a decreasing number of supply chains and a shift to a more network-based approach. However, there are still problems which are best solved through a supply chain within a bigger network.

Although I consider Jacobides et al.'s (2018) approach as incomplete or even false to limit the business ecosystem to the value network to simplify the blueprint, I agree that the blueprint quickly becomes too confusing to be of any help. Therefore, one should consider using layers such as those used in Moore's (1996) illustration of a business ecosystem. Furthermore, different indications (e.g. colors) should be used to describe the types of actors and the types of interactions between different nodes. For example, critical actors, complementors, financial institutions or labor unions etc. and transfer of goods, resources, information, competition or financial support should be highlighted in different ways.

Furthermore, it could be improved by using the thickness of the and/or intensity of the colors to illustrate the importance of the actors or interactions.

The scope of this blueprint m not be complete. It should be considered which actors and interactions are important enough to be recorded in the blueprint. There is no right or wrong answer to that question since the answer is highly dependent on the situation and the purpose of the analysis. Nevertheless, it would be negligent to exclude many important factors by design, as prior research suggests (Pidun et al., 2019; Jacobides, et al. 2018; Kapoor, 2018).

Including links between business ecosystems becomes even more important when taking into account that a business is rarely active in just one business ecosystem. Particularly for the corporate strategy and analysis of synergies and risks, the aggregated and linked information could be of immense value. However, the analysis of a business ecosystem with pen and paper will quickly reach its limits. For this reason, a software tool becomes necessary and should be the subject of future research. In particular, the option to filter for specific attributes and kinds of interactions could be of high value. Furthermore, a software tool enables connection to a database, allowing the assignment of more attributes to actors and interactions. Thereby, an extensive analysis of a business ecosystem could display manifold styles of networks, thus supporting in-depth analysis.

### **3.2.2 Managing Business Model Ecosystems**

BMES have a high potential of value co-creation and grant their actors access to new knowledge and resources, which gives them the ability to complement each other and to share costs and risks (Camarinha-Matos & Afsarmanesh, 2006). Members of the business ecosystem can make strategic use of business ecosystems which are subject to change, adaptation and revolution (Zahra & Nambisan, 2012). One of the biggest differences between business ecosystems and biological ecosystems is the awareness of the business ecosystem's actors and their ability to position themselves and act strategically within the ecosystem. Managing the BMES properly can be understood in two ways, both of which include very important aspects: The first option is managing the BMES as a community and the second one refers to managing the actions of a single business model within a BMES. If organizations, for instance, fail to attract customers, do not get the support of financial or other essential institutions or are not followed by their complementors who produce

---

necessary products, they can be considered to have failed in their BMES (Demil et al. 2018). No matter how good the business model is, without the right BMES it cannot achieve anything. After all, the BMES is constituted of all the decisions the community - in other words, all its business models - make, whether the choices are made in agreement or not.

The business ecosystem constitutes an own instance independent of single business models (Demil et al., 2018), but in the end, it is only held together by the community's agreement on its future development (Koenig, 2012). Hence, the BMES must not only account for the value proposition towards its end-customer but also towards its own actors, keeping them within the ecosystem while also trying to attract external businesses so they might join the BMES (Adner et al., 2013). This argument is supported by the fact that businesses often have to make investments to become and/or stay part of the business ecosystems. Developers of video games, for instance, have to develop their games specifically customized for individual console platforms, which represents a financial investment in the business ecosystem (Pidun et al., 2019).

There is disagreement in the literature about the aspects of competition. On the one hand, market power is an important aspect to secure the control over important resources and activities within the ecosystem to increase a business's influence within the community, strengthen its position and maximize the value captured for the business itself (Hannah & Eisenhardt, 2018). On the other hand, one could argue that an effective analysis and coordination of the interrelationships within an ecosystem goes beyond pure market power and is rather based on exactly this structure of interdependence (Adner et al., 2013).

In short, the business model concerned with the competitiveness of the individual firm contradicts the BMES concerned with the competitiveness of the business ecosystem and its participants against other BMES (Adner, 2017). This is congruent with the game-theoretical approaches of cooperative game theory (CGT) and non-cooperative game theory (non-CGT). The general question is the same in both theories: How does the single actor maximize his benefits? Non-CGT considers primarily the decisions of individuals and their utility maximization, whereas CGT considers the opportunities to collaborate with others and build networks (e.g. using synergies), but is nonetheless still concerned with the goal of maximizing the individual's benefit (Chatain, 2016). Porter's (2008) traditional concept of industry competition goes hand in hand with the non-CGT. Companies regard the

ecosystem, or in Porter's words the industry, as a closed system in which they have to compete for a place amongst their rivals.

Making the transition to the initial controversy, the business model is consistent with the classical non-CGT, whereas the CGT lays the foundation for BMES. Thus, overall the benefit of an individual company is not determined solely by their own business model but is also greatly dependent on the BMES and its ability to compete with other business ecosystems.

To conclude, the two approaches are, in fact, not contradicting but rather complementing each other – competition and cooperation go hand in hand. The business model's goal is to secure its position in a competitive ecosystem, whereas the goal of the BMES is to achieve an alignment structure which represents the extent of mutual agreements amongst its members in regard to their positions and flows. If the participants begin to define the BMES in different ways and are not aligned with their actions, that could lead to the loss of competitive advantage and thereby to a loss of value captured for the whole community (Adner, 2017). Consequently, actors must be sensitive to the goals and motives of other actors and consider how their actions impact the balance of the business ecosystem (Jacobides et al., 2018). Moreover, this approach represents one example of why the business ecosystem is not only characterized by cooperation but also by competition. Therefore, it is in agreement with Hannah and Eisenhardt's (2018) statement that a business ecosystem requires a healthy mix of cooperation and competition to achieve the best results.

The requirement of both cooperation and competition can be best explained with an analogy to a social ecosystem. On the one hand, we also strive to achieve the greatest benefit for everyone by working together in our society. We collaborate on many levels to achieve that. The whole way our modern societies work is shaped by an organic solidarity, which means that society can be imagined like an organism: There is a high division of labour, everyone does his or her part. This is how the entire system is working together, but it also leads to a lot of interdependencies (Merton, 1934). On the other hand, society also needs competition as a tool for selection, balance and motivation to perform and innovate. For example, children learn to both cooperate and compete in school. Grades, sports contests or job interviews, for example, can be considered places in which competition with other individuals for the places within the ecosystem takes place. Once an individual successfully earned a module, it cooperates with the ecosystem. Furthermore, politics are a method of

governing society in order to align all the individuals and to set rules for the ecosystem. Different political systems have different ways to decide the course of action which a society takes and how it competes and cooperates with other societies. Democracy, for example, is the closest one to a decentralized business ecosystem working on the basis of complete interdependence. On the contrary, a military dictatorship is closer to a mega platform such as Amazon, where the power of decision making is very unequally distributed. This analogy is far from exhausted and the purpose of it is not to judge different systems but to promote reflection and understanding. The important conclusion is that BMES should not only promote collaboration but rather try to find the right balance between collaboration and competition.

A BMES pushes its actors with its complex interactions to reflect on the way they interact within their business ecosystem and also ensure that benefits are shared by all (Lang, von Szczepanski, & Wurzer, 2019). Although the system is not dependent on a single member, the members depend on the system. A member of a business ecosystem can choose to leave and join another one, but ultimately it will be dependent on one or the other. To operate within a business ecosystem, an actor has to be accepted and trusted by the other participants. For this reason, a company cannot merely focus on maximizing its own profit because then its partners would not trust their cooperation and rather cooperate with a different actor who can operate its module. Trust enables value co-creation and thus constitutes the glue of business ecosystems, in which building trust is one of the major objectives of managing a BMES (Msanjila & Afsarmanesh, 2007). Instead of only relying on trust, however, it is also possible to use contractual and relational governance for specific arrangements or alliances within a business ecosystem (Dellyana, Simatupang, & Dhewanto, 2018). Ensuring compliance with internal rules can, in fact, represent a separate module within a business ecosystem. The business model of Fairtrade, for instance, offers business ecosystems its service to oversee the conditions of farmers and workers of developing countries which are part of an international business ecosystem. Fairtrade observes price dynamics, working conditions and sustainability to ensure fair conditions. Eventually, this indicates compliance to internal standards through a Fairtrade-label on a product (Fairtrade Foundation, 2019).

In general, a differentiation can be made between BMES whose governance is decentralized and those which are governed centrally. BMES governed centrally are much more common in the literature, whereas decentralized BMES are less specific, and thus allow one to

generally draw more valid conclusions if studied. There are different factors that shape the governance model, with two factors being most prevalent: the control of key resources and type of interdependence (Koenig, 2012). In general, if the control of resources is centralized, this can give one actor a strong bargaining position. Potentially, this might even enable him to orchestrate the business ecosystem on his own. The same holds true for the type of interdependence. Figuratively speaking, if one drew the blueprint of an ecosystem, would there be any patterns highlighting the importance of a specific actor? Are there particularly many links at a certain node or do links of a specific type just occur at one node? If one actor is interlinked in the network in such a way that the business ecosystem cannot operate without him, the actor also has sufficient bargaining power to dominate the decisions of the business ecosystem (Koenig, 2012). In addition, if the focal firm is not directly linked to enough other actors, it is very difficult for it to get in contact with important actors frequently enough and to prevail with its strategy.

