CORPORATE INNOVATION SYSTEMS AND THE EFFECT OF CONTINUITY, COMPETENCE, AND CO-OPERATION ON INNOVATION PERFORMANCE

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ABSTRACT

Innovations have always been an essential factor for the long-term success of corporations. This is all the more true at times like the present, which is becoming increasingly dynamic and fast due to such effects as digitalization and globalization. However, as important as innovations are for the success of corporations, their systematic development is just as challenging. This fact can be demonstrated not least by numerous practical examples in which formerly successful corporations were unable to react appropriately to changing market and competitive conditions and consequently had to give up their market position. The challenges in the development of innovations can be traced back to different organizational conditions, which are necessary for the efficient exploitation of existing products on the one hand and the exploration of new innovations on the other.

The scientific literature recommends, among other things, the separation of exploration and exploitation into different organizational units to meet the challenges mentioned above. In addition to the operational business units, which are usually responsible for the exploitation of existing products, it is advisable to establish innovation units, such as corporate incubators or corporate venture capital units, and to entrust them with the exploration of innovations. For a detailed examination of the current state of research on corporate incubators and corporate venture capital, two systematic literature analyses were carried out within the scope of this thesis. As a result, it was discovered that further research is needed, particularly concerning the organizational integration of such innovation units into the overall organization and the associated conflicts of objectives.

To make an initial contribution to closing the research gap mentioned above, a further study of this work is devoted to the organizational integration of different innovation programs in an established corporation. This study differs from previous studies in that it takes an overarching perspective and considers the entire organization, including the innovation units, as a holistic innovation system. Such a corporate innovation system consists of at least three different types of innovation units in addition to the operational business units: exploration-oriented innovation units for the generation of disruptive innovations, exploitation-oriented innovation units for the further development of existing products and transformation-oriented innovation units for the transformation of the corporate culture. Such a system can ensure the systematic and sustainable generation of innovations, especially in the interaction of the various innovation units.

In addition to the basic establishment of the innovation units mentioned above, however, appropriate organizational framework conditions are required to ensure that innovations can be developed successfully. The fourth study in this thesis is dedicated to the question of how continuity, competence and cooperation affect the innovation performance of corporations. It could be analyzed that the continuous implementation of innovation activities has the greatest positive effect on the innovation performance of enterprises. While cooperation, in combination with continuity, has a short- to medium-term impact on innovation performance, competence and continuity have a long-term effect on innovation performance. Cooperation and competence are complementary concepts in that cooperation should be used for short-term innovation activities, while competence should be used for the long-term sustainable development of innovations within the enterprise.

As a result, this work addresses existing research gaps with regard to the integration of innovation units and the organizational structures of corporations and provides valuable insights and approaches for further research. For this purpose, it was necessary to link findings from the field of innovation management and corporate venturing with concepts of organizational theory. Through this connection, we have succeeded in gaining new scientific insights that previously could not be gained independently within the individual research streams. We are convinced that our findings on Corporate Innovation Systems and the effects of continuity, competence and cooperation on innovation performance have made an important scientific contribution. That is all the more true at a time when successful innovation is becoming increasingly important for corporations and a growing number of newly emerging innovation units can be observed in practice.

ZUSAMMENFASSUNG

Innovationen stellen seit jeher einen wesentlichen Faktor für den langfristigen Erfolg von Unternehmen dar. Dies gilt umso mehr in einer Zeit wie der heutigen, welche durch Effekte wie die Digitalisierung und Globalisierung zunehmend an Dynamik und Schnelligkeit gewinnt. So bedeutsam Innovationen jedoch für den Erfolg von Unternehmen sind, so herausfordernd stellt sich deren systematische Entwicklung dar. Dies lässt sich nicht zuletzt an zahlreichen Praxisbeispielen belegen, in welchen ehemals erfolgreiche Unternehmen nicht in der Lage waren angemessen auf veränderte Markt- und Wettbewerbsbedingungen zu reagieren und in der Folge ihre Marktposition aufgeben mussten. Die Herausforderungen bei der Entwicklung von Innovationen lassen sich dabei insbesondere auf unterschiedliche organisatorische Voraussetzungen zurückführen, welche einerseits für die effiziente Exploitation bestehender Produkte und andererseits für die Exploration neuer Innovationen benötigt werden.

Zur Begegnung der angeführten Herausforderungen wird in der wissenschaftlichen Literatur unter anderem die Trennung von Exploration und Exploitation in verschiedene Organisationeinheiten empfohlen. Neben den operativen Geschäftseinheiten, welche in der Regel für die Exploitation bestehender Produkte verantwortlich sind, empfiehlt es sich daher Innovationseinheiten wie beispielsweise Corporate Incubators oder Corporate Venture Capital Einheiten zu etablieren und diese mit der Exploration neuer Innovation zu betrauen. Zur detaillierten Untersuchung des aktuellen Forschungsstands zu Corporate Incubators und Corporate Venture Capital wurden im Rahmen dieser Arbeit unter anderem zwei systematische Literaturanalysen durchgeführt. Im Ergebnis konnte hierdurch aufgedeckt werden, dass es insbesondere hinsichtlich der organisatorischen Einbindung solcher Innovationseinheiten in die Gesamtorganisation und damit verbundener Zielkonflikte noch weiterer Forschung bedarf.

Um einen ersten Beitrag zur Schließung der angeführten Forschungslücke zu leisten, widmet sich eine weitere Studie dieser Arbeit der organisatorischen Einbindung unterschiedlicher Innovationsprogramme in ein etabliertes Unternehmen. Dabei differenziert sich diese Studie von vorangegangenen Arbeiten, indem sie eine übergreifende Perspektive einnimmt und die Gesamtorganisation samt der Innovationseinheiten als ein holistisches Innovationssystem (Corporate Innovation System) betrachtet. Ein solches Corporate Innovation System besteht dabei neben den operativen Geschäftseinheiten aus mindestens drei verschiedenen Typen von Innovationseinheiten: Exploration-

orientierten Innovationseinheiten für die Generierung disruptiver Innovationen, Exploitation-orientierten Innovationseinheiten für die Weiterentwicklung bestehender Produkten sowie Transformation-orientierte Innovationseinheiten für die Transformation der Unternehmenskultur. Insbesondere im Zusammenspiel der verschiedenen Innovationseinheiten kann dabei ein solches System die systematische und nachhaltige Generierung von Innovationen gewährleisten.

Neben der grundsätzlichen Etablierung der angeführten Innovationseinheiten bedarf es jedoch zusätzlich entsprechender organisatorischer Rahmenbedingungen damit Innovationen erfolgreich entwickelt werden können. Hierzu widmet sich die vierte Studie dieser Arbeit der Frage, wie sich Kontinuität, Kompetenz und Kooperation auf die Innovationsleistung von Unternehmen auswirken. Hierbei konnte analysiert werden, dass die kontinuierliche Durchführung von Innovationsaktivitäten die größte positive Auswirkung auf die Innovationsleistung von Unternehmen hat. Während sich Kooperationen im Zusammenspiel mit Kontinuität insbesondere kurz- bis mittelfristig auf die Innovationsleistung auswirken, wirken Kompetenz und Kontinuität langfristig auf die Innovationsleistung. Kooperationen und Kompetenz stellen hierbei sich ergänzende Konzepte dar, indem Kooperation für kurzfristige Innovationsmaßnahmen eingesetzt werden sollten, während die Kompetenz im eigenen Unternehmen langfristig für die nachhaltige Entwicklung von Innovationen zum Einsatz kommen sollte.

Im Ergebnis nimmt sich diese Arbeit bestehender Forschungslücken hinsichtlich der Einbindung von Innovationseinheiten und die Organisationsstrukturen von Unternehmen an und liefert hierzu wertvolle Erkenntnisse sowie Ansätze für weitere Forschungsarbeiten. Hierzu war es notwendig Erkenntnisse aus dem Bereich des Innovationsmanagements und des Corporate Venturing mit Konzepten der Organisationstheorie zu verknüpfen. Durch diese Verknüpfung ist es uns gelungen neue wissenschaftliche Erkenntnisse zu erlangen, die zuvor innerhalb der einzelnen Forschungsströme nicht unabhängig voneinander gelöst werden konnten. Wir sind überzeugt, dass unsere Erkenntnisse über Corporate Innovation Systems und die Auswirkungen von Kontinuität, Kompetenz und Kooperation auf die Innovationsleistung einen wichtigen wissenschaftlichen Beitrag geleistet haben. Dies gilt umso mehr in einer Zeit, in der erfolgreiche Innovation für Unternehmen immer wichtiger wird und in der eine wachsende Zahl neu entstehender Innovationseinheiten in der Praxis zu beobachten ist.

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1. INTRODUCTION

1.1. Corporate innovation programs as field of research

1.1.1. Corporate innovation programs to master the innovation challenge

1.1.1.1. Corporations' challenge of developing innovation

There has long been a consensus within the academic literature that constant innovation is a key factor for the long-term success of a corporation (Levinthal & March, 1993; March, 1991). Already at the beginning of the 20th century, Schumpeter (1934) argued in his pioneering work *Theory of Economic Development* that economic development is based on a process of "creative destruction" in which new developments regularly replace old structures. Innovations are thus a fundamental driver of the reorganization and further development of our economy (Nelson & Winter, 1982). Corporations, as a major part of our economy, therefore contribute significantly to our economic and societal development through their entrepreneurial and pioneering spirit paired with the willingness to push their products and services forward (Nelson, 1993).

In addition to their social responsibility, which goes hand in hand with the further development of the economy, corporations also pursue their own economic interests by selling innovative products and services (Schumpeter, 1934). Thus, innovations initially allow corporations to realize monopoly profits until they are taken up by imitators and become subject to competition. In addition to price differentiation, product and service differentiation by way of new and improved offerings represents an essential feature in the market. Innovations thus help corporations assert themselves against competitors and survive in the market long-term (Christensen, 1997). Especially in an economy like today, which is becoming increasingly fast and dynamic due to effects such as digitalization, globalization (Berger et al., 2019), and the post-pandemic effects of COVID-19 (Kuckertz et al., 2020), the development of innovations is more important than ever. Corporations must therefore be able to adapt to changing conditions more and more quickly and use these changes to generate new competitive advantages—especially through the development of innovative technologies and products.

As important as innovations are for corporations, their development is particularly challenging. This can be shown by many examples from the recent past in which many formerly successful—in some cases even market-leading—corporations did not react to new, relevant developments in

time and consequently lost their favorable market position (Christensen, 1997; Christensen & Raynor, 2003). This can be attributed to, among other things, the different organizational requirements which are needed for the efficient production of existing products and services on the one hand and for the exploration of new products and services on the other. This phenomenon has been described in the academic literature, in particular by March (1991), who has worked out the different organizational and structural conditions for exploration and exploitation.

If corporations do not succeed in designing their organizational structures for the exploitation of existing products and the exploration of new products, they run the risk of not being able to react appropriately to new developments and, in the mid- to long-term, of being forced out of the market by competitors as part of "creative destruction" (Schumpeter, 1934). To meet this challenge, Tushman & O'Reilly (1996) have developed the concept of "ambidexterity" in the academic literature, which describes various approaches to balance exploration and exploitation (Kollmann et al., 2009). In general, the concept provides different approaches for the contextual, sequential, and organizational separation of exploratory and exploitative activities (Gibson & Birkinshaw, 2004; Raisch & Birkinshaw, 2008). This balance should enable corporations to explore new products and exploit existing products to a sufficient extent.

In this vein, organizational ambidexterity is understood as the establishment of different organizational units, whereby some units are optimized for the performance of exploitative activities and other units are optimized for exploratory activities (Gibson & Birkinshaw, 2004; Raisch et al., 2009). Exploitation-oriented corporate units are characterized by standardized and formal structures and processes which enable them to perform with high efficiency. Exploration-oriented organizational units, on the other hand, are characterized by much more flexible structures with flatter hierarchies to promote creative and interdisciplinary activities (Benner & Tushman, 2003; Tushman & Smith, 2002).

1.1.1.2. Corporate innovation programs to master innovation

Following the concept of organizational ambidexterity, many corporations have established separate organizational units for exploratory activities in addition to their operational business units with a focus on the efficient exploitation of existing products (Burgers et al., 2009; Hill & Birkinshaw, 2006, 2012). The design of the exploration-oriented units is highly individual and can take a variety of different forms depending on the specific objectives (Miles & Covin, 2002; Narayanan

et al., 2009). In this context, particular reference is made to the research field of corporate venturing – one of the trending topics in entrepreneurial research (Kuckertz & Prochotta, 2018) –, in which a wide variety of innovation activities are discussed, each of which aims to develop innovative products based on internal and external innovation impulses (Sharma & Chrisman, 1999). One common classification of these activities is based on the degree of commitment associated with the respective activity. Based on the principles of transaction cost economics, van de Vrande et al. (2006) differentiated various innovation activities according to their degree of liability and reversibility (see Figure 1-1). According to this distinction, innovation activities (such as idea contests, hackathons, and corporate accelerators) are associated with a low degree of commitment and a high degree of reversibility, while corporate incubators and corporate venture capital units are associated with a high degree of commitment and a low degree of reversibility.

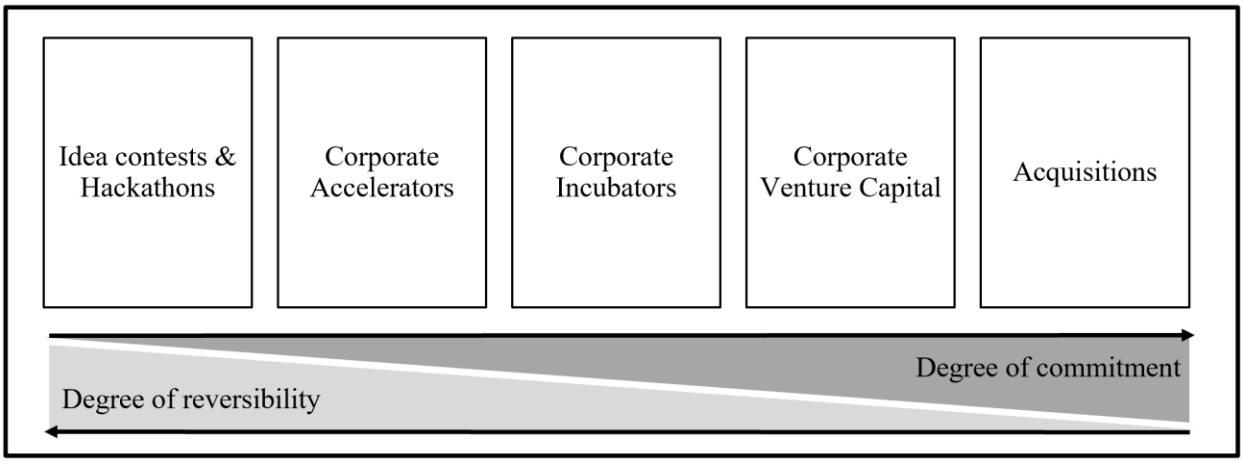


Figure 1-1: Innovation activities and their degree of commitment/reversibility (van de Vrande et al., 2006)

Despite the already comprehensive investigation and classification of the innovation activities cited in the academic literature, it must be noted that many innovation activities apparently cannot develop their intended potential in practice and are subsequently discontinued. With regard to corporate incubators and corporate venture capital, for example, research shows that about one third of the corporations that have established such innovation activities were not satisfied with the results (e.g., Becker & Gassmann, 2006b; Dushnitsky & Lenox, 2006). The high failure rate is attributed in particular to the fact that the innovation activities were not able to meet the promised

strategic goals of the parent corporation and the operational business units. For this reason, a more detailed examination of the integration of innovation programs into the organizational structures of their parent corporation is required (Kötting & Kuckertz, 2019; O'Connor & DeMartino, 2006).

