Eindhoven University of Technology

MASTER

Against mathematics: how 2+2 can equal 5 
an application of open business model innovation to create and appropriate synergy in 
a sustainable business context

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Against mathematics: how 2+2 can equal 5
An application of open business model innovation to create and appropriate synergy in a sustainable business context

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in partial fulfilment of the requirements for the degree of

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Management summary

“*If you can’t explain it shortly, you don’t understand it well enough*.”
(Free interpretation of Albert Einstein)

Introduction
The notion that a single firm cannot innovate in isolation serves as starting point for the open innovation paradigm introduced by Chesbrough (2003). In order to improve innovative performance, firms have to engage with other parties to gain access to new ideas or resources (Dahlander and Gann, 2010). So, open innovation is a mean to create and capture value, which in essence is the function of a firm’s business model (Osterwalder and Pigneur, 2010). Following from this, Chesbrough (2007) states that firms have to open their *business models* to other parties in order to improve innovative performance, rather than relying at internally generating innovation solely. However, as pointed out by Reed et al. (2012), there is a trade-off between the benefits and risks of open innovation: all parties involved should benefit from open innovation, otherwise firms could better focus on internally generating innovation, thereby avoiding any risks concerned with opening up a firm’s boundaries. In other words, the value captured and created by firms opening up their business model should naturally be higher than the sum of the value both parties could have created in isolation. St John and Harrison (1999) describe this phenomenon as ‘synergy’.

Research question
Although sounding promising for both managers and scholars, there are two premises that may seem to strike with synergy achievement via open business model innovation. The first premise stems from Chesbrough (2007), who states that the journey towards open business models is challenging. The second premise, following Goold and Campbell (1998), states that although synergy has the potential to create value, it turns out that many synergy efforts end up *destroying* value rather than creating it. So, although desired by managers and receiving increased attention from scholars, creating synergy (via open business models) still has its rough edges. For firms willing to open their business models in their desire for synergy, it is important to gain insights in dealing with these challenges. This thesis contributes to gaining these insights by posing and answering the following research question:

*“How can open business model innovation help firms establish synergies?”*

Many scholars in the field of economics and management have paid attention to the topic of synergy, but a well-defined theory of synergy and inter-firm networks has yet to emerge (Wei, 2010). This thesis will contribute to the closure of this gap, by developing a synergy typology grounded in literature, which can be linked to an open business model template, to see how open business model innovation could result in firm synergies. Design principles based on both theory and practice are developed in order to show how these different types of synergy can be achieved.
Synergy in open business models: literature review

A literature review has been conducted, revealing (recent) research on the topics of open innovation, business model innovation and synergy.

Open innovation

Reviewing the open innovation paradigm has started with finding a widely accepted definition of the concept. The definition used in this thesis is as follows: “[open innovation is] the use of purposive inflows and outflows of knowledge to accelerate internal innovation, and to expand the markets for external use of innovation, respectively” (Chesbrough, Vanhaverbeke and West, 2006, p.1). Following from this definition, the (dis)advantages of open innovation are discussed. Scholars seem to have an imbalanced focus on the advantages of open innovation, thereby neglecting its downside. The main advantages scholars agree upon are shorter time to market, lower innovation costs and increased sales. Dahlander and Gann (2010) are among the few who describe the disadvantages of open innovation: fear of competitors becoming better positioned, increasing transaction costs, lack of absorptive capacity and the possibility of relying too heavily on external resources.

Business model innovation

Next, in order to see how applying open innovation can create and capture value, the concept of business model innovation is discussed. The business model canvas of Osterwalder and Pigneur (2010) serves as the basis for the theoretical framework. They (ibid, p. 4) state that a business model “describes the rationale of how an organization creates, delivers and captures value”. Concerning business model innovation, Amit and Zott (2010, p.5) describe this as “designing a new, or modifying a firm’s extant activity system”. However, there are some powerful barriers to business model innovation, most importantly the fact that managers have difficulties in recognizing a promising business model timely or that its development is resisted due to conflicts with the prevailing business model (Chesbrough, 2010). Thomke (2002) argues that the way forward is to adopt an experimental stance towards it: companies should develop the ability to experiment with their business models to partake more fully in the benefits of open innovation, coined by Chesbrough (2007) as open business models. So, open business models specifically focus on using the firm’s environment as key component in the business model in order to create and capture value (Sandulli and Chesbrough, 2009). To see how collaborating firms can capture a surplus in value, the thesis continues with elaborating on the concept of synergy.

Synergy

Synergy is achieved when the value of a combined entity exceeds the sum of values of the firms in isolation (St John and Harrison, 1999). However, this definition remains rather abstract (cf. Knoll, 2008). Therefore, a synergy typology grounded in literature has been developed consisting of financial, management, customer, operational and knowledge management synergy. Each synergy type has been defined by synthesizing previous literature. For the creation of synergy Wu and Choi (2004) state that firms should exchange and combine resources with business partners to become more competitive and efficient. Based on Goold and Campbell (1998), six processes to achieve synergy are formulated: sharing know-how, coordinating strategies, sharing tangible resources, vertical integration and pooling negotiation power. Although tempting for managers to strive for synergy, four potential biases should be taken into account whilst seeking it: the synergy bias, the parenting bias, the skills bias and the upside bias (ibid).
Theoretical framework

These findings have resulted in a theoretical framework and 22 theory-based design principles that show which interventions should take place in order to establish firm synergy (see figure 1).

![Diagram of theoretical framework](image)

**Figure 1 - Theoretical framework of this thesis**

Methodology

This thesis adopts a science-based design approach, based on qualitative research. The nature of the research question lends itself readily for such an approach, since it contributes to bridging the gap between researchers’ abstract descriptions of synergy and practitioners’ search for realizing it (cf. Romme, 2003). More specifically, this thesis follows the reflective cycle of Van Aken et al. (2007), which entails designing a solution for a specific case based on design principles in order to generate design knowledge. To derive the final set of principles, the approach of Van Burg et al. (2008) is followed, which contains designing a final set of principles by combining principles based on practice (by analysing ten case studies using open coding) and principles merely based on research. So, the final set of principles draws on both practitioner- and research knowledge. The principles follow the CIMO logic of Denyer et al. (2008, p.395): *if you want to achieve outcome O in context C, then use intervention type I*. The explanation through which Mechanism the intervention produces the outcome is represented by the 'M' in the CIMO acronym. These principles will be applied to a specific case: Club van 30 (C30). The data collected for the detailed design solution for C30 has been gathered by conducting interviews and via direct observations during the time spent on-site.
Design
The central role of the business environment has extended from being a traditional economic actor, towards being a political and social actor (Li and Toppinen, 2011). Fowler and Hope (2007) argue that it is possible to achieve win-win scenarios under which a firm can maximize returns while making progress towards the implementation of sustainable business practice. So, sustainable design and practices not only decrease negative impact on the environment, but also could provide benefits to the firm (Gottfried, 2003), making it increasingly impossible for firms to avoid the concept of sustainable development (Dyllick and Hockerts, 2002). However, the concept of sustainability “has been used to mean different things to different people in different contexts” (Bebbington, 2003, p.1). As a result, sustainable development constitutes a challenge for firms, since neither the concept, nor the implementation can be properly grasped. To overcome these challenges, Van Kleef and Roome (2007) argue for collaborative innovation through networks and multi-actor forums.

In this context, C30 helps firms overcome these challenges by translating their ambitions into their business models. However, as stated by Gottfried (2003), the solutions that C30 presents to its customers might have more potential value than solely being presented to the customer and decreasing the customer’s negative environmental impact. Momentarily, C30 advises customers and helps with the implementation of the solution in the customer’s business model, after which the project is finished. However, in view of the open innovation paradigm, combining knowledge and expertise of C30 with daily operations of its customers could result in innovations through collaboration, resulting in a surplus of value for both companies. In other words, collaboration between C30 and its customers has the potential to result in firm synergy, but stagnates at this moment after the project is finished. In a situation of close collaboration, the challenge that firms face while implementing sustainability in their business model can be overcome by using knowledge and expertise of C30, while C30 on its turn could make use of the resources or daily operations of the firms develop and implement sustainable business innovations. The potential benefits for both firms that could arise would be repulsing green-washing, ensuring recurring payments for both firms, implementing innovations market-wide and image building.

A solution for this problem has been designed, in the form of an open business model template based on the design principles, to see how the building blocks of the template should be detailed in order to achieve (one of) the different synergy forms. The generic template has been contextualized for the situation of C30. This way, knowledge from C30 can be turned into valuable sustainable business development (knowledge management synergy) by collaborating with external partners, thereby not only creating a surplus in economic benefits (i.e. financial synergy) for both firms, but also decreasing negative impact on the environment, achieving productivity benefits (operational synergy) and enhancing public relations, which include marketing advantages to reach and serve multiple customer segments (customer synergy), cf. Gottfried (2003). Figure 2 on the next page shows the generic open business model template, with the different synergy types. Management and knowledge management synergies reflect on all business model components and therefore these synergies have not been visualized in the figure. The tailored solution to the situation of C30 is described in the thesis.
This thesis contributes to literature in several ways. First, as pointed out by Wei (2010), a well-defined theory of synergy and firm networks had yet to emerge. This thesis contributes to closing this gap by reflecting on five decades of literature on synergy in order to provide a comprehensive synergy typology with accompanying definitions. Even more important, this thesis aimed at closing the gap between desired synergy outcomes and how to achieve them by combining open business models to the concept of firm synergy. As a result, it shows how synergy can be created and captured by developing an open business model template, based on the work of Osterwalder and Pigneur (2010). Furthermore, a set of over 30 design principles has been developed, building on both theory and practice. The set of principles shows how the different synergy types can be achieved.

For managerial purposes, this thesis is a first step for practitioners in overcoming the problems they face when opening up their business model, by providing concrete guidelines for filling in the business model components, thereby providing a potential pathway to greater innovation activity. Especially when considering Chesbrough’s (2003) notion that companies must innovate to survive and the fact that open innovation has been shown to provide opportunities, but simultaneously can be challenging for many firms (Chesbrough, 2010), the open business model template and the accompanying the design principles could be a valuable tool for firms when opening up their borders in an attempt to enhance innovative performance.

Limitations and future research
As with any research, this research has been subject to some limitations. First of all, as stated by McGrath (2010), a new business model cannot be fully anticipated in advance, but must be learned over time. In this view, the theoretical framework of this thesis approaches the open business model innovation process perhaps too simplistic, by stating that synergy could be a direct result of changes in a firm’s business model. In practice, this process will take time and might involve experimentation to learn from
mistakes made and to find out which business model is appropriate for creating and appropriating synergy. So, although this thesis provides clear and useful linkages between open business model innovation and synergy, future research could address the concept of synergy creation via experimentation, in addition to this study. In doing so, the dynamic and iterative process of experimentation, which is suggested for business model innovation (Thomke, 2002), can be mapped and applied to a case design over a longer period of time, to see if there are any changes compared to the findings of this study.

Next, the choice for the ten case studies on which the practice based design principles are based, has some limitations. Although the case studies show how synergy can be created in practice and the derived principles correspond to theory, the number of cases is rather low. Furthermore, the cases have different sizes, including multi-nationals, while the final design has been applied to a relatively small firm in a specific context (i.e. C30). Future research should address these issues by designing, implementing and evaluating the practice based design principles and the template for multiple case studies in diversified contexts and of different sizes. This way, differences in size and context can be overcome by detailing the design, which could strengthen the robustness of the design.

Third, although the typology of this study is comprehensive, 50 years of literature on synergy makes it virtually impossible to cover all typologies present in literature. Driven by the fact that there is no consensus on the terminology and definition of the concept, many synonyms or concepts related to ‘synergy’ can be found in literature (e.g. ‘strategic fit’ or ‘strategic alignment’). Although this thesis has covered a large part of these theories, there remain some research streams that focus on the topic of synergy that has not received comprehensive attention in this study. For example, mergers and acquisitions literature dives in the concept of two firms combining their strengths in order to achieve value. However, this thesis has focused on synergy between collaborating firms rather than merging or acquiring firms, since this approaches open innovation practices most directly. Future research could apply the open business model template in the context of mergers and acquisitions, to see if the template can be used in different settings or could be extended to value creation and appropriation in different forms of joint structures, other than open innovation practices.
Dankwoord
Voor u ligt het resultaat van vijf maanden werk. Vijf maanden die voorbij zijn gevlogen. De keuze om mijn thesis te schrijven binnen een bedrijf, in dit geval Club van 30, is een keuze geweest waaraan ik veel plezier heb beleefd. Naast het kunnen toepassen van theorieën in een praktijk situatie, heeft de afstudeerstage mij leuke herinneringen, veel ervaring en boven verwachting veel taart en champagne gebracht. Mijn eerste woord van dank gaat daarom uit naar Colette, Mark en met name Yoeri, die vanaf minuut één heeft meegedacht en gezocht naar mogelijke afstudeerrichtingen. Ik kijk er naar uit om binnen dit bedrijf aan de slag te gaan!

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Veel plezier met het lezen van deze thesis.

Michiel van Ardenne

Utrecht, 2013
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1. Introduction

“Most innovations fail. And companies that don’t innovate die”, are the first words in Chesbrough’s (2003, p. xvii) book on open innovation. The second part of the quote shows the importance of innovation: companies need to innovate in their struggle to survive and search for competitive advantage (Tidd et al., 2005; Porter, 1985). Meanwhile, the conditions they are facing are changing rapidly and radically (Baldwin and Von Hippel, 2011). The importance being evident, the first part of the quote shows the difficulty of innovating for most firms. Even firms atop of their industries fail to innovate, as explained and illustrated in Christensen’s The Innovator’s Dilemma (1997).

Recent research on this dilemma focuses on the concept of open innovation, as shown in the review of Dahlander and Gann (2010). Starting point for this idea is that a single organization cannot innovate in isolation. Engagement with different types of parties is necessary to have access to new ideas or resources (Dahlander and Gann, 2010). Reed et al. (2012) find that openness to these new ideas from the environment improves firms’ innovative performance: more and more firms find value by tapping into the ideas of open innovation. Chesbrough (2007) puts it differently and describes that, in order to get the most out of open innovation, companies most open their business models to be more effective in creating as well as capturing value. So, as described by Reed et al. (2012) and in even more detail by Chesbrough (2007), open innovation is a mean to create and capture value, which in essence is the function of a firm’s business model (cf. Chesbrough, 2007; Osterwalder and Pigneur 2010).

As pointed out by Reed et al. (2012), there is a trade-off between the benefits of open innovation and the benefits of internally generated innovation. All parties involved should benefit from open innovation, otherwise the risks of open innovation, namely, coordination costs, removed barriers to new competition and loss of innovation skills (Enkel et al., 2009) could better be avoided. To put it differently, the value captured and created by firms opening their business model should naturally be higher than the sum of the value both parties could have created in isolation. St John and Harrison (1999) describe this phenomenon of two firms being more profitable or competitive together than the aggregate of their profitability when they would have been alone as ‘synergy’.

So, firms should strive for synergy by opening up their business model and combine it with the business models of other firms. However, when making the transition from the business models of two firms towards a new open business model, firms must figure out what to do with their own business model, since: “managing the existence of a new business model alongside an existing one can be tricky” (Chesbrough, 2007, p. 27). Although the word ‘tricky’ perhaps implies that with some effort this problem can be overcome, still, like described by the same author four years earlier, most innovations fail. Even for the success cases Chesbrough (2007) describes, the journey towards successful open business models all began with a shock or challenge of the status quo. In addition, Lichtentaler (2008) mentions that many firms experience severe challenges in managing the entire process of open innovation, which includes the open business model. For companies that are willing to open their business models, it is important to know how to deal with these challenges and how they can create the synergy needed to become the small group of innovators that does not fail, nor die.
1.1 Research Question
As stated, in the view of the open innovation paradigm firms should open their business model in order to create and capture value. Although many scholars discuss the benefits of open innovation, fewer focus their research on open business model innovation (see Chesbrough, 2007). Furthermore, although scholars mention the benefits of open innovation and sometimes implicitly mention a surplus in value for both parties, to the best of my knowledge no scholar have linked open business model innovation explicitly to the different types of synergy appearing in literature. Although some scholars have studies the linkages between open innovation and firm value (e.g. Grimpe and Sofka, 2009), literature on achieving firm synergy via the mechanism of an open business model remains absent, or at least scarce. Therefore, this thesis will dive into this topic to see how synergy can be created for those firms opening up their business models (i.e. how can two firms create and capture higher values together than they could have done separately). In doing so, the following research question will be answered:

“How can open business model innovation help firms establish synergy?”

The term ‘synergy’ in this study refers to both synergies within, as well as between firms, since value creation through open innovation can result from the generation of inter-firm synergies, which in many cases has the potential to simultaneously unlock intra-firm synergies (Smits et al., 2012). To capture all value generated by open business model innovation, this thesis will focus on the total sum of value generated, regardless of the fact that it is inter-firm synergy or simultaneously unlocked intra-firm synergy. Although many typologies found in literature do not mention the distinction in inter- and intra-firm synergy, the division could have both scholarly and managerial implications. The discussion session will elaborate on this topic.

To answer the main research question, this thesis will consist of three parts: a literature review to derive theory-based principles, ten case-analyses to derive practice-based principles and finally a design case for applying the principles (i.e. Club van 30 B.V.).

Part 1: Literature review
The first part of the thesis (chapter 2) is a reflection of the current state of literature on open business model innovation and firm synergy. This part will answer two sub-questions, namely:

Sub-question 1: What is open business model innovation?

This question elaborates on the concept of open innovation, business model innovation and the creation of business model innovation. More specifically, open business models as described by Chesbrough (2007) will be elaborated upon, since firms have to open and combine their business models in order to create and capture value. Literature on business models and open business models complements rather than substitutes each other, since in order to understand how to capture synergy with open business model innovation, it is essential to understand how to capture value with ‘normal’ or ‘closed’ business models.

Sub-question 2: What does the concept of synergy in a business context entail?
This sub-question clarifies the concept and creation of firm synergy. Synergy, as well as value, is a rather abstract concept. Therefore, this part of the thesis will define synergy, develops a typology following from literature and describes how synergy can be achieved.

Part 2: Case-analyses
The second part of this thesis (chapter 4) will focus on ten case studies in order to answer sub-question 3 by deriving practice-based design principles:

Sub-question 3: What are the lessons learned from open business model initiatives in practice?

Part 3: Design case
Following from the answers on sub-questions 1 and 2, a conceptual framework is developed and theoretically grounded design principles will be formulated. Together with practically grounded design principles (the answer on sub-question 3), these principles will be used to design a solution (chapter 5) for a specific case on the issue of how to establish synergies via open business model innovation in a particular context, in this case in a sustainable business context.

In today's world, the concept of ‘value’ moves beyond firms’ traditional economical performance, towards the reconciliation of economic, social and environmental performance (Elkington, 1998). Nowadays, more and more firms proactively integrate environmental considerations in their business strategies (Sharma and Henriques, 2011). However, even firms that “have invested significant resources and efforts in the integration of sustainability issues into their business models find it increasingly difficult to manage the learning and change processes necessary to tackle the challenge” (Arevalo et al., 2011, p. 942). Open business model innovation could perhaps help overcome these challenges, since access to knowledge and resources of other parties could not only improve firms’ innovative performance (cf. Reed et al., 2012), but also the reconciliation of their economic, social and environmental performance (cf. Elkington, 1998).

Following from this, the design case can be introduced: Club van 30 B.V. (from hereon C30), a project bureau focusing on ‘hands-on’ sustainability in the business environment. Hands-on sustainability refers to involving active participation, or to ‘walk the green talk’. The opportunity C30’s founder and CEO Yoeri van Alten saw in these challenges that firms face, is to start a project bureau to develop sustainable solutions that can be implemented in firms’ business models. In doing so, C30 creates favourable business models and new opportunities for firms1. Since sustainability is a broad topic, knowledge is dispersed and no single organization has all necessary knowledge in-house. So, C30 closely collaborates with customers, suppliers, or other parties, while executing their projects. During this close collaboration, it appears to the project management team that some of the projects’ outcomes may have the potential to create more value for both firms than anticipated when both firms join their strengths for future activities. Matching C30’s capabilities to those of its customers could create and capture more value than the individual firms could have achieved alone, for example via combined business creation. Although perhaps not intentionally, sometimes C30 and its customers are at the beginning of an open innovation practice. However, this process

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1 See http://www.clubvan30.nl/over-ons/
being relatively new to C30, the firm has yet to figure out how to create and capture value through these open innovation practices. So, to speak with the words of Osterwalder and Pigneur (2010), C30 is interested to know how exploiting an open business model can result in the creation and appropriation of synergy.