The centrally governed BMES has received a lot of attention but has been given many different names in the literature. The keystone organization (Iansiti & Levien, 2004), the focal firm (Adner, 2017), the lead firm (Williamson, 2012), the central contributor (Moore, 1993), the hub (Iansiti & Levien, 2004) and others ultimately all refer to the same concept. In the following, the term ‘keystone player’ is used to refer to the actor governing the BMES alone while ‘BMES community’ is used to refer to the governance of the BMES in general without reference to the specific design. Often, the definition of the business ecosystem depends on the central keystone player. Adner (2017) states that even in cases of a decentralized ecosystem, it is necessary for one player to take the role of the leader who shapes the ecosystem and gets the others to align with its strategy. Accordingly, other actors would need to accept their role as followers. However, I do not agree with this approach, although this governance model might be beneficial in some cases. The tendency towards central leadership could be attributed to the historical evolution of the business ecosystem and to the origins of the previous concepts such as the supply chains, which were usually centrally governed with one keystone player who builds a value chain or network around himself. However, it is not necessarily essential to have a keystone player, it is just the form of governance that we are used to. Therefore, specific governance models for decentralized ecosystems should be targeted by future research. For instance, even in business ecosystems which have actors with extraordinary bargaining power, the other participants do not have to blindly follow the keystone player. Followers should instead build interest unions (similar to

labor unions) to represent and communicate their interests better and increase their own bargaining power in the business ecosystem, especially if they feel that their interests are not sufficiently represented.

Those approaches are, for example, necessary if the value captured is unfairly distributed amongst the actors since the position of the keystone player allows him to collect a higher share of the value the BMES created (Moore, 1993). Therefore, decisions might be put forward by one keystone player, but they have to be negotiated and finally accepted by the rest of the participants of the business ecosystem. Although actors might be invested in the business ecosystem, businesses are part of them on a voluntary basis. Thus, if they are not satisfied by the BMES, they can always leave the business ecosystem at any time they want (Viswanadham, 2017). In short, the keystone player has to account for all actors of the business model to preserve legitimacy. He might have a powerful bargaining position but he is, nonetheless, dependent on the approval of the other participants in order to keep the BMES working. Moreover, implementing a common vision for the BMES increases legitimacy, trust amongst its members and strengthens the culture of the BMES.

Business ecosystems are not static, they might change over time and so might also the power distribution, the internal alliances and the culture. The same holds true for the role of a company in the ecosystem and across business ecosystems. Since companies are usually part of many different ecosystems, they also inherit different roles in them. One actor might be the keystone player in one business ecosystem and in the other one a complementor who could easily be substituted (Iansiti & Levien, 2004).

Despite the refutation of the concept, it can be observed that some centrally governed business ecosystems are currently very successful and attract a lot of attention in the literature. One example above all: the platform ecosystem (Cusumano & Gawer, 2002; Zahra & Nambisan, 2012; Kapoor, 2018; Romero & Molina, 2011). Gawer and Cusumano (2014) define

*“internal (company or product) platforms as a set of assets organized in a common structure from which a company can efficiently develop and produce a stream of derivative products. We define external [...] platforms as products, services, or technologies that act as a foundation upon which external innovators, organized as an*

*innovative business ecosystem, can develop their own complementary products, technologies, or services” (p. 418).*

Thus, platforms form a business ecosystem built on a foundation provided by one actor of the business ecosystem. All other actors are allowed to access to this platform but are also depending on it as a resource and central node of the business ecosystem. The platform, on the other hand, although depending on the business ecosystem as a whole, does not depend on one single actor, as is the case for the other actors. Furthermore, most actors of a business ecosystem are directly linked to the platform and thus the business ecosystem depends on it to operate as a structure. Therefore, the platform is an example of a centrally governed BMES, characterized through interdependence and control of an essential resource at the same time. Current examples for those mega-platforms with immense positional power and a monopoly position are Amazon, Alibaba and eBay.

### *Shaping a Successful BMES*

There is a subset of considerations and choices available to the BMES community to shape their business ecosystem and possibly build competitive advantages through its BMES (Kapoor, 2018). There are no designs for managing BMES which are as yet generally considered correct or incorrect. Lang et al. (2019) suggest different approaches to manage BMES: beginning with initially choosing the right ecosystem and setting up a governance model, developing a monetization strategy, focusing on a mutual value creation strategy, maintaining flexibility, creating reporting structures with key performance indicators and building trust and a sense of community. Those actions are a wild mix across different fields and are mostly independent of each other, but in the end, they share a common goal.

Lang et al. (2019) state that a strong and attractive BMES should include mechanisms to share the value co-created. Therefore, combined margin systems, profit pooling, revenue sharing or stakes in the venture are necessary. However, the authors do not explain how those approaches should be implemented and how they work in more detail. Furthermore, Lang et al. (2019) focus on the community approach in which the BMES is strengthened through trust and strong cooperation with good and regular communication. In summary, the establishment of a strong culture of affiliation in the business ecosystem is an important aspect of a successful BMES. However, the authors also suggest to not only build on strong partnerships but to stay flexible, in the sense of being able to respond quickly to changes by entering and building new partnerships and exiting old ones. In addition, a reporting system

which is supported by key performance indicators should be used to track the performance of the actors within a business ecosystem. Finally, the BMES should have a governance model, usually in the form of a central keystone player who defines the BMES, identifies potential participants for the business ecosystem and defines rules and responsibilities. As already discussed, I disagree with the limitation to this governance model, however, it can be observed that the BMES described by Lang et al. (2019) is characterized by a healthy mix of cooperation and competition, which is in line with the findings of this thesis.

There are many other ways to shape a BMES in addition to Lang et al.'s (2019) suggestions. One of the most important aspects for a successful BMES is the modularity of value proposition in order for each node to be occupied by actors who are suited best to the actions needed. Within the module, the actors have a high degree of autonomy, for example with regards to design, pricing and operation through which they also can compete over operating the module (Jacobides et al., 2018). As a result, healthy competition for the modules of the business ecosystem can develop and benefit the BMES. Once modularity is established, the business ecosystem community should not lock itself up to secure their positions but rather be susceptible to new members (Jacobides et al., 2018). Although securing the position may be important for an individual actor, it does not benefit the BMES community to close the whole business ecosystem because this prevents important competition and external input for innovation. For this reason, the BMES community has to be open, for example through creating opportunities for new players and imposing a better alignment with each other (Weiblen, 2015).

Besides the technological architecture impacting the value creation, the structure of the BMES itself holds great potential for value co-creation. The structure should be chosen in accordance with the value proposition, actors and resources (Kapoor, 2018). It constitutes the foundation of how the business ecosystem is able to operate and should thus be chosen wisely within the scope of action. The potential actions may be limited since BMES cannot always be fully managed because they are the result of many single business models. A centrally managed ecosystem has the advantage that it can be designed more easily through the positional power of the keystone player. A platform ecosystem, for example, embodies the structure itself and can easily set rules about who is allowed to participate in which way and thus co-creates value through its participating agents (Romero & Molina, 2011).

Since customers are also part of the ecosystem, they should be integrated into the BMES. There are many possible types of interaction, from feedback to product design and thus participation in value co-creation. In newer business models, for example, the customer is also a user who creates value through his or her personalized data which can then be used or sold. With customer engagement, new products can be designed and then be tested by lead-users (Romero & Molina, 2011). Furthermore, the traditional view of customers at the end of the value chain where they destroy value has shifted to the view of customers as actively co-creating and especially re-creating value. In this perspective, customers are considered active partners in the BMES (Romero & Molina, 2011) (cf. chapter 3.3).

Besides trust and openness, transparency plays another major role in successful BMES. In order to position itself efficiently within a business ecosystem, a company has to align itself with the other actors. It needs to share and receive knowledge, information, products and other resources. However, a company can only do so if it has knowledge about the operations and value flows of the business ecosystem. The more transparency there is, the more easily a company can increase its fit to the BMES.

### *Positioning in a Business Ecosystem*

As already discussed in previous chapters, actors should choose their business ecosystems wisely. But which strategic choices do they have regarding their position within the business ecosystem, especially with respect to nascent business ecosystems?

Hannah and Eisenhardt (2018) divide those decisions into the following components: “(a) how many and which components to enter, (b) with which complementors to align, and (c) how to balance cooperation and competition” (p.3187). This then leads to three possible strategies: bottleneck, component and system (cf. figure 14).