1.1.1.3. Organizational embedding of corporate innovation programs

Despite the classification of the various innovation activities in the academic literature, existing studies often do not detail the integration of individual innovation activities into the organizational structures of the parent corporation (e.g., Kötting, 2019; Röhm, 2018). Given the complexity of this topic, it requires increased attention in theory and practice. As shown in Figure 1-2, innovation units can be designed along a continuum from low to high autonomy, always taking into account the goals of the parent corporation (Evald & Bager, 2008; Ginsberg & Hay, 1994). Close integration can ensure an intensive transfer of knowledge between the innovation and operational business units (Chen & Kannan-Narasimhan, 2015; Gassmann & Becker, 2006). This close cooperation allows the two units to interact and build acceptance at an early stage (Zedtwitz et al., 2004). On the other hand, this close involvement, usually combined with insufficient autonomy, can lead to a direct negative influence of the operational business units on the activities of the innovation unit (van Burg et al., 2012). Consequently, the activities of the innovation unit are usually less innovative and more focused on the existing core business (Gassmann & Becker, 2006).

The advantages of a high degree of autonomy can be seen in the greater independence of the innovation unit and consequential in the development of more disruptive innovations. The disadvantage of too much autonomy, however, is that it makes knowledge transfer between the innovation unit and other business units more difficult and leads to less acceptance of the developments (Dokko & Gaba, 2012; Zedtwitz et al., 2004). A conflict of objectives can therefore be identified in the organizational integration of innovation units. Corporations can thus decide either to develop innovative products in isolation or to produce incremental improvements geared to their core business. Neither of these objectives can currently be achieved by using a single innovation unit.

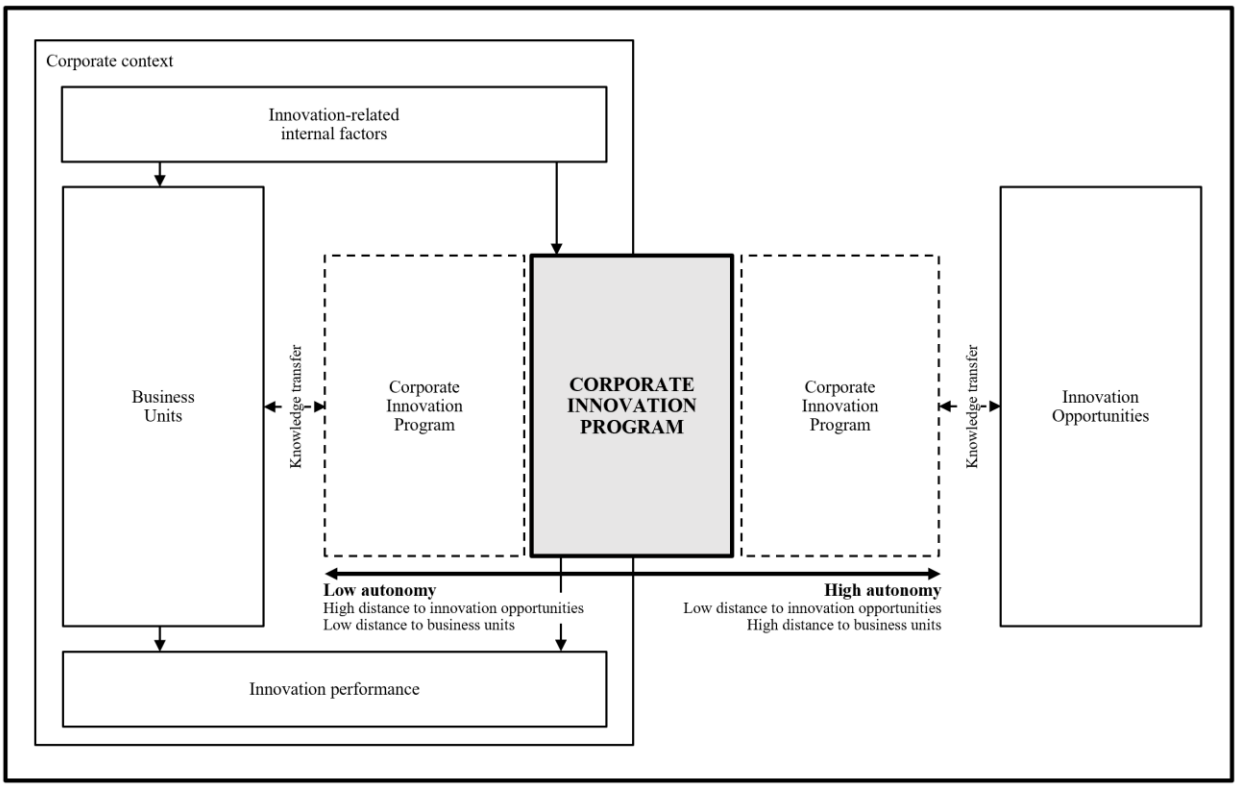


Figure 1-2: Organizational embedding of corporate innovation programs

The above-mentioned findings ultimately lead to several questions that have not yet been adequately answered in the academic literature, at least not for corporate incubators and corporate venture capital (Kötting, 2018, 2019). In particular, the question arises of how the best possible balance can be ensured so that innovation units can develop radical innovations (high autonomy) on the one hand, but also ensure the transfer of knowledge to and acceptance from the other business units (low autonomy). From this, in turn, the following questions can be derived: how can good knowledge transfer and high acceptance be ensured despite high autonomy? How can radical innovations be developed independently of the direct and indirect influence of other business units despite low autonomy? Are there organizational structures that solve this dilemma?

1.1.2. Corporate innovation programs as part of a corporate innovation system

While the academic literature on innovation management and corporate venturing has already dealt in detail with the design of innovation units (e.g., corporate incubators, corporate venture capital), many of these studies focus exclusively on individual innovation units within a corporation (e.g.,

Allen & Hevert, 2007; Dushnitsky & Lenox, 2006; Maula et al., 2013). Although this perspective is valuable and has already contributed to answering many open research questions, it lacks a holistic perspective and neglects the integration of the innovation units into the overall organization (Maine, 2008; O'Connor & Ayers, 2005). However, this perspective is important for examining the organizational embedding of the innovation unit and, in particular, its interactions with other innovation and operational business units within the corporation. Individual innovation units often represent only one component of a larger, corporation-wide innovation system (Kötting & Kuckertz, 2019).

Following Kötting & Kuckertz (2019), a corporate innovation system usually consists of several different innovation units that are highly interdependent. For this reason, an analysis of individual innovation units is not sufficient for a holistic understanding of the innovation mechanisms within a corporate group. Rather, a holistic view of the these units and the activities of a corporation is required, since the coordination mechanisms between the individual elements of the system are also of great academic interest (O'Connor & Ayers, 2005). The interaction between these units is of high importance, especially when corporations use different organizational units to implement organizational ambidexterity. For this reason, innovation units should be regarded less as autonomous and isolated actors within a corporation and instead as part of a holistic corporate innovation system.

While in practice and in the academic literature innovation units are mainly classified according to corporate accelerators, corporate incubators, and corporate venture capital, a clear differentiation between these forms—exceeding the degree of commitment and reversibility—is difficult due to diverse and sometimes divergent definitions (Narayanan et al., 2009; Sharma & Chrisman, 1999). For this reason, Kötting & Kuckertz (2019) introduced corresponding archetypes for organizational innovation units to compare the actors of a corporate innovation system across different corporations. In this context, the authors refer to the classification of exploration-oriented programs, exploitation-oriented programs, and transformation-oriented programs.

1.1.2.1. Three different archetypes of corporate innovation programs

Exploration-oriented programs pursue the exploration of radically new products. For this to be possible, these units must be able to identify innovation opportunities and evaluate and develop them in a protected space. This should be done with a high degree of autonomy for the innovation

unit and only loose integration with the operational business units (Kötting & Kuckertz, 2019). Loose integration allows sufficient distance from the business units to be maintained to prevent negative disruptive influences. On the other hand, loose integration ensures a minimum of acceptance (Jansen et al., 2006). If an innovation opportunity has sufficient potential, it should be further developed with the support of the operational business units. For this purpose, the business units provide personnel and access to the relevant market. Development is carried out within the framework of informal processes so that activities are not hindered by the imposition of standardized procedures or excessive bureaucracy (Jansen et al., 2006). The design of exploration-oriented programs is thus in line with previous academic findings regarding the exercise of exploratory activities (March, 1991).

Exploitation-oriented programs aim to incrementally innovate existing products along standardized processes and structures. With the close involvement of the operational business units, further development and optimization opportunities are identified and, once they have been implemented, marketed accordingly (Kuckertz et al., 2017). As the products have already successfully established themselves in the market, further developments of these products usually have a high market potential with little uncertainty. However, since these are merely further developments of existing products, the innovations are often much less radical than those developed within the scope of the exploration-oriented programs (Bower & Christensen, 1995). Exploitation-oriented programs require close coordination and a continuous transfer of knowledge with the operational business units in order to ensure a fit between existing products and innovation opportunities (Jansen et al., 2006). For this reason, exploitation-oriented programs have much less autonomy than exploration-oriented programs. In addition, formal structures and processes are in place to maximize the commercialization of the identified development opportunities (Uotila et al., 2009). The design of exploitation-oriented programs is thus in line with previous academic findings regarding the exercise of exploitational activities (March, 1991).

Transformation-oriented programs have no market or product focus. Instead, the programs aim to transform corporate culture by promoting individual responsibility and openness to external developments (Ebersberger & Herstad, 2011). To this end, transformation-oriented programs offer a protected space in which selected employees of the operational business units can pursue their own ideas over a defined period (Feurer et al., 1996). Since these programs are not geared toward the marketing of ideas, close coordination with the operational business units is not necessary. For this

reason, the programs benefit from a high degree of autonomy and are more likely to be regarded as training programs (Lumpkin & Dess, 1996). To ensure creativity and open exchange, the programs often have informal structures and processes (Brand, 1998). There is a clear focus on the individual development of employees.

1.1.2.2. Knowledge transfer within a corporate innovation system

The transfer of knowledge between the various innovation units is of great importance within the framework of a corporate innovation system. There is often a regular exchange of innovation opportunities between exploration-oriented programs and exploitation-oriented programs. In this way, the dilemma between low and high autonomy, as outlined in section 1.1.1.3, can be resolved by using a corporate innovation system with several specialized innovation programs (Kötting & Kuckertz, 2019). Exploration-oriented programs (high autonomy) can identify radical innovations and evaluate them in detail. If these innovations qualify, they can be developed by the exploration-oriented programs or forwarded to the exploitation-oriented programs to be brought to market maturity together with the operational business units and then marketed. Such a path of incremental development has already been examined in the academic literature within the real option theory (van de Vrande et al., 2009; Vanhaverbeke et al., 2008). In the opposite case, however, the results of the exploitation-oriented programs are generally not suitable as input for the exploration-oriented programs, since the development potential identified there is usually already at an excessively mature stage of development.

Transformation-oriented programs are also part of the continuous exchange of knowledge within a corporate innovation system. If the knowledge exchange between transformation-oriented programs and other programs is less explicit, it is nevertheless of great importance. This can be explained by the fact that, as a rule, transformation-oriented programs cannot pass on concrete innovation opportunities, but the transformation of culture is an essential prerequisite for the success of exploration-oriented and exploitation-oriented programs (Gilsing & Nooteboom, 2006; Matzler et al., 2013). Nevertheless, or perhaps precisely because of this, transformation-oriented programs are an essential element of a corporate innovation system. Figure 1-3 shows a holistic overview of the knowledge transfer between the programs.

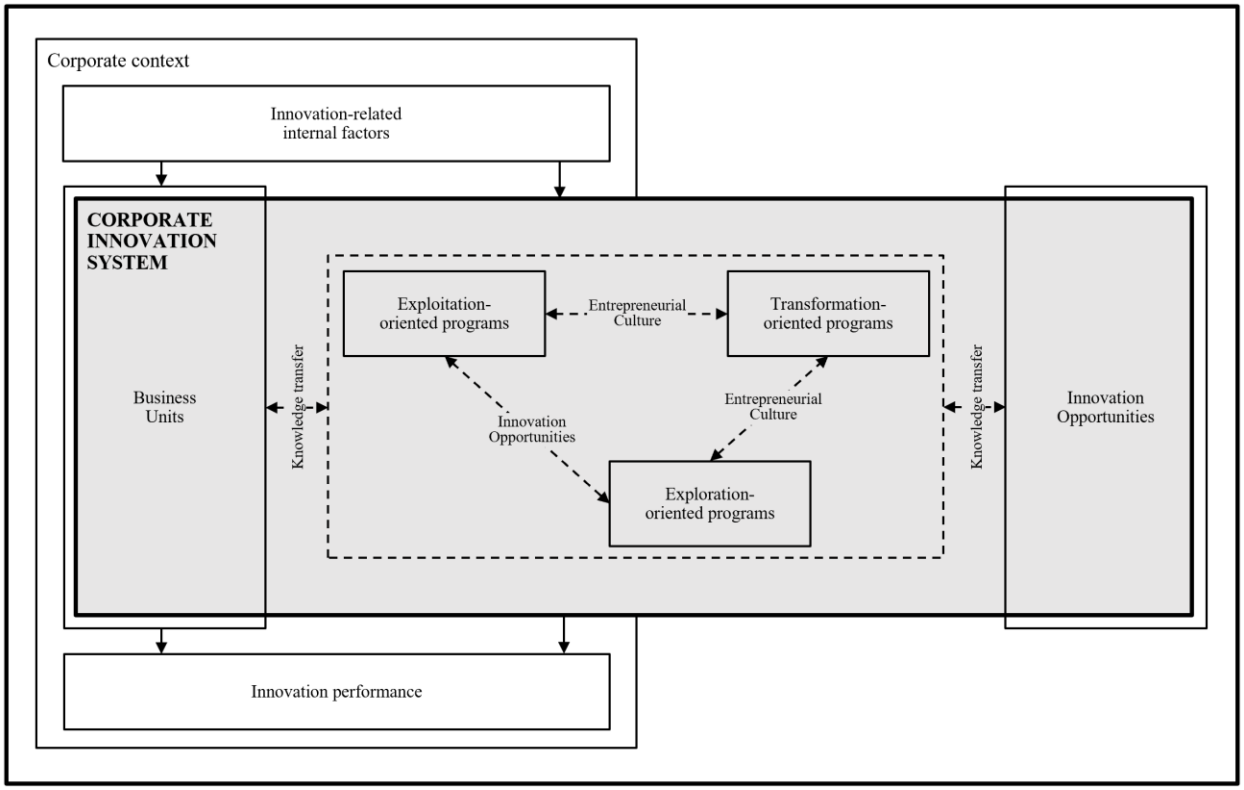


Figure 1-3: Elements of a corporate innovation system

1.1.3. Impact of different success factors on corporate innovation performance

1.1.3.1. Continuity, competence, and cooperation as main success factors

In practice, there are numerous examples of corporations that successfully make use of corporate innovation systems (e.g., Kötting & Kuckertz, 2019; Maine, 2008; O'Connor & DeMartino, 2006). However, it cannot be concluded that the mere existence of such programs within an organization automatically leads to the successful and repeatable development of innovations. Rather, certain prerequisites and conditions must be considered in order to achieve long-term success. For this purpose, various studies can be found in the academic literature which identify and empirically prove relevant factors for the successful development of innovations (Ernst, 2002; van der Panne et al., 2003). Many of the success factors identified can be traced back to fundamental concepts such as continuity, competence, and cooperation (3C).