The design case readily fits the topic of this thesis, since C30 wants to know how to achieve synergies via open innovation. Additionally, the context of the case study (creating value through implementing sustainability in business models) is a problem at hand for many firms and a relevant topic in today’s changing world (see for example Hubbard, 2009). Therefore, the choice for the design case and the accompanying answer to sub-question 4 are relevant for applying design knowledge in practice, simultaneously contributing to both the answer to the research question and to solving the issues C30 has, concerning open business model innovation.

**Sub-question 4: How can open business model innovation help C30 in creating and appropriating synergy?**

The remainder of the thesis is structured as follows. Chapter 2 elaborates on the concepts of open innovation, business model innovation and synergy. These concepts are combined into a conceptual framework and theory-based principles will be derived. Next, the methodology is provided, followed by the analysis of ten case studies to derive practice-based principles. The design for C30 based on the principles is given in chapter 5. The thesis ends with a discussion of the results and directions for future research.

**1.2 Contribution**

This thesis has multiple purposes. Theoretically, it aims at closing the currently existing gap between desired synergy outcomes and how to realize them. More specifically, it aims at contributing to the perspective of change in organization theory by describing how organizational change in today’s dynamic markets can result in value creation and capturing for firms. This thesis aims at extending the literature on how firms can create and capture value through realizing synergistic opportunities by opening up their boundaries to third parties. Realizing synergies from an open business model perspective adds the aspect of synergy achievement to business model literature and open innovation literature. Many scholars in the field of economics and management paid much attention to the topic of synergy, but a well-defined theory of synergy and inter-firm networks has yet to emerge (Wei, 2010). This thesis is a contribution to fill this gap. Furthermore, although scholars increasingly mention sustainability as a potential source of economic benefits (Gottfried, 2003), integrating sustainability in open business models in order to create a surplus in value for two firms has not been focused on yet. Especially nowadays, when more and more managers accept corporate sustainability as a precondition for doing business (Dyllick and Hockerts, 2002), open business model innovation applied to the design case of this thesis could contribute to a better understanding of the reconciliation of economic, social and environmental performance. Practically, this thesis also contributes to managerial practice, since the design for synergy creation via open business models might provide managers with insights in opportunities for value creation and guidelines for capturing this value, especially in the context of sustainable business initiatives.
2. Synergy in open business models: literature review

“Synergies are outcomes where the whole exceeds the sum of the individual parts: they are the “raison d’être of organizations” (Passfield, 2002, p.156).

This chapter describes the current state of literature concerning open innovation, business model innovation and synergy creation. This literature will be analysed and combined in order to find an answer on sub-questions 1 & 2.

2.1 Open innovation

As said, starting point for the idea of openness is that a single firm cannot innovate in isolation. This starting point emphasizes the permeability of firms’ boundaries, since ideas, resources and individuals flow in and out an organization (Dahlander and Gann, 2010). The following parts will discuss the concept of openness, open innovation and whether or not firms should have permeable boundaries (i.e. what could be the (dis)advantages for firms when applying open innovation to their business models).

2.1.1 Conceptualization

One of the most commonly used definitions of open innovation is the one by Chesbrough (2003), who first coined the term open innovation (Dahlander and Gann, 2010). Chesbrough (2003, p. XXIV) defines open innovation as “a paradigm that assumes that a firm can and should use external ideas as well as internal ideas, and internal and external paths to the market, as firms look to advance their technology”. He continues, “the business model [of a firm] utilizes both external and internal ideas to create value, while defining internal mechanisms to claim some portion of that value”. In order to utilize both external and internal ideas, firms have to be ‘open’; they must engage in various forms of relationships with external actors. To do so, firms need competencies in areas related to their partners’ in order to co-develop ideas that originate from external resources (Brusoni, Prencipe and Pavitt, 2001). Internal capabilities and external relations are therefore complements rather than substitutes (Dahlander and Gann, 2010).

Since open innovation is a relatively new and rich concept researchers use many different definitions, which hinders theory development (Huizingh, 2011). In fact, even Chesbrough refined his definition together with his colleagues Vanhaverbeke and West (2006, p.1) and stated that: “open innovation is the use of purposive inflows and outflows of knowledge to accelerate internal innovation, and to expand the markets for external use of innovation, respectively”. This definition has become well cited, because of the distinction in two processes it contains. The first process, the use of purposive inflows of knowledge to accelerate internal innovation, is called inbound open innovation. The second part, using purposive outflows of knowledge to expand the markets for external use of innovation, is called outbound open innovation (Huizingh, 2011).

2.1.2 Inbound versus outbound innovation

Inbound open innovation consists of opening up and establishing relationships with external organizations in order to access their technical and scientific competences for improving the firm’s innovative performance. It is “the practice of leveraging the discoveries of others” (Chiaroni, Chiesa and Frattini, 2011, p. 35). Lichtentaler (2011) puts it slightly different by stating that inbound open innovation involves opening up the innovation process to knowledge exploration from outside the organization to inside the
organization, whereas external knowledge exploration refers to the acquisition of knowledge from external resources. Contrary, outbound open innovation is an inside-out process and involves opening up the innovation process to knowledge exploitation (Lichtenthaler, 2011). So, external knowledge exploitation refers to commercialization of technological knowledge. Chiaroni, Chiesa and Frattini (2011, p. 35) see this as inside out open innovation, and refer to it as “rather than relying entirely on internal paths to market, companies can look for external organizations with business models that are better suited to commercialize a given technology”. So, open innovation is establishing relationships with external parties with the objective to commercially exploit innovative opportunities (Chiaroni, Chiesa and Frattini, 2011).

In addition to the distinction between inbound and outbound open innovation, Dahlander and Gann (2010) add a monetary aspect; open innovation can be pecuniary or non-pecuniary. This results in two types of inbound and two types of outbound open innovation. Table 1 shows the results of these different forms of openness:

<table>
<thead>
<tr>
<th>Inbound innovation</th>
<th>Outbound innovation</th>
</tr>
</thead>
<tbody>
<tr>
<td>Pecuniary</td>
<td>Acquiring</td>
</tr>
<tr>
<td></td>
<td>Selling</td>
</tr>
<tr>
<td>Non-pecuniary</td>
<td>Sourcing</td>
</tr>
<tr>
<td></td>
<td>Revealing</td>
</tr>
</tbody>
</table>

The reason for this extra division is the fact that the advantages and disadvantages of pecuniary and non-pecuniary innovation are different. Therefore, the advantages and disadvantages of the different forms of openness as proposed by Dahlander and Gann (2010) will be discussed next.

2.1.3 Advantages and disadvantages

In their review, Dahlander and Gann (2010) have noticed that the current state of literature has been imbalanced in its strong focus on the benefits of open innovation. To create a more balanced overview of open innovation, this thesis will discuss both the advantages (+), as well as the disadvantages (-) that accompany opening up a firm's borders, starting with Dahlander and Gann’s (2010) four types of openness as provided in table 1, followed by a review of other literature on open innovation.

**Revealing**

(+): The main advantage of revealing is what Allen (1983) calls collective invention. The idea is that patents no longer protect new ideas, so competing firms can use each other’s information. This way, the possibility arises to build upon each other’s work, hereby stimulating incremental innovation. So, firms have the possibility to selectively reveal (part of) their technologies, in order to elicit collaboration.

(-): The downside of revealing is, obviously, the difficulty in capturing value, rather than creating it. Competitors can be, or become, better positioned with complementary assets and/or facilities to make use of the technology. Therefore, firms should carefully select which information to make publicly available and which information is used for ‘closed’ innovation (Dahlander and Gann, 2010).

**Selling**

(+): By commercializing inventions, via selling or licensing-out, firms can more fully leverage their investments in R&D. Chesbrough and Rosenbloom (2002) refer to this as a benefit when spillovers resulting from R&D funding are commercialized by new business models.
(-) The problem with selling or licensing however, is the fact that a firm must reveal some of the information in an attempt to license or sell the innovation to a potential customer. Of course, it is possible that the customer is opportunistic and steals the innovation without paying for it. This makes inventors reluctant to reveal their innovations. Another disadvantage is that there are significant transactions costs involved in transferring innovations between organizations. It is hard for a company to decide whether or not these costs are acceptable, since anticipating the potential value of an innovation is troublesome (Chesbrough and Rosenbloom, 2002).

Sourcing

(+) Firms that manage to create synergy between their own processes and externally available ideas may create and capture value from the ideas of outsiders via sourcing, since resources become available and paths to the market shorter. This can be realized by taking an active part in the external environment (Dahlander and Gann, 2010).

(-) However, the danger with sourcing is the concept of ‘over-searching’; some firms spend too much time looking for external sources of innovation. As a result, the innovative performance of these firm decreases. Although there may be an initial effect of openness, firms that over-search can come to rely too heavily on external sources of innovation, thereby decreasing innovative performance (Dahlander and Gann, 2010).

Acquiring

(+) The advantages of acquiring are frequently described in literature and include the following: the technological know-how that is missing in a firm can be acquired, R&D costs can be decreased and innovations can be brought to the market faster.

(-) Less frequently mentioned, however, are the downsides of acquiring. When acquiring knowledge or ideas, within the firm expertise is required to search and evaluate these external ideas (Dahlander and Gann, 2010). Even after evaluation and acquisition, it is important to know how to facilitate the integration of the ideas into the firm’s own business model (cf. Chesbrough, 2007, who stated that managing a new business model alongside an existing one can be troublesome).

Other literature reviews

Whereas Dahlander and Gann (2010) speak of advantages and disadvantages, Huizingh (2011) refers to the trade off of these as the effectiveness of open innovation. The most important reasons for open innovation he mentions are lower innovation costs, shorter time to market and increased sales. This may lead to a chain of open innovation effects and strategic benefits, e.g. getting access to new markets and enhancing a firm’s technological position (Nagaoka and Kwon, 2006). In line with this view, Vanhaverbeke, Van der Vrande and Chesbrough (2008) distinguish four types of benefits, which will be discussed next:

1) Benefits from early involvement – Open innovation increases a firm’s ability to sense developments in a wide range of externally developed inventions, for example by participating in venture capital funds. This way, firms get more information and learn about projects with uncertain payoffs. The main advantage is that firms learn early on about new projects, when investments are still small. So, the company can scan a broad range of interesting ideas, possibly resulting in more diversified opportunities.

2) Delayed financial commitment – Whereas in closed innovations firms have to start an innovation and pull it through the innovation funnel (Tidd et al., 2005; Reitzig, 2011), open innovation offers more flexibility about when to start the internal portion of
the innovation process. Delaying internal innovation activity allows a firm to consider a broader portfolio of entry options, resulting in differentiated innovation strategies.

3) The early exit – Open innovation is characterized by the possibility that firms can always license or sell innovations that are not promising enough or do not fit their business model. This way, initiatives can be pursued through multiple firms with multiple forms of investment, rather than one firm’s own capital solely. So, a smaller amount of capital could still result in the desired innovation exploration.

4) The delayed exit – Contrary to the early exit, there is also the possibility of the delayed exit: when corporate ventures are created outside the firm, the firm can monitor the development while delaying the exit decision. While the venture grows, the firm can decide whether to spin in the venture or sell the innovation to external capital providers: the firm “benefits from other people’s money” (Vanhaverbeke, Van der Vrande and Chesbrough, 2008, p.254).

2.1.4 Conclusion
Most literature reviews on open innovation agree on the main benefits: shorter time to market, increase in sales and lower costs. The differences lie in the different points of view taken by the authors. Although not mentioned specifically, in the article by Vanhaverbeke, Van der Vrande and Chesbrough (2008) one can see the analogy to the innovation funnel in closed innovation (see e.g. Tidd et al., 2005). Therefore, all benefits mentioned involve the aspect of time: the benefits arise either from time delays or from early involvement, resulting in shorter time to market and lower costs. Dahlander and Gann (2010), on their turn, present a more detailed overview of the advantages, but eventually agree that the captured value lies within the three most frequently mentioned benefits of open innovation: shorter time to market, increase in sales and lower costs. Considering the disadvantages of open innovation, Dahlander and Gann (2010) are among the few who describe these, because they have noticed an imbalanced view towards the benefits of open innovation. The disadvantages they mention are fear of competitors becoming better positioned, so firms are reluctant to reveal (part of) their information. Furthermore, transaction costs, required expertise and the possibility of ‘over-searching’ are mentioned as possible downsides of open innovation.

So, the preferred outcome of open innovation is more or less similar, however it depends on the authors’ perspectives and levels of detail to see via which pathways these benefits can be realized, hereby taking in mind that every pathway also has it downsides. Firms should not overestimate the potential benefits of open innovation, but should carefully consider whether or not the advantages outweigh the disadvantages: the process that Huizingh (2011) coined the effectiveness of open innovation. Table 2 summarizes the findings.

Table 2 - Advantages and disadvantages of open innovation

<table>
<thead>
<tr>
<th>Advantages</th>
<th>Disadvantages</th>
</tr>
</thead>
<tbody>
<tr>
<td>Shorter time to market</td>
<td>Fear of competitors becoming better positioned</td>
</tr>
<tr>
<td>Lower innovation costs</td>
<td>Firms are reluctant to reveal (part of) their information for selling purposes</td>
</tr>
<tr>
<td>Increased sales</td>
<td>Significant transaction costs</td>
</tr>
<tr>
<td></td>
<td>Risk of over-searching</td>
</tr>
<tr>
<td></td>
<td>Expertise required for integration in the business model</td>
</tr>
</tbody>
</table>
2.2 Business model innovation

Before diving into the concept of business model innovation, a thorough understanding of the business model concept is required. After all, before achieving innovation, often described as ‘disruptive’, ‘discontinuous’ or a ‘breakthrough’ (Christensen, 1997; Garcia and Calantone, 2002), the state of a firm’s current business model has to be grasped. However, as Zott, Amit and Massa (2010) point out in their work, this is easier said than done. Their review reveals that scholars disagree on a single definition of the concept and literature is developing largely in silos. Still, their paper is a recent, broad and multifaceted review of business model literature and will therefore be used as guiding paper in a search for the definition to be used in the remainder of this thesis.

2.2.1 The concept of business models

The business model concept has grown exponentially over the last twenty years (Ghaziani and Ventresca, 2005). These findings are consistent with the assumption of Zott, Amit and Massa (2010) that Internet is one of the factors driving the interest in the business model. Increased availability of electronic means of communication has created opportunities for organizations to change their business model, as their value offerings become available to customers as e-services (Andersson, Johanesson and Zdravkovic, 2009). This enables the implementation of new ways of doing business (Timmers, 1998) and new mechanisms for creating value (Amit and Zott, 2001).

The definition of a business model has been widely argued in literature. Amit and Zott (2010, p. 5) describe a business model very generally as “a system of activities that depicts the way a company ‘does business’ with its customers, partners and vendors”. Not only define many authors the broad and abstract term ‘does business’ differently, neither there is consensus on the definition of the ‘model’ itself. To illustrate the diversity of definitions, table 3 shows some of the findings by Zott, Amit and Massa (2010). Note that these findings are all definitions of the business model at a general level, so it does not provide any information about the purpose of the business model.

Table 3 - Definitions of business models at the general level (based on Zott, Amit and Massa, 2010)

<table>
<thead>
<tr>
<th>Business model referred to as a(n):</th>
<th>Sources</th>
</tr>
</thead>
<tbody>
<tr>
<td>1. Description</td>
<td>Applegate (2000)</td>
</tr>
<tr>
<td>5. Method</td>
<td>Afuah and Tucci (2001)</td>
</tr>
</tbody>
</table>

Concerning the business model purpose, Calvacante et al. (2011) posit that a firm’s business model serves two interlinked purposes: the first is to provide some stability for the development of a firm’s activities. The second purpose is, at the same time, to be flexible enough to allow for change. In doing so, “the business model should recognize, explore, seize and exploit valuable new technology and/or market opportunities in time” (Calvacante et al., 2011, p. 1328). A similar definition is that of Osterwalder and Pigneur (2010, p.4): “a business model describes the rationale of how an organization creates, delivers and captures value”. Although there is no consensus on the definition of business models, there seems to be some agreement on the purpose of business models, namely the aspect of value creation and capture as can be seen in the article by Zott, Amit and Massa (2010). In this article, the authors select many definitions of business models.
Most of these definitions contain the concept of ‘value’, or some synonym (see for example Chesbrough and Rosenbloom (2002), Johnsen, Christensen and Kagermann (2008) and Teece (2007)). For the sake of consistency, this literature review will follow the mentioned definition by Osterwalder and Pigneur (2010), since value creating and capturing turns out to be essential for a business model and closely fits the concept of synergy creation. Furthermore, this definition is widely accepted and used in literature. To conclude this section, a firm’s business model is a broad concept that is flexible and can change over time to create fit with the changing environment. The ability to change is part of the business model innovation concept, which will be discussed next.

2.2.2 The concept of business model innovation
Calvaccine et al. (2011) describe four different types of business model change. The first type is business model creation, i.e. getting a new business model ‘up and running’. It is the transition from idea to venture. The second change is extension, which is adding activities and/or expanding existing core processes. The next type of change is revision, which entails removing something that modifies an existing business model and replacing it with a new process. So, the existing working processes are subject to change. Finally, the last type of change is termination, i.e. abandoning or removing processes. Termination can refer to closing down a business unit or even entire company. Amit and Zott (2010, p. 5) refer to these processes as designing a new (i.e. creation), or modifying the firm’s extant activity system (i.e. extension, revision or termination), also called “business model innovation”. Business model innovation may complement innovations in products and services, methods of production, distribution or marketing, and markets (Amit and Zott, 2010). An innovative business model can either create a new market or allow the firm to create and exploit new opportunities in existing markets. Mitchell and Coles (2003) put it differently by proposing that business model innovations involve modifications in the ‘who’, ‘what’, ‘when’, ‘why’, ‘where’, ‘how’, or ‘how much’ involved in providing products and services to customers. Similarly, Johnsen, Christensen and Kagermann (2008) state that business model innovations involve changes in firms’ value proposition, customers, resources, revenue model, cost structure, rules and norms.

The interest in business model innovation from scholars, managers and entrepreneurs has several reasons (Amit and Zott, 2010). First, business model innovation represents an often-overlooked source of future value for the business. Second, competitors find it difficult to imitate and/or replicate a business model; it is easier to copy a product or process. The third and final reason is based on the previous two; since business model innovation can be a powerful competitive tool, firms must be aware of competitors’ effort in this area. Osterwalder and Pigneur (2010) focus on markets rather than on competitors to show the reasons for business model innovation: they mention satisfying market needs, bringing a new product or service to the market, improving or disrupting an existing market and finally, creating an entirely new market as main drivers.

2.2.3 Business model frameworks
Having discussed the importance of business model innovation and the fact that it builds on firms’ value proposition, customers, products, etc. (Johnsen, Christensen and Kagermann, 2008), it is time to see how these terms are connected to the business model as a whole. To do so, the business model framework is introduced. Since the definition of the business model is adopted from Osterwalder and Pigneur (2010), so will the business model framework. This framework consists of nine building blocks that follow the logic of how a company intends to make money. These building blocks are
customer segments, value proposition, channels, customer relationships, revenue streams, key resources, key activities, key partnership and cost structure and together complete the business model canvas. Most of the building blocks speak for themselves, for completeness of this thesis, the definition of each building block can be found in appendix I. Figure 3 is a graphical representation of the business model canvas.

![Figure 3 - Business model canvas (Osterwalder and Pigneur, 2010)](image)

2.2.4 The process of business model innovation

Business model innovation represents an often-overlooked source of future value for the business (Amit and Zott, 2010). While companies may have investments and processes for exploring new ideas and technologies, by itself these have no single objective value. The economic value remains latent until it is commercialized in some way via a business model (Chesbrough, 2010). Every firm acknowledges the importance of value capturing, by exploiting their current business models in order to survive. However, the search for potential new business models before the time comes when external innovation renders their traditional ones redundant has only been recognized by a minority of firms (Chesbrough, 2010). This seems paradoxical; on one hand firms strive for innovations and exploit their current business models to capture value from these innovations, while on the other hand they are susceptible to innovate the way of capturing this value. Apparently, there are some obstacles to business model innovation.