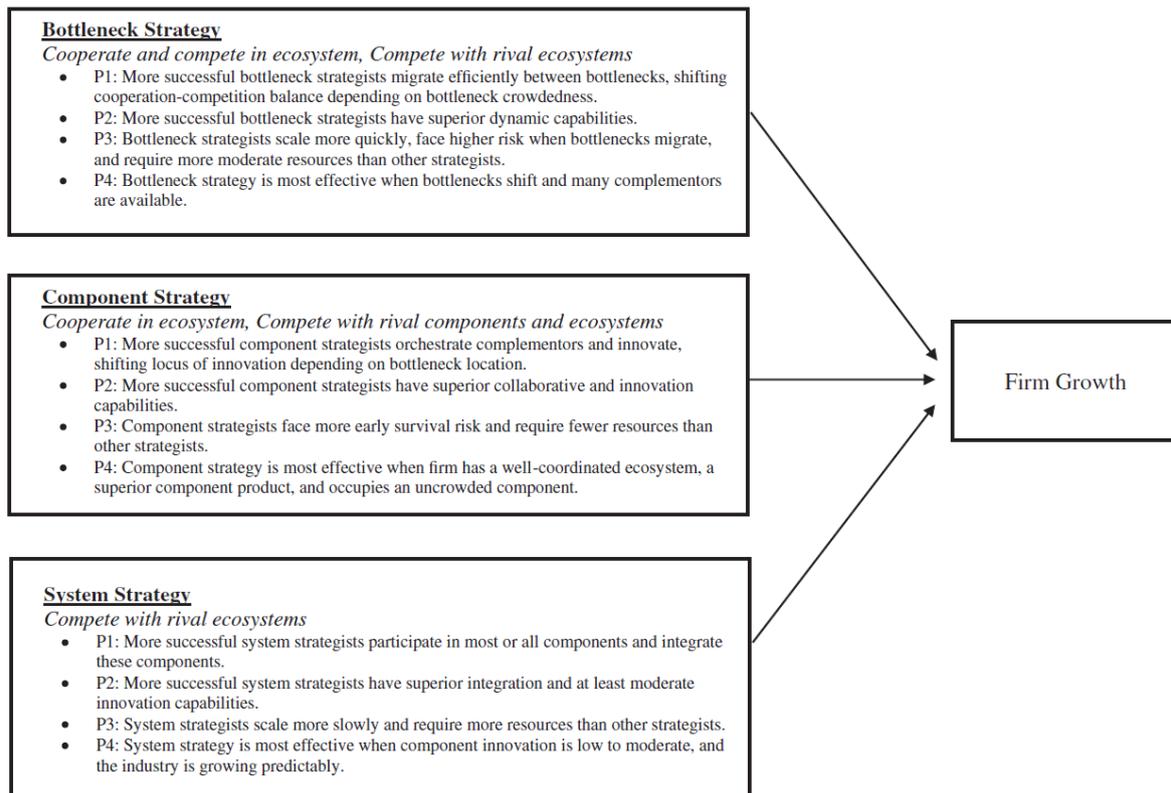


Figure 14. Viable Ecosystem Strategies. Reprinted from “How firms navigate cooperation and competition nascent ecosystems” by Hannah & Eisenhardt, 2018, p. 3189

The most comprehensive strategy is the system strategy. With this strategy, a company aims to operate all or most modules and thus focuses on competition within its business ecosystem as well as with other business ecosystems. The company probably still cooperates with some other agents, yet with fewer than in alternative strategies. The strategy is generally regarded as very difficult and, to a certain extent, limited because there are several reasons why this strategy might fail, such as difficulties in coordination or capacity risk (Hannah & Eisenhardt, 2018). Even facing those difficulties, companies might be motivated to pursue the system strategy for the prospect of control and multiple margins (Arora & Bokhari, 2007). In the case of success, a company could create a centrally governed business ecosystem focusing on competition against other BMES.

Equally focused on competing against other BMES is the bottleneck strategy. Bottlenecks are the modules within a BMES which constrain it because of poor quality, weak performance, or scarcity (Adner, as cited in Hannah & Eisenhardt, 2018). Therefore,

bottleneck-modules are the most important factors for the inter BMES competition and could also constitute a very important competitive advantage and not just disadvantages that need to be fixed. In contrast to the system strategy, however, the bottleneck strategy is more dependent on cooperations since it does not operate the other modules. Therefore, the bottleneck strategy is focused on cooperation and competition at the same time and represents an essential part of a BMES with great positional power, allowing the company pursuing this strategy to potentially capture a big share of the value co-created (Hannah & Eisenhardt, 2018).

Finally, companies also have the opportunity to pursue a component strategy and focus on a specific complementing item. This strategy pays particular attention to cooperation with its business ecosystem and on innovation, as well as specialization in, of a specific product. Thereby, the company can focus on its core competencies. The strategy only works if the company is able to innovate in its niche and then integrate into the BMES. This strategy requires fewer resources but also faces more survival risk and less positional power. The positions are not static and might shift during a change of the BMES. In particular, the bottleneck of the BMES might change frequently (Hannah & Eisenhardt, 2018).

### **3.2.3 Innovating Business Model Ecosystems**

BMI of a single business model might have strong effects on the whole business ecosystem (Clauß, 2017). For this reason, it is important for a business to not only focus on itself but on the whole business ecosystem and how it might be affected. If a business does not consider those effects, it not only wastes great potential but also risks losing the support of the business ecosystem. It is no longer possible to design a business model in isolation, and innovators will have to learn how to take the structure and capabilities of the business ecosystem into account (Iansiti & Levien, 2004). The business ecosystem not only presents challenges for BMI but also opportunities since actors can make use of the knowledge, resources and capabilities of its business ecosystem to implement changes which they could not have implemented on their own. Also, they can react more quickly to technological changes and thereby seize promising opportunities. Furthermore, a single business can achieve much more with its actions when it is part of a business ecosystem because it can change the entire composition of resources and interactions across the business ecosystem,

---

as well as the entire structure and power distribution (Zahra & Nambisan, 2012). BMI with a very strong impact even changes neighboring business ecosystems (Lindgren, 2016).

BMES are continuously subject to change, adaptation and revolution (Zahra & Nambisan, 2012). As a result, this leads to the permanent change of mutual interactions and actors within the business ecosystem. Each one of those changes represents a potential opportunity for BMI (Hannah & Eisenhardt, 2018) and thus changes the mix of resources and interactions in a way that changes the whole business ecosystem. Since ecosystems are co-evolving systems, they will reshape with a successful BMI, once more representing new opportunities, therefore theoretically representing a never depleting source of innovation. Business models might try to disrupt the business ecosystem by changing the BMES or by creating a new business ecosystem. In both cases, the ecosystem has to stay flexible and adapt to disruptive changes in order to survive (Le & Tarafdar, 2009; Yuliya & Llewellyn, 2018).

As in the classic BMI, all parts of the BMES structure can potentially be innovated or changed, especially value co-creation and value co-capture, but also value delivery, the alignment of actors, the method of interaction or even the whole value proposition. If the current BMES is defined as the “*as is*” BMES, and innovating business offers the business ecosystem a “*to be*” BMES in conjunction with its actors. Those *to be* BMES are important drivers of BMES innovation. If the *to be* BMES receives sufficient support, it eventually becomes the new *as is* BMES (Lindgren, 2016). To increase acceptance, fungibility plays an important role in decreasing the investment cost of the BMES’s members (Jacobides et al., 2018). The proposed BMES innovation must fit well with the business ecosystem, especially for cooperative strategies as the bottleneck strategy. On the other hand, this is less true for system strategies or platform systems because they can orchestrate the innovation process. However, the keystone player should not ignore this concept to keep its legitimacy and support by the other actors of the business ecosystem.

The governance of the BMES has important implications for the frequency and degree of innovation in BMES. First, centrally governed business ecosystems have a lower degree of BMI. Second, strictly governed business ecosystems tend to have BMI less frequently than less strictly governed BMES (Dellyana et al., 2016). In general, the number of actors and the distribution of bargaining power has an impact on innovation of BMES. This is congruent with the suggestions in chapter 3.2.2.1 to open up the BMES, build transparency and open

niches for new players to encourage innovation. In a strictly centrally governed BMES, the innovation usually arises from the keystone player in a top-down stream, with the keystone player in a position to dictate and reorganize the BMES according to his ideas (Adner, 2006).

Creating a new BMES from scratch usually requires an initiating focal firm building the business ecosystem around itself. This requires persuasiveness, strong relations (for instance through already existing partnerships in other business ecosystems), and a vision to follow. Ozcan and Eisenhardt (2009), for example, found that successful wireless gaming BMES led to the emergence of the business ecosystem through sharing a vision, and thereby getting complementors like headset manufacturers to participate in their BMES.

### 3.3 Sustainable Business Ecosystems

According to Lindemann (as cited in Lindgren, 2016), the primary drivers of ecosystems are flows of energy, however, these have unfortunately not been defined more specifically. For a long time, it was claimed that profit is the main driver of any business and industry (Marx, 1867). This was probably true in 1876, but the world has changed, and the importance of energy flows of the triple bottom line increases continuously. From the literature of the past few years regarding SBMs, it can be concluded that the triple bottom line and sustainable management are becoming increasingly important for the individual company. Since the focus shifts from a single business perspective to a business ecosystem perspective, it follows that the focus of triple bottom line and sustainability in general shifts as well. Therefore, the sustainable business ecosystem constitutes, equally to the SBM, the ideal type for the business ecosystem in which the triple bottom line is taken into account when the BMES is designed.

Before the implications of sustainable business models are discussed, the interrelations of business ecosystems and sustainability need to be emphasized in more detail.

### 3.3.1 Interconnection of Ecosystems

More than 300.000 years ago, there was only one category of ecosystem – the biological ecosystem. Then, about 70.000 years ago, due to the cognitive revolution, homo sapiens was able to build a social ecosystem as a kind of tool to create a competitive advantage over other species. The more complex structures and interactions within the ecosystem of homo sapiens exceeded the mere cooperation that other species had been using. Homo sapiens thereby gained an advantage which still constitutes the foundation of humankind's superiority over other species (Harari, 2015).

Thousands of years later, first the agricultural revolution and then the industrial revolution led to further change. Humans started building their first business ecosystems, revolutionizing the way of trading. Societies began to be shaped by the division of labor and increasing specialization of work. To complete the evolution, with the invention of the internet, the digital ecosystem was born (Harari, 2015).

*“The rise of natural science is often mistakenly viewed as the great turning point in the history of man’s conception of himself, as Copernican revolution in reverse, one in which man regains his central place as he learns to master nature. Actually, according to even the more optimistic assumptions of natural scientists, man is only able to learn the laws of nature and to use them for his own purposes. He advances by riding the natural current but is unable to modify even the weakest laws of nature”* (Nagel, as cited in Etzioni, 1968).