Continuity in this context means the continuous practice of innovation activities and measures. This allows corporations to react to market and technological developments on a short-term (Boer

& Gertsen, 2003; Steiber & Alänge, 2013). Competence, on the other hand, describes the ability of a corporation to identify, evaluate, integrate, and use new knowledge to develop innovation (Gibson & Birkinshaw, 2004; O'Reilly & Tushman, 2008). While competence is primarily based on the internal knowledge of a corporation, cooperation describes the collaboration with strategic partners to acquire their knowledge and use it to expand the corporations own internal knowledge base (Cohen & Levinthal, 1990; Ebersberger et al., 2012; Ireland et al., 2002; Mowery et al., 1996). In principle, the three concepts are closely interlinked and depend upon each other in various ways. For this reason, an analysis of the influence of these factors on the innovation performance of a corporation also requires the consideration of their interdependencies.

1.1.3.2. Interdependence between continuity, competence, and cooperation

Many of the existing academic studies on innovation performance have already statistically confirmed the effectiveness of the mentioned concepts in detail (Keupp et al., 2012; Savino et al., 2017). Although these papers are informative and valuable, the standardized methodological approaches they use often do not capture the complexity and interactions of various interrelated theoretical concepts (Greckhamer et al., 2008; Woodside, 2010, 2013). Therefore, it has not yet been scientifically determined how the concepts of continuity, competence, and cooperation interact and what effects they have on the innovation performance of a corporation in the short-, mid-, and long-term.

In the context of this dissertation, we have taken the research gap highlighted as an opportunity to investigate this issue. For this purpose, we have combined the three concepts in a 3C model of innovation performance (see Figure 1-4). This has shown that continuity—in the form of continuous innovation activities—is most critical for innovation performance. This observation is also consistent with other research, as earlier works have also been able to empirically prove the relevance of continuity (e.g., Boer & Gertsen, 2003; Hargadon, 1998; Xu et al., 2010). Moreover, our results suggest that, although competence and cooperation can be important parts in developing innovation, they play a subordinate role compared to the continuous practice of innovation activities. Continuity is therefore an essential prerequisite for the successful development of innovations, whether in the short-, mid-, or long-term.

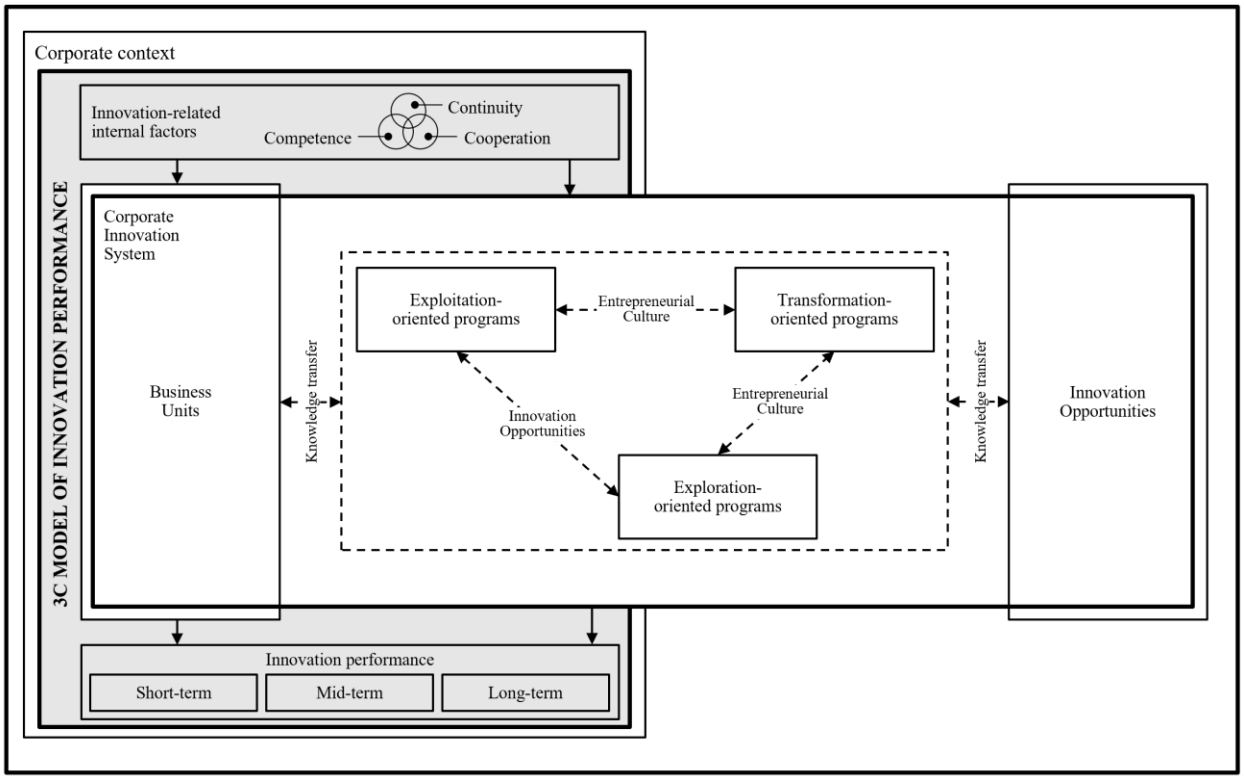


Figure 1-4: Impact of the 3C model on innovation performance

Despite the high importance of continuity, competence and cooperation should not be neglected. Competence particularly affects the mid- and long-term development of innovations. However, competence only occurs in connection with continuity. From this it can be concluded that the continuous exercise of innovation activities promotes the development of internal competence and thus has a positive influence on innovation performance. This is also confirmed by previous results in the academic literature (Crossan et al., 1999; Grant, 1996). However, our results also show that the combination of continuity and competence requires appropriate lead times and thus only has an impact on mid- and long-term innovation performance. The development of internal competencies—for example, through transformation-oriented programs or targeted recruitment—thus significantly promotes the mid- to long-term innovation performance of a corporation (Herstad et al., 2015). This observation is consistent with our findings on corporate innovation systems (Kötting & Kuckertz, 2019).

Cooperation has a particular impact on the short- and mid-term innovation performance of a corporation. However, as with competence, cooperation does not have an isolated influence on

innovation performance, but only occurs in combination with continuity. Here, too, the conclusion must therefore be that only cooperation activities that are performed on a regular basis have a positive influence on innovation performance. This can be explained by the fact that for the successful development of innovations, the mere acquisition of external knowledge through cooperation alone is not sufficient. Additionally, the transfer of this knowledge into innovative products and services must take place through suitable innovation activities (Hamel, 1991; Mowery et al., 1996). This is consistent with our findings on corporate innovation systems, which define a fundamental openness to external developments as an overarching principle. In addition, exploration- and exploitation-oriented programs require the identification of internal and external innovation opportunities, which are then transformed into innovation performance through appropriate processes (Kötting & Kuckertz, 2019).

However, the results of our work mentioned above also make clear that there is no case in which both competence and cooperation occur together. This could be due to the fact that innovation performance is considered over different time horizons. Thus, both concepts demonstrably influence innovation performance, albeit at different points in time. However, this does not mean that the concepts are mutually exclusive, but rather that competence and cooperation should be regarded as complementary concepts, each with its own specific advantages and disadvantages.

1.2. Scope and structure of this dissertation

This dissertation comprises four studies dealing with corporate innovation programs and their impact on innovation performance (see Table 1-1). For this purpose, chapters two and three each include a systematic literature analysis of corporate innovation programs and derive open research questions. While the second chapter focuses on corporate venture capital units, the third chapter deals with corporate incubators. Following the research needs identified in the literature analyses, chapter four examines the embedding of different corporate innovation programs in an overarching system and their interaction with each other. Finally, chapter five examines how continuity, competence, and cooperation interact with each other and influence the innovation performance of a corporation (see Figure 1-5).

Table 1-1: Overview of empirical chapters

#	*Chapter*	*Domain*	*Title*	*Research question*	*Method*	*Sample*
1	Chapter 2	Corporate innovation programs	Corporate Venture Capital to Promote the Innovation Capability of Established Corporates: A Systematic Literature Analysis	Despite the theoretical advantages, many CVC programs fail in practice. What are the reasons for these failures and how can they be countered?	Systematic literature review (Tranfield et al., 2003)	51 peer-reviewed academic papers
2	Chapter 3	Corporate innovation programs	Corporate Incubators as Knowledge Brokers between Business Units and Ventures: A Systematic Review and Avenues for Future Research	What are the main differences between business incubators and corporate incubators? How do corporate incubators differ in terms of their embedding in an existing organizational structure and the pursuit of strategic goals?	Systematic literature review (Tranfield et al., 2003)	45 peer-reviewed academic papers
3	Chapter 4	Corporate innovation system	Three Configurations of Corporate Innovation Programs and Their Interplay: A Theory-Building Case Study on Innovation Programs	What elements constitute successful innovation programs, how are those configured, and do different types of programs have the potential to enrich each other?	In-depth, longitudinal embedded case analysis (Eisenhardt, 1989; Yin, 2003)	One German technology corporation with five innovation programs
4	Chapter 5	Innovation performance	Short-, Mid-, and Long-Term Effects of Innovation Activities: A Configurational Analysis on Continuity, Competence, and Cooperation	How do continuity, competence, and cooperation together translate into innovation performance?	Fuzzy-set qualitative comparative analysis (Ragin, 2000, 2008)	220 German firms

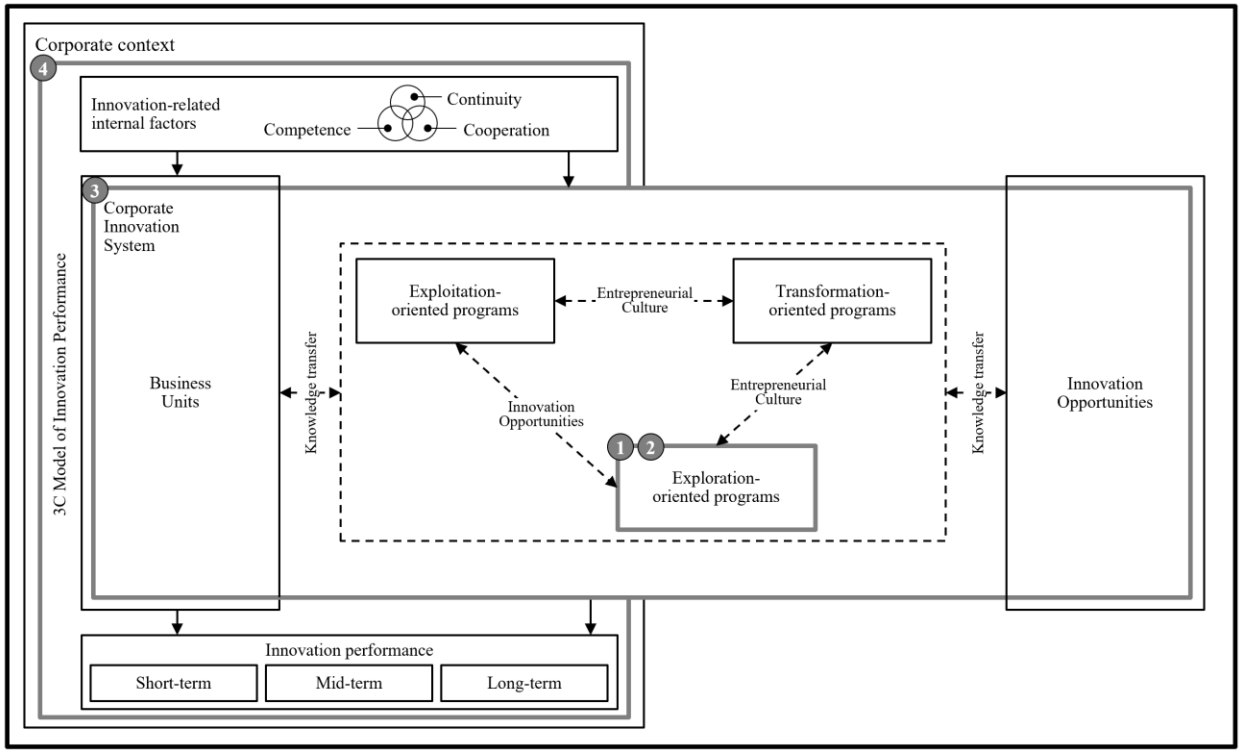


Figure 1-5: Scope of this thesis

1.2.1. Corporate venture capital to promote the innovation capability of corporations

The first study of this dissertation is called *Corporate Venture Capital to Promotion the Innovation Capability of Established Companies: A Systematic Literature Analysis*. Within this study we conducted a systematic literature analysis on corporate venture capital (Tranfield et al., 2003). The goal of this analysis was to conduct a detailed investigation of the mismatch between the theoretical advantages of corporate venture capital on the one hand and the challenges that arise in practice on the other hand. Many academic papers attest to the advantages of corporate venture capital, especially with regard to the innovative capability of corporations (e.g., Dushnitsky & Lenox, 2005b; Keil, Autio, et al., 2008; Röhm, 2018; Wadhwa & Kotha, 2006). However, a practical examination shows that many corporations do not achieve their intended goals and therefore often cease the operations of the units (Dushnitsky & Lenox, 2006; Gaba & Dokko, 2016). For this purpose, 51 peer-reviewed academic papers were subjected to a detailed analysis based on a transparent and comprehensible procedure.

1.2.2. Corporate incubators as knowledge brokers between business units and ventures

The study *Corporate Incubators as Knowledge Brokers between Business Units and Ventures: A Systematic Review and Avenues for Future Research* provides a broad overview of the current state of research on corporate incubators based on a systematic literature review (Tranfield et al., 2003). Corporate incubators were selected as the unit of analysis as—in addition to corporate venture capital—they represent a common form of corporate innovation programs (Hausberg & Korreck, 2020; Weiblen & Chesbrough, 2015). While a large number of academic papers have already been published on business incubators in general, the field of research on corporate incubators still has the potential for further development (e.g., Ahmad, 2014; Evald & Bager, 2008; Hausberg & Korreck, 2020; Uittenbogaard et al., 2005), as literature often considers the topic too undifferentiated and neglects the special characteristics and features of the different forms of incubators (Aaboen, 2009; Barbero et al., 2014; Becker & Gassmann, 2006b). Therefore, we have 45 peer-reviewed academic papers systematically analyzed.