Amit and Zott (2001) recognize this by arguing for the existence of significant barriers to business model innovation. They state that novelty, lock-in, complementarity and efficiency are key aspects of successful business model innovation. However, these aspects may conflict with the more traditional configuration of firm assets and might threaten the on-going value of the company (Chesbrough, 2010). This is the process that Christensen (1997) calls disruptive innovation; the new business model will disrupt the current business model and thereby the source of value to the firm. So, although managers might recognize a promising business model timely, its development is resisted due to its conflict with the prevailing business model (Amit and Zott, 2010).

Although the explanation of disruptive innovation seems plausible as a barrier to business model innovation, it is based on the assumption that managers recognize promising business models, even in dynamic environments with ever-changing conditions. Chesbrough (2010) rejects this assumption and argues that it is far from clear to managers what the ‘right’ business model ought to be. As a result, not only obstruction from managers who are afraid of disrupting their current business model hinders business model innovation, but also the concept of confusion. That is, managers
do not know beforehand which business model is the ‘right’ business model in creating and capturing value.

By having established these barriers, the question no longer remains why many firms are hesitant to innovate their business models, but rather becomes how they can overcome the barriers they face. According to Chesbrough (2010, p.359) the answer to this question lies within commitment to experimentation, i.e. “undertaking active tests to probe nascent markets with new potential configurations of the elements of a business model can allow a firm to learn ahead of the rest of the market, and to begin to generate the new data that can power its change process”. One promising approach to experimentation is constructing business models maps, e.g. the framework of Osterwalder and Pigneur (2010). This modelling approach provides a pro-active way to experiment with alternative business models, since it enables firms to simulate various possibilities before actually committing to specific investments (Chesbrough, 2010).

The construction of business model maps itself cannot promote business model innovation. For the actual transition from maps to alternative business models, managers need to adapt organizational processes. Besides experimentation, Chesbrough (2010) mentions two other sets of processes to do so: effectuation and organizational leadership. These three processes will be discussed in more detail in appendix II.

In conclusion, there are some powerful barriers to business model innovation, but the way forward is to adopt an experimental stance towards it. The information gathered should be reflected in discovery driven models and leaders must be empowered to take action based on these findings. In spite of this experimental stance, companies still find it increasingly difficult to justify (business model) innovations due to rising development costs and shorter product life cycles. One way to overcome this difficulty is what Chesbrough (2007) calls the use of open business models, i.e. companies should develop the ability to experiment with their business models to partake more fully in the benefits of open innovation. The role of the business model in open innovation is discussed next.

2.2.5 Role of the business model in open innovation

Previously, companies defined their business model on value creation through the use of internal resources of a company. Over time however, firms initiated the process of opening up the boundaries of their business model, as they began to analyse the contribution of suppliers, customers and other stakeholders in the firm’s environment. In doing so, companies could include external resources as key components in the business model (Sandulli and Chesbrough, 2009). Firms start to share internal resources with a third party to create value, or vice versa, firms are beginning to incorporate external resources in their own business model. These new business models have been defined by Chesbrough (2007) as open business models. So, analogous to the concept of open innovation, open business models specifically focus on business model innovation by using the firm’s environment as key component in the business model.

Open business models enable an organization to be more effective in creating as well as capturing value. Value creation is established by leveraging more ideas because of their inclusion of a variety of external concept. Value capturing is enhanced by utilizing a firm's key assets, resource or position not only in the firm’s own operations but also in other firms' businesses (Chesbrough, 2007; Lichtentaler, 2011). Figure 4, adopted from
Chesbrough (2007), visualizes the process of open business models regarding to value creation and capturing. As can be seen, the costs- and time savings create value to the firm by leveraging external development. The licensing, spinoffs and sales capture the newly created revenues, a surplus compared to the market revenues from exploiting the closed business model.

Figure 4 - Added value of open business models (Chesbrough, 2007)

Creating and capturing this surplus in value requires effective and efficient sharing of resources. Sandulli and Chesbrough (2009) describe factors that support resources sharing between two or more parties, both from the standpoint of the firm that decides to share its resources with others (the seller), and from the point of the firm that decides to use third-party resources in its business model (the buyer). From a buyer’s perspective, one of the most important factors is absorptive capacity. According to Sandulli and Chesbrough (2009) the success of a company that decides to use third-party resources depends on its ability to identify resources that create value, integrate them with internal resources and exploit them. Companies will be more likely to integrate external resources coming from trustful and committed partners, who complement internal resources and fit the firm’s strategy. Furthermore, the value contribution should not be uncertain and it should be possible to measure it. Another important factor to overcome from a buyer’s perspective is organizational inertia. This factor is also known as the ‘not-invented-here’ or NIH syndrome, resulting in rejection of external resources or knowledge by a firm, simply because it is not invented internally. To overcome the NIH-syndrome, firms should be ambidextrous; simultaneously embracing multiple contradictory elements, i.e. manage the challenge of implementing a new business model next to the existing one (Tripsas and Gavetti, 2000). From a seller’s perspective, a firm is willing to share a resource with a third party when exploiting a resource in third party business models generates more value than constraining the resource to the firm’s own business model (Sandulli and Chesbrough, 2009). However, firms must decide the degree to which they are willing to share their resources. The level of partner trust and legal protection are factors that can help a firm in determining the degree of information sharing.

2.2.6 Conclusion
This part of the thesis has systematically approached the concept of open business model innovation, starting with finding consensus in the definition of a business model. As turned out, one of the most widely used definitions is the one of Osterwalder and
Pigneur (2010, p. 4), which is also adopted in this thesis: “a business model describes the rationale of how an organization creates, delivers and captures value”. Concerning business model innovation, Calvacante et al. (2011) describe four processes: creation, extension, revision and termination. Implementation of business model innovation can be achieved via experimentation, effectuation or organizational leadership (Chesbrough, 2010). Finally, to answer the first sub-question “What is open business model innovation?” these findings are combined and complemented by the work of Chesbrough (2007). Open business model innovation refers to the use of external resources as key components in the business model (Sandulli and Chesbrough, 2009). Firms start to share internal resources with a third party to create value, or vice versa, firms are beginning to incorporate external resources in their own business model (Chesbrough, 2007).

Taking into account the factors that support sharing resources, open business models can even lead to cooperation with competitors (Sandulli and Chesbrough, 2009). This cooperation can be justified by the need to obtain synergies between resources (Das and Teng, 2000). So, open innovation, and open business models more specifically, has the potential to contribute to synergy creation between two collaborating firms. The next part of this thesis will elaborate on the concept of synergy.

2.3 Synergy
This part of the thesis describes the concept of synergy in detail and aims at finding consensus between the many typologies present in literature. It starts with providing an overview of synergy typologies discussed by researchers over the years. Next, these typologies are analysed to see if consensus between them based on their definitions can be found, in order to formulate a comprehensive typology grounded in literature that will be used in the remainder of this thesis. Hereafter, the creation of synergy is discussed, followed by an analysis of the possible disadvantages firms might encounter while chasing synergy.

2.3.1 The concept of synergy
The root of the word synergy is derived from the Greek word ‘synergia’, meaning joint working, working together, collaboration or cooperation (Goold and Campbell, 1998). King et al. (2004, p.188) describe synergy as “the concept that the sum of merging two firms is greater than the sum of their individual parts (i.e. 2+2=5)”. Although this definition if viewed in the light of merging two firms, the definition, and especially the colourful way of saying (i.e. 2+2=5), speaks to the imagination. Brunori and Rossi (2000, p. 409) define synergies “as linkages between two or more entities, whose joint effort produces quantitatively and qualitatively higher effects than those produced by the efforts of the same entities alone”. In line with these definitions, Seth (1990) and St John and Harrison (1999) also describe that synergy exists when the value of the combined entity exceeds the sum of values of the two firms in isolation. Finally, Goold and Campbell (1998) look at the concept of synergy as the ability of two or more units or firms to generate greater value working together than the sum of their values could be when working apart.

For practical or managerial purposes however, these definitions remain rather abstract. Furthermore, theoretically grounded typologies of business synergies are largely absent in literature. This is also acknowledged by Knoll (2008), who considers most typologies arbitrary and lacking any form of classification criteria or theoretical grounding. In order to contribute to closing this gap, this part of the thesis will start with a
comprehensive list of synergy typologies discussed by several scholars arranged per year (table 4). As can be seen, the various synergy forms are scattered throughout many typologies, which illustrates the lack of consensus between scholars. These typologies will be described in detail in an attempt to find consensus between them and provide a typology grounded in literature that covers the many types of synergy in table 4.

Table 4 - Synergy typologies arranged per year

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Starting with the seminal work of Ansoff (1965), who differentiates between sales synergy, operating synergy, investment synergy and managerial synergy, Knoll (2008, p. 24) states that even he does not provide “proper definitions, classification criteria or theoretical grounding”. Although Ansoff’s (1965) classification lacks theoretical grounding, it does serve as the basis for many of the typologies developed over the years, as will come forward in this thesis. The sales synergy Ansoff (1965) describes, occurs when different products use common distribution channels, common sales administration, or common warehousing. Operational synergy includes higher utilization of facilities and personnel, spreading of overhead, advantages of common learning curves and shared purchasing. Investment synergy is the result of joint use of plant, common raw materials inventories, transfer of R&D, and common use of machinery. Finally, managerial synergy is achieved when firms face strategic, organizational or operating problems, which are similar to problems that other firms’ management has dealt with in the past.

Two decades later, Chatterjee (1986) developed a typology, in which he argues for the existence of three categories of synergy, based on firms’ resources. These categories are collusive, operational and financial synergies. Collusive synergies are price related
synergies involving the class of resources leading to market power, similar to the sales synergy of Ansoff (1965) Operational synergies represent the class of resources that lead to production/administrative efficiencies, whereas financial synergies represent the class of resources that leads to reduction in costs of capital. The operational and financial synergies described by Chatterjee (1986) are similar to Ansoff’s (1965) operating and investment synergies, respectively.

Wind and Mahajan (1988) developed a similar typology almost simultaneously with Chatterjee (1986). The third typology of this thesis differentiates between four types of synergy consisting of several components, heavily corresponding to Ansoff’s typology:

Sales synergy, consisting of common distribution channels, common sales administration, common sales force and promotion, common market segments, etc.

Operating Synergy: consisting of shared facilities and personnel, shared overhead, shared purchasing, etc.

Investment synergy: consisting of joint use of plant and equipment, common raw material inventories, shared R&D and engineering, etc.

Management Synergy: consisting of risk reduction, the ability to generate better strategies, shared resources, etc.

A notable exception on the comment of Knoll (2008), although not mentioned in his study, is the typology of Kaplan and Norton (2006), who describe synergy in terms of business unit synergy, rather than business model synergy. However, like the intention of a business model, they mention that the intention of the business unit is to create products and/or services that offer a unique differentiated mix of benefits, called the “customer value proposition” (ibid, p.4). Their typology is based on a set of cross-business objectives intended to create value, the enterprise value proposition. They describe four types of value propositions around which business units compete:

Best total costs – business units offer products and services that are consistent, timely and have low costs.

Product leader – business units offer products and services that expand existing performance boundaries.

Customer solutions – business units provide a customized mix of products and services, combined with know-how, to solve customers’ problems.

System platform – business units provide a platform that becomes the industry standard for offering products and service.

Obviously, there are major similarities with the business model classification of Treacy and Wiersema (1993). The three types of value proposition (best total costs, product leader and customer solution) of Kaplan and Norton (2006) can easily be replaced by Treacy and Wiersema’s (1993) operational excellence, product leadership and customer intimacy, respectively. Only the last value proposition, the system platform, has not been described by Treacy and Wiersema (1993). However, one could argue that to become the new industry standard, firms should deliver value in one of the three other value propositions. Gawer and Gubrium (2002, p.16) describe this as the fact that “platform leadership and complementary innovation are not things that happen spontaneously in an industry”. Rather, firms need to create and capture value by making it difficult for others to imitate their products. So, since business units have similar purposes and value propositions as firms’ business models, the corporate synergies between business units
described by Kaplan and Norton (2006) can be seen as congruent to synergies arising from business model alignment. The four forms of corporate synergy Kaplan and Norton (2006) describe are:

**Financial Synergy** – involves issues as where to invest, where to harvest and how to create an investor brand. It creates value by its ability to allocate capital among its operating units. The value comes from operating an internal capital market that is “more effective and efficient than if each autonomous company were an independent and public owned company” (ibid, p.7).

**Customer Synergy** – by expanding the market message, corporations can bring multiple products of several business units to the customer, thereby increasing revenue per customer by cross-selling. Furthermore, possible standardization contributes to a consistent customer experience, which reinforces and enhances the corporate brand.

**Internal Synergy** – large firms have the opportunity to create economies of scale, which enhances competitive advantage and shareholder value. Firms can create scale economies by examining common processes required by multiple business units.

**Learning and Growth Synergy** – the development and sharing of intangible assets: people, technology, culture and leadership. These assets present an opportunity to be managed in such a way that they create synergy and sustained competitive advantage.

In addition, Persaud’s (2005) findings from rigorous statistical analyses on synergy creation between R&D departments in firms show the following synergies:

**Strategic R&D synergy;** the extent to which collaborations among R&D units result in an increase in their participation in a larger number of complex R&D projects

**Managerial and Operational synergy:** the extent to which the efficiency of the R&D unit’s managerial and operational resources are enhanced as a consequence of working collaboratively with other units.

**Knowledge management synergy** is the ability of R&D units to harness and leverage knowledge, ideas, people, technology, and organizational competencies and systems for the creation of new, more successful innovations

**Innovative proficiency** is the ability to develop and exploit new and successful innovations quickly and cost-effectively.

The typology Knoll (2008) suggests to address the shortcoming of classification criteria is grounded in a resources-based perspective of a firm. Resources are defined as “all assets, capabilities, organizational processes, firm attributes, information, knowledge etc., controlled by a firm that enable the firm to conceive of and implement strategies that improve its efficiency and effectiveness” (Barney, 1991, p. 101). Knoll (2008) states that leveraging resources across business creates cross-business synergy and delineates different types of cross-business synergies based on the four classes of resources: *operative resources* (the tangible and intangible business-level resources necessary for on-going operations), *market power resources* (all resources of the firm to reduce competition and increase prices), *financial resources* (firms’ risk capacity and all means of financing) and *corporate management resources* (the managerial capabilities at the corporate level). Figure 5 (adopted from Knoll, 2008) displays the accompanying synergies.
The market power synergies and financial synergies of Knoll (2008) are quite similar to the customer and financial synergies previously mentioned and will therefore not be discussed in detail. The operactive and corporate management synergies on the other hand, are distinctive and will therefore be elaborated upon.

Operative synergies are derived from operative resources and increase efficiency and profitable growth. The resources refer to product knowledge, product components, production plants, etc. Operative synergies are classified in (1) efficiency synergies and (2) growth synergies, which both will be discussed next.

(1) Efficiency synergies are efficiency advantages of firms from sharing operative resources in order to reduce costs (Knoll, 2008). These advantages, also called economies of scope, exist "when for all outputs the cost of joint production is less than the costs of producing each output separately" (Teece, 1980, p.224). Economies of scope generally arise from sharing or joint utilization of resources for production (Gimeno and Woo, 1999), since this leads to lower joint production costs by putting underutilized resources to productive use (Panzar and Willig, 1981). Besides the production process, scope economies may also occur in other value chain activities, such as R&D (Knoll, 2008) and may involve intangible resources such as reputation or best practices (Szulanski, 1993). Firms can transfer many kinds of resources to achieve efficiency synergies, so it is virtually impossible to provide an exhaustive list (Knoll, 2008).

(2) Growth synergies are profitable growth advantages from (re)combining and transferring complementary resources across business (Knoll, 2008). Whereas efficiency synergies are reflected as cost reductions, growth synergies are expressed by revenue enhancements or "valuable revenue super-additivities" (Knoll, 2008, p.29). They exist if the total revenue from utilizing the resources of two firms together within one firm exceeds the combined revenue from utilizing the individual resources in different firms (Knoll, 2008). Contrary to efficiency synergies resulting from static resource sharing, growth synergies are based on dynamic (re)combinations of complementary resources across firms to capture market opportunities (Tannirverdi and Venkatraman, 2005; Eisenhardt and Martin, 2000). So, growth synergies are achieved through combining resources (e.g. product knowledge or customer knowledge) across firms into solutions to provide unique customer value (Knoll, 2008).
To clarify the concept of operational synergies, table 5 provides a comparison of the differences between efficiency and growth synergies. Although different, these synergies are not mutually exclusive and often occur together (Knoll, 2008).

Table 5 - Differences between efficiency- and growth synergies (based on Knoll, 2008)

<table>
<thead>
<tr>
<th>Primary Effect</th>
<th>Efficiency Synergies</th>
<th>Growth Synergies</th>
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<tbody>
<tr>
<td>Conceptualization</td>
<td>Cost sub-additivities</td>
<td>Revenue super-additivities</td>
</tr>
<tr>
<td>Primary Value Driver</td>
<td>Operational efficiency</td>
<td>Customer utility, innovation</td>
</tr>
<tr>
<td>Realization Mechanism</td>
<td>Transfer of similar resources across businesses</td>
<td>Combination of complementary resources across businesses</td>
</tr>
<tr>
<td>Examples</td>
<td>Shared sales force, central production plant</td>
<td>Cross-business solutions, new products from combined resources</td>
</tr>
</tbody>
</table>

The corporate management synergies of Knoll (2008) are a type of synergies that stem from leveraging corporate management capabilities. These can be entrepreneurial capabilities, capabilities in organization design and superior strategic capabilities (Hill and Jones, 2007). Goold, Campbell and Alexander (1994, p.6) agree that corporate management resources are key to success: “It is the [corporate] parent that decides what new businesses to support, what acquisitions to make, and whether to form joint ventures and alliances. It is the parent that determines the structure of the corporation, defines the budgeting and capital expenditure processes, and sets the tone for corporate values and attitudes. [...] The parent is at the heart of corporate strategy decisions. Our approach to corporate strategy therefore places the role of the parent in center stage”. So, corporate managers should be able to gain an understanding of how each synergy initiative should be implemented and executed, thereby forming a type of synergy on its own.

Although Knoll (2008) argues to fill the gap in literature created by arbitrary definitions and classification criteria, for more than 40 years scholars generally have agreed upon the different types of synergy. However, there is another research stream that divides synergy in a different way, namely efficiencies and enhancements, to cover for both cost savings and value enhancing synergies (Zaheer et al., 2013). Furthermore, a combination between both research streams can be found, e.g. Austin and Leonard (2008) who define synergies as cost-based synergies, revenue-based synergies and organizational learning. Schweiger and Very (2003) add market power synergies and intangibles (for instance knowledge sharing) to the already mentioned cost- and revenue-based synergies. However, Knoll’s (2008) division of operative synergies in growth and efficiency synergies also covers these cost- and revenue-based synergies.

So, it shows that over four decades of research resulted in several changes in Ansoff’s (1965) definitions. The most important change is the addition of one type of synergy; emerging from the year 2000 knowledge management synergy has made its entrance in several typologies (in the work of Kaplan & Norton, 2006; Persaud, 2005 and Austin & Leonard, 2008). For a complete overview of the different synergy types and their analysis, see appendix III. This appendix shows the synergy typologies arranged by author, followed by the definitions of each synergy type. The many typologies are compared to each other, to see if consensus between the scholarly works can be found. As a result, all synergies are reduced to one overarching typology consisting of five different synergy forms that together cover the definitions found in theory. This
typology can be found in table 6 and is primarily based on the seminal work of Ansoff (1965), completed by an analysis of 40 years of research carried out on the topic of synergy.