Although it was initially focused on science, the Nagel’s statement is interesting because it demonstrates that humankind did not change the system they live in by developing ecosystems from scratch but rather by building up on a foundation which it was given and that, furthermore, they are still depending on it. There are not only links within ecosystems but also between different ecosystems. Those links exist horizontally between ecosystems of the same type but also vertically between ecosystems of other types. Figure 15 shows how the ecosystems are built upon each other.

The illustration is extremely simplified since the structures are very complex in reality. The hierarchy of the pyramid represents the direction of dependencies since the business ecosystem is dependent on the social ecosystem and both depend on the biological one. The biological ecosystem, however, is not dependent on the other ecosystem. In short, each

ecosystem is rooted in the one underneath it since it provides a foundation as well as major resources. Thus, the layers are vertically linked to each other while each ecosystem depends on the layers beneath it. A manufacturing company, for instance, needs the biological ecosystem because of the resources it extracts and the river which it uses for cooling its machinery. In turn, the business ecosystem depends on society for its labor force as well as for its purchasing power, for the education it provides and for its government which sets the rules for the economic environment within which a business ecosystem functions.

The environment and the risks it poses for a business ecosystem can be analyzed by the PESTLE analysis. Unfortunately, PESTLE does not cover the interrelations between the two. Instead, it only considers the effects in one direction: from the environment towards the business ecosystem. The business ecosystem, however, is not only vertically linked to other ecosystems but can also, directly and indirectly, affect them in positive and negative ways. Additionally, apart from all the dependencies explained above, the business ecosystem can also be affected by the other ecosystems in several ways (illustrated by the black arrows on the left side of the pyramid in figure 15). Modern examples of negative effects are wage dumping (effect of the business on the social ecosystem) or air pollution, carbon emissions and sea pollution (effect of the business on the biological ecosystem). These negative effects lead to both environmental damage and social inequality.

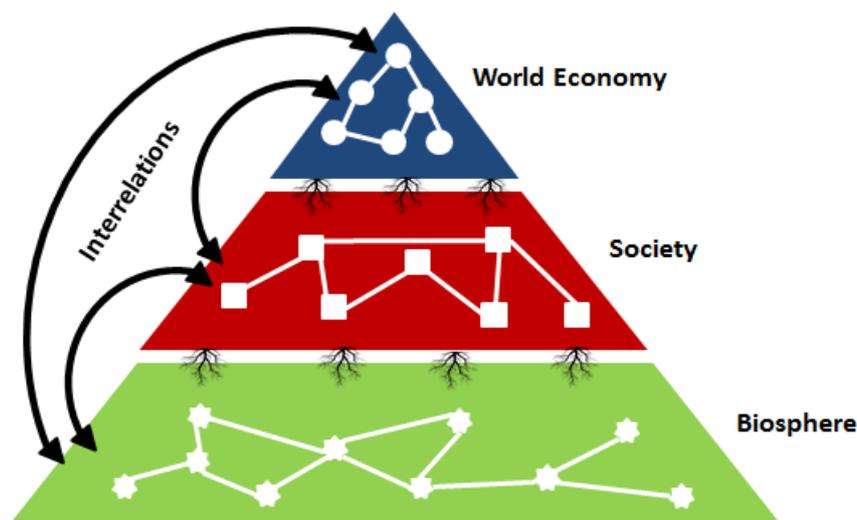


Figure 15. Interconnections of Ecosystems. Own figure

The business ecosystem is not only tightly linked with society and the biosphere but is also part of them. Just like the biosphere is the sum of all ecosystems (Peltoniemi, 2008; World Resources Institute, 2000), the society of mankind can be considered as the sphere of the sum of all social ecosystems and the world economy as the sum of all business ecosystems. As already discussed, ecosystems are subject to co-evolution, not only co-evolving within an ecosystem but also with respect to their environment and related ecosystems. This includes horizontally as well as vertically connected ecosystems (Mitleton-Kelly, 2003).

It is in the nature of nature for a species to do everything it can to survive. Similarly, in our society, a business model has to generate profit in order to persist. Consequently, a business ecosystem's primary focus is to generate profit. This is also the justification of why profit is not truly on the same level as the other values of the triple bottom line, even if communicated differently. Financial sustainability is a necessary condition for businesses to survive: if businesses do not generate profit, legal entities might die. Thereby, the way our system works is completely congruent with the theoretical framework of ecosystems.

But the point which seems to have been forgotten is that, essentially, business ecosystems are theoretical institutions that are supposed to help society organize itself and eventually give it a competitive advantage in its biological ecosystem. However, in reality, different societies also compete with each other to a great extent through their business ecosystems. Therefore, amongst other reasons, we put the survival and welfare of our business ecosystems over the health of our society and our biosphere. One example of this dilemma is a debate in Germany about whether coal power plants should be shut down (Wilkes & Parkin, 2019). On the one hand, coal power plants damage the biosphere to a great extent but on the other hand, they provide jobs and generate profit. The fact that, up to this point, coal power plants are still operating despite their negative environmental effects shows the prioritization of the business ecosystem over the biological ecosystem and, considering the long-term effects, also over society.

### **3.3.2 Implications of Sustainable Business Ecosystems**

Moore (1998) stated that “[c]ompanies must foster growth-oriented synergistic economic communities” (p. 168). This still holds true, but companies can, nonetheless, have more synergies than just economic ones. Lindgren (2016) already realized that the values which

business models offer the BMES do not necessarily have to be of economic nature but could also be something such as learning or supporting a vision. In the case of sustainable business models, those values could also be of a social or environmental nature such as reduction of carbon emission or improvement of work safety.

The natural-resource-based view (NRBW) (Hart, 1995) already addressed those aspects with respect to a single business model. The NRBW respects the biological ecosystem the business is located in and the possible harm the firm can inflict on it. Therefore, Hart (1995) proposes that companies should consider pollution prevention, product stewardship and sustainable development in their strategy. All of these may also constitute a competitive advantage. Although sustainable development includes social aspects by nature, the NRBW is usually only considered with respect to the natural environment. Unfortunately, in practice, the NRBW is often limited to pollution prevention (Hart & Dowell, 2011).

Although the industrial ecology emerged six years before NRBW (Frosch & Gallopoulos, 1989), it builds upon it conceptually.

*“Undoubtedly, all will agree that industrial ecology is about the physical flows of matter and energy. Industrial ecology concentrates on the flows between and within the industrial systems and ecosystems aiming to contribute to the efforts of controlling and reducing the impacts that the use of the flows generates on ecosystem”* (Korhonen, 2004).

The biggest focus of industrial ecology is on the physical flows of matter and energy, thus highlighting the impact on biological ecosystems. At the same time, industrial ecology aims to reduce the negative impact on the biological ecosystem (Korhonen, 2004). However, a business ecosystem might also have positive impacts on other ecosystems. For instance, if it retimbers forests or binds carbon to produce new goods as, for example, Sunfire GmbH (2019) and Carbon Engineering Ltd. (2019) are doing.

The concept of considering the potential impact on ecosystems fits perfectly with the reasoning of this thesis. Moreover, industrial ecology or the industrial ecosystem also sets the focus on inter-organisational coordination, as business ecosystems do:

*“In the case of the organisational characteristics and properties of industrial systems and ecosystems, one tries to identify whether there are connections and links between*

---

*the system components and, if so, what kind of connections and links there are, and how are these organised” (Korhonen, 2004).*

The reference to links amongst businesses and their organization is congruent with business ecosystems as well. But what exactly differentiates the industrial ecosystem from the sustainable business ecosystem? First, the sustainable business ecosystem regards the system of ecosystems (cf. figure 15) as one unit within a given hierarchy. That also includes different kinds of ecosystems interconnected with each other, enabling them to interact which might lead to positive as well as to negative effects. Although the industrial ecosystems include social impact as well, it is arguable that the industrial ecosystem has strong connotations in terms of physical processes. The industrial ecosystem regards sustainability as a source for competitive advantage, whereas the sustainable business ecosystem considers a balance between the ecosystems as a requirement for stability and economic growth in general. In addition, the sustainable business ecosystem relates to sustainability in the way the SBM does, with complex interrelations and the possibility to have a positive influence across all ecosystems and with the triple bottom line as its measurement of success. In summary, the industrial ecology and the sustainable business ecosystem overlap to a great extent but have differences in their values.

Although the concepts are technically congruent, one controversy exists between the industrial ecology and sustainable business models. The management of physical flows favors the proximity of its actors in order to minimize the distance of overall transport routes. This factor cannot be denied, provided transport is not innovated to neutralize its environmental impact. In contrast to concepts such as cluster, industries or value chains the concept of business ecosystems rejects geographical borders (Moore, 1996). Consequently, to become sustainable, business ecosystems have to reverse the process of globalization to become more local again.

This conclusion is true only to a small extent. First, business ecosystems are defined through many different types of interactions, not only including long-distance transportation. Therefore, the necessity of devolution back to more local networks is only true for the manufacturing parts of the business ecosystems. All other parts are still geographically independent, wherefore the term business ecosystem fits better than industry since a business ecosystem consists of many different kinds of actors and interactions. Second, specialization leads to lower production and transportation costs (Alchian, 1984), also with respect to its

costs across the triple bottom line. For example, lower carbon emissions and lower fuel cost per kilometer decrease transportation costs with respect to the other ecosystems. Therefore, sustainable business ecosystems are also affected by the trend of globalization, but at a slower pace considering the extra costs. The development of globalization, considered only with respect to economic values, probably went too fast. In an ideal world, it should probably be partially reversed, but not completely set back to the starting point of local communities. This conclusion, however, as mentioned above only holds true for the part of manufacturing networks.