1.2.3. Three configurations of corporate innovation programs and their interplay

The third study, entitled *Three Configurations of Corporate Innovation Programs and Their Interplay: A Theory-Building Case Study of Innovation Programs*, analyzes how several innovation programs interact within a corporation and how they are combined to form a comprehensive corporate innovation system. The necessity for this work is that research on innovation management and corporate venturing has already dealt with the design of corporate innovation programs (e.g., corporate incubators, corporate venture capital, strategic partnerships), but existing work has too often focused on individual innovation programs only (e.g., Allen & Hevert, 2007; Dushnitsky & Lenox, 2006; Maula et al., 2013). To close this gap in research, this work uses an inductive theory-building case study approach to analyze in detail how one of the largest and most successful German technology corporations structures its various innovation activities (Eisenhardt, 1989; Yin, 2003).

1.2.4. Short-, mid-, and long-term effects of innovation activities

The final study of this thesis is titled *Short-, Mid-, and Long-Term Effects of Innovation Activities: A Configurational Analysis on Continuity, Competence, and Cooperation*. This study examines the influence of continuity, competence, and cooperation on the short-, mid-, and long-term innovation performance of a corporation. This approach is appropriate since several organizational,

procedural, and cultural factors which impact innovation performance have been identified in the academic literature (Ernst, 2002; van der Panne et al., 2003), but the dependencies and interactions between these factors have often not been analyzed. For this reason, we have chosen a configurational and longitudinal approach to analyze a data panel that covers the innovation behavior of 220 German corporations between 2009 and 2015 (Ragin, 2000, 2008).

2. CORPORATE VENTURE CAPITAL TO PROMOTE THE INNOVATION CAPABILITY OF ESTABLISHED COMPANIES – A SYSTEMATIC LITERATURE ANALYSIS[1]

Abstract

Corporate venture capital is highly relevant as a strategic tool to promote innovation in established companies. Although numerous scientific papers deal with the topic and confirm the positive efficacy many companies fail on the practical implementation and use of corporate venture capital. In order to contribute to the dissolution of the gap between theory and practice the current state of the scientific literature is analyzed and research gaps are identified within this work. On one hand it is discovered that there is a high degree of disagreement in the scientific literature, particularly with regard to the objectives of corporate venture capital and the organizational structure. On other hand it is found that the interests of new ventures in the context of CVC have not been sufficiently appreciated.

2.1. Introduction

Digital transformation and globalization affect companies of various industries and confront them with increasing market dynamics (Tushman & Anderson, 1986). Although these market dynamics represent a great opportunity for companies to gain new competitive advantages, especially established companies which are not able to adapt to the necessary changes face enormous challenges (Bower & Christensen, 1995). In the past, established companies were able to establish themselves in a market and develop their processes and structures over many years so as to be able to operate as efficiently as possible in this market (Bower & Christensen, 1995; Greiner, 1998). Having applied such a focused business approach, for a long time these companies were able to use and refine existing resources in order to optimally meet customer requirements (March, 1991).

[1] This study is published with the kind permission of Duncker & Humblot. A German version is published under Kötting (2018) and appeared in Zeitschrift für KMU und Entrepreneurship, 66(2), 113–146. An online version can be found at the following address: https://elibrary.duncker-humblot.com/zeitschriften/id/23/vol/66/iss/1819/art/8545/.

In a dynamic and quickly changing market environment, existing resources are no longer sufficient to meet the increased requirements of customers and business partners (Tushman & Anderson, 1986). Instead, new resources must be developed through exploration and then combined to create new products and services (March, 1991). However, many established companies have difficulties shifting from the standardized use of existing resources, which has been practiced for many years, to exploring new resources, which is subject to uncertainties (March, 1991).

Corporate venturing (CV) has taken root as a concept for exploring new resources (e.g., Covin & Slevin, 1991; Narayanan et al., 2009). CV provides for the setup of new organizational units, separated from the established company, so that these units can work without being influenced by the established company (Sharma & Chrisman, 1999). A specific way to implement CV is the use of corporate venture capital (CVC). Yang et al. (2014) define CVC as "*direct equity investments by firms (corporate investors) in external privately held entrepreneurial companies (portfolio companies) […].*" By using CVC, established companies launch partnerships with new ventures. While established companies hope to stimulate innovation with these partnerships (Roberts & Berry, 1985), new ventures expect to receive support in further developing their business operations (Park & Steensma, 2012). In contrast to independent venture capital (VC), where new ventures receive capital from independent investors with the aim of realizing profits, in this case, established companies not only offer capital, but also strategy support (Maula et al., 2009).

In theory, the use of CVC appears to be advantageous for both new ventures and established companies (e.g., Dushnitsky & Lenox, 2005b; Keil, Autio, et al., 2008; Wadhwa & Kotha, 2006). However, regardless of the theoretical advantages, a look at practice shows that many CVC initiatives were discontinued shortly after their launch because they did not achieve satisfactory results (e.g., Dushnitsky & Lenox, 2006; Gaba & Dokko, 2016). In order to contribute to explaining the discrepancy described, this work aims at analyzing and reviewing the current state of the science. First relevant findings have already been presented by Dushnitsky & Lenox (2006) and Maula (2007). Due to the exploratory character of the scientific publications and the large amount of new CVC literature[2], this work intends to review the current state of the scientific literature and identify gaps in the corresponding research.

[2] 70% of the literature identified in the course of this research was published after Dushnitsky & Lenox (2006) and Maula (2007) and is therefore not included in these papers.

2.2. Systematic literature search

To ensure transparency and replicability of the research, the literature search was conducted according to Tranfield et al. (2003).

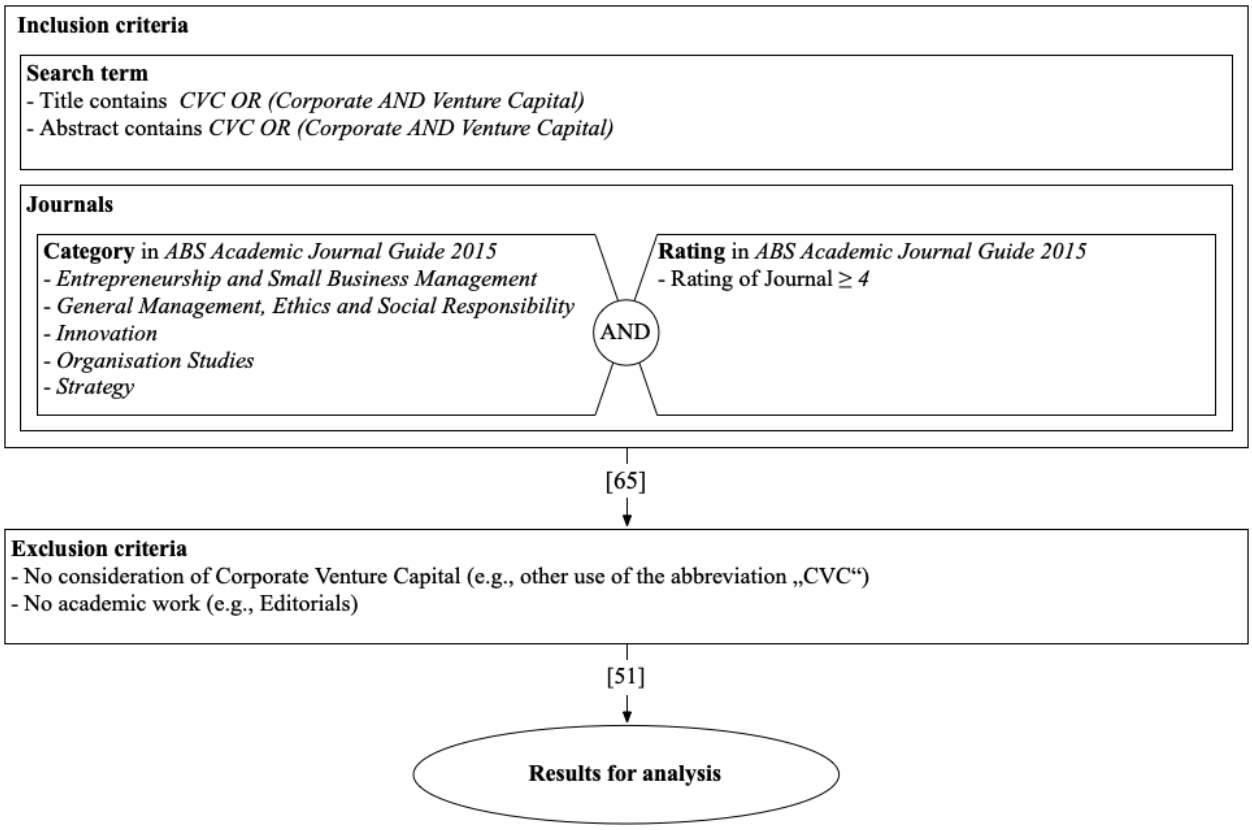


Figure 2-1: Process for literature search and selection

The literature search was based on the search term *(CVC OR (Corporate AND Venture Capital))*, which was derived from the two keywords *CVC* and *Corporate Venture Capital*. To ensure high-quality results, the search was limited to top-ranked journals at all times (Podsakoff et al., 2005). The search was conducted in journals with a rating of 4 or higher[3] from the relevant subject-matter categories *Entrepreneurship and Small Business Management*, *General Management*, *Ethics and Social Responsibility*, *Innovation*, *Strategy* and *Organisation Studies* of the *ABS Academic Journal Guide 2015* (Chartered Association of Business Schools, 2015). The databases *ABI/INFORM*

[3] The rating scale ranges from 1 (lowest rating) to 4* (best rating).

Collection and *Business Source Complete* were used to search the titles and abstracts of the selected journals (see Figure 2-1).

Table 2-1: Result of the literature search

Journal	∑	*1981 - 1990*	*1991 - 2000*	*2001 - 2010*	*2011 - 2016*
Academy of Management Journal	5	-	-	2	3
Entrepreneurship Theory and Practice	3	-	-	2	1
Journal of Business Venturing	15	4	3	5	3
Journal of Management Studies	3	-	-	3	-
Journal of Product Innovation Management	3	-	-	-	3
Organization Science	3	-	-	1	2
Research Policy	1	-	1	-	-
Strategic Entrepreneurship Journal	8	-	-	2	6
Strategic Management Journal	10	1	-	4	5
	51	*5*	*4*	*19*	*23*

The search identified 65 articles. These articles were then checked for relevant content. In the course of this screening, 13 articles had to be excluded, as they did not address the CVC issue. A further article was excluded as it was not a scientific paper. In total, 51 relevant articles were identified (see Table 2-1).

2.3. Systematic literature analysis

The literature analysis aims to classify articles with a similar research focus in order to obtain a first indication of relevant key research topics (Tranfield et al., 2003).

To make the analysis as objective as possible, the identified literature was screened along the previously defined criteria *research question, unit of analysis, theory, hypotheses, method, data set* and *results* and the findings were transferred to a data extraction form (Tranfield et al., 2003). In the course of the classification, the *unit of analysis* was used as the first classification criterion, with the concrete contents of the paper serving as the second classification criterion (see Figure 2-2). The results of the content analysis are presented hereinafter.

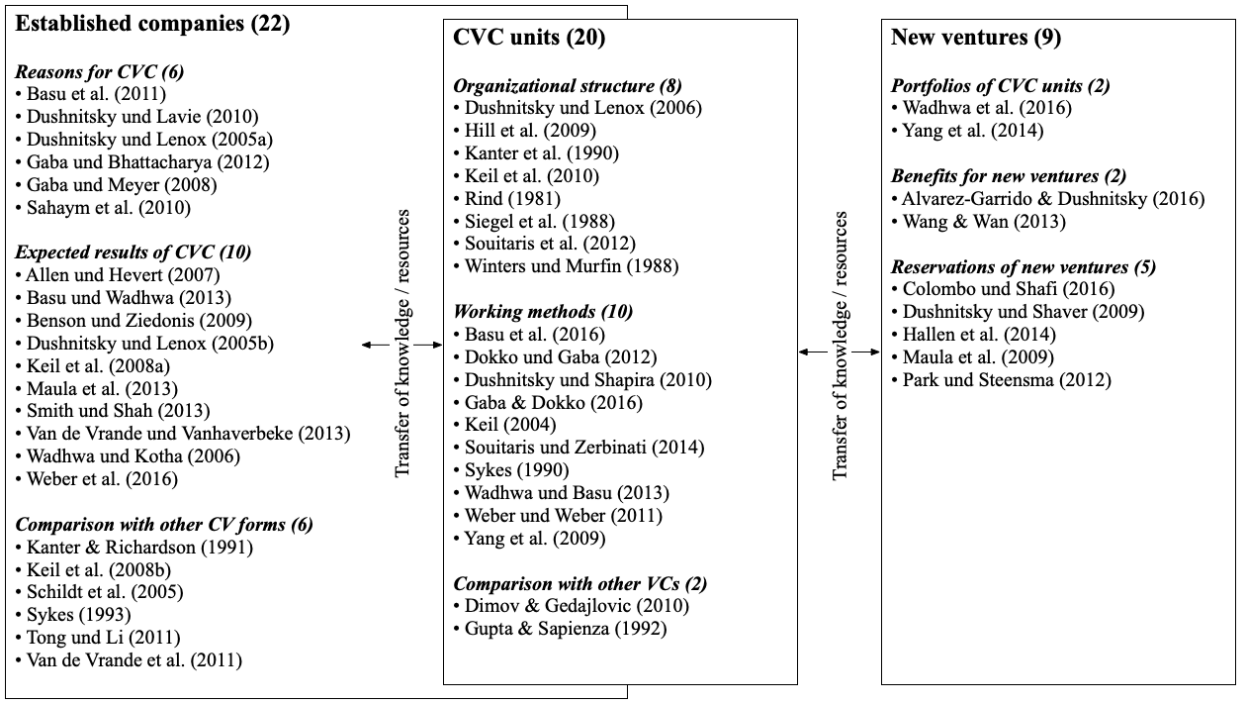


Figure 2-2: Classification of identified literature

2.3.1. Established companies

2.3.1.1. Reasons for CVC

The use of CVC is influenced by various external factors. Dushnitsky & Lenox (2005a) observed that established companies make use of CVC primarily in industries with poorly protected property rights, a highly dynamic technological change and a high importance of complementary goods. The findings are supported by Basu et al. (2011), who additionally found out that a highly dynamic competitive environment has a positive effect on companies' CVC activities. The findings are completed by Sahaym et al. (2010). There is a positive correlation between research and development spending within an industry and the use of CVC. In addition, they revealed that this correlation is more pronounced in industries with a high level of technological change. In their paper, Gaba & Meyer (2008) prove that the adoption of a CVC program increases when there is a geographical proximity to a cluster of successful VC companies.

Besides external factors, internal factors also influence the use of CVC. Dushnitsky & Lenox (2005a) found out that the available capital of an established company and its capacity to absorb knowledge have a positive effect on the use of CVC. Basu et al. (2011) confirm this finding. They

observed that the available technology and marketing resources of an established company and its CVC experience have a positive effect on the number of CVC partnerships. Furthermore, Gaba & Bhattacharya (2012) investigated whether the establishment of a CVC unit is influenced by a company's ability to innovate. In this context, the authors found that if a company's ability to innovate exceeds its level of aspiration, the company's motivation to establish a CVC unit decreases. Conversely, the authors were unable to prove that the motivation to establish a CVC unit increases if the ability to innovate falls below the company's level of aspiration. In conclusion, Dushnitsky & Lavie (2010) found out that the use of strategic alliances has an inverted U-shaped effect on the adoption of CVC. The relationship is influenced by the established company's available resources, level of maturity and CVC experience.