Table 6 - Synergy typology of this thesis

<table>
<thead>
<tr>
<th>Synergy Type</th>
<th>Description</th>
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<tbody>
<tr>
<td>1. Financial synergy:</td>
<td>Synergy that stems from operating a capital market that is more effective and efficient than if each company were an independent company (e.g. joint use of investments)</td>
</tr>
<tr>
<td>2. Management synergy:</td>
<td>Synergy that stems from leveraging entrepreneurial capabilities, capabilities in organization design and superior strategic leadership</td>
</tr>
<tr>
<td>3. Customer synergy:</td>
<td>Synergy created by expanding the market message and bringing multiple products to the customer, thereby increasing revenue per customer via cross-selling.</td>
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<tr>
<td>4. Operational synergies:</td>
<td></td>
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<tr>
<td>a) Growth synergy:</td>
<td>Synergy that stems from (re)combining and transferring complementary operative resources across businesses (revenue enhancements)</td>
</tr>
<tr>
<td>b) Efficiency synergy:</td>
<td>Synergy that stems from sharing operative resources in order to reduce costs (economies of scope)</td>
</tr>
<tr>
<td>5. Knowledge management synergy:</td>
<td>The ability of a firm to harness and leverage knowledge, ideas, people, technology and organizational competences and systems for the creation of new, more successful innovations.</td>
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2.3.2 Synergy creation

Having established the different types of synergy, the next logical step is to look at the creation of synergy. Several preconditions for the creation of synergy can be found in literature. This part of the thesis provides an overview of the findings. The preconditions mentioned represent factors that are frequently found in literature. Reoccurring themes in literature on synergy creation are organizational leadership and top management support, trust, clear communication and absorptive capacity for transferring resources (e.g. Sandulli and Chesbrough, 2009; Chesbrough, 2007; Daniel and Metcalf, 2001; Knoll, 2008).

The importance of leadership and top-management support has been described while focusing on business model innovation. As said, leaders are actively involved, and can ensure clear communication. In addition, leaders can be inspiring to employees, by guiding their attention and energy towards the right direction (Daniel and Metcalf, 2001). To finish the topic on leadership, leaders could involve the right people by building a strong and committed team around the synergy initiative (Aiken and Keller, 2007).

Communication is the next frequently described precondition in literature. Lewis et al. (2006) find that multiple communication channels make sure all selected stakeholders receive the information necessary for focusing their attention towards the right direction. In addition, building in feedback serves as an intervention to reduce uncertainty amongst staff which prevents declining productivity (Galpin and Herndon, 2007). Finally, Nguyen and Kleiner (2003) advise management to communicate a strong set of organization wide values and beliefs in order to enhance interrelationships between departments and the willingness to cooperate (thereby reducing the Not Invented Here syndrome and creating trust.).
Absorptive capacity has been defined as the ability to identify resources that create value, integrate them with internal resources and exploit them (Sandulli and Chesbrough, 2009). So, this value should be created by integrating external resources or knowledge, currently not present within the firm. In other words, firms should combine complementary resources for value creation. In alliance literature, the process of creating complementary balance or mutual benefits is often related to ‘strategic fit’ between firms. According to Douma et al. (2000), this ‘fit’ of strategy depends on several drivers. First, cooperation is only advisable when partners have a shared vision, which enables partners to solve issues effectively. So, in the case of open business model innovation, both partners should have the same objectives and should be committed to the initiative by for example making resources available. Another driver is the fact that a cooperation is important for both firms and that these firms are equally dependent on each other (Douma et al., 2000). So, the partners should be able to trust each other, since they depend upon each other for external knowledge currently not present within the firm. Next, the joint activities should have added value for both firms (i.e. synergy), in order to make the collaboration work (Douma et al., 2000). The combination of complementary resources or knowledge should for example result in leveraging internal resources or knowledge (intra-firm synergies) or combined value creation (inter-firm synergies). To complete this part, Tanriverdi and Venkatraman (2005) find that synergies can arise from the complementarity of product knowledge relatedness (or fit), customer knowledge relatedness and managerial relatedness. When all three sources are combined, the performance of the multi-business firm can be improved.

Knowing which preconditions should be met in order to achieve synergy, the definition of synergy creation can be better understood. Wu and Choi (2004, p. 326) state that synergy creation refers to “the fact that a firm is more competitive and efficient after the exchange and combination of all kinds of useful resources with its business partners” (emphasis added). In their research, Wu and Choi (2004) propose five hypotheses based on literature findings and tested in the Chinese business market. The hypotheses that are supported lead to the findings that ties with financial institutions (i.e. good relationships with government offices and financial institutions) and repeating business transactions (i.e. long-term on-going business interactions between two existing business partners) contribute towards firm synergy creation.

Synergy creation is associated with either strategic changes, or financial diversification (Seth, 1990). Strategic changes are changes in operating decisions. Underlying economic sources (e.g. market power or economies of scale) make synergy available, whereas the exploitation involves a change in operating decisions (e.g. production, marketing, R&D decisions). Financial diversification is associated with more stable cash flows, increased levels of leverage and more profitability (Amit and Livnat, 1988). The strategic changes as described by Seth (1990) are seen as a synergistic motive by Amit and Livnat (1988). They describe that synergy exists when individual units operate as a single organization. Economies of scale in manufacturing, marketing, R&D, etc. may be realized by consolidating individual units and thereby increasing synergy. Furthermore, synergy may be created if operations of individual units complement one another, resulting in benefits from offering consumers a complete line of products (Amit and Livnat, 1988). On the long run, profitability of a firm is closely associated with growth in productive opportunity, i.e. “the opportunity to use its tangible and intangible assets more efficiently” (Seth, Song and Pettit, 2002, p. 924). Furthermore, these authors state that value
creation is realized by asset sharing and financial diversification, which builds on the theory of Seth (1990).

Goold and Campbell (1998) recognize that the goals and creation of synergies often tend to be expressed in broad and vague terms, as for example ‘leveraging international products’ or ‘fit’. Clarifying the real objectives and benefits of a synergy initiative is “the first and most important discipline in making sound decisions on synergy” (Goold and Campbell, 1998, p.137). Therefore, policy makers should disaggregate the synergy program; systematically break the concept down into meaningful components that can be addressed individually.

The actual synergy achieved can take one of six forms according to Goold and Campbell (1998). Although they argue that these forms are a typology of synergy, they have focused on actions (verbs) rather than a type of value. By doing so, they are among the few scholars who actually provide guidelines for achieving synergy by disaggregating the synergy concept and providing accompanying actions to achieve it. The six business synergies Goold and Campbell (1998) distinguish are:

1. **Shared Know-How** – units often benefit from sharing knowledge or skills. Value can be created by exposing one set of people to another who have different ways of doing things. Many companies place emphasis on leveraging core competencies and sharing best practices, which shows the importance attributed to shared know-how.

2. **Coordinated Strategies** – Sometimes it works to a company’s advantages to align the strategies of its businesses with others (which is in line with the strategy alignment of Kaplan and Norton (2006) to create four different types of synergy). For example, coordinated response to shared competitors may be a powerful way to counter competitive threats. However, although coordinated strategies can in principle be a good source of synergy creation, they are tough to achieve, since striking the balance between corporate intervention and firm autonomy is not easy (Goold and Campbell, 1998).

3. **Shared tangible resources** – units or firms can sometimes save a lot of money by sharing assets and resources (e.g. via shared use of manufacturing facilities or R&D). This may gain economies of scale and avoid duplicated effort.

4. **Vertical integration** – reflects the coordination of flows of products or services from one unit to another and can reduce inventory costs and product development time. Furthermore, it can increase capacity utilization and improve market access.

5. **Pooled negotiation power** – by combining purchases, firms can gain greater leverage over suppliers, reducing costs or improving quality of the goods they buy.

6. **Combined business creation** – the creation of new business can be facilitated by combining know-how from different units or firms. Furthermore, this can be established by forming joint ventures or alliances.

### 2.3.3 The dark side of synergy

Logically, many firms and managers pursue the creation of synergy, since it promises increased value to the firm. However, it is conceivable that there is a reverse side of the medal. In their article ‘Desperately seeking synergy’ Goold and Campbell (1998, p. 131) address synergistic opportunities with “a healthy dose of scepticism [to] distinguish real opportunities from mirages”. They find that the pursuit of synergy often does not live up to management’s expectations. Besides frustration and embarrassment, after which the efforts tend to be called “learning experiences” (Goold and Campbell, 1998, p.132), the pursuit of synergy in vain has more drawbacks. First of all, it distracts managers’
attention from core tasks, and thereby excludes initiatives that might generate real benefits. Moreover, sometimes the synergy program backfires, with potential loss of brand value, customer relationships or employee morale (Goold and Campbell, 1998). So, while on one hand synergy has to potential to create value, it turns out that many synergy efforts end up destroying value, rather than creating it. Goold and Campell (1998) describe four biases that make synergy seem more attractive and easily achievable than it truly is. These biases are synergy bias, parenting bias, skills bias and the upside bias. Descriptions of these biases can be found in appendix IV.

2.3.4 Conclusion
This part of thesis attempted to systematically move from the business model canvas, via business model innovation towards synergy creation. According to Calvacante et al., (2001), business model innovation consists of creation, extension, revision and termination. Chesbrough (2010) mentions three processes for the implementation of these business model innovations, namely experimentation, effectuation and organizational learning. The next step, moving from business model innovation to synergy creation, has not been described in literature explicitly, although combining the preconditions of synergy with the actions as described by Goold and Cambell (1998) can be used for this purpose. This combination entails that firms need to comply with the preconditions, i.e. firms should have high absorptive capacity for efficient resource sharing, should communicate with all partners in order to enhance trust and should show organizational leadership. The actions Goold and Campbell (1998) mention that actually can achieve the desired synergies are sharing of know-how, coordinating strategies, sharing of tangible resources, vertical integration and pooling negotiation power. Following from the literature review, the different forms of synergy that can be achieved are financial synergy, management synergy, customer synergy, knowledge management synergy and operational synergy. Although tempting for managers to strive for synergy, Goold and Campbell (1998) describe four biases that should be taken into account whilst seeking for it. Meeting the preconditions and disaggregating the synergy program should prevent managers from desperately looking for synergy, thereby keeping in mind that this cannot be seen as a panacea.

2.4 Theoretical framework and theory-based principles
The findings of the literature review result in a theoretical framework of figure 6. The figure visualizes the conclusion of the literature review, starting from business model innovation, moving towards the synergy typology developed in this study.

Following from this framework and the literature review, 22 design principles are derived. Appendix III shows the construction of the principles (see also chapter 3, methodology). The outcomes of the principles are the different forms of synergy as used in this thesis (the typology of Van Ardenne, 2013 in appendix III). The intervention and mechanisms to achieve these outcomes are synthesized from the earlier scholarly work. For example, Ansoff’s (1965) ‘sales synergy’ corresponds to the definition of ‘customer synergy’ in this thesis. To achieve this type of synergy, the work of Ansoff (1965) suggest that firms should share their distribution, administration, and warehousing channels, since sharing can achieve a greater volume of activity for each product and could obtain economies of scale or economies of scope, thereby increasing revenue per customer (principle 1). For each of the synergy forms corresponding to ‘customer synergy’, the design principles are derived this way, resulting in the three principles provided in chapter 2.4.1. The same method has been followed for operational synergy, financial
synergy, management synergy and knowledge management synergy, resulting in 17 principles. The 5 remaining principles could not be linked to any of the synergy types of this thesis, since the scholars that mention these synergies discuss synergy as an umbrella concept and do not specifically link interventions to different types of synergy. Therefore, principles #18 to #22 have received the overarching sub-heading ‘Firm Synergies’ (chapter 2.4.6).

Figure 6 - Theoretical framework
2.4.1 Customer synergies

#1 – In order to create customer synergy, firms should share their distribution, administration and warehousing channels, since sharing can achieve a greater volume of activity for each product and could obtain economies of scale or economies of scope, thereby increasing revenue per customer (based on Ansoff, 1965).

#2 – In order to establish customer synergy, firms should share their distribution channels en market segments, since this could increase sales growth by lowering the costs of sales (based on Wind and Mahajan, 1988; Chatterjee, 1986; Kaplan and Norton, 2006; Knoll, 2008).

#3 – In order to establish customer synergies, firms should strive for standardization of processes and output since this contributes to a consistent customer experience, which reinforces and enhances the corporate brand (Kaplan and Norton, 2006).

2.4.2 Operational synergies

#4 – In order to create operational synergy, firms should share their facilities and personnel, since sharing can achieve steeper learning curves and obtain economies of scale by increasing profit from operations by lowering operating costs per firm (based on Ansoff, 1965; Wind and Mahajan, 1988; Chatterjee, 1986; Kaplan and Norton, 2006).

#5 – In order to establish operational synergies, managers should examine common processes for economies of scale, since this enhances competitive advantage and shareholder value (based on Kaplan and Norton, 2006).

#6 – In order to establish growth synergies, firms should combine complementary resources across firms, since this could provide unique customer value and capture market opportunities, thereby enhancing revenues (based on Knoll, 2008).

#7 – In order to establish efficiency synergies, firms should share resources in the production of multiple outputs across firms, since this leads to lower joint costs by putting underutilized resources to productive use (based on Knoll, 2008).

2.4.3 Financial synergies

#8 – In order to create financial synergy, firms should share their plant, raw material inventories and machinery, since sharing can achieve a greater volume of activity and could obtain economies of scale or economies of scope with lower investments (based on Ansoff, 1965).

#9 – In order to establish financial synergy, firms should share their use of equipment and R&D facilities, since this lowers investment costs and increases the return on investment (based on Wind and Mahajan, 1988).

#10 – In order to establish financial synergies, firms should allocate capital among its joint structure since this capital market is more effective and efficient than if each autonomous firm were an independent owned firm (based on Chatterjee, 1986; Kaplan and Norton, 2006; Knoll, 2008).

2.4.4 Management synergies

#11 – In order to establish management synergy, firms should share their strategic, organizational or operating problems, since sharing can achieve faster solutions to similar problems that other managers have dealt with in the past (based on Ansoff, 1965; Wind and Mahajan, 1988).

#12 – In order to establish management synergy, firms should share resources, since this could result in the ability to generate better strategies that greatly affect other synergy types (based on Wind and Mahajan, 1988).
#13 – In order to establish management synergy, firms should coordinate knowledge flows and marketing and technological expertise among firms, since this could reduce costs and improve innovative interactions among dispersed firms (based on Persaud, 2005).

#14 – In order to establish management synergy, firms should structure the context so that procedures for collaboration and reporting are clearly defined and communicated, since this minimizes conflicts and makes firms more comfortable sharing knowledge, resources and personnel (based on Persaud, 2005).

#15 – In order to management synergy, corporate managers should disaggregate the objectives of synergy initiatives, since clarifying the objectives contributes to the evaluation of costs and benefits, and to the creation of concrete implementation plans (based on Knoll, 2008; Dahlander and Gann, 2010).

2.4.5 Knowledge management synergies

#16 – In order to establish knowledge management synergies, firms should leverage knowledge, ideas, people, technology and organizational competences, since this could contribute to the creation of new, more successful innovation (based on Persaud, 2005).

#17 – In order to establish knowledge management synergy, firms should develop and share intangible resources, since these resources present an opportunity to create competitive advantage (based on Kaplan and Norton, 2006).

2.4.6 Firm synergy

#18 – In order to create firm synergy, firms should communicate frequently, since this improves the ability to develop and exploit new and successful innovations quickly and cost-effectively (based on Persaud, 2005).

#19 – In order to create firm synergy, firms should invest in strong ties with government offices and (financial) institutions, since this provides access to valuable information and benefits that can put the firm in a better position to cooperate more efficiently with its business partners (based on Wu and Choi, 2004).

#20 – In order to create firm synergy, firms should engage in long term, on-going interactions with each other, since this enables both firms to establish an effective work routine for the exchange of information and knowledge (based on Wu and Choi, 2004).

#21 – In order to create firm synergy, firms should engage with committed and trusted partners, who complement internal resources and fit the firm’s strategy, since this will increase the absorptive capacity of the firm so that resources with added value can be identified, integrated with internal resources and exploited (based on Sandulli and Chesbrough, 2009).

#22 – In order to create firm synergy, firms must open their business models to other parties, since by combining own processes with externally available ideas, available resources become key components in the business model and paths to market become shorter (based on Dahlander and Gann, 2010).
3. Methodology

“It's a capital mistake to theorize before one has data”.
(Sherlock Holmes)

This section elaborates on the research methodology. In this thesis, a science-based design approach is adopted, based on qualitative research. The nature of the research question lends itself readily for such an approach, since the notion of design may “contribute to solving the fundamental weakness of organization and management theory – the so-called relevance-gap between theory and practice” (Romme, 2003, p. 559). McMaster (1996) suggests that the first step in this approach is to derive design principles. The principles will be applied to a specific case in order to illustrate the application and provide feedback on the design principles.

3.1 Research design

“Academic management theory has a serious utilization problem” (Van Aken, 2004, p.219). As discussed, this certainly holds for academic literature on synergy (Martin, 2002). Van Aken (2004) argues that academic management literature stands a better chance of being adopted for use if theory is based on the paradigm of ‘design science’, rather than ‘explanatory science’. Whereas explanatory science describes, explains and predicts, design science rather aims at developing tested and grounded technological rules (Van Aken, 2004). Table 7 summarizes the differences between explanatory science (or ‘descriptive research’) and design science (or ‘prescriptive research’).

<table>
<thead>
<tr>
<th>Characteristic</th>
<th>Description-driven research programmes</th>
<th>Prescription-driven research programmes</th>
</tr>
</thead>
<tbody>
<tr>
<td>Dominant paradigm</td>
<td>Explanatory sciences</td>
<td>Design sciences</td>
</tr>
<tr>
<td>Focus</td>
<td>Problem focused</td>
<td>Solution focused</td>
</tr>
<tr>
<td>Typical research question</td>
<td>Explanation</td>
<td>Alternative solutions for a class of problems</td>
</tr>
<tr>
<td>Typical research product</td>
<td>Causal model; quantitative law</td>
<td>Tested and grounded technological rule</td>
</tr>
<tr>
<td>Nature of research product</td>
<td>Algorithm</td>
<td>Heuristic</td>
</tr>
<tr>
<td>Justification</td>
<td>Proof</td>
<td>Saturated evidence</td>
</tr>
</tbody>
</table>

Design science can bridge the gap between researchers’ abstract description of synergy and practitioners’ search for realizing it, since it is based on pragmatism and produces knowledge that is both actionable and open to validation (Romme, 2003). Van Burg et al. (2008) suggest two ways of applying the core idea of bridging the gap between managerial practice and academic research. The first method involves “using principles grounded in research to create (i.e. conceptual) solutions to be subsequently tried out and implemented in practice” (Van Burg et al., 2008, p. 116). Alternatively, experimentation with new solutions can also serve to derive design principles. In their article, Van Burg et al. (2008) structure the process of formulating design principles by separately developing principles based on practice (practice-based design principles) and principles merely based on research (research-based principles). Synthesis of these
principles results in a final set of design principles, which draws on both practitioner knowledge and research knowledge.

The master thesis will adopt the approach of Van Burg et al. (2008), with some minor changes. Figure 7 shows the design process approach of the thesis. As can be seen, both theory-based principles (grounded in literature) and practice-based principles (derived from 10 case studies) are used to develop a set of design principles. These principles will be applied to the specific case of Club van 30, followed by a reflection on the result, in the discussion and conclusion section. The discussion will provide feedback and insights for further research, which could strengthen the development of design principles in the future.