### **3.3.3 Who is Responsible for Sustainability?**

In the literature, there are different approaches to assign responsibility for sustainability. Most prevalent are the approaches of consumer and producer responsibility which leads back to the discussion about whether the markets are driven by demand or by supply (Lenzen, Murray, Sack, & Wiedmann, 2007). A detailed discussion of both approaches exceeds the scope of this thesis, but McKerliea, Knight and Thorpe (2006) state that one cannot attribute the whole responsibility to one party. Instead, they believe

*“that all parties with a role in designing, producing, selling or using a product are responsible for minimizing the environmental impacts of the product over its life. In practice, this “shared responsibility” extends beyond the producers and users of a product to include local governments and general taxpayers who incur the expense of managing products at their end-of-life as part of the residential waste stream.”*

This approach is in line with the sustainable business ecosystem considering that customers and producers are both parts of the business ecosystem and involved in the co-creation of value. Following this line of reasoning implies that both sides have an incentive to enter a dialogue about the value co-creation and its sustainability. However, a business ecosystem is, in most cases, not dependent on single businesses. Customers, on the other hand, are vital components of a business ecosystem since it cannot exist without them. In addition, customers can usually change over to another business ecosystem with relative ease, provided that more sustainable business ecosystems exist. Therefore, a business ecosystem requires a social license to operate (Gunningham, Kagan, & Thornton, 2004). Thus, one

could conclude that from this perspective customers can be attributed a slightly greater responsibility – at least if they manage to act united. In the end, however, the business ecosystem still shares the responsibility as a community.

Furthermore, the consumer represents a measure for the different value flows because his evaluation influences the potential value that can be captured by it. However, evaluating every flow separately poses an impossible challenge, whereas it is possible for the customer to evaluate the aggregated value or cost of an SBMES. If the customer, for example, considers purchasing an electric car, he cannot evaluate every flow as for example the footprint of the specific paint fabric used. He can, however, evaluate major aspects as the environmental impact of a lithium-ion battery, recycling options and carbon footprint of the energy consumption including the electricity mix and thereby form an opinion about the impact the BMES compared to others. This, however, concludes that only major value flows are important for the BMES and suscept BMES to greenwashing. Following this line of reasoning, this represents the border of consumer and producer responsibility.

Since the overall value of the entire business ecosystem is relevant and not just the value of one's own business model, businesses have to re-evaluate their links within a business ecosystem or even their complete participation in specific BMES. Considering that other business ecosystems are more sustainable across the triple bottom line, companies in fossil energy BMES slowly shift their business models towards renewable energy BMES (Lindgren, 2016).

It should not be forgotten that the government is also a part of business ecosystems and the business ecosystem is strongly linked with the social ecosystem including its legal system. This provides another possible level on which sustainability can be achieved. If the legal system changes, the interconnected business ecosystems have to co-evolve with it. Although business ecosystems reject geographical borders, businesses are based in one country and, due to this, are interconnected to various social ecosystems on different levels. This leads us back to the prisoner's dilemma and to the competition of social ecosystems which was referred to in chapter 2.2 (Shi-Lling-Hsu, 2010). Therefore, every social ecosystem with geographical borders is better off by not tightening the laws. Thus, a social ecosystem without geographical borders or at least with very broad ones would have to take action. Alternatively, multiple social ecosystems could build a union, similar to the European

Union, to enact laws that affect as many business ecosystems as possible and by doing so, do not represent a competitive disadvantage for either of the social ecosystems.

### 3.4 Sustainable Business Model Ecosystems

This last chapter of the synthesis aims to conjunct all of the concepts, namely sustainability, business models and business ecosystems into a general concept of sustainable business model ecosystems (SBMES). All findings and conclusions made in the other sections of chapter 3 are also valid for the concept of SBMES, in particular the findings concerning the concept of BMES. To avoid unnecessary repetition, this chapter will focus on the most important aspects differentiating the SBMES from the BMES. For more general concepts, please see chapter 3.1 - 3.3. Within this chapter, the following points will be discussed: The definition of SBMES, the relation of the circular economy and SBMES, competition along the triple bottom line, achieving sustainability on an aggregated level, the importance of deliberate strategy for managing (physical) value flows and innovation within an SBMES.

First of all, SBMES are the BMES of sustainable business ecosystems which are characterized by being restorative and regenerative (McDonough & Braungart, 2010). They are stories of how the sustainable business ecosystem works. The SBMES describes a system of how the modules of a sustainable business ecosystem are linked together considering all kinds of interactions. A good SBMES must have a logic (who needs to be included), a structure (who hands off to whom), and a governance (who sets the rules). Since the sustainable business model accounts for the triple bottom line, the SBMES needs to manage all different kinds of flows that affect people, planet and profit. In comparison, the BMES is theoretically not obliged to account for more than shareholder value and its compliance with the law. Therefore, the SBMES is even more complex as it has to manage more value flows (Rivkin, 2000).

Second, equally to the relationship of SBM towards the business model, the SBMES embodies the “ideal type” of a BMES. The SBMES differs from the BMES through its intention of doing business and through the purpose of the community. The purpose, in this case, would be to maximize the value across the triple bottom line and optimally be absolutely sustainable in all three dimensions.

---

Aligning the BMES along the triple bottom line can potentially have a great impact on its performance (Ellen MacArthur Foundation, 2015). However, keeping in mind the complexity of the BMES, the SBMES is also more complex because it has to align its partners with respect to multiple value streams which need to be balanced (Rivkin, 2000; Hart & Dowell, 2011). As discussed in chapter 3.3.2, managing SBMES includes, to a large extent, managing physical flows of matter such as resources and waste. The alignment of the involved actors is essential in order to not lose valuable resources and instead keep them within the ecosystem. The concept of the circular economy has already been discussed in a previous chapter because in the literature it is usually referred to SBM (Jørgensen & Pedersen, 2018; Frishammar & Parida, 2018; Lahti, Wincent, & Parida, 2018). In fact, the focus of research with respect to the circular economy is just beginning to shift towards business ecosystems (Paridaa, Burströmc, Visnjicd, & Wincent, 2019).

A business model cannot keep all value flows within its own business model to manage them in a sustainable way. Eventually, it has to deliver the value to other businesses or to its customers who are both part of the ecosystem it operates in. The transition towards a circular economy, in fact, affects the organization of the entire business ecosystem (Paridaa et al., 2019) because it requires value co-creation and co-capture to manage value flows which extend across the business ecosystem. Therefore, the systems described in research are not SBM but rather SBMES. However, referring to the concepts of slowing, closing and narrowing the loop (Bocken et al., 2016), one could argue that some parts of the circular economy refer to single SBMs and some to SBMES. SBMs can, for example, narrow loops by becoming more efficient in their use of resources and SBMES can focus on closing the flows between post-use and production to keep the resources within the business ecosystem. The first example, with respect to the concept of BMES, represents a way for an SBM to compete for a module by offering the SBMES a more sustainable solution.

Furthermore, the role of consumers as a part of the SBMES, should be highlighted. The consumer is of high relevance for the SBMES, in addition to his relevance for BMES in general (cf. chapter 3.2). In traditional BMES, the customer represents the end of the value creation process and the beginning of value destruction. To change this view, the customer has to be integrated into the value co-creation process and urged to actively participate in the SBMES. The customer embodies a key actor to redirect value-flows and to close the loop of material and resource flows. (Bocken et al., 2016; Romero & Molina, 2011).

Third, in contrast to the SBM, the business models of the SBMES are not necessarily required to achieve sustainability along the triple bottom line. The SBMES focuses on the achieved values of the community instead of each of its members separately. In practice, this implies that business models can focus on their core competences no matter whether they deliver social, environmental or economic value for the business ecosystem. However, in sum, the business ecosystem has to evaluate its results in all three dimensions.

In BMES the single businesses have wide autonomy and can compete over the module in different ways as, for example, through price or design (Jacobides et al., 2018). This implies, that within SBMES, business models can, in addition, compete with each other through different value mixes of the triple bottom line. Let's take, for example, a module which requires its business model to deliver a power supply: One company might offer a very inexpensive solution, whereas another one offers a very energy-saving method which is more expensive. The decision for one of the two companies poses a difficult challenge because the different values of the triple bottom line are very hard to compare. Making those decisions within a sustainable business ecosystem constitutes an important part of the SBMES which has to evaluate the different flows and balance them across the business ecosystem.

Not every actor within a business ecosystem contributes economic value which it can capture for itself. Therefore, Lang et al.'s (2019) suggested mechanisms of sharing co-created value through a combined margin system, profit pooling or revenue sharing are of great importance for the BMES. In any way, the actors are participating in the value co-created and, in turn, expect to be compensated by a share of the value which is co-captured. The SBMES can, however, require certain standards from its members and also ensures the compliance with previously determined standards. The code of conduct, for example, represents a similar compliance tool.

Fourth, recalling Iansiti and Levien's (2004) statement, the importance of the SBMES becomes even more apparent:

*“A business that takes an action without understanding the impact on the ecosystem as a whole is ignoring the reality of the network environment in which it operates.”* (p. 8)

Business ecosystem strategy is, as discussed in chapter 3.2, a mix of deliberate and emergent strategy (Mintzberg & Waters, 1985). One goal of BMES is to conceptualize an intended strategy which is followed by the business ecosystem. However, BMES is a very novel concept and it is challenging for a business ecosystem to align and create a coherent BMES. Therefore, the proportion of emerging strategy in many business ecosystems is probably too large. To manage a sustainable business ecosystem and ecosystems in general, the community has to increase the proportion of its deliberate strategy, which can be achieved through a coherent (S)BMES. Therefore, the SBMES is an important tool to manage the value flows across the whole sustainable business ecosystem. In summary, the SBMES is a gestalt that can be shaped in an infinite amount of structures, which include structures of the circular and of the sharing economy.