2.3.1.2. Expected results of CVC

Weber et al. (2016) provide the groundwork for the general advantages of CVC by applying the concept of the relational view in the context of CVC. The authors succeeded in empirically substantiating the relational view concept and in proving that the resources embedded in the CVC relationship can generate competitive advantages for both parties. In their paper, Dushnitsky & Lenox (2005b) discuss the positive effects of CVC on the established companies' ability to innovate. The authors observed that this positive effect is more pronounced for companies that have a high organizational absorptive capacity. This observation is confirmed by Wadhwa & Kotha (2006). They also discovered that knowledge generation within a company has an inverted U-shaped dependence on the number of CVC investments. This curve shape can be explained by the organizational absorptive capacity as stated by Dushnitsky & Lenox (2005b). Once the number of investments exceeds absorptive capacity limits, no additional value can be generated for established companies. In their research, Keil, Autio, et al. (2008) examined the acquisition of new skills through CVC investments. The authors argue that the use of CVC and the associated exploration of new technologies and products can promote the acquisition of new skills in an established company. While an increased complexity of technologies and products has a negative impact on the relationship, a good knowledge transfer within the established company can have a positive effect. Smith & Shah (2013) were able to analyze that established companies incorporate knowledge from CVC into new products and technologies more strongly than new knowledge from other sources. The authors therefore argue that CVC investments have a positive impact on the development of new products and technologies. Besides the numerous positive results, Basu

& Wadhwa (2013) found out that while CVC can have a positive impact on an established company's ability to innovate, these companies primarily rely on CVC to expand existing business areas. The exploration of innovations, for example by opening up new business areas, is therefore not driven by the use of CVC. Due to the investment costs, CVC reinforces the direction a company is taking rather than paving new paths for it. In addition to the strategic aspects mentioned above, Allen & Hevert (2007) investigated whether CVC investments can also generate significant monetary value for their investors. The authors identified positive financial results in approximately one third of the cases, with larger programs achieving significantly better results than smaller programs.

In addition to the aforementioned aspects, there are also papers that consider the impact of CVC on more specific areas of application. In their paper, Benson & Ziedonis (2009) state that CVC improves the ability of established companies to acquire new ventures. This effect is influenced by the internal knowledge base and absorptive capacity of the established company. Van de Vrande & Vanhaverbeke (2013) observed that a CVC investment in a new venture increases the probability of the established company starting a strategic cooperation with the new venture at a later stage. The described effect is influenced positively by the technological similarity between the companies and the time of the last investment. As a last point, Maula et al. (2013) conducted a study on how CVC influences the management's perception of technological innovation. The authors were able to reveal that the use of CVC has a strong positive effect on the management's perception.

2.3.1.3. Comparison with other CV forms

Kanter & Richardson (1991) argue that in practice especially external CV approaches, in which they include CVC, tend to fail. Apparently they lead to disappointing financial results, conflicts with the existing business units and high management costs. In response to the criticism, Sykes (1993) argues that CVC is particularly suitable for internalizing developments taking place outside the company and thus has a specific application scenario. Schildt et al. (2005) found out that CVC is used in particular in the case of a high degree of uncertainty about new ventures. The authors explain this circumstance by the fact that CVC is less binding than a joint venture or acquisition. Tong & Li (2011) support this result. They worked out that the use of CVC is always preferred over acquisitions when there is a high degree of uncertainty. Van de Vrande et al. (2011) focused

on another aspect and examined the influence of different forms of CV on the development of new technologies. They observed that strategic alliances and CVC investments have a positive impact on the development of new technologies, whereas acquisitions exert a negative impact. Keil, Maula, et al. (2008) consider the effect of similarity between new ventures and established companies on the established company's ability to innovate. For CVC, alliances and joint ventures, the relationship follows an inverted U shape.

2.3.2. CVC units

2.3.2.1. Organizational structure

Souitaris et al. (2012) argue that the organizational structure of a CVC unit should be derived from the strategic focus of that unit. According to the authors, the focus can be either on the established company or on the new venture. Winters & Murfin (1988) come to a similar conclusion. However, they make no distinction of the CVC unit's focus, but base the decision for or against a structure on the objectives of the established company. To realize strategic goals, it is recommended to set up an organizational unit within the company, since the tight integration enables a regular exchange of knowledge between the CVC unit and the operational units of the established company. If the established company's intentions are primarily of a financial nature, setting up a separate CVC unit should be considered. The findings are confirmed by Siegel et al. (1988). They also observed that the design of a CVC unit can follow a continuum between a low and a high level of autonomy. Contrary to Winters & Murfin (1988), Rind (1981) and Siegel et al. (1988) recommend always designing the CVC unit in such a way that it can act as autonomously as possible, regardless of the objective. Thus the unit can act quickly and flexibly and better meet the requirements of the VC market. This is the only way for a CVC unit to establish itself as an attractive partner for new ventures. This argumentation is also supported by Kanter et al. (1990), who add that it is important to ensure not only the CVC unit's autonomy, but also the autonomy of the new venture—even if this means that the strategic objectives associated with the partnership have to be abandoned. Hill et al. (2009) pick up on the aspect of autonomy. They observed that CVC units that adapt practices of original VC companies are more successful. According to this finding, CVC units should act independently of the interests of the established company and introduce performance-related pay for their staff, syndicate investments, gradually disburse capital to new ventures and specialize in specific subject areas. Keil et al. (2010) observed that the provision of resources by the established

company has a significant impact on the position of a CVC unit within a VC network. The established company can thus control the position of the CVC unit within a VC network and hence realize benefits for the CVC unit, for example through an improved deal flow. Dushnitsky & Lenox (2006) conclude that CVC investments with a strategic focus can ultimately generate more value for the established company than investments with purely financial intentions.

2.3.2.2. Working methods

In their paper, Dokko & Gaba (2012) reveal that employees with experience gained in original VC companies tend to align the CVC unit's working methods to that of VC companies. If the employees used to work for the established company, they adapt the working methods accordingly. Keil (2004) found out that the company-wide ability to engage in CVC is enhanced by two learning processes. One learning process is set outside a concrete use case. The knowledge gained this way is very generic and cannot be applied directly. The second learning process involves learning-by-doing, whereby generic knowledge is adapted to the specific needs of the CVC unit during application. Furthermore, Keil (2004) observed that both learning processes strongly depend on the initial prerequisites, which in this specific case correspond to the given organizational structure and the available resources. Souitaris & Zerbinati (2014) confirm the findings by Keil (2004). The practices applied by a CVC unit are highly dependent on its organizational structure. While autonomous CVC units can be strongly oriented towards the practices of original VC companies, CVC units with a low level of autonomy need to adapt practices that help to best support the goals of the established company. Dushnitsky & Shapira (2010) substantiate the results by showing that the type of pay has an impact on the way employees work. Fixed pay, which is common practice in established companies, leads employees to invest at a later point in time and to rely mainly on syndicates with many partners. By contrast, performance-based pay makes employees invest at earlier points in time and rely on syndicates with few partners. In addition to the already mentioned working methods, Sykes (1990) investigated which activities have a positive or negative impact on the success of a CVC unit. Activities with a negative impact include, for example, the established company's intention to acquire the new venture as a result of the CVC investment or to gain information. Activities with a positive impact can be the establishment of further partnerships, the support of the new venture with expertise or the assistance in further development. Basu et al. (2016) also investigated which working methods are used within CVC units. In the context of knowledge generation, the authors were able to identify the formation of syndicates with VC

companies, the support of the new venture with resources, the evaluation of the new venture and the focus on key topics as critical success factors. The integration process was characterized by establishing formal governance mechanisms and supporting management with technology and market trends. Yang et al. (2009) demonstrate that both wide experience and specific experience as well as expertise in acquisitions have a positive effect on the CVC unit's selection capabilities. In addition, Wadhwa & Basu (2013) investigated the factors that determine the amount of the initial investment. The authors discovered that the initial investment is high when the level of exploration is particularly low or particularly high. Weber & Weber (2011) revealed that social capital in a CVC relationship has a positive effect on knowledge transfer and knowledge generation. The authors also found that CVC relationships adapt to changing circumstances over time. In their paper, Gaba & Dokko (2016) focus on the reasons behind abandoning a CVC unit. If the CVC unit is very active and makes a large number of CVC investments, the probability of the CVC unit being abandoned is reduced. Similarly, the use of external staff experienced in VC has a negative impact on the abandonment of a unit.

2.3.2.3. Comparison with other VCs

CVC units differ from original VC companies in certain key aspects. In their paper, Gupta & Sapienza (1992) examined the characteristics of various VC companies. The authors found out that CVC units have a very strong industry focus compared to other VC companies, but prefer a very broad radius of action in terms of geographical proximity. Dimov & Gedajlovic (2010) came to very similar conclusions. The authors found that when compared to other VC companies, CVC units have very concentrated portfolios, invest in new markets at later stages and support new ventures at very early stages.

2.3.3. New ventures

2.3.3.1. Portfolios of CVC units

Yang et al. (2014) discovered that there is a U-shaped relationship between the diversification of a CVC unit's portfolio and its strategic value. Wadhwa et al. (2016) examined the effects of portfolio diversification on the established company's ability to innovate. The authors identified an inverted U-shaped relationship between portfolio diversification and the ability to innovate of the established company. Furthermore, they discovered that the portfolio diversification also depends on the portfolio companies' level of technological integration.

2.3.3.2. Benefits for new ventures

New ventures also hope to gain strategic advantages from CVC. In their research, Alvarez-Garrido & Dushnitsky (2016) found out that new ventures' ability to innovate varies depending on the group of investors. If an established company is part of the group of investors, new ventures have a demonstrably higher number of publications and patents compared to new ventures where the group of investors does not include an established company. The described effect occurs in particular when the two companies are complementary. Wang & Wan (2013) also focus on the group of investors. The authors show that there is a positive correlation with undervaluation when new ventures which have received capital from original VC companies first go public. In contrast, the initial public offering (IPO) of new ventures that have received capital from CVC units has a negative correlation with undervaluation. The authors explain these findings with the different interests of the investors. While an IPO is a good opportunity for original VC companies to realize financial gains, CVC units continue to expect strategic advantages from their investment even after the IPO.

2.3.3.3. Interests of new ventures

Park & Steensma (2012) analyzed that new ventures particularly benefit from CVC investments when they are dependent on special resources or operate in an uncertain environment. However, Dushnitsky & Shaver (2009) point out that numerous new ventures refrain from CVC investments because they fear plagiarism by established companies. These fears are particularly pronounced if both companies operate in the same industry which is additionally characterized by poor protection of intellectual property rights. While Dushnitsky & Shaver (2006) focus on the American market, the replication study conducted by Colombo & Shafi (2016) considers the European market. Analogously to the findings of Dushnitsky & Shaver (2006), it shows that new ventures in Europe particularly resort to CVC from established companies from the same industry when intellectual property rights are well-protected. Contrary to the findings of Dushnitsky & Shaver (2006), however, Colombo & Shafi (2016) found out that new ventures in Europe also lean toward CVC if intellectual property rights are poorly protected. The reason they give for this finding is the lack of financing alternatives in Europe. In principle, these results are also consistent with the findings of Maula et al. (2009). The authors showed that if both companies have overlapping activities, the new venture deploys protective measures to protect its knowledge. These measures ultimately have

a negative effect on social interaction and consequently also on the learning behavior of both companies. In their study, Hallen et al (2014) look at how original VC companies as part of the group of investors can serve as a social protection mechanism. The awareness and network centrality of original VC companies can provide effective protection, as CVC units must expect reputational damage in the event of misconduct.

2.4. Discussion

2.4.1. Organizational structure of CVC units

In the literature, there is a consensus that a CVC unit can be designed along a continuum from a low to a high level of autonomy (see Figure 2-3). When designing a CVC unit, the established company's goals should always be taken into account (Siegel et al., 1988; Winters & Murfin, 1988). There are, however, controversial discussions about the objectives that are advantageous for established companies and the resulting implications.

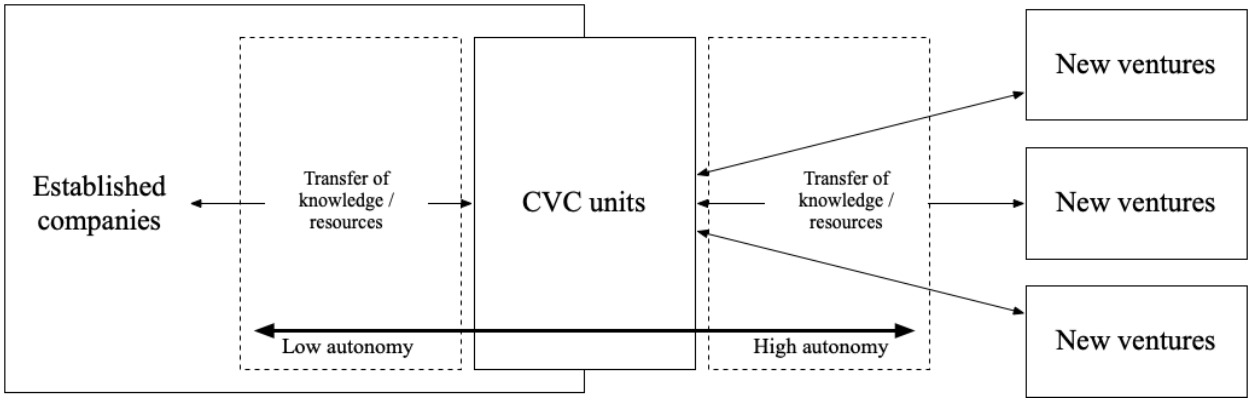


Figure 2-3: Organizational structure of a CVC unit

On the one hand, the relevant literature advocates a focus on financial goals (e.g., Kanter et al., 1990). Proponents argue that by focusing on financial goals, there is no need for a close link to the established company and that the CVC unit can therefore be designed quite autonomously. The high level of autonomy enables the adoption of original VC practices. The CVC unit can thus act similarly to a VC company, which leads to high acceptance on the part of VC companies and new ventures (Souitaris & Zerbinati, 2014). A high level of autonomy and the resulting advantages have proven to contribute to the success of a CVC unit (Hill et al., 2009; Keil et al., 2010).

On the other hand, the literature argues that focusing on purely financial goals makes little sense (Dushnitsky & Lenox 2006). Instead, the CVC unit should be closely linked to the operational units of the established company to ensure an intense exchange of knowledge and resources (Dokko & Gaba 2012). The CVC unit can thus respond to the specific requirements of the individual operational units and align its investment strategy accordingly. In addition to direct financial income, the exchange of strategic resources between the established company and the new venture can generate a much greater indirect added value (Dushnitsky & Lenox 2006).

The dilemma of CVC can be illustrated by comparing the two approaches. According to the argumentation, established companies have to decide between focusing on strategic goals and the associated poorer chances of success or focusing on financial goals and thus better chances of success. Neither of the two approaches allows for a full realization of the desired potential of CVC. Based on this dilemma, the following questions therefore need to be answered:

(1) What is required to ensure the best possible balance between financial and strategic goals?

(2) What is required to ensure a proper transfer of knowledge despite a high level of autonomy?

(3) What is required to ensure good contact with VC companies and new ventures despite a low level of autonomy?

(4) Are there other CV forms which help established companies avoid the outlined dilemma?