For the fifth chapter, the design for C30, a set of design activities has to be performed, which together form the regulative cycle as described by Van Strien (1997). Figure 8 displays the regulative cycle (adopted from Van Aken et al., 2007). The driver of the regulative cycle is the problem definition. This definition could be a perception problem or only a symptom of an underlying problem. Therefore, the initial problem statement has to be put in the problem mess (Van Aken et al., 2007). The analysis and diagnosis is the analytical part of the project. This step produces specific knowledge on the context and nature of the problem. During the plan of action the solutions for the problem and associated change plan are designed. For this step, Van Aken et al. (2007) suggest either the use of knowledge from descriptive research or, more powerful, the use of field-testing and grounded technology rules or solutions concepts (i.e. design principles). As said, the principles are developed by business research on the basis of design science research. Together with the practice-based principles, these theory-based principles form a range of solution concepts to the problem. From these solutions, an appropriate one is chosen (Van Aken et al., 2007).
The design principles will follow the form of CIMO logic (Denyer et al., 2008). CIMO-logic is based on Bunge's (1967) technological rule: "if you want to achieve outcome O in context C, then use intervention type I" (Denyer et al., 2008, p. 395). The issue of causality, the explanation through which mechanism the intervention produces the outcome in the given context, is represented by the 'M' in CIMO. These design principles can be seen as offering general templates for the creation of solutions for a particular class of field problems (Denyer et al., 2008). Although the meaning of the letters of the CIMO acronym is clear-cut, for completeness of this study, appendix V provides the definitions as given by Denyer et al. (2008). During these interventions in the regulative cycle, work processes are changed on the basis of the design and change plan. Hereafter, the evaluation takes place, to see whether or not intervening resulted in the desired outcome. The adjustments made, result in changes in the problem mess and accompanying problem definition, which closes the cycle and the problem definition begins again, when necessary or desired (Van Aken et al., 2007). Actually applying the principles to C30 will be used to enter the implementation phase in the regulative cycle. Closing the regulative cycle (i.e. finishing the ‘Evaluation’) lies outside the scope of this thesis, since implementing the design will cover a period longer than the writing of this master thesis.

The regulative cycle is part of a bigger system, namely of the reflective cycle (Van Aken et al., 2007). Figure 9, adopted from Kerssens-Van Drongelen (2001), displays the entire system; namely the reflective cycle and the regulative cycle captured within. As the name suggests, the reflective cycle reflects upon the problem solving process in the regulative cycle. Generally, the outcomes are compared to other case studies and literature in order to develop general knowledge. This general knowledge, in the form of design principles, can be applied to design solutions for new cases and problem situations, thereby contributing to the theory development and completing the reflective cycle. Given the size of the master thesis and the fact that the Evaluation phase of the regulative cycle is not completed, the application of the principles in other cases than C30 will not take place, so the reflective cycle will not be completed.

![Diagram of Reflective and Regulative Cycle](image-url)

**Figure 9 - Reflective cycle (adopted from Kerssens-Van Drongelen, 2001)**
The following part of this methodology will elaborate on the literature review and the research synthesis used to create the design principles. Next, the approach to the design for C30 is described ('Plan').

3.2 Systematic literature review and review synthesis: theory-based principles
In order to derive the design principles from literature and the case studies, a literature review method and research synthesis has been developed. Literature currently available on the topic of synergy and business model innovation does not provide a readily available solution to the problem stated in the introduction. To gain insight into the relevant aspects of the problem and to derive design principles, the literature is reviewed systematically. The first part of the master thesis, the literature review, forms the basis for this process by reflecting on synergy (creation), open innovation and business model innovation. The search strings used, quality criteria and databases for the review are described in detail in appendix VI². Together with the practice-based design oriented research synthesis described next (based on the ten case-studies), a final set of design principles is formulated.

3.3 Case analysis: practice-based principles
As mentioned, to develop theory-based design principles, a literature review is performed. In addition, to develop practice-based design principles, ten case studies are analysed to include empirical evidence (Romme and Endenburg, 2006). A unique strength of using case studies is the ability to deal with a wide range of data sources (Yin, 1994). Combining multiple data resources fosters data triangulation, which increases the quality of the data, by enhancing construct validity through multiple measurements of the same phenomenon (Yin, 1994). Section 3.4 'Validity and Reliability' elaborates on the concept of validity. According to Yin (1994), there are six sources of evidence that can be used for research: documents, archival records, interviews, direct observations, participant observations and physical artefacts. The master thesis will make use of the documents and interviews from the EURIS BMOI Project (BMOI, 2013).

By using the data from the case studies, practice-based design principles are developed. When analysing the data, flexibility is necessary since it cannot be known beforehand which concepts and theories are key elements in the development of the theory. Two techniques Yin (2004) suggests as analytical techniques for qualitative research are pattern matching and explanation. Pattern matching aims at comparing empirically based patterns with predicted ones. Explanation building is a form of pattern matching: an iterative process that begins with theoretical statements, which are refined by comparing data from the case studies to these statements until the data no longer suggests adaptions. The process behind deriving the principles is open coding. Open coding involves labelling, which is, simply stated, putting labels on the data. At the early stage of data analysis, the labels are provisional and any piece of data may have multiple labels. Closure on final labels will take place when substantial coding has been performed and the analyst has a stable view of what is central in the data (Punch, 2005). Open coding is not about bringing concepts to the data; it is used to generate labels for use in theory building.

² For the analysis of the literature quality, please see part I of the master thesis project: the literature study
The coding process starts with analysing the documents to create a list of open innovation initiatives, which were defined as action or events initiated by the venture in order to collaborate with external parties. Second, for each initiative, the result has been described. These results were labelled according to the different synergy types following from the theoretical framework, to check for synergy achievements resulting from the initiatives. Finally, the intervention from the cases have been described and the actions have been labelled with interventions that meet the preconditions derived from the literature review: Trust and Communication (TC), Absorptive Capacity for sharing resources (AC) and Organizational Leadership support (OL). Chapter 4.2 will elaborate on this process.

### 3.4 Data collection and analysis for the design

After the data necessary for developing the design principles is gathered, a detailed solution will be designed for a specific case, namely C30. Therefore, data collection concerning the design for C30 is necessary. This chapter will reflect on the data collection and analysis for the solution design. This data consists of three of the six sources of evidence as proposed by Yin (1994): *documents, interviews* and *direct observations*. These sources contribute to the strength of the tailored solution and will be discussed shortly:

*Documents* – Documentation involves the retrieval and analysis of internal documentary data from previously finished projects and news bulletins of C30. These documents include presentations, organizational guidelines, process documentations and business case reports.

*Interviews* – The second method of data collection is the use of interviews. Interviews will be held with the owner of the firms, the persons responsible for each division and employees. Table 8 displays the list of interviewees. By conducting the interviews, the researcher gets involved more deeply in the firm and the data collected can be used to design the solution.

<table>
<thead>
<tr>
<th>Firm/organization</th>
<th>Interviewee</th>
</tr>
</thead>
<tbody>
<tr>
<td>C30</td>
<td>Yoeri van Alteren (CEO) (YvA)</td>
</tr>
<tr>
<td>C30 Project Bureau</td>
<td>Colette van der Minne (CM)</td>
</tr>
<tr>
<td>C30 Media</td>
<td>Mark Beumer (MB)</td>
</tr>
<tr>
<td>C30 Network</td>
<td>Linda Castricum (LC)</td>
</tr>
</tbody>
</table>

*Direct observations* – The final method of data collection is direct observation. During this research, the researcher spends substantial time on-site, hereby getting involved in the daily operations of the firm. This provides the researcher with the opportunity to collect contextual information and impressions in addition to the interviews (Knoll, 2008).

### 3.5 Validity and reliability

The following part of this research proposal will look at the validity and reliability of the data, to see whether it is possible to design general knowledge on the topic of synergy creation via open business model innovation. This part will start with the discussion of the validity.
3.5.1 Construct validity
Construct validity refers to the appropriate and accurate measurement of key constructs, i.e. it refers to the extent to which a research procedure leads to an accurate observation of reality (Yin, 1994). To assure construct validity, Yin (1994) suggests the use of multiple sources of evidence. In this thesis, different sources of data are used, resulting in multiple sources of evidence for the design principles, which minimizes perception bias through triangulation. Furthermore, Yin (1994) argues for a closed chain of evidence from data to the constructs. This means that the researcher must aim for establishing a closed chain of evidence that allows an external observer to follow the derivation of the evidence from research question to final conclusions. This thesis will use interview citations and case descriptions to assure such a closed chain of evidence. Finally, Yin (1994) states that the results of the study should be reviewed by key informants, who discuss the adequacy and meaningfulness of the results. In this master thesis, the results will be discussed with the managers of C30, starting with the preliminary results and ending with the actual implementation plan, to see whether the design solution meets the design requirements and is relevant for the construct, i.e. for the creation of synergy.

3.5.2 Internal validity
Since the master thesis aims at establishing a causal relationship, the internal validity of the research should be taken into account. Internal validity refers to the validity of the causal inferences made in the diagnosis and analysis of the (business) problem (Yin, 1994). To address internal validity, Yin (1994) proposes the use of pattern-matching logic (checking a perceived sequence of events for the presence of some pattern) and time-series analysis. These points are taken into account while writing the master thesis, since it is a longitudinal study in search for some pattern.

3.5.3 External validity
External validity refers to the generalizability of the research results beyond the case studies. How generalizable results are, depends on the research approach (Yin, 1994). Since the reflective cycle will not be completed, generalizability of determined design knowledge will not be possible. However, it should be pointed out that the design principles could contribute to a more holistic theory (Lamnek, 1995), namely theory on synergy creation and business model innovation. The design for C30 will be used to see whether the design principles grounded in literature and the case studies have the desired effect. The reflection of the thesis will cover the topic of external validity in greater detail.

3.5.4 Reliability
Reliability refers to the possibility that scholars can replicate the research with the same findings (Yin, 1994). The use of semi-structured interviews and direct observations in the design case makes reproduction somewhat difficult, since it is bound to the context and responses of the interviewees. However, working in a structured way by documenting the research design and raw data sets will contribute to higher reliability of the thesis. As with the external validity, the reflection part of this thesis will discuss the reliability concerning this study in greater detail.
4. Synergy in open business models: insights from practice

“The only source of knowledge is experience”
(Albert Einstein)

In order to gain insights in synergy creation in practice, this thesis will derive design principles from case studies in addition to the theory-based principles. The ten case studies are drawn from established firms and provided by the first supervisor of this thesis. Therefore, data collection will not be described in detail. The cases will be introduced shortly, followed by the construction of the practice-based design principles.

4.1 The case studies

The case studies are drawn from ten established firms in three European regions (Navarre, Stuttgart and Eindhoven) and all have implemented open innovation practices in their business initiatives. The firms have different sizes and are from different sectors. Table 9, adopted from the BMOI Project (BMOI, 2013) gives an overview of the ten case studies.

Table 9 - Case studies (BMOI, 2013)

<table>
<thead>
<tr>
<th>Firm</th>
<th>Size</th>
<th>Industry</th>
</tr>
</thead>
<tbody>
<tr>
<td>Bosch</td>
<td>Large</td>
<td>Engineering and electronics</td>
</tr>
<tr>
<td>MechaniCo*</td>
<td>Medium</td>
<td>Engineering and electronics</td>
</tr>
<tr>
<td>Bodegas Ochoa</td>
<td>Small</td>
<td>Food</td>
</tr>
<tr>
<td>Bruns</td>
<td>Small</td>
<td>Exhibition engineering</td>
</tr>
<tr>
<td>Ingeteam Energy</td>
<td>Small</td>
<td>Power plants-equipment design and development</td>
</tr>
<tr>
<td>FEI</td>
<td>Medium</td>
<td>Electron microscopes</td>
</tr>
<tr>
<td>Kugler-Womako</td>
<td>Small</td>
<td>Printing and paper processing</td>
</tr>
<tr>
<td>Frenos Iruña</td>
<td>Small</td>
<td>Brakes systems design and manufacturing</td>
</tr>
<tr>
<td>Philips</td>
<td>Large</td>
<td>Electronics</td>
</tr>
<tr>
<td>Van Gansewinkel</td>
<td>Medium</td>
<td>Waste Management</td>
</tr>
</tbody>
</table>

*MechaniCo is a pseudonym

4.2 Analysis

This part of thesis provides the practice-based principles, derived from the case-study analyses. The design principles are derived via open coding. For each case study, the open innovation practice in their business initiatives has been analysed, in order to see if these initiatives have resulted in a type of synergy as described in the literature section. As they stand, the open innovation initiatives are not particularly useful for analysis, because each initiative is “just a qualitative indicator of what happened in the development of an [open] innovation over time” (Huber and Van de Ven, 1995, p. 168). So, the next step in representing the data is to code the incidents into theoretically meaningful events; in this case the interventions performed by the firm to start an open innovation initiative with a third party. Examples are seeking intermediate organizations, cooperation with external partners and opening up facilities for other parties to use in order to increase the chances of fruitful partnerships. In order to be

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3 The data collection and details of the ten case studies has been described in detail in appendix I of the EURIS BMOI Project (BMOI, 2013). For more information please contact the author of this master thesis.
listed as an open business model innovation for synergy creation, the events have to involve (at least) two parties, a change in business model element(s) and the intention to achieve a surplus in value (i.e. open innovation practices describing desired synergy outcome as well as already realised synergy outcomes were listed as events). The types of synergy were coded according to the typology and definitions developed in this thesis, as provided in the theoretical framework. This first step resulting in the event constructs is provided in the second column of table 10 on the next pages. The result of the initiative is provided in the third column and coding into the (desired) synergy in the fourth column of the table. The coding scheme used for coding the constructs can be found in appendix VII.

In the next step, the construct events are analysed to discover which interventions have been made, and how these interventions realize the desired outcomes (i.e. the mechanisms behind the intervention). The interventions are described as actions taken on behalf of the venture in order to achieve the (desired) synergy. The underlying mechanisms that make the intervention work are labelled according to which preconditions are met by making the intervention, as explained in the theoretical framework. To recap, these preconditions are enabling Trust and Communication (TC), Absorptive Capacity to share and utilize resources (AC) and Organizational Leadership (OL). Table 10 on the next pages shows the results of the coding and analysing of the events, the type of synergy achieved of desired, the intervention and the mechanism to achieve the desired outcomes. The Roman numerals between brackets in the table correspond to the practice-based design principle provided after the table, arranged per synergy type.
<table>
<thead>
<tr>
<th>Firm</th>
<th>Construct events: open BM innovation (change in business model component)</th>
<th>Result of open business model innovation</th>
<th>Type of Synergy desired</th>
<th>Intervention (# practice based principle) - [precondition met]</th>
</tr>
</thead>
<tbody>
<tr>
<td>Bosch</td>
<td>Intermediate organizations were sought to search for external partners to gain access to complementary technologies and to look for potential solutions to solve internal development problems. An extensive legal framework has been developed, with the potential to be re-used in further initiatives (key partners)</td>
<td>The use of intermediaries to scan the environment offers a quick overview of a certain research field and potential technology providers for starting collaboration in order to save time and structure problems. A legal framework protects Bosch’s knowledge.</td>
<td>Operational (efficiencies) &amp; Management (solve problems with external knowledge)</td>
<td>Development of extensive legal framework (# I) - [TC] Use of intermediaries and clear communication (# VI) - [TC]</td>
</tr>
<tr>
<td>MechniCo</td>
<td>In order to achieve high level of innovation, MechniCo aims to cooperate with external partners within publicly funded research projects (key partners)</td>
<td>Not yet determined, goal to achieve higher levels of innovation</td>
<td>Knowledge Management (achieve higher levels of innovation)</td>
<td>(# III) Introduction of a central network and cooperation management department and creation of an interface between the external research world and internal expert world. [TC]</td>
</tr>
<tr>
<td>MechniCo</td>
<td>In order to enable knowledge assimilation (beyond the central network) a new department was set up to develop cross-functional interfaces and secure knowledge assimilation (communication reflecting upon all components)</td>
<td>Outcomes of the participation has been used for the development of products/service concepts and marketing and image purposes</td>
<td>Knowledge management (achieve higher levels of innovation) &amp; Management (management involvement)</td>
<td>(# VII) Development of cross-functional interfaces to generate commitment and implementation decisions that are broadly supported, thereby overcoming the NIH syndrome [TC]. (# V) Senior management involvement, so assimilation could occur via the hierarchy of authority [OL]</td>
</tr>
<tr>
<td>Bodegas Ochoa</td>
<td>Bodegas Ochoa started in 2003 with its first plantation of olive trees, in close collaboration with Agromilla, a plants nursery (key resources, key partners)</td>
<td>New business opportunities by accessing knowledge and acquiring machinery together for both olive- and wine harvesting</td>
<td>Knowledge management (experimentation and joint business development)</td>
<td>(II) Mutual trust is the reason why this partnership offers such interesting benefits for both partners. [TC]</td>
</tr>
<tr>
<td>Bruns</td>
<td>Working together with a design agency to secure design and marketing competences (value proposition, customer segments, channels)</td>
<td>New business model to bring low cost standardized museum exhibits to the market and serve new customers segments</td>
<td>Customer (expanding the market message) &amp; Management (leveraging new business model)</td>
<td>(VIII) (AC) Search for firms with a compatible culture, since this lays the foundation for collective behaviour (IV) [OL] Bring in leaders from outside with strong commitment, since they can bring a fresh perspective and are less tight to existing business models.</td>
</tr>
<tr>
<td>Company</td>
<td>Collaboration</td>
<td>New Business Model</td>
<td>Customer</td>
<td>Notes</td>
</tr>
<tr>
<td>------------------</td>
<td>-----------------</td>
<td>--------------------</td>
<td>-------------------------------</td>
<td>----------------------------------------------------------------------</td>
</tr>
<tr>
<td>Ingeteam Energy</td>
<td>Working together with several university partners when implementing the new business model <em>(key partnerships, value proposition)</em></td>
<td>New business model to bring more standardized products to the market.</td>
<td>Customer <em>(expanding the market message)</em></td>
<td><em>(VIII) [TC] Form partnerships and maintain good connections by investing in partners with common knowledge and learning skills, since this way joint projects can be developed that may decrease costs and risks.</em></td>
</tr>
<tr>
<td>FEI</td>
<td>Working together with external partners that provided manufacturing and software competences in order to provide affordable cost effective solutions <em>(all components: new business model)</em></td>
<td>A new business model to commercialise a low cost scanning electron microscope</td>
<td>Customer <em>(expanding the market message)</em></td>
<td><em>(X) [AC] FEI has developed smaller business teams, differentiated from the mainstream organization to become 'ambidextrous' by combining new and old business models together and so respond to environmental change and new opportunities. FEI has used clients to experiment with the microscope at reduced costs, to fine-tune the device.</em></td>
</tr>
<tr>
<td>Kugler-Womako</td>
<td>Working together with a new customer operating in the automotive industry as co-creator <em>(key partners, value proposition)</em></td>
<td>New business model to commercialise a new machine to produce wire mesh for the automotive industry</td>
<td>Customer <em>(expanding the market message)</em></td>
<td><em>(VIII) [OL] Monitor strategic fit: have goals with similar level of importance that are non-conflicting.</em></td>
</tr>
<tr>
<td>Frenos Iruña</td>
<td>Working together with a technological centre that provided the test bench to verify prototype products in the new business model <em>(all components: new business model)</em></td>
<td>Strategic collaboration to develop new business models to offer brake systems to the wind-power sector</td>
<td>Management <em>(leveraging new business model)</em> &amp; Customer <em>(expanding the market message)</em></td>
<td><em>(V) [OL] Management involvement reinforcing open minded attitude resulting in committed workers that embrace opportunities,</em> <em>(XII) [AC] Map the business model to overcome interpretation differences between the stakeholders involved in business model innovation.</em></td>
</tr>
<tr>
<td>Philips</td>
<td>Opening up several of its clean rooms and related research services to outside parties in order to increase the chances of fruitful partnerships <em>(value proposition)</em></td>
<td>Lower operating costs via customers using the clean rooms, insights in knowledge and ideas for new business development</td>
<td>Customer <em>(expanding the market message)</em></td>
<td><em>(IX) Appoint communication manager, conduct stakeholder analysis to define value proposition. [TC]</em></td>
</tr>
<tr>
<td>Van Gansewinkel</td>
<td>Start collaboration with product designers and developers at manufacturers to bring design knowledge from the perspective of optimal recycling <em>(value proposition)</em></td>
<td>New business development (consultancy &amp; recycling, rather than solely waste collection and processing</td>
<td>Customer <em>(new consulting offers to customers)</em></td>
<td><em>(XI) Start cross-functional internal events (internal communication) to identify and categorise technological knowledge competences, to turn these competences in value propositions. [AC]</em></td>
</tr>
</tbody>
</table>
4.3 Practice-based principles
Following from the analysis, the practice-based principles are derived, categorised per synergy type. Together, the principles form the answer to sub-question 4, by showing what lessons can be learned from practice.

4.3.1 Operational synergy
Principle I – In order to create operational synergies, firms could develop a legal framework, since this builds confidence with partners to be sure that they can reap the benefits of the initiative (based on the case of Bosch).