As discussed, making objective decisions regarding the triple bottom line poses a big challenge. The community of the sustainable business ecosystem can only make those decisions if they share common values and evaluate the values (co-)created by its members in the same way. For this reason, a common vision is an essential requirement for an SBMES. Furthermore, the culture, the relation and the trust amongst the participants represent further critical aspects for an SBMES, just like in a BMES (cf. chapter 3.2.). In the cases in which values and needs of a group of actors are not taken into account, it is advisable to build unions to represent them accordingly.

Fifth, Moore (1998) states that “[w]e live in a business world where the only true sustainable advantage is innovation” (p. 167). The drivers for BMI can be divided into 6 themes: activities, external stakeholders, environmental factors, organizational characteristics, service stream, and miscellaneous (Andreini & Bettinelli, 2017). The SBMES especially focuses on external stakeholders, environmental factors and organizational characteristics. Thereby, the sustainable business ecosystem provides a great environment for innovation, and thus sustainability, overall. However, this does not mean that the other factors are not important, they are just being less influenced by the SBMES.

To create a business model which fits into the SBMES, detailed information about its value flows across the triple bottom line is required. Therefore, transparency, modularity, openness and access to resources constitute essential attributes of a successful SBMES (Jacobides et al., 2018). Sustainable business ecosystems are in need of innovation to increase their value created across all dimensions. This innovation can either be in the form of technological

innovation, of BMI or of innovation with respect to the structure and value co-creation and co-capture of the SBMES. Similar to the BMES (cf. chapter 3.2), the latter favors open and decentral governance (Dellyana et al., 2018). Furthermore, it can be differentiated between generic or specialized innovation. A specialized innovation is customized for the SBMES and only enhances the value in this specific business ecosystem. Generic innovation, however, works independent of the business ecosystem and could be used in other business ecosystems, as well. An example of sustainable generic innovation is Newlight, a company which collects carbon emissions from industrial chimneys to produce plastic (Newlight Technologies, Inc., 2019). This innovation is still dependent on a business ecosystem and partnerships but can be used in cooperation with any manufacturing business ecosystem.

Although the modules require autonomy to foster competition and innovation, business ecosystems need formal or informal reporting systems (Lang et al., 2019). Compared to the BMES, in the SBMES those information streams have to be extended by key performance indicators with respect to social and environmental performance.

## 4. Conclusion & Implications

This chapter aims to summarize the most important findings of this thesis and answer the research questions which were stated in the introduction of this work.

First of all, a large part of this thesis was dedicated to conceptualizing BMES. “A business model describes the rationale of how an organization creates, delivers, and captures value” (Osterwalder & Pigneur, 2010, p. 14), whereas BMES are stories of how the business ecosystem works. BMES describe a system of how the modules of a business ecosystem are linked together, considering all kinds of interactions. A good BMES must have a logic (who needs to be included), structure (who hands off to whom), and governance (who sets the rules). Therefore, the BMES consists of several business models and combines them into an aggregated system which focuses on value co-creation and co-capture. The BMES is not an alternative system to value chains and networks but rather includes them within its broader boundaries. At the heart of the BMES there is the value proposition around which business models align to materialize it. Within this structure, the business models can align in various ways as, for instance, in value chains. In addition, the BMES does not only include direct links but also a great number of indirect links such as the government, labor unions, NGO’s, universities, R&D institutions, and finance institutions.

Second, this understanding of BMES has several implications for its management. The BMES constitutes an own instance which is usually independent of single business models. The development of the BMES depends on a mutual agreement of the community with respect to its values. Nevertheless, in some cases, the positional power of one keystone player is so strong that he can orchestrate the BMES to a certain degree. However, the business ecosystem is still constituted of a community which requires common values and a common vision. Moreover, the BMES requires openness, transparency and trust. Furthermore, a BMES can also include more formal structure as, for example, contracts, reporting systems and code of conducts.

However, the BMES is not solely composed of cooperation but instead requires a healthy mix of cooperation and competition at the same time. The BMES constitutes of interconnected modules that can be operated by one or multiple businesses. With reference to the question what all of this implicates for the businesses participating in a business ecosystem one could say that businesses are able to create different business models to

compete through these modules. Accordingly, businesses can use different strategies to engage in business ecosystems, including system, component and bottleneck strategy. Furthermore, participation in a business ecosystem gives business models access to knowledge and resources which can enable new innovations and in particular BMI.

The relevance of all of this is based on the fact that different types of ecosystems are intertwined with each other and that, furthermore, the business ecosystem represents a part of society and the biosphere. The business ecosystem interacts with other ecosystems and, thus, can have positive as well as negative effects on them. For this reason, business ecosystems share a part of the responsibility for sustainability in our society. However, a business cannot face those challenges alone but needs to act strategically in cooperation with its business ecosystem. Therefore, not only business models but also BMES are required to account for the triple bottom line.

For this reason, eventually, the concept of business model ecosystems has been applied to sustainable business model ecosystems. SBMES is defined as a BMES accounting for the triple bottom line. An SBMES, in contrast to a BMES, is more complex because it has to manage even more value flows within the ecosystem. SBMES is a gestalt that can be shaped in an infinite amount of structures and subject to change, adaptation and revolution. For this reason, the SBMES continuously innovates to maximize the value it co-creates and co-captures across the triple bottom line. Thereby, it may take the shape of common structures including cradle to cradle, the circular and sharing economy.

Sustainability does not only require SBMs but also a coherent SBMES which manages the value co-creation and co-capture of the whole sustainable business ecosystem. Since no business can manage the complex value flows on its own, the SBMES represents a powerful structure to aid in sustainable value co-creation and co-capture. On account of this, thinking in terms of (sustainable) business ecosystems instead of thinking about maximizing one's own business's profit could help businesses in the process of becoming more sustainable and thereby represent an important step towards a new era of sustainable economic growth.

## 4.1 Future Scope of Study

Although a lot of research implicitly discusses BMES, the concept is relatively new and is not really established yet. Consequently, there are various new fields of research with respect to managing, innovating and organizing business ecosystems – as well with consideration of sustainability as without. However, I would like to highlight four research fields that I believe are of great importance for the development of (S)BMES.

First of all, the theory of BMES and SBMES was developed on a theoretical basis. The theory needs to be followed up by empirical research to confirm or invalidate the assumptions and conclusions which were drawn from those theories.

Second, there is a lot of research about the central orchestration of BMES but there is a lack of research with respect to the self-organization of BMES which should be addressed in the future. On top of that, businesses need guidance on how to build unions to represent their interests in business ecosystems with unbalanced power distributions.

Third, in chapter 3.2.1 it was suggested that it might be helpful to use a software tool to draw the boundaries of business ecosystems and to manage them. This would allow businesses to innovate their business models more efficiently in order to fit into the business ecosystem and to use synergies between different business ecosystems which are linked with each other.

Last but not least, one of the biggest challenges of SBMES is to evaluate and compare different flows of values. Therefore, future research needs to be conducted to find innovative approaches to evaluate, compare and manage those value flows efficiently.

## References

- 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. *Journal of Management*, 43(1), pp. 39–58.
- Adner, R., Oxley, J. E., & Silverman, B. S. (2013). *Collaboration and Competition in Business Ecosystems*. Bingley: Emerald Group Pub. Ltd.
- Alchian, A. A. (1984). *Journal of Institutional and Theoretical Economics*, 140(1), pp. 34-49.
- Allee, V. (2003). *The Future of Knowledge : Increasing Prosperity Through Value Networks*. Oxford: Butterworth-Heinemann.
- Andreini, D., & Bettinelli, C. (2017). *Business Model Innovation. From Systematic Literature Review to Future Research Directions*. Cham, Switzerland: Springer International Publishing AG.
- Apple Inc. (2019), a. Environmental Responsibility Report.
- Apple Inc. (2019), b. Supplier List. *Apple Supplier Responsibility 2019*.
- Arora, A., & Bokhari, F. A. (2007). Open vs. closed firms and the dynamics of industry evolution. *The Journal of Industrial Economics*, 55(3), pp. 499–527.
- Beegle, J. A., & Loomis, C. P. (1957). *Rural Sociology: The Strategy of Change*. Englewood Cliffs, NJ: Prentice-Hall.
- Biem, A., & Caswell, N. (2008). A Value Network Model for Strategic Analysis. *Proceedings of the 41st Hawaii International Conference on System Sciences*. Institute of Electrical and Electronics Engineers.
- Bjørn, A., & Hauschild, M. Z. (2013). Absolute versus Relative Environmental Sustainability, What can the Cradle-to-Cradle and Eco-efficiency Concepts Learn from Each Other? *Journal of Industrial Ecology*, 17(2), pp. 321-332.