2.4.2. Interests of new ventures

Another weak spot in the literature is the insufficient consideration of the interests of new ventures (Dushnitsky & Shaver, 2009). The literature largely assumes that enough new ventures are willing to join forces with established companies. However, new ventures pursue their own interests and stand up for them in negotiations with investors. Especially new ventures with good ideas and technologies can display considerable confidence.

For new ventures, CVC units of established companies can be an interesting alternative to original VC companies. This allows them to benefit greatly from strategic resources provided by the CVC unit (Park & Steensma, 2012). At the same time, they have to fear that established companies may

consider acquiring critical knowledge (Dushnitsky & Shaver, 2009; Sykes, 1990). New ventures are therefore skeptical about CVC units (Maula et al., 2009) and, if in doubt, decide against a CVC investment. This raises the following questions:

(5) *What factors influence the decision of new ventures to accept investments by a CVC unit?*

(6) *What are the negotiating positions of new ventures and CVC units?*

(7) *What factors influence the negotiating positions of new ventures and CVC units?*

2.5. Conclusion

When it comes to CVC, the scientific literature paints a very heterogeneous picture. This refers in particular to the objectives associated with CVC for established companies and the organizational structure that needs to be implemented, as well as the interests of new ventures. To ensure that these so far unanswered aspects are taken into account, concrete research questions have been derived which need to be addressed in the context of further scientific studies.

As an implication for real-life situations, this research has identified that established companies need to be clear about what their own objectives are. Only when the objectives have been worked out can a CVC unit be aligned with these goals. If the established company merely aims at making financial profits, it is advisable to set up a largely autonomous CVC unit, which is similar to an original VC company in terms of structure and way of working. In this case, the established company has to ask itself whether a professional VC company would not be more appropriate for this project and whether developing the necessary resources internally is worth the effort. If the established company pursues strategic goals, it is necessary to pay attention to and actively manage the transfer of knowledge and resources with the established company's business units. The definition and design of these interfaces largely determines whether strategic goals will be achieved and whether the CVC unit will ultimately be successful.

Limitations of this work result from the strict focus on contributions from top-ranked journals. Although this approach has ensured a high quality of search results, it has also negatively impacted the diversity of the literature screened. Furthermore, it must be noted that the influence of subjective perceptions cannot be completely excluded when analyzing the contents.

3. CORPORATE INCUBATORS AS KNOWLEDGE BROKERS BETWEEN BUSINESS UNITS AND VENTURES: A SYSTEMATIC REVIEW AND AVENUES FOR FUTURE RESEARCH[4]

Abstract

Through digitization and globalization, corporate incubators have gained new relevance as tool to foster innovation within established companies. Although many studies address business incubators in general, the specifics of corporate incubators are often neglected in the literature. The special differentiating characteristics of corporate incubators are their embeddedness in an existing organization and the transfer of knowledge between the parent organization and the incubatees. As part of a systematic literature review, previous research on the subject of corporate incubation was identified and analyzed. Based on an analysis of 45 academic papers, a holistic framework was constructed that explicitly considers the critical aspects of both embedding and knowledge transfer. In the course of a subsequent analysis, open questions for further research were identified and addressed.

3.1. Introduction

The digitization and globalization of the economy are affecting companies from all industries and confronting them with an increasingly changed market dynamic (Tushman & Anderson, 1986). Although this market dynamic can represent a great opportunity for companies to gain new competitive advantages, established companies that are unable to adapt to the associated changes see themselves as confronted by especially tremendous challenges (Bower & Christensen, 1995). To meet such market changes, established companies must develop new knowledge through exploration and use this knowledge to create new products and services (O'Connor & DeMartino, 2006). The shift from the standardized use of existing knowledge, as practiced over many years, towards

[4] This study is published with the kind permission of Emerald Publishing Limited. The study is published under Kötting (2019) and appeared in European Journal of Innovation Management, 23(3), 474–499. An online version can be found at the following address: https://www.emerald.com/insight/content/doi/10.1108/EJIM-12-2017-0201/full/html.

an exploration of new knowledge with diverse uncertainties is an enormous challenge for many established companies (March, 1991).

As a concept aiming to solve the described problem, corporate incubation has begun to take root in practice (Hausberg & Korreck, 2017; Weiblen & Chesbrough, 2015). Leveraging corporate incubation implies the creation of a new organizational entity to develop new knowledge and to transfer this knowledge through a constant process to business units (O'Connor & DeMartino, 2006). The generation of new knowledge takes place through the development of internal and external ventures. The knowledge generated in the course of the development is combined with existing knowledge of the business units in order to generate new innovation as result of the corporate incubation process (Becker & Gassmann, 2006b). In this context, the corporate incubator serves as owner of the incubation process and ensures as knowledge broker the knowledge transfer between the ventures and the business units (Gassmann & Becker, 2006).

Although the use of corporate incubation appears promising at first glance, the sustainability of corporate incubators requires critical reflection. An analytical perspective on the past shows that roughly a third of companies implementing corporate incubators have failed (Becker & Gassmann, 2006a, 2006b). The high failure rate is especially attributed to incubators not meeting the promised objectives of the parent company and the business units (Gassmann & Becker, 2006; Kambil et al., 2000; O'Connor & Ayers, 2005). In addition to the expectations of the parent company, the expectations of the ventures have also frequently been disappointed (Zedtwitz & Grimaldi, 2006). Therefore scientific approaches to explain the phenomenon of corporate incubation and to give practical recommendations are needed.

Whereas an abundance of scientific literature has been published regarding business incubation in general (e.g., Albort-Morant & Ribeiro-Soriano, 2016; Hackett & Dilts, 2004), the research field of corporate incubation still shows potential for further development (Ahmad, 2014; Evald & Bager, 2008; Hausberg & Korreck, 2017; Pauwels et al., 2016; Uittenbogaard et al., 2005). The existing literature regarding business incubation takes a homogeneous look at the issue, neglecting often characteristics and specificities of different forms of incubation (Aaboen, 2009; Barbero et al., 2014; Becker & Gassmann, 2006a). While the basic processes and support services between different forms of incubators may not be substantially different (Grimaldi & Grandi, 2005), corporate incubators differ in the embedding in an existing organizational structure and the pursuit of

strategic goals like generating relevant knowledge for the business units (Gassmann & Becker, 2006). Following the classification of Grimaldi & Grandi (2005), it is noticeable that Business Innovation Centers and Independent Private Incubators, in contrast to Corporate (Private) Incubators and University Business Incubators, only aim for a unilateral knowledge transfer from the incubator to the ventures. Corporate (Private) Incubators and University Business Incubators, on the other hand, aim to establish a bidirectional knowledge transfer. Therefore, a corporate incubator has always to consider the strategic alignment and knowledge brokering between the business units and the ventures (Hausberg & Korreck, 2017). The embedding of the incubator in an existing organizational structure and consideration of the strategic alignment with the parent company and their business units on the one hand, and the ventures on the other hand, are unique characteristics of corporate incubators. To be able to accommodate mentioned peculiarities of corporate incubation, we are in line with existing research (Barbero et al., 2014; Hausberg & Korreck, 2017), requiring a more differentiated examination of the phenomenon.

Intent on contributing to the advancement of the research field of corporate incubation, the present work aims to systematically analyze the current state-of-the-art of the research field. The goal is to derive a cohesive framework based on existing literature, allowing a holistic view of the corporate incubation research field. Putting the process of knowledge transfer in the center of our consideration, we will highlight the supporting elements connected with the process. Moreover, the literature review should help identify open research questions and provide an impetus for further research. The present work suggests that it is one of the first that systematically analyze the literature on corporate incubation with a focus on the knowledge transfer between the incubator, the ventures and the parent company.

The present work can be divided into five sections. Section 2 is dedicated to the method of the systematic literature review. Here, the applied methodology and associated procedure is outlined in a transparent manner. Sections 3 analyzes the relevant literature and thereby deduct the central framework. Section 4 presents the open research questions resulting from the framework. Subsequently section 5 addresses the study limitations, and summarizes the key findings of this work.

3.2. Review approach

The aim of this research is to construct a framework for structuring the corporate incubation literature. The framework is based on existing findings that need to be identified systematically and

analyzed substantively (Denyer & Tranfield, 2006). The recommended methodological approach is therefore a systematic literature review, which allows for a systematic, transparent, and comprehensible identification of relevant literature (Tranfield et al., 2003). For this reason, systematic literature reviews are an accepted research tool to obtain a structured overview of a research field (Rousseau & McCarthy, 2007) and are also accepted in the context of business incubation (Hackett & Dilts, 2004; Hausberg & Korreck, 2017).

3.2.1. Systematic literature search

The literature search was conducted in July 2018. The focus was on academic papers published in the English language in peer-reviewed scientific journals (Keupp et al., 2012; Meier, 2011; Savino et al., 2017). This approach assures the content quality of the review because contributions in journals enjoy an excellent reputation and exert a strong influence on the academic discourse (e.g., Podsakoff et al., 2005). For the purpose of achieving high-quality results, the focus was particularly directed towards high-ranked journals (e.g., Armstrong & Wilkinson, 2007). The identification of relevant contributions occurred in four steps (see Figure 3-1):

Baseline. In a first step, the databases *ABI/INFORM Collection*, *Business Source Complete* and *ScienceDirect* were searched in full-text mode (incl. title, abstract, keywords) using the search terms "corporate" and "incubat*". By using these databases, broad coverage of academic journals could be ensured (Djokovic & Souitaris, 2008). For the search, both search terms were linked via proximity-operator ("corporate" NEAR/2, "incubat*"). This approach is mindful of the inconsistent terminology in the literature. For instance, the literature makes use of terms such as corporate incubators (e.g., Allen & McCluskey, 1990), corporate business incubators (Grimaldi & Grandi, 2005) and corporate private incubators (Grimaldi & Grandi, 2005).[5] Through the search, 214 results were identified. After consolidating double entries, an initial 196 articles were identified.

Thematic relevance. The second step consisted of verifying the thematic relevance of the identified articles. The thematic relevance of an article was regarded as given if the journal of publication was assigned to the category *Business, Management and Accounting* by the *Scimago Journal & Country Rank*. Due to this criterion, 39 articles were excluded. Articles not named in the *Scimago*

[5] Grimaldi & Grandi (2005) make use of both terminologies in their work.

Journal & Country Rank were cross checked with the *Journal Citation Report*, a step that eliminated an additional 34 articles cited in neither the *Scimago Journal & Country Rank* nor in the *Journal Citation Report*. Failing to be listed was regarded as a criterion of minor relevance of the journal, since the *Scimago Journal & Country Rank* and the *Journal Citation Report* are accepted as leading ranking platforms for scientific publications (Falagas et al., 2008). Hence, the second phase yielded a total of 123 articles.

Content quality. The third step was designed to guarantee the quality of the content. The *Scimago Journal & Country Rank* served as the basis for assessment. Articles published in journals ranking in the lowest quartile of our interim search result (SJR ≤ .492) were excluded from further consideration. Podsakoff et al. (2005) showed that the relevance of journals ranking in the lowest quartile was negligible concerning the number of citations. As a conclusion, contributions in these journals have no significant impact on the scientific development. Consequently, 102 articles remained.

Content-related review. In the fourth and final step, the author conducted a content-related review of the remaining 102 articles. To avoid subjective bias, the articles were reviewed using a data extraction sheet (Tranfield et al., 2003). Subsequently, 13 articles were excluded because they did not qualify as scientific contributions (e.g., editorial, book reviews). Another 44 articles were excluded because the topic of corporate incubation was not addressed contextually. Consequently, the literature search was completed based on 45 remaining articles (see Table 3-1)[6]. As demonstrated in previous work, this is an appropriate number of articles for a systematic literature review (e.g., Hackett & Dilts, 2004; Klotz et al., 2014; Thywissen, 2015).

[6] A detailed presentation of the used methods and samples can be found in Appendix 3-1.

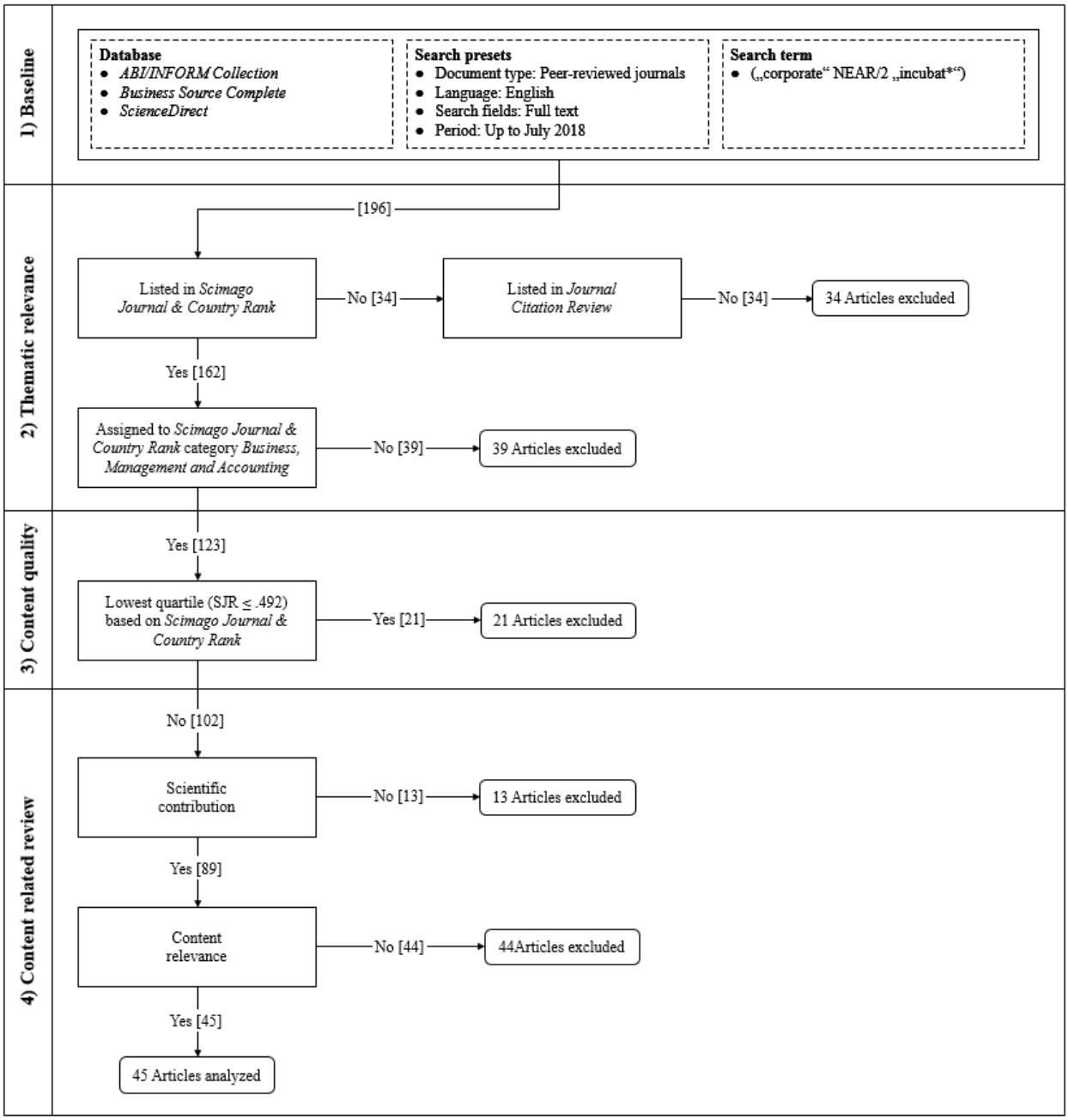


Figure 3-1: Systematic search and selection process

Table 3-1: Analyzed corporate incubation literature

	Research method				*Parent company*			*Corporate incubator*			*Business units*		*Knowledge transfer*		
	Conceptual	*Descriptive*	*Qualitative*	*Quantitative*	*Objectives*	*Embedding*	*Support*	*Management*	*Processes*	*Services*	*Participation*	*Resources*	*Selection*	*Development*	*Spin-off*
Aaboen (2009)			✓										●	●	
Ahmad (2014)			✓											●	
Allen & McCluskey (1990)		✓			●										
Barbero et al. (2012)				✓	●										
Barbero et al. (2014)				✓					●			●			
Becker & Gassmann (2006a)			✓											●	
Becker & Gassmann (2006b)			✓		●●●				●		●	●	●●	●●●	
Block et al. (2018)	✓									●					
Branstad (2010)			✓							●			●●	●	
Branstad & Saetre (2016)			✓						●					●	
Carayannis & Zedtwitz (2005)	✓				●										
Chen & Kannan-Narasimhan (2015)			✓								●			●●●	
Chesbrough (2003)			✓										●		
Chesbrough & Brunswicker (2014)		✓			●									●	
Chesbrough & Socolof (2000)			✓			●		●●							
Christensen et al. (2016)	N/A				●										●
Euchner & Ganguly (2014)	✓					●					●			●	