4.3.2 Management synergy
Principle III – In order to create management synergies, firms should start a central network, since this enhances collaboration with external partners, to achieve higher level of (open) innovation (based on the case of MechaniCo).

Principle IV – In order to create management synergies, firms could bring in leaders from outside, since they can bring a fresh perspective and are less tight to existing business models assimilation could occur via the hierarchy of authority (based on the cases of Bruns; MechaniCo)

Principle V – In order to create management synergy, senior management should be involved, reinforcing open-minded attitude resulting in committed workers that embrace opportunities (based on the case of Frenos Iruña).

4.3.3 Knowledge management synergy
Principle II – In order to create knowledge management synergies, firms should build partnerships based on mutual trust, since mutual trust is important for the exchange of knowledge, which could offer interesting benefits for both partners (based on the case of Bodegas Ochoa).

Principle VI – In order to create knowledge management synergies, firms should communicate clearly their objectives (e.g. via intermediaries), since communication can help overcoming the knowledge transfer issues, resulting in knowledge management synergies (based on the case of Bosch).

Principle VII – In order to create knowledge management synergies, firms should start cross-functional interfaces, since this generates commitment and implementation decisions that are broadly supported, thereby overcoming the NIH syndrome (based on the case of MechaniCo).

4.3.4 Customer synergy
Principle VIII – In order to create customer synergies, firms should search for partners with a compatible culture (i.e. partners with common knowledge and learning skills and with similar goals that are non-conflicting) and form partnerships and maintain good connections by investing in these partners, since this way joint projects can be developed that result in new business initiatives and may decrease costs and risks (based on the cases of Bruns, Ingeteam Energy and Kugler-Womako).
**Principle IX** – In order to create customer synergy, firms should appoint a communication manager and conduct stakeholder analysis to define the value proposition for the customer (based on the case of Philips).

**Principle X** – In order to create customer synergies, firms should develop (smaller) business teams, differentiated from the mainstream organization to become ‘ambidextrous’ by combining new and old business models together and so respond to environmental change and new opportunities (based on the case of FEI).

**Principle XI** – In order to create customer synergies, firms should start cross-functional internal events (to ensure internal communication) to identify and categorise technological knowledge competences, to turn these competences in value propositions (which can be found by conducting a stakeholder analysis or experimentation) (based on the case of Van Gansewinkel).

**Principle XII** – In order to create customer synergies, firms should develop a business model canvas to overcome interpretation differences between the stakeholders involved in business model innovation (based on the case of Frenos Iruña).

### 4.4 Comparison of design principles

When the practice-based principles are compared to the theory-based principles, the main difference can be seen instantly, namely the absence of practice-based principles concerning financial synergies. Although some of the firms in the cases share investment costs (e.g. investments of both Bodegas Ochoa and Agromilla in machinery), the (desired) synergy turns out to be either operational or customer synergy (e.g. jointly development of olive oil to expand Bodegas Ochoa’s customer base). So, while theoretically the financial synergies are described in terms of operating a capital market more efficiently, in practice it turns out that sharing equipment has the purpose of growing, becoming more efficient, or serving new customer segments. This can be explained by the fact that most of the synergy effects resulting from financial synergies have to occur via lowering operational costs or selling more or additional products/service to customers in order to create value (i.e. make profit). This does not mean that financial synergies are superfluous in the synergy typology, because tax benefits or accounting benefits could be forms of financial synergies (mostly seen in finance and accounting literature on mergers and acquisitions, e.g. tax advantages of unused debt capacity as described by Sudarsanam et al., 1996). However, the case studies have not shown any examples for this type of synergy, so no practice-based design principles concerning financial synergy could be derived from these cases.

Concerning the other synergy types, no striking differences appear in the sets of principles. However, the practice-based principles provide less abstract interventions, since these interventions are executed actions by firms, rather than descriptive actions by scholars (e.g. ‘structure the context for communication’ or ‘leverage knowledge, ideas and resources’). So, it appears that the practice-based principles provide concrete, or perhaps illustrative, interventions of the theory-based principles.
5. Design

This section describes the design solution following from applying the design principles. The design case of the thesis (i.e. Club van 30) will be introduced, followed by the problem mess (i.e. the context in which the design principles are applied). Hereafter, the design requirements are brought forward. These requirements should be met in order to make sure that the solution fits C30’s current business model and strategy. Once the context, the problem and requirements have been established, the actual solution is designed. The solution will be an open business model template that provides C30 with directives to achieve the different kinds of synergy. The open business model template will be described in general terms, so that C30 can apply it to multiple cases in the future. However, for the sake of clarity, an illustrative open business model initiative is provided, which shows how opening up C30’s business model could result in achieving firm synergy. This initiative has started recently, following the design solution of this thesis. Unfortunately, the initiative is currently in progress, so results on the design solution cannot be used for feedback on the design. So, the initiative remains in the implementation phase of the reflective cycle of Van Aken et al. (2007).

5.1 Club van 30

C30 consists of three different units, namely C30 Project Bureau, C30 Media and C30 Network. The following parts will describe these units in more detail. Although this thesis will focus on open innovation from the perspective of C30 Project Bureau, this chapter will also discuss C30 Network and C30 Media shortly for a complete overview of the firm.

5.1.1 C30 Project Bureau

In 2009, current CEO Yoeri van Alteren has founded Club van 30 B.V., a Project Bureau that assists firms and organizations in making their business processes become more sustainable, by focussing on processes concerning energy, water, packaging and waste, and mobility. The services C30 Project Bureau provide, consist of three different parts, displayed in figure 10. The first part of the figure, ‘Denken’4, determines the strategy and objectives C30’s clients want to reach, to develop a roadmap together that will lead to more sustainable business processes. After determining the strategy, the business case can be developed, based on optimization and innovation concerning the four themes (energy, water, packaging and waste, and mobility).

Figure 10 - Service of C30 (adopted from www.clubvan30.nl)

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4 Translated from Dutch: ‘to think’
In C30's view, key aspect in successful business case development is cooperation, displayed in the second part of the figure 'Delen'. Every company depends on suppliers, buyers and other stakeholders. Knowledge sharing concerning sustainability themes results in innovative ideas and promising business models, hence the importance of cooperation and the analogy to the concept of open innovation. The final step in the process is 'Doen': the actual implementation of the business case. Part of the implementation is the funding of the project, either internally or funded by subsidies, when eligible. The business model canvas of C30 Project Bureau is provided in appendix VIII.

5.1.2 C30 Network
Sustainability is a broad and complex concept. To make sure C30 Project Bureau can develop business cases and implementation plans that fit the customers' objectives and capabilities, the project bureau makes use of a network to combine knowledge on the topic of sustainability. The network consists of firms and non-government organizations that provide access to valuable knowledge and contribute to business case development.

5.1.3 C30 Media
C30 Media is an information channel that aims at making sustainability accessible for the business environment. Daily, the website displays several important news topics on sustainable (entrepreneurial) issues, in order to inspire companies. C30 Media finds its origin at the foundation of C30 Project Bureau. News bulletins were published on the website of C30 Project Bureau, to inspire and inform visitors on the topic of sustainability. Starting June 2012, C30 Media communicates through its own website, Duurzaambedrijfsleven.nl, rather than via the channels of C30 Project Bureau. Duurzaambedrijfsleven.nl is an autonomous and independent part of Club van 30 BV. The term C30 Media in this thesis refers to the currently used autonomous website apart from C30 Project Bureau.

5.2 Problem mess and objectives
"The central role of business has extended from that of the traditional economic actor to being a political and social actor" (Li and Toppinen, 2011, p. 114). Concerns about social responsibility have consequently become an increasingly high profile issue in many countries and globalizing industries. In addition to economic assessments, environmental and social impact from operations should also be integrated more closely into corporate strategic decision-making (Christmann, 2004). Dyllick and Hockerts (2002) define corporate sustainability as "meeting the needs of a firm's direct and indirect stakeholders (such as shareholders, employees, clients, pressure groups, communities etc.), without compromising its ability to meet the needs of future stakeholders as well". Today, most managers have accepted corporate sustainability as a precondition for doing business. Towards this goal, firms have to maintain and grow their economic, social and environmental capital base (Dyllick and Hockerts, 2002). In recent years, scholars have argued that it is possible to achieve win-win scenarios under which a firm can maximize returns while making progress towards the implementation of sustainable business practices (Fowler and Hope, 2007). A proactive corporate environmental strategy can lead to the development of important organizational capabilities that can increase firm competitiveness (Fowler and Hope, 2007). So,

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5 In English: 'to share'
6 In English: 'to act'
sustainable design and practices not only decrease negative impacts on the environment, but also could provide economic benefits, productivity benefits, and enhance public relations (Gottfried, 2003). Sustainability improves the economic bottom line by reducing operating costs and optimizing life-cycle economic performance. Productivity benefits include improved performance and increased productivity and sales, whereas public relations enhancements include marketing advantages (Gottfried, 2003).

Although many firms with poor environmental performance sell themselves as being green, the so-called ‘green washing’ (Walker and Wan, 2011), and managers may prefer symbolic actions to substantive actions on environmental issues, since signalling green values is easier than implementing these values with actions (Suchman, 1995), it is increasingly important for firms to become more sustainable. Also in literature, the relationship between sustainability and performance is an emerging field of study. However, the current state of research on sustainability in business often focuses on how the concepts of sustainability could be interpreted in the business-context, rather than prescribing how sustainability should be integrated into it (Silvius & Nedeski, 2011).

As can be deducted, it becomes increasingly impossible for both firms and scholars to avoid the concept of sustainable development. However, at the same time it is clear that the concept ‘sustainability’ “has been used to mean different things to different people in different contexts” (Bebbington, 2001, p.3). As a result, sustainable development constitutes a challenge to firms, since neither the concept, nor the implementation of it, can be properly defined. To overcome these challenges, Van Kleef and Roome (2007) argue for collaborative innovation through networks and multi-actor forums. The concept being broad, knowledge on the different topics is also widespread and requires expertise in many fields.

C30 Project Bureau recognizes these challenges firms are facing and helps them with implementing their ambitions by translating these into their business models. Despite the expertise present within the company, C30 also recognizes the need for networking and collaborative innovation to develop applicable business cases (in line with Van Kleef and Roome (2007)). This is expressed well by the following quote from CEO Yoeri van Alteren:

“**We derive our legitimacy from our network. No party has all knowledge in the area of sustainability in-house. Our project managers know for each job which parties to link and how to guide them to a successful cooperation**”

This method has resulted in multiple successful and sustainable initiatives over the past years7. However, as came forward during the interviews, the solutions C30 currently presents to its customers, might have the potential to be introduced into an entire market, rather than solely being used by one customer. At this moment, C30 advises customers with the implementation, after which the project is finished. However, combining the knowledge and expertise of C30 with the daily operations of its customers, could result in innovations that could be implemented market-wide, resulting in a surplus in value for both companies. In other words, collaboration

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7 See for more information: http://www.clubvan30.nl/portfolio/
between C30 and its customers has the potential to result in firm synergy, but currently stagnates after the project is finished. In a situation of close collaboration, the challenge firms face while implementing sustainability in their business model can be overcome by using knowledge and expertise of C30, while C30 on its turn could make use of the daily operations of the firms to enter new markets with sustainable business innovations. The potential benefits that arise would be repulsing green-washing, ensuring recurring payments for both firms, implementing innovations market-wide and image building for both firms.

So, as came forward from the interviews with Yoeri van Alteren and Colette van der Minne, C30 Project Bureau already delivers the output for sustainable business innovations, but lacks the means and operational resources to enter the market with this knowledge. Its customers on the other hand, receive the sustainable solution they have asked for, but lack the knowledge to implement it in their business model without the knowledge and expertise of C30. Together, C30 and its customers could collaborate and open their business models in order to maximize the potential of the solution and create more value together then the combined value they could have created acting independently of each other. The problem remains, however, how opening their business models would result in firm synergies. Therefore, the design solution will focus on this issue by answering sub-question 4:

**Sub-question 4: How can open business model innovation help C30 in creating and appropriating synergy?**

### 5.3 Design requirements

Van Aken et al. (2007) propose that the design has to fulfil several requirements. If these requirements are overlooked, it leads to justification problems of the solution. The requirements Van Aken et al. (2007) propose are functional requirements (the solution should solve the identified problem), user requirements (specific demands from the viewpoint of the users, so that they are willing and capable of implementing the solution), boundary conditions (appear in many forms, e.g. in the form of laws, regulations, ethics, the company’s policy, etc.) and finally, design restrictions (restrictions that should be met in order to implement the solution). During the interviews and the internal discussions held while spending substantial time on site (five months), the following design requirements have been mentioned:

**User requirements:**

1. The solution should contribute to recurring payments (e.g. via services), in order to reduce the risk of low cash flows, associated with executing one-of-a-kind projects for firms (i.e. financial synergy).
2. C30 wants to reach more customers with the solution they have developed by introducing it to the market (i.e. customer synergy).
3. Since specific market knowledge and resources are not readily available within C30, there must be a strong focus on opening borders in order to form partnerships with parties that have the resources and knowledge to serve the market (operational/knowledge management synergy).
Design restrictions

4. Since C30 is a relatively small firm, currently no business development unit exists and initiatives should be the result from projects executed by C30 Project Bureau.

Functional requirements

5. The solutions should provide an overview of the synergies types that can be achieved via collaboration with other parties (functional requirement).
6. The solution should provide clear guidelines that show how the open business model of C30 Project Bureau could result in the different synergy forms.

5.4 Design solution

Following from the design requirements and both practice- and theory-based principles, the solution can be designed. The design will be an open business model template, following Osterwalder and Pigneur's (2010) business model canvas. The solution starts with discussing the open business model template to see why it is important to map the design solution and will continue with providing the separate business model components and the design principles that reflect upon these components (the theory-based principles have Arabic numerals and the practice-based principles are presented with Roman numerals). The design principles that cannot be attached to one of the business model components, but reflect on all business model components will be discussed separately at the end of the solution. However, as stated by Chesbrough (2010), mapping the business model solely cannot promote business model innovation, also the processes need to be adapted, e.g. via experimentation. Therefore, also an illustrative case, an initiative in the implementation phase, is provided in the text boxes as part of the design solution to clarify some of the design principles. Appendix IX shows the application of the principles and the analysis to see which business model components they reflect upon.

5.4.1 Mapping the open business model for synergy

Following design principles 22, X and XII, C30 should combine its 'old' business model with newly developed business models with other parties, since by combining own processes with externally available ideas and resources, these become key components in the new business model and paths to market become shorter. When opening up its business model to other parties, C30 is recommended to map the business model, since this ensures that interpretation differences with the partnering firm are overcome during the business model innovation process. If so, opportunities in the market arising from implementing sustainable innovations can be captured. In addition, mapping the business model could provide directions for both firms when partnering up, so that the newly formed team can become ambidextrous. That is, mapping the open business model can help both firms combining the old and new business models in order to capture opportunities while maintaining their current (key) processes.

So, part of the solution has focused on developing an open business model template (cf. Osterwalder and Pigneur, 2010) for C30, to see how each component can contribute to synergy creation at a general level. The open business model canvas is based on the design principles and can be found in figure 11. As can be seen, design principles concerning operational synergies reflect mostly on key resources, key partners and key activities. Customer synergy focused principles involve primarily the firm’s value proposition, channels and customer segments. Financial synergies reflect on the firm’s cost structure and revenue streams. The design principles concerning the two remaining
synergy types, management and knowledge management synergies, focus on all business model canvas elements and therefore cannot be visualized in figure 11. As a result, not all design principles can be found in the template, since these principles reflect on the entire canvas rather than on some of the building blocks. To make the design solution more specific, a second, illustrative open business model canvas has been developed for a specific initiative of C30, as can be seen in illustration box 1.

Illustration 1:

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Figure 11 – Open Business Model Canvas (based on both practice and theory-based design principles)
5.4.2 Key partners
As explained, opening up a firm’s business model to third parties is not without risk. Therefore, C30 should carefully select its business partners for collaboration. Following from design principles 19, 20, 21, I, II, III & VIII there are several aspects that C30 should focus on when forming open innovation partnerships.

First, C30 should focus on establishing long term and on-going relationships with committed and trusted partners. Long-term collaboration enables both firms to establish effective work routines in the exchange of information. Although trust seems obvious in the context of partner selection, it remains an important aspect of the partner selection process and should receive significant attention (e.g. via legal frameworks to ensure trust). One of C30’s benefits is the fact that through its projects, it has worked on a different project with its customers prior to a potential start of an open innovation initiative. Therefore, C30 has the possibility to see which parties can complement internal resources and are compatible with C30’s culture and strategy. This will increase the absorptive capacity of C30 so that resources with added value can be identified and integrated with internal resources in order to exploit them. A second benefit for C30 is the potential that C30 Network offers. C30 Network consists of both governmental institutions and firms, each with valuable information and benefits on sustainability matters that can help C30 achieve higher levels of open innovation.

Illustration 2 – Key partners
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5.4.3 Key resources and activities
Following from principle 4, 5, 6, 7, 12, 16 & 17 there are several key activities and key resources that should be combined while opening up the business model. First of all, in order to implement an innovation into the market, C30 should focus on the equipment and facilities necessary to operate this market. This way, initial investment decreases, thereby increasing return on investment. Furthermore, C30 should strive for economies of scope and economies of scale, as fixed costs are spread out over more output (e.g. more units, more customers, etc.), resulting in operational, financial and customer synergy. Combining complementary resources of C30 and its partner could provide unique customer value and capture market opportunities.
5.4.4 Channels, customer segments & relationships
Based on principle 1, 2 & 3 and building on the key resources and activities, both C30 and its partner could extend its customer base, since new market segments can be reached by combining the available expertise and network of both firms. Sharing the channels used by both firms to bring the value proposition to the customer, allows both firms to reach new potential customers with sustainable business innovations. C30 should focus on bringing standardized service solutions for sustainability issues to the customers, since this contributes to a consistent customer experience and could readily be implemented in the business model of multiple customers in the same market segment, thereby contributing to recurring payments resulting form the delivered services.

Illustration 4- Channels, customer segments and relationships
This illustration has been removed because it contained confidential information.
5.4.5 Value proposition
As with any firm, the open business model of C30 should deliver value to its customers. In this case, the value proposition is the possibility to combine complementary resources (or to leverage knowledge, ideas, people, technology and organizational competences) across firms to provide unique customer value and capture market opportunities. In order to see what these opportunities are, C30 should start cross-functional events with potential partners to identify and categorise knowledge competences and turn these into value propositions. Furthermore, in order to become ambidextrous, C30 should start a (small) business team, differentiated from the main organization, to further develop the initiatives based on the knowledge produced at C30 Project Bureau. In doing so, the ‘old’ en ‘new’ business models can be executed simultaneously, thereby remaining focus on the main activity (the projects) and simultaneously not passing by on environmental changes and new opportunities (based on principle 6, XIII, IX and XI).

Illustration 5 – Value proposition
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5.4.6 Revenue streams and cost structure
Based on principles 8, 9, 10 & 15, C30 should disaggregate the objectives of a synergy initiative, prior to starting the project. This way, the potential of the synergy initiative and the accompanying costs become clear to all stakeholders, so they can estimate their return on investment and know how capital for the new joint structure should be allocated. This way, initiatives based on synergy biases resulting in failures can be prevented.

Illustration 6 – Revenue streams and cost structure.
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5.4.7 Design principles reflecting all business model components

So far, the design principles have been applied in the open business model canvas, when applicable. However, as can be seen, there are several principles that not have been discussed yet in the business model canvas, since they do not specifically reflect upon one or two components, but on the entire canvas. These principles focus on three different components (see also appendix IX):

1. Coordinated strategies:
   a. Principle 13 - Coordinate strategies to improve interactions among firms
   b. Principle VII – start cross-functional interfaces to generate commitment
   c. Principle X – develop business teams in order to become ‘ambidextrous’.

2. Communication
   a. Principle 18 – communicate frequently
   b. Principle 14 - Structure context for clear communication

3. Leadership support
   a. Principle IV – Bring in leaders from outside
   b. Principle V – Senior management involvement

These components cannot be mapped separately into the business model framework of Osterwalder and Pigneur (2010), and therefore will be discussed apart from the nine building blocks. As will be clear, coordinating strategy, leadership and communication are intertwined constructs and will therefore be discussed and illustrated together.