- 
- Bocken, N. M., de Pauw, I., Bakker, C., & van der Grinten, B. (2016). Product design and business model strategies for a circular economy. *Journal of Industrial and Production Engineering*, 33(5), 308-320.
- Bouwman, H., Faber, E., Haaker, T., Kijl, B., & de Reuver, M. (2008). Conceptualizing the STOF model. In H. Bouwman, d. V. Henny, & T. Haaker, *Mobile Service Innovation and Business Models* (pp. 31-70). Berlin: Springer.
- Camarinha-Matos, L. M., & Afsarmanesh, H. (2006). Collaborative Networks: Value Creation in a Knowledge Society. *Knowledge Enterprise: Intelligent Strategies in Product Design, Manufacturing, and Management*, 207, pp. 26-40.
- Cambridge Dictionary*. (2014). Retrieved 11 22, 2019, from Cambridge Dictionary: <https://dictionary.cambridge.org/de/worterbuch/englisch/ecosystem>
- Carbon Engineering Ltd. (2019). *Carbon Engineering*. Retrieved from <https://carbonengineering.com/>
- Chatain, O. (2016). Cooperative and Non-cooperative. In M. Augier, & D. J. Teece, *The Palgrave Encyclopedia of Strategic Management*. Philadelphia, USA: Springer Link.
- Chesbrough, H. (2010). Business Model Innovation: Opportunities and Barriers. *Long Range Planning*, 43, pp. 354-363.
- Clarative Analytics. (2019). *Web of Science*. Retrieved November 28, 2019, from Web of Science: <https://apps.webofknowledge.com/>
- Clauß, T. (2017). Measuring Business Model Innovation: Conceptualization, Scale Development and Proof of Performance. *R&D Management*, 47(3), pp. 385-403.
- Corning. (2019), a. *Corning.com*. Retrieved November 28, 2019, from Corning Gorilla Glas: <https://www.corning.com/gorillaglass/worldwide/en.html#>
- Corning. (2019), b. *Corning.com*. Retrieved November 28, 2019, from Smartphones with Gorilla Glas: <https://www.corning.com/gorillaglass/worldwide/en/products-with-gorilla-glass/smartphones.html>

- Cusumano, M. A., & Gawer, A. (2002). The elements of platform leadership. *MIT Sloan Management Review*, 43(3), pp. 51-60.
- Dellyana, D., Simatupang, T., & Dhewanto, W. (2016). Business Model Innovation in Different Strategic Networks. *International Journal of Business*, 21(3), pp. 191-215.
- Dellyana, D., Simatupang, T., & Dhewanto, W. (2018). Managing the actor's network, business model and business model innovation to increase value of the multidimensional value networks. *International Journal of Business and Society*, 19(1), pp. 209-218.
- Demil, B., & Xavier, L. (2010). Business Model Evolution: In Search of Dynamic Consistency. *Long Range Planning*, 43, pp. 227-246.
- Demil, B., Lecocq, X., & Warnier, V. (2018). "Business model thinking", business ecosystems and platforms: the new perspective on the environment of the organization. *M@n@gement*, 21(4), pp. 1213-1228.
- Elkington, J. (1998). Accounting for the Triple Bottom Line. *Measuring Business Excellence*, 2(3), pp. 18-22.
- Ellen MacArthur Foundation. (2014). *Towards the Circular Economy*.
- Ellen MacArthur Foundation. (2015). *Growth Within: a Circular Economy. Vision for a Competitive Europe*. UK.
- Etzioni, A. (1968). *The Active Society*. New York, USA: The Free Press.
- Fairtrade Foundation. (2019). *Fairtrade*. Retrieved December 02, 2019, from What is Fairtrade?: <https://www.fairtrade.org.uk/What-is-Fairtrade>
- Fjeldstad, Ø. D., & Haanæs, K. (2001). Strategy Tradeoffs in the Knowledge and Network Economy. *Business Strategy Review*, 12(1), 1-10.
- Freeman, E. R. (2004). The stakeholder approach revisited. *Zeitschrift für Wirtschafts- und Unternehmensethik*, 5(3), 228-254.
- Frishammar, J., & Parida, V. (2018). Circular Business Model Transformation: A Roadmap for Incumbent Firms. *61(2)*, pp. 5-29.

- 
- Frosch, R. A., & Gallopoulos, N. E. (1989). Strategies for Manufacturing. *Scientific American*, 261(3), pp. 144-152.
- Gawer, A., & Cusumano, M. A. (2014). Industry Platforms and Ecosystem Innovation. *Journal of Product Innovation Management*, 31(3), pp. 417–433.
- Grasso, M. (2004). *Climate change: the global public good*. Department of Economics, University of Milan - Bicocca. Milan: Working Paper.
- Gueguen, G., & Isckia, T. (2009). The Borders of Mobile Handset Ecosystems: Is Coopetition Inevitable? In T. a. Informatics (Ed.), *Mobile Wireless Middleware, Operating Systems, and Applications - Workshops, Mobilware 2009 Workshops, Berlin, Germany, April 2009, Revised Selected Papers*, (pp. 45-54). Berlin.
- Gunningham, N., Kagan, R. A., & Thornton, D. (2004). Social License and Environmental Protection: Why Businesses Go Beyond Compliance. *Law & Social Inquiry*, 29(2), pp. 307-341.
- Haglund, M., & Helander, J. (1998). *Development of Value Networks - An Empirical Study of Networking in Swedish Manufacturing Industries*. Institute of Electrical and Electronics Engineers.
- Hannah, D. P., & Eisenhardt, K. M. (2018). How firms navigate cooperation and competition in nascent ecosystems. *Strategic Management Journal*, 39, pp. 3163–3192.
- Harari, Y. N. (2015). *Sapiens : a brief history of humankind*. New York, USA: Harper.
- Hart, S. L. (1995). A Natural-Resource-Based View of the Firm. *The Academy of Management Review*, 20(4), pp. 986-1014.
- Hart, S. L., & Dowell, G. (2011). A Natural-Resource-Based View of the Firm: Fifteen Years After. *Journal of Management*, 37(5), pp. 1464-1479.
- Hearn, G., & Pace, C. A. (2006). Value-creating ecologies: Understanding next generation business systems. *Foresight*, 8(1).

- Iansiti, M., & Levien, R. (2004). Strategy as Ecology. *Harvard Business Review*, 82(3), pp. 68-78.
- Jacobides, M. G., Cennamo, C., & Gawer, A. (2018). Towards a theory of ecosystems. *Strategic Management Journal*, 39(8), pp. 2255-2276.
- Jensen, A. B. (2013). Do we need one business model definition. *Journal of Business Models*, Vol. 1(No. 1), pp. 61-84.
- Jørgensen, S., & Pedersen, L. J. (2018). *RESTART Sustainable Business Model Innovation*. Cham, Switzerland: Palgrave Macmillan.
- Jørgensen, S., & Pedersen, L. J. (2018). *RESTART Sustainable Business Model Innovation*. Cham, Switzerland: Palgrave Macmillan.
- Kapoor, R. (2018). Ecosystems: broadening the locus of value creation. *Journal of Organization Design*, 7, p. Article No. 12.
- Kim, J. (2016). The platform business model and business ecosystem: quality management and revenue structures. *European Planning Studies*, 24(12), pp. 2113–2132.
- Kiron, D., Kruschwitz, N., Haanes, K., Reeves, M., Fuisz-Kehrbach, S.-K., & Kell, G. (2015). *Joining Forces: Collaboration and Leadership for Sustainability*. MITSloan Management review.
- Koenig, G. (2012). Business Ecosystems Revisited. *M@n@gement*, 15(2), pp. 208-224.
- Korhonen, J. (2004). Theory of industrial ecology. *Progress in Industrial Ecology An International Journal*, 1(1/2/3), pp. 61-88.
- Kroeber, A. L., & Parsons, T. (1958). The Concepts of Culture and of Social Systems. *The American Sociological Review*, 23, pp. 582-583.
- Lahti, T., Wincent, J., & Parida, V. (2018). A Definition and Theoretical Review of the Circular Economy, Value Creation, and Sustainable Business Models: Where Are We Now and Where Should Research Move in the Future? *Sustainability*, 10(2799), pp. 1-19.

- 
- Lang, N., von Szczepanski, K., & Wurzer, C. (2019). *BCG*. Retrieved November 12, 2019, from The Emerging Art of Ecosystem Management: <https://www.bcg.com/de-de/publications/2019/emerging-art-ecosystem-management.aspx>
- Le, T. T., & Tarafdar, M. (2009). Business ecosystem perspective on value co-creation in the Web 2.0 era: implications for entrepreneurial opportunities. *International Journal of Entrepreneurial Venturing*, 1(2), pp. 112-130.
- Lenzen, M., Murray, J., Sack, F., & Wiedmann, T. (2007). Shared producer and consumer responsibility — Theory and practice. *Ecological Economics*, 61, pp. 27-42.
- Lindgardt, Z., Reeves, M., Stalk, G., & Deimler, M. (2009). Business Model Innovation: When the Game Gets Tough, Change the Game. *Boston Consulting Group*.
- Lindgren, P. (2016). The Business Model Ecosystem. *Journal of Multi Business Model Innovation and Technology*, 4(2), pp. 1-50.
- Lindgren, P. (2018). *The Multi Business Model Innovation Approach*. River Publishers.
- Lozano, R. (2008). Envisioning sustainability three-dimensionally. *Journal of Cleaner Production*, 16, pp. 1838–1846.
- Luhmann, N. (1982). The World Society as a Social System. *International Journal of General Systems*, 8(3), pp. 131-138.
- Magretta, J. (2002). Why Business Models Matter. *Harvard business review*, 80(5), pp. 86-92.
- Marx, K. (1867). *Das Kapital. Kritik der politischen Ökonomie*. Hamburg: Meissner.
- Massa, L., Tucci, C. L., & Allan, A. (2017). A Critical Assessment of Business Model Research. *The Academy of Management Annals*, 11(1), pp. 73-104.
- Mayjo, M., & Brown, G. (1999). Strategic Planning: The business model: Relied upon for years, the traditional business model is on shaky ground. *Ivey Business Journal*, 63, 18-23.
- McDonough, W., & Braungart, M. (2010). *Cradle to cradle: Remaking the way we make things*. Macmillan.