	Research method				*Parent company*			*Corporate incubator*			*Business units*		*Knowledge transfer*		
	Conceptual	*Descriptive*	*Qualitative*	*Quantitative*	*Objectives*	*Embedding*	*Support*	*Management*	*Processes*	*Services*	*Participation*	*Resources*	*Selection*	*Development*	*Spin-off*
Ferrary (2008)			✓					●●							
Ford et al. (2010)			✓				●		●				●●●		●●
Ford et al. (2012)			✓			●								●	●●
Fryges & Wright (2014)	✓													●●	●
Ginsberg & Hay (1994)	✓												●		
Grimaldi & Grandi (2005)			✓					●		●●●			●		
Hausberg & Korreck (2018)	Literature review				●					●					
Hughes et al. (2007)				✓	●					●					
Kambil et al. (2000)			✓							●					
Kim et al. (2012)			✓		●●●	●					●	●	●●		
Kohler (2016)			✓						●						
Maine (2008)			✓		●		●		●		●	●			
Markham et al. (2005)			✓		●										
Neck et al. (2004)			✓							●					
O'Connor & Ayers (2005)			✓				●								
O'Connor & DeMartino (2006)			✓			●●								●	●●
Ohe et al. (1992)				✓						●			●		
Pauwels et al. (2016)			✓										●		

	Research method				*Parent company*			*Corporate incubator*			*Business units*		*Knowledge transfer*		
	Conceptual	*Descriptive*	*Qualitative*	*Quantitative*	*Objectives*	*Embedding*	*Support*	*Management*	*Processes*	*Services*	*Participation*	*Resources*	*Selection*	*Development*	*Spin-off*
Powell (2010)			✓											●	●●
Robeson & O'Connor (2007)			✓			●	●	●●							
Simpson & Hill (2004)	✓				●										
Trompenaars & Woolliams (2002)	✓													●●	●
Uittenbogaard et al. (2005)			✓		●●	●	●								
Vanhaverbeke & Peeters (2005)			✓		●	●								●	
van Burg et al. (2012)			✓											●●	●●
Weiblen & Chesbrough (2015)			✓												●
Zedtwitz & Grimaldi (2006)			✓					●							
Zedtwitz et al. (2004)			✓					●							
	7 (16%)	2 (5%)	30 (70%)	4 (9%)											

3.2.2. Descriptive literature analysis

For the purpose of generating a preliminary overview, the identified articles were subjected to a descriptive analysis (Tranfield et al., 2003). Table 3-2 shows that up to the year 2004, corporate incubation attracted little attention in the scientific literature. Beginning in the year 2005, however, an increasing number of scientific contributions are recorded. On a positive note, the number of scientific articles remained at a constant level over time and up to the present day.

Table 3-2: Descriptive analysis of the identified literature

Journal	*SJR*	∑	*90-94*	*95-99*	*00-04*	*05-09*	*10-14*	*15-18*
Asia Pacific Journal of Management	1,676	1					1	
Business Horizons	0,726	1						1
California Management Review	1,571	1						1
Creativity and Innovation Management	0,654	2				2		
Entrepreneurship: Theory and Practice	4,240	1	1					
European Journal of Innovation Management	0,596	1					1	
European Management Journal	0,816	1	1					
Int. Journal of Entrepreneurial Behaviour and Research	0,694	1					1	
Journal of Business Venturing	4,923	1	1					
Journal of Change Management	0,505	1			1			
Journal of Engineering and Technology Management	1,079	1				1		
Journal of International Management	1,829	1			1			
Journal of Product Innovation Management	2,337	1				1		
Journal of Small Business and Enterprise Development	0,575	1						1
Journal of Small Business Management	1,368	1			1			
Journal of Technology Transfer	1,518	5				3	1	1
Long Range Planning	1,958	1				1		
MIT Sloan Management Review	1,128	2			1			1
R&D Management	0,939	5				2	2	1
Research Policy	3,536	1			1			
Research Technology Management	0,522	6			1	2	3	
Small Business Economics	2,013	2					1	1

Journal	*SJR*	∑	*90-94*	*95-99*	*00-04*	*05-09*	*10-14*	*15-18*
Technological Forecasting and Social Change	1,348	1					1	
Technovation	1,794	5				3	1	1
Total Quality Management and Business Excellence	0,662	1			1			
		45	*3*	*0*	*7*	*15*	*12*	*8*

It is of special interest here, that the above mentioned journals mainly cover literature in the domain of innovation and technology management. This observation underpins the introduction, according to which corporate incubation is primarily a tool to foster the innovation capability of established companies. The 45 articles are spread over 26 journals. This finding demonstrates the heterogeneous distribution of the corporate incubation literature among academic journals.

3.3. Corporate incubators as knowledge brokers

A corporate incubator can be characterized as an organizational unit of an established company with a mission to generate new knowledge and to transfer that knowledge into existing business units (Gassmann & Becker, 2006). To generate and transfer new knowledge, the incubator selects and develops ventures and acts as a knowledge broker between the ventures and the business units of the established company. Therefore, the knowledge transfer is bidirectional, operating not only from the ventures to the business units but also from the business units to the ventures. In addition to this function as knowledge broker, integration of the corporate incubator within the parent organization and its interaction with the business units is especially associated with a high degree of complexity and is one of the major features differentiating the corporate incubator from other forms of incubators. In this vein, O'Connor & DeMartino (2006), who conducted a longitudinal study of 12 firms, concluded that the successful generation of new knowledge and innovation is not solely dependent on the corporate incubator. Instead, it requires the consideration of the whole organizational innovation system and the interplay among the incubator, the parent company and its business units and the ventures. Taking these findings by O'Connor & DeMartino into account, in the next section, we will describe a corporate incubation framework with the process of knowledge transfer and venture development as its central element (Fryges, 2014). This process will be supported by the organizational units involved and by related supporting activities (see Figure 3-2).

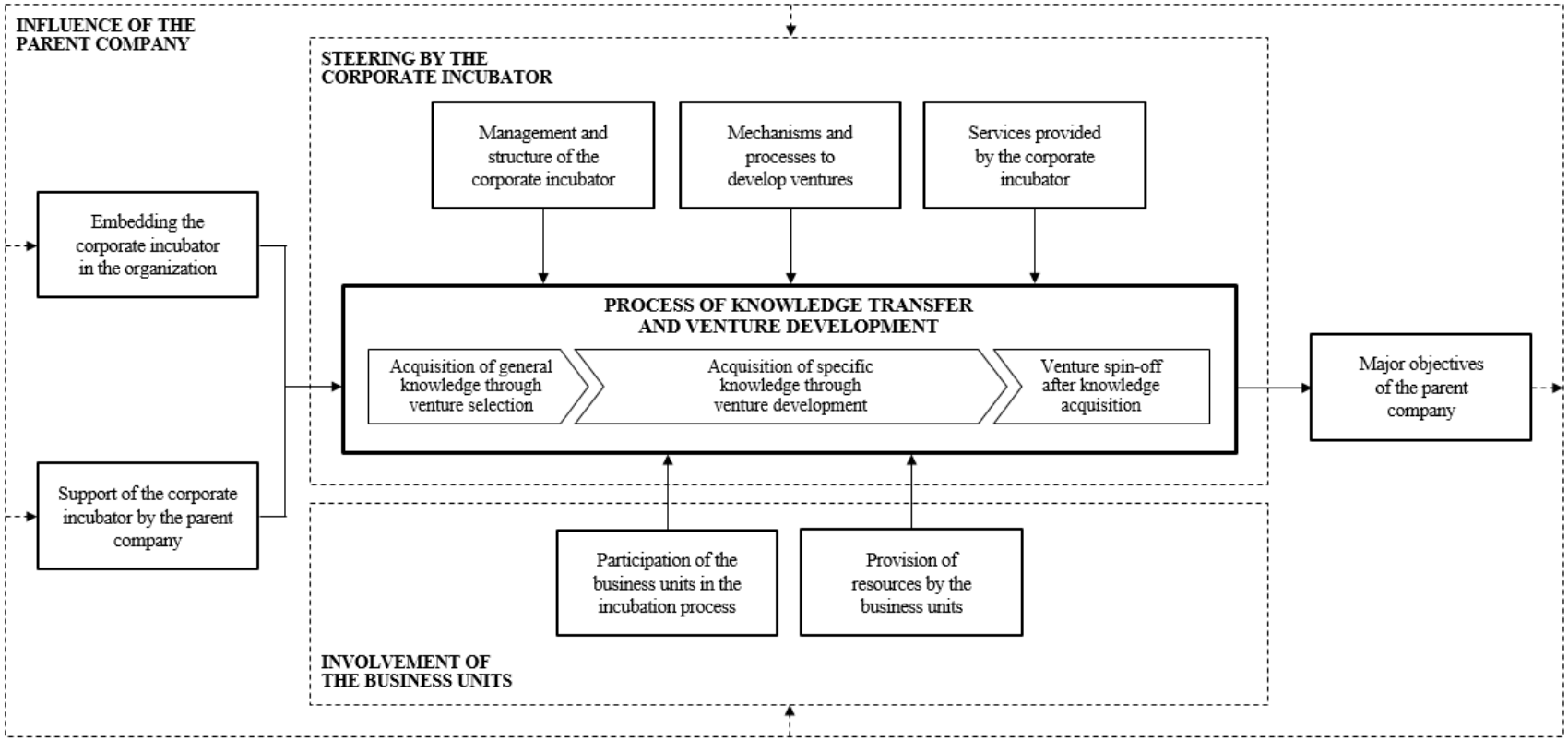


Figure 3-2: Framework of corporate incubation

3.3.1. Influence of the parent company

The parent company establishes the guardrails for the corporate incubator (O'Connor & DeMartino, 2006). For this purpose, the parent company must define the objectives associated with the corporate incubator and create appropriated conditions (e.g., organizational structure, resource equipment, and support services) for setup and operation (Ford et al., 2010; Maine, 2008; O'Connor & DeMartino, 2006).

3.3.1.1. Major objectives of the parent company

Companies pursue particular strategic objectives with corporate incubators (e.g., Carayannis & Zedtwitz, 2005). For example, Becker & Gassmann (2006a) differentiate four strategic goals in their qualitative study involving 25 cases from Europe and the US. The authors hereby distinguish among Fast-profit Incubators, which gain financial returns by spinning out internal noncore technology units, Leveraging Incubators, which create breakthrough technology by acting as matchmakers between central R&D and marketing units, Insourcing Incubators, which scan the environment for windows on emerging technologies, and Market Incubators, which support the development of complementary technology to increase the demand for the parent company's product. Following Becker & Gassmann (2006a), Fast-profit Incubators and Leveraging Incubators focus on the exploitation of existing knowledge, while Market Incubators and Insourcing Incubators focus on the exploration of new knowledge. In addition to the exploration of new knowledge and the exploitation of existing knowledge, the creation of an entrepreneurial culture was identified as a common rationale of corporate incubators by Uittenbogaard et al. (2005), who based their study on comparative research in five multinational high-technology companies.

The literature primarily describes the exploration of new knowledge as the most frequently named objective of corporate incubators. Becker & Gassmann (2006a) confirm what Allen & McCluskey (1990) found earlier in their study based on a survey of 127 incubators: parent companies are tasking corporate incubators primarily with the exploration of new knowledge and the development of new products and services. These early insights were corroborated later with qualitative works by Christensen et al. (2016), who investigated a large German car manufacturer, and by Kim et al. (2012), who focused on two large Asian technology companies. In a study involving workshops with twenty participants responsible for new technology initiatives, Markham et al. (2005) also concluded that established companies are mainly motivated by the generation of new

knowledge in the form of a window onto emerging technologies, market opportunities, new business models, and channels of distribution. The authors also point out that the success of corporate incubators predominantly lies in matching what the incubator can provide with what the company actually needs. The parent company must therefore provide the appropriate framework conditions that allow the realization of the targeted objective. Finally, Chesbrough & Brunswicker (2014), who based their findings on interviews with 125 companies from Europe and the US, show that corporate incubators are increasingly used as an opportunity to exercise open innovation. In comparison with other approaches, companies thus far have attached a medium relevance to corporate incubators as a tool for open innovation. However, it is clear that the relevance of corporate incubators in the context of open innovation has steadily increased over the past few years.

The exploitation of existing knowledge is another major rationale of corporate incubation. In their analysis of British Telecom, Simpson & Hill (2004) report that one of the main goals of British Telecom was to unlock some of the value contained in their technology patents. The corporate incubator was therefore designed to leverage existing knowledge to create value. In a quantitative analysis of 70 incubators from Spain, Barbero et al. (2012) also demonstrated how different archetypes of incubators (Basic Research Incubator, University Business Incubator, Economic Development Incubator, Private Incubator) affect the incubator's performance. The authors were able to show that private incubators create high financial returns for their parent company. This can be derived from sales growth rates in the region of 20% for a five-year period. The authors conclude that private incubators are especially well positioned to exploit existing knowledge to generate sales growth.

In a case study of a large German chemical group, Maine (2008) explores to what extent an organizational culture that enables efficient resource allocation can limit the ability to create corporate innovation. Hence, it seems consistent that for many companies, corporate incubators aim to sustainably transform corporate culture. Using case studies, Uittenbogaard et al. (2005) as well as Hughes et al. (2007) and Kim et al. (2012) have proven that companies use corporate incubators to revitalize and transform the company into an entrepreneurial organization by infusing an entrepreneurial spirit and streamlining its organizational processes. Moreover, Kim et al. (2012) and Hausberg & Korreck (2017) argue that corporate incubators also represent a suitable means to steer entrepreneurial talent towards options for the future within an established company. This finding is also supported by Ferray (2008), who conducted an in-depth case study of France

Telecom. Vanhaverbeke & Peeters (2005), in yet another case study of a Dutch chemical manufacturer, found that through the temporary transition of employees from business units to the corporate incubator, employees learn new working methods they can subsequently put to use in the business units.