In order to profit maximally from open business model innovation, C30 should structure the context for clear and frequent communication (e.g. via the development of a legal framework or to start cross-functional interfaces). This way, conflicts will be minimized and firms become more comfortable in sharing knowledge. Having meetings on a regular basis improves the ability to develop and exploit new and successful innovations quickly, and will help overcome the NIH syndrome. To do so, C30 should share strategic, organizational or operating problems with managers of its partner. Sharing these problems could resolve these problems, since managers may have dealt with similar problems in the past. These leaders from other organizations bring in a fresh perspective and reinforce an open-minded attitude.

Illustration 7: Leadership, coordinated strategies & communication

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6. Discussion and conclusion

This chapter consists of the findings of this thesis and answers the research question and sub-questions posed in the introduction, followed by a reflection of the findings, focusing on the synergy typology, the principles and the business model template. Next, the contribution and managerial implications of this thesis are discussed. Finally, limitations will be addressed, to see how these can be overcome in future studies. This thesis does not pretend to be exhaustive, so starting points for future research will be given at the end of this section, based on the findings of this study.

6.1 Findings

The purpose of this thesis has been to answer the main research question: “How can open business model innovation help firms establish synergy?” In order to do so, four sub-questions have been posed, that together form an answer to this question. These sub-questions will be discussed first, followed by an answer to the research question.

Sub-question 1: What is open business model innovation?

Starting point for this thesis has been the notion of Dahlander and Gann (2010) that nowadays a single firm cannot innovate in isolation, but that openness to new ideas from the environment improves firms’ innovative performance: more and more firms find value by tapping into the ideas of open innovation (Reed et al., 2012). In literature, the concept of open innovation as a source of value has received substantial attention from scholars (e.g. Dahlander and Gann, 2010; Huizingh, 2011; Reed et al., 2012). However, manners to capture this created value (often referred to as exploiting a firm’s business model), has received scant attention (the exception being Chesbrough, 2007). Therefore, this thesis has focused on the concept of open business model innovation. Following from literature, it shows that the role of the business model in open innovation is including external resources as key components in the business model: firms start to share internal resources to create and capture value by leveraging ideas and utilizing a firm’s key assets, resources or position not only in the firm’s own operations but also in other firms’ businesses (Chesbrough, 2007; Lichtentaler, 2011).

Sub-question 2: What is firm synergy?

Since the work of Ansoff (1965) the concept of synergy has received attention for almost 50 years from both scholars (Knoll, 2008) and managers (Goold and Campbell 1998). Considering this long period of interest, the more astonishing it becomes that no consensus has been found in the typology of synergy. Therefore, this thesis has focused on conducting a review to find consensus in the many typologies circulating in literature by posing the second sub-question. From over a dozen definitions and eight typologies, an overarching typology has been developed. As it turns out, over the years the seminal work of Ansoff (1965) has been subject to several changes in definitions and one major change; namely adding knowledge management synergy to his typology. This results in the following synergy types used in this thesis: financial synergy, management synergy, customer synergy, operational synergy (consisting of growth and efficiency synergies) and knowledge management synergies. As can be seen in table 4 (p.15), all scholars have mentioned operational synergies, while knowledge management synergies have just emerged from the early ’00s. Financial, management and customer synergies have
received attention throughout all decennia, although the combination of all three has not been mentioned in every scholar’s typology.

Sub-question 3: What are the lessons learned from open business model initiatives in practice?
The answer to this sub-question is provided in the form of 12 practice-based design principles, provided on pages 37-38. Together the theory- and practice-based principles, provide an instrumental template for practitioners, which has been used to design a solution for Club van 30, in order to provide an answer to sub-question 4:

Sub-question 4: How can open business model innovation help C30 in creating and appropriating synergy?
To answer this question, an open business model template based on the design principles has been developed for C30, to see how the building blocks should be detailed in order to achieve (one of) the different synergy forms. This way, knowledge produced from C30 can be turned into valuable sustainable business development (knowledge management synergy) by collaborating with external partners, thereby not only creating a surplus in economic benefits (i.e. financial synergy) for both firms, but also decreasing negative impact on the environment, achieving productivity benefits (operational synergy) and enhancing public relations, which include marketing advantages to reach and serve multiple customer segments (customer synergy), cf. Gottfried (2003).

So, the comprehensive theoretical grounding of the principles, leading from business model creation towards the creation of different synergy types, has resulted in a conceptual framework that shows how synergy can be created. An open business model template has been developed that shows which forms of firm synergy can be achieved by applying both theory- and practice- based design principles to the specific business model components of the template. The practice-based principles have shown less abstract and more illustrative applications of the interventions described in theory. A comparison of both types of principles has been given, which shows that the principles complement and strengthen each other, with some exceptions that will be discussed in the next part of this thesis.

6.2 Reflecting on the findings
This thesis has developed a synergy typology and has linked these different synergy types to the different components of a firm’s business model. As it turns out, most of the design principles concerning customer synergy focus on the building blocks channels, customer segments, value proposition or customer relationships of the business model canvas of Osterwalder en Pigneur (2010). This is consistent with the description of customer synergy used in this thesis, which states that in order to create and capture customer synergy, the market message should be expanded and multiple products should be brought to the customer. The second type of synergy, operational synergy, is defined as synergy that stems from sharing or recombining operative resources. This is also reflected in the template: most of the principles focus on sharing key resources and selecting key partners to collaborate with, in order to achieve economies of scale.
Concerning financial synergies, the design principles reflect on those components focusing on revenue and costs, namely costs structure and revenue streams. However, when comparing theory-based principles to practice-based principles, it shows that financial synergies are frequently described in literature, but less apparent in the case
studies. Potential reasons for this discrepancy have been mentioned; sharing investments often results in other types of synergy, rather than financial synergies. Financial synergies could occur for example in tax benefits, but future research should focus on empirical based evidence to verify these assumptions concerning financial synergies. Management synergies were defined as leveraging entrepreneurial capabilities, capabilities in organizational design and superior strategic leadership. The design principles found in this study are partially in agreement with this definition, since they reflect on several building blocks (namely key activities, key resources and key partners) but also on coordinated strategies and leadership support. These last two components are not reflected in the business model template, but following from both the principles, coordinated strategies and leadership support are important factors in establishing management synergies. Finally, knowledge management synergies were defined as harnessing and leveraging knowledge, ideas, people and organizational competences for the creation of new, more successful innovations. Following from the principles all business model components are essential in realizing knowledge management synergy, and creating this type of synergy cannot be linked to separate components of the template, but involves all aspects of a firm’s business model.

6.3 Contributions
This thesis has contributed to literature in three ways. First of all, a synergy typology has been developed. Although scholars in the field of economics and management paid much attention to the topic of synergy, a well-defined theory of synergy and firm networks had yet to emerge (Wei, 2010). This thesis contributes to closing this gap by reflecting on five decades of literature on synergy in order to provide a comprehensive typology with accompanying definitions. This typology contributes to management literature by showing that consensus can be found in the many typologies present in literature. The typology covers many of the definitions found, thereby making the concept of synergy less abstract.

The second contribution of this thesis has been linking the synergy typology to the business model of a firm. Thereby contributing to literature on (open) business model innovation thereby answering to Huizingh’s (2011) appeal for more integrated theories on open innovation. Following Chesbrough (2007), the thesis has reflected on open business model innovation to see how potential value stemming from open innovation practices can be created and captured. More specifically, the different synergy types have been linked to the building blocks of the business model canvas of Osterwalder and Pigneur (2010). This way, an open business model template for creating and appropriating synergy has been developed. This template shows which building blocks firms should focus on to create the different synergy types. So, by describing how organizational change in today’s dynamic markets can result in value creation and capturing for firms, the thesis contributes to the perspective of change in organization theory.

Finally, a set of over 30 design principles derived from theory and practice has been developed that provides guidelines on linking the building blocks to the synergy types. When comparing both sets of principles, it shows that these are highly compatible and complement each other, which strengthens the final set of principles. Since the theory-based principles are grounded in more general theories, the addition of the practice-
based principles has shown to be illustrative and clarifying. This way, the strength of theory is combined with practice, to provide a comprehensive final set of principles.

6.4 Managerial implications
The final design of this thesis has been implemented in order to contribute to synergy creation for C30. Since the open innovation initiative is still in progress, results cannot be achieved at this moment. However, this thesis has some important implications for managerial practice, including the following:

As stated by Goold and Campbell (1998, p.131) “the pursuit of synergy pervades the management of most large companies”. However, the concept being abstract and troublesome to grasp, knowledge and practices on the actual creation and capturing of synergy has received scant attention. As a consequence it takes courage and vision to try out new ideas, especially during times of financial difficulty. As pointed out by Chesbrough (2007, p.28), “the alternative solution of opening up a company’s business model may not be easy, but if diligently pursued, it provides a potential pathway to greater innovation activity and increased growth.” This thesis is a first step for managers in overcoming this problem, since the design principles provide concrete guidelines for filling in the business model components diligently, thereby hopefully providing the potential pathway to the greater innovation activity that Chesbrough (2007) mentions. Managers can consult the design principles to develop targeted solutions for a specific context when opening up their business model in order to achieve synergy.

6.5 Limitations and recommendations for future research
There are several limitations that impair the findings of this thesis. These limitations will be discussed next, accompanied by recommendations for future research.

First of all, as stated by McGrath (2010), a new business model cannot be fully anticipated in advance, but must be learned over time. In this view, the conceptual model in this thesis approaches the open business model innovation process perhaps too simplistic: although experimentation and designing a solution addresses the issue appropriately, the final solution of this thesis is not a dynamic, iterative process, which is suggested for open business model innovation (Thomke, 2002). So, in addition to this study, future research could address the concept of synergy creation via experimenting or effectuation over a longer period, to see if there are any changes compared to the solution of this study.

Next, the choice for the ten case studies has some limitations. Although the case studies show how synergy can be created in practice and the derived design principles correspond to theory, the number of cases is rather low. Furthermore, the cases have different sizes, including multi-nationals, while the final design has been applied to a SME (i.e. C30). Future research should address these issues by designing, implementing and evaluating solutions based on this thesis, for multiple case studies in diversified settings and of different sizes. This way, differences in size and context can be overcome by detailing the different, which could strengthen the robustness of the design.

Third, although the typology of this study is comprehensive, 50 years of literature on synergy make it virtually impossible to cover all typologies present in literature. Especially since there is no consensus on the terminology and definition of the concept, the concept of synergy has many synonyms (e.g. ‘strategic fit’ or ‘strategic alignment’).
There are multiple research streams that focus on the topic of synergy. For example, mergers and acquisitions literature dives in the concept of two firms combining their strengths in order to achieve value. However, this thesis has focused on synergy between collaborating firms, since this approaches open innovation practices mostly.

Fourth, when describing firm synergy, the division in inter- and intra-firm synergy has not been taken into account, since this distinction has not been mentioned in the different typologies present in literature. However, recent research has shown that inter-firm synergy often results in intra-firm synergies as well (Smits et al., 2012). Future research should focus on this topic and should make the distinction into inter- and intra-firm synergy, to see if any differences in the open business model template can be found.

Finally, concerning the methodology, the coding of the EURIS cases for the practice-based design principles has been performed by only one researcher. So, unfortunately, there is no validation of these results and the findings could be subject to retrospective bias. If multiple researchers had performed the coding, the results would be more reliable, which would strengthen this thesis. Future research could easily address this issue by letting multiple researchers perform the open coding process.
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www.clubvan30.nl, first time accessed December 12th 2012
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BMOI (2013) EURIS Business Models for Open Innovation (BMOI) Project
http://bmoi.euris-programme.eu/project-info/euris, first time accessed April 27th 2013
OVAM (2012) Openbare Vlaamse Afvalstoffenmaatschappij
Respons (2013) Respons online festival monitor
Appendices

Appendix I – Business model canvas building blocks
(Based on Osterwalder and Pigneur, 2010)

Customer segments – define the different groups of people or organizations an enterprise aims to reach and serve. The business model should be carefully designed around a strong understanding of the customers’ needs, since without customers no company can survive for long.

Value Proposition – describes the bundle of products and services that create value for a specific customer segment. In other words, it is the reason why customers turn to one company over another. The value proposition has to either satisfy a customer’s need, or solve a customer’s problem.

Channels – describe how a company communicates with and reaches its customer segments to deliver the value proposition. It is the interface with the customer and therefore plays an important role in the customer experience.

Customer relationships – describes the types of relationships a company establishes with specific customer segments. These relationships range from automated assistance to personal assistance to co-creation with the customer.

Revenue streams – represent the cash a company generates from each customer segment. A business model can involve two different types of revenue streams, namely transaction revenue streams (resulting from one-time customer payments) and recurring revenue streams (resulting from on-going payments).

Key resources – describe the most important assets required to make a business model work. These resources can be physical, financial, intellectual, or human. Key resources can be owned by the company, acquired from key partners or leased.

Key activities – describe the most important things a company must do to make its business model work. These activities are required to create and offer the value proposition.

Key partnership – describes the network of suppliers and partners that make the business model work. Especially in the context of open (business model) innovation, key partnerships have the potential to become an important source of value creation, since partnering up with customers, suppliers, or even competitors provides access to new information and resources (Chesbrough, 2007).

Cost structure – describes all costs incurred to operate a business model. These are the costs attached to the value creation by the other eight building blocks.

Appendix II – Experimentation, effectuation and leadership

Experimentation – Thomke (2002) has written a useful paper on principles for effective experimentation. Although his concepts are focused on new product and process innovation, they apply equally to business models. An important principle concerns the fidelity of the experiment, which is the extent to which the experimental conditions are representative for the larger market (Chesbrough, 2010). Highest fidelity is achieved by trying out an alternative business model on real customers paying real money in real economic transactions. There are some important parameters for this type of process: the costs of conducting the test (direct costs as well as cost of failure), time required to obtain feedback and the amount of information learned from the test
(Thomke, 2002). The failures Thomke (2002) mentions should not be confused with mistakes made. Failures are a natural outcome of the experimentation process and can provide useful information. Mistakes on the other hand, are experiments that are too poorly designed to yield any new learning. So companies should strive to develop processes that provide high fidelity as quickly and cheaply as possible. The goal of the experiments is to gain accumulative learning, even from failures, before discovering a viable alternative business model (Chesbrough, 2010). In line with Chesbrough (2010) and Thomke (2002), McGrath (2010) argues that strategies aiming to discover and exploit new models must engage in significant experimentation and learning. This approach is called *discovery driven*, rather than the conventional analytical approach. There are some underlying constructs in support for the discovery driven approach. First, it shifts the focus from an internal perspective (focusing on core competences of the firm) to a more customer-centric view: focusing on, and adapting to, changing customer values. Second, business models cannot be fully anticipated in advance, but must be learned over time. This emphasizes the centrality of experimentation in the discovery and development of new business models. Finally, there is a shift from sustainable towards a more temporary competitive advantage. Under changing conditions, firms seek to achieve a temporary advantage until competition has caught up, or the market has changed. At this point, firms start the hunt for a new advantage (McGrath, 2010).

*Effectuation* – the second set of processes mentioned by Chesbrough (2010) is the concept that Sarasvathy (2001) calls effectuation, a term opposite of causation. In effectuation processes actors do not study the market so much as *enact* it (Chesbrough, 2010). Where causation processes “*take a particular effect as given and focus on selecting between means to create that effect*”, [effectuation processes] “*take a set of means as given and focus on selecting between possible effects that can be created with that set of means*” (Sarasvathy, 2001, p.245). Effectuation assumes a dynamic decision environment involving multiple interacting decision makers and is based on four principles. First, effectuation predetermines how much loss is affordable and focuses on experimenting with as many strategies as possible with the given limited means. Second, effectuation emphasizes strategic alliances rather than competitive analyses. Third, effectuation would be better for exploiting contingencies that arose unexpectedly over time, rather than exploiting pre-existing knowledge. Finally, effectuation focuses on the controllable aspects of an unpredictable future rather than trying to predict an uncertain one (Sarasvathy, 2001). Especially important in the context of open innovation and business model innovation, these principles take into account changing circumstances and unpredictable futures. This provides firms with a starting point, namely their own intellectual, human and social capital. From hereon, new information will become available that can guide the firm through the unpredictable future (Sarasvathy, 2001).

*Organizational leadership* – the final process that is vital for changing the business model is leading the change in the organization, which basically means who is responsible for the experimentation (Chesbrough, 2010). Knowing when to shift resources from the former to the latter business model is not an easy task and possibly comes with career consequences for the responsible ones involved. Organizations must address these leadership issues to ensure effective governance of business model experimentation (Chesbrough, 2010).
### Appendix III – Synergy typologies and derived design principles

Table 11 - Synergy typologies and principles

<table>
<thead>
<tr>
<th>Typology</th>
<th>Author</th>
<th>Year</th>
<th>Synergy</th>
<th>Description</th>
<th>Synergy typology Van Ardenne (2013)</th>
<th>Design principle from literature (the numbers (#) correspond to the design principles, structured to synergy type, in chapter 2.4)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Operating Synergy</td>
<td>Ansoff</td>
<td>1965</td>
<td>Sales Synergy</td>
<td>Occur when different products use common distribution channels, common sales administration, or common warehousing.</td>
<td>Customer synergy</td>
<td>#1 In order to create customer synergy, firms should share their distribution, administration and warehousing channels, since sharing can achieve a greater volume of activity for each product and could obtain economies of scale or economies of scope, thereby increasing revenue per customer</td>
</tr>
<tr>
<td></td>
<td>Wind and Mahajan</td>
<td>1988</td>
<td>Investment Synergy</td>
<td>The result of joint use of plant, common raw materials inventories, transfer of R&amp;D from one product to another, common tooling and machinery.</td>
<td>Financial synergy</td>
<td>#8 In order to create financial synergy, firms should share their plant, raw material inventories and machinery, since sharing can achieve a greater volume of activity and could obtain economies of scale or economies of scope with lower investments</td>
</tr>
<tr>
<td>Operating Synergy</td>
<td>Wind and Mahajan</td>
<td>1988</td>
<td>Sales Synergy</td>
<td>Common distribution channels, common market segments</td>
<td>Customer synergy</td>
<td>#2 In order to establish customer synergy, firms should share their distribution channels en market segments, since this could increase sales growth by lowering the costs of sales</td>
</tr>
<tr>
<td>Operating Synergy</td>
<td>Wind and Mahajan</td>
<td>1988</td>
<td>Operating Synergy</td>
<td>Shared facilities and personnel, shared overhead, shared purchasing</td>
<td>Operational synergy</td>
<td>Similar to operational synergy of Ansoff (1965) Similar to principle #4</td>
</tr>
<tr>
<td>Management Synergy</td>
<td>Wind and Mahajan</td>
<td>1988</td>
<td>Management Synergy</td>
<td>Risk reduction, shared resources, ability to generate better strategies</td>
<td>Management synergy</td>
<td>#12 In order to establish management synergy, firms should share resources, since this could result in the ability to generate better strategies that greatly affect other synergy types</td>
</tr>
<tr>
<td></td>
<td>Wind and Mahajan</td>
<td>1988</td>
<td>Investment Synergy</td>
<td>Joint use of equipment, shared R&amp;D and engineering</td>
<td>Financial synergy</td>
<td>#9 In order to establish financial synergy, firms should share their use of equipment and R&amp;D facilities, since this lowers investment costs and increases the return on investment</td>
</tr>
<tr>
<td></td>
<td>Wind and Mahajan</td>
<td>1988</td>
<td>Investment Synergy</td>
<td>Joint use of equipment, shared R&amp;D and engineering</td>
<td>Financial synergy</td>
<td>#9 In order to establish financial synergy, firms should share their use of equipment and R&amp;D facilities, since this lowers investment costs and increases the return on investment</td>
</tr>
</tbody>
</table>