- McDonough, W., & M., B. (2010). *Cradle to cradle: Remaking the way we make things*. Macmillan.
- McGrath, R. G. (2010). Business models: A discovery driven approach. *Long Range Planning*, 43(2-3), 247-261.
- McKerliea, K., Knight, N., & Thorpe, B. (2006). Advancing Extended Producer Responsibility in Canada. *Journal of Cleaner Production*, 14, pp. 616-628.
- Merton, R. K. (1934). Durkheim's Division of Labor in Society. *American Journal of Sociology*, 40(3), pp. 319-328.
- Mintzberg, H., & Waters, J. A. (1985). Of Strategies, Deliberate and Emergent. *Strategic Management Journal*, 6(3), pp. 257-272.
- Mitleton-Kelly, E. (2003). Ten principles of complexity and enabling infrastructures. In E. Mitleton-Kelly, *Complex Systems and Evolutionary Perspectives on Organizations: The Application of Complexity Theory to Organizations*. (pp. 23-50). Amsteradm: Pergamon.
- Moore, J. F. (1993). Predators and Prey: A New Ecology of Competition. *Harvard Business Review*, 71(3), pp. 75-86.
- Moore, J. F. (1996). *The death of competition : leadership and strategy in the age of business ecosystems*. Chichester, NY: Wiley Harper Business.
- Moore, J. F. (1998). The Rise of a New Corporate Form. *The Washington Quarterly*, 21(1), pp. 167-181.
- Moore, J. F. (2006). Business ecosystems and the view of the firm. *The Antitrust Bulletin*, 51(1), 31-5.
- Morris, M., Schindehutte, M., & Allen, J. (2005). The Entrepreneur's Business Model: Toward a Unified Perspective. *Journal of Business Research*, 58(6), pp. 726-735.
- Msanjila, S. S., & Afsarmanesh, H. (2007). Modelling trust relationships in Collaborative Networked Organisations. *International Journal of Technology Transfer and Commercialisation*, 6(1), pp. 40-55.

- 
- Newlight Technologies, Inc. (2019). *Newlight*. Retrieved December 13, 2019, from Newlight: <https://www.newlight.com/>
- Nielsen , C., & Montemari, M. (2012). The role of human resources in business model performance: the case of network-based companies. *Journal of Human Resource Costing & Accounting*, *16*(2), 142-164.
- Nielsen, C., Lund, M., Montemari, M., Paolone, F., Massaro , M., & Dumay, J. (2018). *Business Models: A Research Overview*. Routledge: ProQuest Ebook Central.
- Orlitzky, M., Schmidt, F., & Rynes, S. (2003). Corporate Social and Financial Performance: A Meta-Analysis. *Organization Studies*, *24*(3), pp. 403-441.
- Osterwalder, A., & Pigneur, Y. (2010). *Business model generation: A handbook for visionaries, game changers, and challengers*. Hoboken, New Jersey: John Wiley & Sons,.
- Ozcan, P., & Eisenhardt, K. M. (2009). Origin of Alliance Portfolios: Entrepreneurs, ORIGIN OF ALLIANCE PORTFOLIOS: ENTREPRENEURS,. *Academy of Management Journal, Network Strategies and Firm Performance*, *52*(2), pp. 246-279.
- Paridaa, V., Burströmc, T., Visnjicd, I., & Wincent, J. (2019). Orchestrating industrial ecosystem in circular economy: A two-stage transformation model for large manufacturing companies. *Journal of Business Research*, *101*, pp. 715-725.
- Parolini, C. (1999). *The Value Net: A Tool for Competitive Strategy*. New York: Wiley.
- Parsons, T. (1972). Culture and Social System Revisited. *Social Science Quarterly*, *53*(2), pp. 253-266.
- Parsons, T., Shils, E. A., Allport, G. W., Kluckhohn, C., Murray, H. A., Sears, R. R., . . . Tolman, E. C. (1976). Some Fundamental Categories of the Theory of Action: A General Statement. In T. Parsons, & E. A. Shils, *Toward a General Theory of Action* (7th ed. ed., pp. 3-29). Cambridge: Harvard University Press.
- Peltoniemi, M. V. (2008). *Business ecosystem as the new approach to complex*. Tampere, Finland: Proceedings of E Business Research Forum.

- Peppard, J., & Rylander, A. (2006). From Value Chain to Value Network: Insights for Mobile Operators. *European Management Journal*, 24, 128-141.
- Perera, R. (2017). *The PESTLE Analysis*. Nerdynaut.
- Pidun, U., Reeves, M., & Schüssler, M. (2019, September 27). *Do You Need a Business Ecosystem?* Retrieved from BCG: <https://www.bcg.com/de-de/publications/2019/do-you-need-business-ecosystem.aspx>
- Porter, M. E. (1985). *The Competitive Advantage: Creating and Sustaining Superior Performance*. New York, USA: Free Press.
- Porter, M. E. (2008). *On Competition*. Boston, USA: Harvard Business Press.
- Radonjic-Simic, M., & Pfisterer, D. (2018). A Decentralized Business Ecosystem Model for Complex Products. In S. Patnaik, X. Yang, M. Tavana, P.-V. F., & F. Qiao, *Digital Business. Lecture Notes on Data Engineering and Communications Technologies* (pp. 23-52). Cham, Switzerland: Springer.
- Radonjic-Simic, M., & Pfisterer, D. (2018). A Decentralized Business Ecosystem Model for Complex Products. In S. Patnaik, X. Yang, M. Tavana, P.-V. F., & F. Qiao, *Digital Business. Lecture Notes on Data Engineering and Communications Technologies* (pp. 23-52). Cham: Springer.
- Rashid, A., Asif, F. M., Krajnik, P., & Nicolescu, M. C. (2013). Resource Conservative Manufacturing: an essential change in business and technology paradigm for sustainable manufacturing. *Journal of Cleaner Production*, 57, pp. 166-177.
- Rivkin, J. W. (2000). Imitation of complex strategies. *Management Science*, 46(6), pp. 745-873.
- Romero, D., & Molina, A. (2011). Collaborative Networked Organisations and Customer Communities: Value Co-Creation and Co-Innovation in the Networking Era. *Journal of Production Planning & Control*, 22(4), pp. 447-472.
- Rong, K., Lin, Y., Li, B., Burström, T., Butel, L., & Yu, J. (2018). Business ecosystem research agenda: more dynamic, more embedded, and more internationalized. *Asian Business & Management*, pp. 167–182.

- 
- Schaltegger, S., Lüdeke-Freund, F., & Hansen, E. G. (2011). Business Cases for Sustainability: The Role of Business Model Innovation for Corporate Sustainability. *International Journal of Innovation and Sustainable Development*, 6(2), 95–119.
- Shi-Lling-Hsu. (2010). A Game-Theoretic Model of International Climate Change Negotiations. *N.Y.U. Environmental Law Journal*, 19, 15-86.
- Spieth, P., & Meissner, S. (2018). Business Model Innovation Alliances: How To Open Business Models For Cooperation. *International Journal of Innovation Management*, 22(04), pp. 1-26.
- Stahel, W. R. (2016). The circular economy. *Nature*(531), 435-438.
- Strategyzer AG. (2019, November 18). *Plusacumen*. Retrieved from The Business Model Canvas: <https://www.plusacumen.org/files/business-model-canvasjpg>
- Stubbs, W., & Cocklin, C. (2008). Conceptualizing a "Sustainability Business Model". *Organization and Environment*, 21(3), 103-127.
- Sunfire GmbH. (n.d.). *Sunfire*. Retrieved from <https://www.sunfire.de/en/>
- Teece, D. (2010). Business Models, Business Strategy and Innovation. *Long Range Planning*, 43(2-3), 172-194.
- Viswanadham, N. (2017). Performance analysis and design of competitive business models. *International Journal of Production Research*, 56(4), pp. 1-17.
- Weiblen, T. (2015). Opening Up the Business Model: Business Model Innovation through Collaboration. *Dissertation, Dissertation no. 4382*. University of St. Gallen.
- Wilkes, W., & Parkin, B. (2019, Januar 30). *Bloomberg.com*. Retrieved December 5, 2019, from Climate Changed. Germany's Debate Over When to Quit Coal Is Just Getting Started: <https://www.bloomberg.com/news/articles/2019-01-30/germany-s-coal-debate-is-just-starting-with-plan-to-quit-by-2038>
- Williamson, P. J. (2012). Ecosystem Advantage: How to Successfully Harness the Power of Partners. *California Management Review*, 55(1), pp. 24-46.

- World Commission on Environment and Development. (1987). *Our common future*. New York: Oxford University Press.
- World Resources Institute. (2000). *World Resources: People and ecosystems: The fraying web of life*. Washington, USA: World Resources Institute.
- Yu, J., Li, Y., & Zhao, C. (2011). Analysis on Structure and Complexity Characteristics of Electronic Business Ecosystem. *Procedia Engineering*, 15, pp. 1400-1404.
- Yuliya, S., & Llewellyn, T. (2018). An Ecosystem-Level Process Model of Business Model Disruption: The Disruptor's Gambit. *Journal of Management Studies*, 55(9), pp. 1278-1316.
- Zahra, S. A., & Nambisan, S. (2012). Entrepreneurship and Strategic Thinking in Business Ecosystems. *Business Horizons*, 55(3).
- Zott, C., & Amit, R. (2008). The Fit Between Product Market Strategy and Business Model: Implications for Firm Performance. *Strategic Management Journal*, 29(1), pp. 1 - 26.
- Zott, C., & Amit, R. (2010). Business Model Design: An Activity System Perspective. *Long Range Planning*, 43, pp. 216-226.