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<table>
<thead>
<tr>
<th>作者</th>
<th>年份</th>
<th>类型</th>
<th>内容</th>
<th>同类原则</th>
</tr>
</thead>
<tbody>
<tr>
<td>Chatterjee</td>
<td>1986</td>
<td>财务协同</td>
<td>内部资本管理：通过有效的内部资本和劳动力市场管理来创造协同效应。</td>
<td>#10</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>需要建立财务协同，公司应该分配资本，确保其组织结构更有效率，因为这降低了开销。</td>
<td></td>
</tr>
<tr>
<td>Persaud</td>
<td>2005</td>
<td>战略协同</td>
<td>协作关系增强的市场区域权力。</td>
<td>#13</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>重组市场区域权力。</td>
<td></td>
</tr>
<tr>
<td>Kaplan and</td>
<td>2006</td>
<td>财务协同</td>
<td>1. 内部资本管理：通过有效的内部资本和劳动力市场管理来创造协同效应。</td>
<td>#16</td>
</tr>
<tr>
<td>Norton</td>
<td></td>
<td></td>
<td>需要建立财务协同，公司应该协调内部资本和劳动力市场，使得公司内部更有效率。</td>
<td></td>
</tr>
</tbody>
</table>

**备注：**
- #10: 根据Chatterjee (1986)的原则，为了建立财务协同，公司应该分配资本，确保其组织结构更有效率，因为这降低了开销。
- #13: 根据Persaud (2005)的原则，为了建立战略协同，公司应该重组市场区域权力。
- #16: 根据Kaplan and Norton (2006)的原则，为了建立财务协同，公司应该协调内部资本和劳动力市场，使得公司内部更有效率。
<table>
<thead>
<tr>
<th>2. Value-chain integration: create value by integrating contiguous processes in the industry value chain</th>
<th>Operational synergy</th>
<th>Similar to operational synergy of Ansoff (1965); Wind and Mahajan (1988); Chatterjee, 1986</th>
<th>Similar to principle #4</th>
</tr>
</thead>
<tbody>
<tr>
<td>Learning and Growth Synergy</td>
<td>Intangible assets: share competency in the development of human, information and organizational capital</td>
<td>Knowledge management synergy</td>
<td>#17 In order to establish knowledge management synergy, firms should develop and share intangible resources, since these resources present an opportunity to create competitive advantage.</td>
</tr>
<tr>
<td>Operative Synergies - growth</td>
<td>Increased revenues, combination of complementary resources across businesses</td>
<td>Operational synergy - growth synergy</td>
<td>#6 In order to establish growth synergy, firms should combine complementary resources across firms, since this could provide unique customer value and capture market opportunities.</td>
</tr>
<tr>
<td>Operative syneriges - efficiency</td>
<td>Operational efficiency, cost sub-additivities</td>
<td>Operational synergy - efficiency synergy</td>
<td>#7 In order to establish efficiency synergy, firms should share resources in the production of multiple outputs across firms, since this leads to lower joint costs by putting underutilized resources to productive use.</td>
</tr>
<tr>
<td>Corporate Management Synergies</td>
<td>Entrepreneurial capabilities, superior strategic capabilities</td>
<td>Management synergy</td>
<td>#15 In order to management synergy, corporate managers should disaggregate the objectives of synergy initiatives, since clarifying the objectives contributes to the evaluation of costs and benefits, and to the creation of concrete implementation plans.</td>
</tr>
<tr>
<td>Wu and Choi 2004</td>
<td>No typology provided, general synergies.</td>
<td>Firm synergy</td>
<td>#19 In order to establish firm synergies, firms should invest in strong ties with government offices and (financial) institutions, since this provides access to valuable information and benefits that can put the firm in a better position to cooperate more efficiently with its business partners.</td>
</tr>
<tr>
<td>Sandull &amp; Chesbrough 2009</td>
<td>No typology provided, general synergies</td>
<td>Firm synergy</td>
<td>#20 In order to establish firm synergies, firms should engage in long-term, on-going business interactions with each other, since this enables both firms to establish an effective work routine for the exchange of information and knowledge.</td>
</tr>
<tr>
<td>Dahlander &amp; Gann 2010</td>
<td>No typology</td>
<td>Firm synergy</td>
<td>#21 In order to establish firm synergies, firms should engage with committed and trusted partners, who complement internal resources and fit the firm’s strategy, since this will increase the absorptive capacity of the firm so that resources with added value can be identified, integrated with internal resources and exploited</td>
</tr>
</tbody>
</table>

In order to create firm synergy, firms must open their business models to other parties, since by combining own processes with externally available ideas, available resources become key components in the business model and paths to market become shorter.
Appendix IV – Synergy biases (based on Goold and Campbell, 1998)

1. **Synergy bias** – this bias refers to the overestimation of synergy and the underestimation of costs involved. These estimations rise from the feeling of executives within firms that they *ought* to be creating synergy. In their search for synergy, perhaps at many costs, firm’s executives make unwise decisions and investments; the creation of synergy becomes top priority and distracts attention from core tasks.

2. **Parenting bias** – this bias refers to a belief that synergy can only be created by persuading business units to cooperate. Therefore, the firm’s parent forces the different units to cooperate, even if the units are hesitant for good reasons. The parent concludes that managers are naturally resistant towards cooperation, e.g. due to the ‘not-invented-here syndrome’. However, as Goold and Campbell point out, this assumption is wrong. Business units managers have every reason to forge links with other units to make their own unit more successful. In fact, they regularly team up with outside organization; suppliers, customers, joint ventures, and even direct competitors if it is in their interest. Indeed, Goold and Campbell (1998) describe here Chesbrough’s (2003) idea of open innovation and see in this valuable opportunities as business units team up to become more successful. However, this article is written five years earlier and therefore does not include the terminology as introduced by Chesbrough (2003).

3. **Skills bias** – frequently accompanying the parenting bias, the skills bias is the assumption that whatever know-how is required to achieve synergy, is available within the firm. Parents that force cooperation between units, assume all skills and knowledge are available within the firm. A lack of the right skills can fatally undermine the implementation of any synergy initiative. Moreover, learning new skills is not easy. If new and unfamiliar skills are required, as Goold and Campbell (1998, p. 136) argue, “*it may be better to pass the opportunity by than to embark on an intervention that can’t be successfully implemented*”. Of course, literature on open innovation sees another possibility here than either ‘do-it-yourself’ or ‘pass the opportunity by’.

4. **Upside bias** – synergies often come with unforeseen consequences, either beneficial or harmful to the firm. This bias reflects the tendency of firms’ executive to concentrate so hard on the potential benefits of synergy, that they overlook the downside.
### Appendix V – CIMO logic

Table 12 - CIMO logic defined (based on Denyer et al., 2008, p. 397)

<table>
<thead>
<tr>
<th>Component</th>
<th>Explanation</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>C</strong></td>
<td><strong>Context</strong></td>
</tr>
<tr>
<td><strong>I</strong></td>
<td><strong>Intervention</strong></td>
</tr>
<tr>
<td><strong>M</strong></td>
<td><strong>Mechanism</strong></td>
</tr>
<tr>
<td><strong>O</strong></td>
<td><strong>Outcome</strong></td>
</tr>
</tbody>
</table>
Appendix VI – Literature search strategy

This appendix describes the used search strategy used to find a purposive sample of academic literature that is relevant for the description of the concepts and answering the research question posed. Several search strings has been used to find the relevant literature, e.g. ‘synergy’, ‘synergy creation’, ‘synergy AND business models’, etc. The search strings are entered in several academic research engines (Google Scholar, ABI/inform, ScienceDirect, Wiley and JSTOR) during the writing of the thesis (November ‘12 – June ‘13). The relevance of the articles has been established by reading its title and abstract. When the content of the article looked promising or even directly relevant, the article was scanned or read, respectively. While reading articles, the scope expanded with relevant references found in literature (i.e. ‘snowballing’). These articles can thus be used in this thesis, without being found via using the search strings. While performing the literature review, new search strings were developed, since fortunately, new insights have been gained during the writing of this thesis. So, the process of writing the thesis can be seen as an iterative process more than a linear process consisting of a literature search and a summary presented of the findings. A final remark on the search strategy is the fact that not all literature is found using this search strategy; some articles are provided by the supervisor of this study, or found via the knowledge base of the ITEM-group (Innovation, Technology, Entrepreneurship and Marketing) of the Industrial Engineering and Innovation Sciences faculty at the Eindhoven University of Technology.

The literature used in this thesis has been evaluated according to three criteria:

*Times cited* – The article should be cited in literature adequately. If an article is cited many times, but does not meet the next criteria, the article is still considered of an appropriate standard, since it is recognized by peers in the field as an important article with relevant theory to cite.

*Source* – Of course, the older the article is, the higher the chances of citation become. To avoid deselecting recent articles of high quality solely on a low number of citations, the second criteria – source of publication – is taken into account. All sources should be scholarly journals and should appear in the 47th Harzing Journal Quality List (Harzing.com, 2012). This list is published to target papers at journals of an appropriate standard. More precisely, the list is a collection of multiple worldwide journal rankings. From this list, the two most recent rankings (both 2012) have been used. Older rankings could be out-dated, since the quality of journals could have improved or decreased over the years. Therefore, the articles used in this literature review should appear on the journal rankings of either the Cranfield University School of Management (Cra) or the Erasmus Research Institute of Management Journals Listing (EJL). Of course, all rankings could have been taken into account. However, this would liberalize the evaluation criteria and possibly would decrease the quality of the literature study.

*Purpose* – the article should develop theory, consist of a review or conducts empirical investigation

Used articles should meet either a combination of criteria 1 & 3 or 2 & 3 for the above-mentioned reasons. All articles found through snowballing, are considered of an appropriate quality since these are mentioned in an article that met the inclusion criteria.
Appendix VII – Coding scheme

- Number of parties > 1
- Change in Business model Component

Construct events:
Open business model initiatives

Coding of open business model innovation
- Value proposition
- Customer segments
- Customer relationships
- Channels
- Revenue streams
- Cost structure
- Key resources
- Key activities
- Key partners

Coding according to definition of (desired) synergy typology
- Operating capital market
- Joint use of equipment
- Financial synergy (F)
- Leveraging entrepreneurial capabilities
- Superior strategic leadership
- Management synergy (M)
- Expanding market message
- Bring multiple products to the customer
- Customer synergy (C)

(Re)combining complementary resources for growth or efficiencies
- Operational synergy (O)

Ability to create new innovations through leveraging resources
- KM synergy (KM)

Coding Intervention and Mechanism
- Trust and Communication (TC)
- Absorptive Capacity (AC)
- Organizational leadership (OL)

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Appendix VIII – Business model canvas of C30 Project Bureau
This appendix has been removed because it contained confidential information.
## Appendix IX – Design Principles and building blocks/parameters arranged by synergy type

### Table 13 - Design principles and parameters – Customer synergy

<table>
<thead>
<tr>
<th>Design Principles</th>
<th>BM component/parameter (explanation/definition)</th>
<th>Synergy creation (Goold and Campbell, 1998)</th>
<th>Synergy created</th>
<th>Based on</th>
</tr>
</thead>
<tbody>
<tr>
<td>#1</td>
<td>Channels (describe how value proposition is delivered)</td>
<td>Shared resources</td>
<td>Customer synergy</td>
<td>Ansoff (1965)</td>
</tr>
<tr>
<td>#3</td>
<td>Value proposition (create a consistent buying experience conforming corporate standards)</td>
<td>Combined business creation</td>
<td>Customer synergy</td>
<td>Kaplan and Norton (2006)</td>
</tr>
<tr>
<td>VIII</td>
<td>Key partnerships, value proposition, (partners that make the business model work; i.e. they fit the culture)</td>
<td>Coordinated strategies</td>
<td>Customer synergy</td>
<td>Bruns, Ingeteam Energy &amp; Kugler-Womako</td>
</tr>
<tr>
<td>IX</td>
<td>Value proposition (products or service that create value for customer must be defined by analysis of both firms)</td>
<td>Combined business creation</td>
<td>Customer synergy</td>
<td>Philips</td>
</tr>
<tr>
<td>X</td>
<td>All components (focus on ambidexterity: combine old and new business model, consisting of all components)</td>
<td>Coordinated strategies/combined business creation</td>
<td>Customer synergy</td>
<td>FEI</td>
</tr>
<tr>
<td>XI</td>
<td>Value proposition (products or service that create value for customer must be defined by analysis of both firms)</td>
<td>Coordinated strategies/combined business creation</td>
<td>Customer synergy</td>
<td>Van Gansewinkel</td>
</tr>
<tr>
<td>XII</td>
<td>All components (overcome interpretation differences by mapping the business model components in a canvas)</td>
<td>Coordinated strategies/combined business creation</td>
<td>Customer synergy</td>
<td>Frenos Iruna</td>
</tr>
</tbody>
</table>

### Table 14 - Design principles and parameters – Operational synergy

<table>
<thead>
<tr>
<th>Design principles</th>
<th>BM Component/parameter (explanation/definition)</th>
<th>Synergy creation (Goold and Campbell, 1998)</th>
<th>Synergy Created</th>
<th>Based on</th>
</tr>
</thead>
<tbody>
<tr>
<td>5</td>
<td>Key resources, key activities (assets/activities required)</td>
<td>Coordinated strategies/Shared (tangible) resources</td>
<td>Operational synergy</td>
<td>Kaplan and Norton (2006)</td>
</tr>
<tr>
<td>6</td>
<td>Key resources, value proposition (combination of assets required to create value for the customer)</td>
<td>Shared (tangible) resources/Combined business creation</td>
<td>Operational synergy</td>
<td>Knoll (2008)</td>
</tr>
<tr>
<td>7</td>
<td>Key resources (assets required)</td>
<td>Shared (tangible) resources</td>
<td>Operational synergy</td>
<td>Knoll (2008)</td>
</tr>
<tr>
<td>1</td>
<td>Key partners (firms should develop a legal framework to build confidence between partners)</td>
<td>Combined business creation</td>
<td>Operational synergy</td>
<td>Bosch</td>
</tr>
</tbody>
</table>
### Table 15 - Design principles and parameters - Financial synergy

<table>
<thead>
<tr>
<th>Design principles</th>
<th>BM component/ parameter (explanation/definition)</th>
<th>Synergy creation (Goold and Campbell, 1998)</th>
<th>Synergy created</th>
<th>Based on</th>
</tr>
</thead>
<tbody>
<tr>
<td>8</td>
<td><em>Cost structure</em> (lowering investments costs incurred in operating the BM by sharing plant and equipment)</td>
<td>Shared (tangible) resources Coordinated strategies</td>
<td>Financial synergy</td>
<td>Ansoff (1965)</td>
</tr>
<tr>
<td>9</td>
<td><em>Cost structure</em> (lowering investments costs incurred in operating the BM by sharing plant and equipment)</td>
<td>Shared (tangible) resources Coordinated strategies</td>
<td>Financial synergy</td>
<td>Wind and Mahajan (1988), Kaplan and Norton (2006)</td>
</tr>
<tr>
<td>10</td>
<td><em>Revenue streams, cost structure</em> (allocate capital together to ensure revenue streams and lower costs)</td>
<td>Coordinated strategies, pooled negotiation power</td>
<td>Financial synergy</td>
<td>Chatterjee (1986), Kaplan and Norton (2006), Knoll (2008)</td>
</tr>
</tbody>
</table>

### Table 16 - Design principles and parameters - Management synergy

<table>
<thead>
<tr>
<th>Design Principles</th>
<th>BM component/ parameter (explanation/definition)</th>
<th>Synergy creation (Goold and Campbell, 1998)</th>
<th>Synergy created</th>
<th>Based on</th>
</tr>
</thead>
<tbody>
<tr>
<td>11</td>
<td><em>Key activities</em> (most important 'things'/problems to be done by both firms)</td>
<td>Shared know-how</td>
<td>Management synergy</td>
<td>Ansoff (1965)</td>
</tr>
<tr>
<td>12</td>
<td><em>Key resources</em> (physical, financial, intellectual or human assets required to generate strategies)</td>
<td>Shared (tangible) resources Coordinated strategies</td>
<td>Management synergy</td>
<td>Wind and Mahajan (1988)</td>
</tr>
<tr>
<td>13</td>
<td><em>Coordinated strategies</em> (coordinate knowledge flows)</td>
<td>Coordinated strategies Shared know-how</td>
<td>Management synergy</td>
<td>Persaud (2005)</td>
</tr>
<tr>
<td>14</td>
<td><em>Coordinated strategies</em> (structured context)</td>
<td>Coordinated strategies</td>
<td>Management synergy</td>
<td>Persaud (2005)</td>
</tr>
<tr>
<td>15</td>
<td><em>Revenue streams</em> (disaggregate the objectives in order to evaluate implementation and revenue streams)</td>
<td>Coordinated strategies, Combined business creation</td>
<td>Management synergy</td>
<td>Knoll (2008), Dahlander and Gann (2010)</td>
</tr>
<tr>
<td>IV</td>
<td><em>All components: Leadership support</em> (fresh perspective that is less tight to existing business model)</td>
<td>Combined business creation</td>
<td>Management synergy</td>
<td>Bruns, MechaniCo</td>
</tr>
<tr>
<td>V</td>
<td><em>All components: Leadership support</em> (fresh perspective and open minded culture stimulated)</td>
<td>Combined business creation</td>
<td>Management synergy</td>
<td>Frenos Iruna</td>
</tr>
<tr>
<td>VI</td>
<td><em>Key partners</em> (to clearly communicate objectives to overcome knowledge transfer issues)</td>
<td>Shared know-how Coordinated strategies</td>
<td>Knowledge management synergy</td>
<td>Bosch</td>
</tr>
<tr>
<td>Design principles</td>
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</tr>
<tr>
<td>16</td>
<td><strong>Key resources</strong> (leverage knowledge, ideas, people, technology and organizational competences)</td>
<td>Shared (tangible) resources Shared know-how</td>
<td>Knowledge management synergy</td>
<td>Persaud (2005)</td>
</tr>
<tr>
<td>17</td>
<td><strong>Key resources</strong> (develop and share intangible resources)</td>
<td>Shared know-how</td>
<td>Knowledge management synergy</td>
<td>Kapland and Norton (2006)</td>
</tr>
<tr>
<td>II</td>
<td><strong>Key partners/ key resources/VP/customer segments</strong> (partners that make the business model work; i.e. that can be trusted)</td>
<td>Combined business creation Coordinated strategies Pooled negotiation power</td>
<td>Knowledge Management synergy</td>
<td>Bodegas Ochoa</td>
</tr>
<tr>
<td>III</td>
<td><strong>Key partners</strong> (start central network that could make the open business model work and achieve higher levels of innovation)</td>
<td>Coordinated strategies</td>
<td>Knowledge management synergy</td>
<td>MechaniCo</td>
</tr>
<tr>
<td>VII</td>
<td><strong>All components through communication</strong> (start cross-functional interfaces to overcome NIH syndrome)</td>
<td>Shared know-how Coordinated strategies</td>
<td>Knowledge management synergy</td>
<td>MechaniCo</td>
</tr>
</tbody>
</table>

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<th>Synergy created</th>
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</tr>
</thead>
<tbody>
<tr>
<td>18</td>
<td><strong>Communication</strong> (improves the ability to develop and exploit new and successful innovations)</td>
<td>Combined business creation Shared know-how</td>
<td>Firm synergy</td>
<td>Persaud (2005)</td>
</tr>
<tr>
<td>19</td>
<td><strong>Key partners</strong> (invest in strong ties with valuable knowledge that can make the business model work)</td>
<td>Shared know-how</td>
<td>Firm synergy</td>
<td>Wu and Choi (2004)</td>
</tr>
<tr>
<td>20</td>
<td><strong>Key partners</strong> (long term, on-going interactions enable both firms to establish an effective work routine for the exchange of information and knowledge)</td>
<td>Shared know-how</td>
<td>Firm synergy</td>
<td>Wu and Choi (2004)</td>
</tr>
<tr>
<td>21</td>
<td><strong>Key partners</strong> (engagement with committed and trusted partners, who complement internal resources and fit the firm’s strategy will increase the absorptive capacity and will make the business model work)</td>
<td>Shared know-how</td>
<td>Firm synergy</td>
<td>Sandulli and Chesbrough (2009)</td>
</tr>
<tr>
<td>22</td>
<td><strong>All components</strong> (opening up the business model involves all business model components)</td>
<td>Shared know-how, coordinated strategies, shared tangible resources, pooled negotiation power &amp; combined business creation</td>
<td>Firm synergy</td>
<td>Dahlander and Gann (2010)</td>
</tr>
</tbody>
</table>
Appendix X – Business Model Canvas C30 Business Development

This appendix has been removed because it contained confidential information.