3.3.1.2. Embedding the corporate incubator in the organization

The organizational structure of a corporate incubator is largely dependent on the objectives of the parent company. A qualitative study by O'Connor & DeMartino (2006) involving 12 companies found that mainly two configurations are found in practice. On the one hand, there are corporate incubators located outside the business units with the purpose to explore new knowledge. On the other hand, there are incubators located within the business units but managed separately and differently within the mainstream operations. The authors also observe that the organizational structure is anything but static. Over time, the structure gradually changes, approaching the parent company's objectives. In a later study, Robeson & O'Connor (2007) arrive at the proposition that firms that moderately coupled their incubator and their business units were more successful than firms that coupled their incubator and their business units either very loosely or very tightly. Therefore, the relationship has an inverted u-shaped form.

In agreement with O'Connor & DeMartino (2006), Vanhaverbeke & Peeters (2005) observed in their single case study that companies tend to set up corporate incubators independently when they intend to develop new knowledge and technologies. Uittenbogaard et al. (2005) also support this line of argumentation. However, the authors add that despite their high autonomy, incubators still require top management support, and moreover a budget to pursue different innovation opportunities. Kim et al. (2012) observe the need for autonomy due to an organizational misfit. They state that ventures require different organizational arrangements, such as an organization's culture and processes, than their corporate parents. Euchner & Ganguly (2014), who studied a US-based tire producer, also agree with this observation. They believe that an independent entity has a greater ability to escape the orthodoxies of the existing company and yet would be able to borrow key assets of the company as necessary.

Should the corporate incubator in particular pursue the exploitation of existing knowledge, it would be worth seeking a very close collaboration between the incubator and business units, according to the research findings by Chesbrough & Socolof (2000). The authors studied a

multinational telecommunications equipment company and concluded that a high degree of integration can address the business unit's needs in a more targeted fashion while avoiding the risk of unintended cannibalization of existing products and technologies. Moreover, the business unit could be informed of interesting developments early in the process, which would allow the unit to consider them in future planning. Ford et al. (2012) also observed a similar approach in their study of a consumer electronics firm. In an initial step, the company did not succeed to integrate technology developed by the incubator into the business unit because the alignment between the technology and the current operations of the business unit was non-existent. However, following a stronger integration of incubator and business unit, the alignment could be increased (Zedtwitz et al., 2004).

3.3.1.3. Support of the corporate incubator by the parent company

Particularly during the initial stages, corporate incubators are often dependent on resources from the parent company. Various scientific studies have concluded that the support services of the parent company focus mainly on support through top-management commitment and support through financial resources (e.g., Ford et al., 2010; Maine, 2008; Uittenbogaard et al., 2005).

A vast body of scientific evidence suggests that a high commitment of top management is a major success factor for corporate incubation (e.g., O'Connor & Ayers, 2005). Among other findings, this was highlighted by Maine (2008), who observed that due to a high-level steering committee, the incubator's acceptance in the organization increased. These findings are also corroborated by Robeson & O'Connor (2007), who investigated 12 large US-based firms with multicase analysis methods and drafted several propositions. In their conclusion, the authors point out that firms that are successful at developing corporate innovation show a high level of senior leadership involvement.

In regard to the acquisition of external knowledge but also the internal promotion and further development of innovations, corporate incubators are dependent on financial resources. In a case study of a corporate incubator of a Netherlands-based technology company, Ford et al. (2010) report that at its launch, the parent company provided the incubator with a fund of five million Euros to support and develop the ventures. The authors add that as the number of ventures housed in the incubator increased, the parent company increased the funding for the incubator, which

ultimately reached 20 million Euros. Thus, to a large extent, financial means are used to acquire minority interests in ventures.

3.3.2. Steering by the corporate incubator

The corporate incubator is responsible for the incubation process. On the one hand, the incubator is responsible for the definition and implementation of the process. On the other hand, however, he must also involve the participating organizational units of the parent company and coordinate their participation (Becker & Gassmann, 2006b). In this function, the incubator acts as an advisor for the ventures but also as a knowledge broker between the ventures and the business units of the parent company (Branstad, 2010).

3.3.2.1. Management and structure of the corporate incubator

The management of a corporate incubator is an essential criterion for its success. For this reason, different authors in the scientific literature have already placed much emphasis on management by conducting various studies on the topic (e.g., Allen & McCluskey, 1990; Branstad, 2010). Thus, most of the reviewed work focuses on the composition of the management board. Moreover, a few studies put compensation of the management board front and center (Ferrary, 2008; Robeson & O'Connor, 2007).

In the context of a multicase analysis of 12 large US-based firms, Robeson & O'Connor (2007) investigated the governance mechanisms of different innovation units (e.g., incubator, corporate venturing unit). As a result of this work, the authors discuss, among other things, the composition of the management board. They conclude that the management board of a corporate incubator should consist of members of the incubator as well as individuals outside of the incubator, such as the business units. Moreover, the authors argue that the board should be characterized by functional diversity among the board members, where the board size should be between five and eight persons, and that the management style should be collaborative and not 'command and control'. With respect to the staffing of the operative management, Chesbrough & Socolof (2000) found in their analysis that it is very difficult for companies to find suitable management personnel for the incubator on the free market. Instead, it was shown that long-serving employees of the company with an entrepreneurial background are the best fit. In their research, Grimaldi & Grandi (2005) observed that the operative management thus plays an extremely important role. On the one hand it must promote the development of external contacts, and on the other hand it must assure the

support of the ventures via mentoring and networking. In this context, however, Zedtwitz & Grimaldi (2006) found in their qualitative analysis of 15 incubators that the management quality of corporate incubators is significantly higher than that of (independent) business incubators.

In addition to the composition of the management board, the compensation of the incubator management is also a relevant research topic (e.g., Ferrary, 2008). According to Chesbrough & Socolof (2000), the compensation can fall within an area of tension spanning from a fixed compensation, as is common for companies, to a very variable compensation, as practiced by independent incubators and venture capital companies. Based on a case study of a multinational telecommunications equipment company, the authors conclude that the compensation should ultimately follow flexible compensation mechanisms. This allows incubator management to create a performance-based incentive system. However, the authors note that different compensation mechanisms between corporate incubator and the remaining business units could lead to tensions between the units.

3.3.2.2. Mechanisms and processes to develop ventures

For the successful development of ventures, the literature recommends a systematic development approach and appropriate support by incubator staff. In addition to ensuring certain quality standards, a systematic approach should be used to standardize development so that a higher number of ventures can receive a certain quality of support (Becker & Gassmann, 2006a; Ford et al., 2010). However, the support of the incubator staff is essential for the company to be able to respond to the individual needs of the ventures as part of their individual development process (Kohler, 2016).

The literature distinguishes different support mechanisms for the development of ventures. In a case study, Maine (2008) observed how the development and provision of resources could be controlled and manipulated by setting financial milestones in the areas of target sales, profit, and capital expenditures, and nonfinancial milestones in the areas of resource building, internal execution, customer acceptance of technical performance, and external perception. Ford et al. (2010) also mention the necessity to control a venture's progress. In their case study, the incubator successfully applied monitoring and controlling processes in a venture capital setting. In addition to a performance-based performance review, a structured approach also enables comparability between different ventures and the standardization of development (Ford et al., 2010).

In the course of a longitudinal case study, Branstad & Saetre (2016) found that high levels of involvement by incubator staff could yield substantial benefits for their ventures. Consequently,

the incubator's ability to provide business assistance is not only about having the right skills but also about bringing these skills and assets into the tenant companies. The study by Barbero et al. (2014) shows that many corporate incubators already place much emphasis on an appropriate supervisory relationship. For example, the authors established that corporate incubators host fewer ventures than other types of incubators, enabling them to focus resources in-depth rather than spreading them thinly across a large number of ventures. Additionally, Brandstad (2010) found that the staff of the incubator regularly acts as knowledge brokers between ventures and business units. Becker & Gassmann (2006b) argue that through the informal communication of knowledge, formal hierarchical communication paths are reduced, and cultural or linguistic barriers are dismantled.

3.3.2.3. Services provided by the corporate incubator

Like business incubators, corporate incubators offer different support services for the development of the ventures. Thus, the provision of management, product and market knowledge is particularly relevant for ventures (Branstad, 2010). Moreover, the incubator enables access to venture capital and to strategic partners (Allen & McCluskey, 1990; Grimaldi & Grandi, 2005).

The provision of specific management, product and market knowledge often involves a crucial unique selling point of corporate incubators compared to business incubators. Through their parent company and contact with business units, corporate incubators can obtain very specific knowledge and make it accessible to ventures. Ohe et al. (1992) investigated 38 ventures of 18 large Japanese manufacturing companies and found that management support and product knowledge from business units are crucial for the successful performance of ventures. The study also indicates that the success of the ventures correlates with the increase of provided marketing know-how. In a longitudinal case study involving a Norway-based incubator, Branstad (2010) concludes that there are clear differences regarding provided knowledge. For example, ventures rely on different forms of knowledge. Thus, the author distinguishes between entrepreneurial and organizational knowledge, which should be provided by the management of the incubator, as well as market and technological knowledge, which should be provided by the business units of the parent company. The type of knowledge required by ventures should be determined by the incubator management while also taking their development into account.

In addition to management, product and market knowledge, the corporate incubator can secure access to venture capital in two ways. Should there be an indication that the venture could become strategically relevant for the parent company or one of their business units, the venture can be supported financially by the parent company or the business unit. In this vein, Block et al. (2017) and Hausberg & Korreck (2017) argue that established companies are increasingly opening up and investing in strategic relevant startups with the help of corporate incubators. If the venture does not develop strategic potential for the parent company or one of its business units, contact with external investors could be initiated. Grimaldi & Grandi (2005) found that corporate incubators fare significantly better in the procurement and brokering of financial resources than do public incubators.

Surveying 15 founders of corporate spin-offs, Neck et al. (2004) found that the informal network between corporate incubators, ventures and strategic partners was of major importance for 67% of the interviewed founders. Another study by Grimaldi & Grandi (2005) underlines that corporate incubators in particular can point to a strong network of strategic partners which ultimately ventures can access as well. The network allows ventures to easily and quickly access competencies that are not available in-house and that are important for their business (Kambil et al., 2000). These relations enable them to speed up their business development cycles. The findings by Grimaldi & Grandi (2005) were also corroborated in a case study by Hughes (2007). A vast network of strategic partners that can provide key services to incubating companies, as well as access to knowledge, expertise and even patents, is the foundation of the corporate incubator studied.

3.3.3. Involvement of the business units

Business units are mainly responsible for the development, production and marketing of technologies. As part of the parent company's strategic goals, it is often the business units that are expected to participate in the activities of the corporate incubator in order to further develop their products or create new innovations (Weiblein & Chesbrough, 2015). To benefit from the activities of the incubator, the business units must be actively involved in the knowledge transfer (Gassmann & Becker, 2006; Kohler, 2016). In addition, the units are required the support the ventures in order to ensure a trusting relationship via a bidirectional exchange of resources (Branstad, 2010).

3.3.3.1. Participation of the business units in the incubation process

The scientific literature agrees that there should be a regular knowledge exchange between business units and the corporate incubator. Maine (2008) argues that an early involvement and a regular exchange are required to prevent rejections of new approaches by the business units. Moreover, Kim et al. (2012) argue that business units become sensitized to relevant developments and their possible synergies. These findings are supported by Euchner & Ganguly (2014), who exhaustively studied the innovation activities of a US-based tire producer. In the literature, mechanisms of coordination are identified as involvement through the management board and involvement through contact persons.

Based on a multiple case study with nine organizations from the US, Chen & Kannan-Narasimhan (2015) observed that the majority of the organizations in their sample established committees or boards consisting of executives from business units to supervise or advise new venture activities. The authors add that the degree of integration, however, varies greatly. Some advisory boards are deeply involved in the details of the incubation process, which often leads to problems as well. First, business unit executives often have extensive experience managing large organizational entities. However, this leads to a strong bottom-line mentality, and they lack the necessary knowledge and skills to properly guide and manage early stage ventures. Second, when the interests of the advisory board members are tied to the interests of established business units, the board members are likely to be biased against new ventures, especially if these ventures hurt the interests of the business units.

More promising is the involvement of the business unit through contact persons. In addition to the establishment of a managing board, Becker & Gassmann (2006b) identified contact persons as another coordination mechanism. Some of the companies studied by the authors succeed in ensuring regular coordination through explicitly defined contact persons at the business unit. The contact persons all take part in a predefined process of advice to develop selected ventures with relations to their business units. If the related venture needs to further tap the business unit's information or networks, the defined communication channels help to reduce the venture's search time and ensure the business unit's commitment and support. These interfaces also support the exit of 'graduated' ventures after a successful incubation process.

3.3.3.2. Provision of resources by the business units

The provision of resources allows business units to demonstrate their commitment to ventures of their choice. Generally, participation includes the provision of specialized knowledge or the provision of financial resources. With the provision of resources, the business units share the risks and rewards associated with these ventures (Gassmann & Becker, 2006). The risk mainly results from the uncertainty that the supported ventures will be further developed (Ford, 2010). This is especially true when business units invest in early stage ventures in which the directions and outcomes of the projects are highly uncertain. Under such situations, business units are motivated to work closely with the corporate incubator and the ventures to minimize the associated risk (Chen & Kannan-Narasimhan, 2015).

Often, business units support the corporate incubator and the ventures through the provision of special knowledge. In a quantitative study of 80 incubators, Barbero et al. (2014) found that business units can support the incubator's ventures with access to leading technology, commercial market knowledge and specialized managerial knowledge. Becker & Gassmann (2006b) draw similar conclusions. In a qualitative study of 25 cases from Europe and the US, the authors found that ventures can gain access to a large pool of internal knowledge on business development, markets, customers, suppliers, technology, and external partners via the business units. According to Kim et al. (2012), ventures of the corporate incubator with access to the knowledge of the business units have a competitive advantage over independent ventures. However, it must be remembered that the transfer of knowledge is in general bidirectional. The close cooperation with the venture also allows the business unit to acquire critical knowledge about, for example, new technologies.

In addition to immaterial resources, business units often support the incubator and the ventures with financial resources. For a corporate incubator, financial resources are of essential importance to acquiring minority equity stakes of ventures and to expediting their further development (Becker & Gassmann, 2006a, 2006b). In addition to the central provision by the parent company, Maine (2008), in his case study of a large German chemical group, observed that in practice there are mechanisms in place allowing financial means to be made available through the business units. In such a case, business units choose ventures that are relevant to them, supporting them with specialized knowledge and capital.

3.3.4. Process of knowledge transfer and venture development

As already mentioned, the bidirectional transfer of knowledge is one of the main differentiating features between corporate incubators and other forms of business incubators (Gassmann & Becker, 2006; Hausberg & Korreck, 2017). After having discussed the support activities of the involved organizational units in the previous sections, the process of knowledge transfer and venture development will be described below. In this setting the corporate incubator acts as an organizational link and knowledge broker between the business units and the ventures. To achieve the strategic objectives of the parent company, the organizational requirements for a continuous knowledge transfer have to been established (Uittenbogaard et al., 2005). Therefore, as shown in Figure 3-3, selected ventures must first be integrated into the governance structure of the incubator before they can be spun off again following a successful incubation process (Chen & Kannan-Narasimhan, 2015; van Burg et al., 2012).

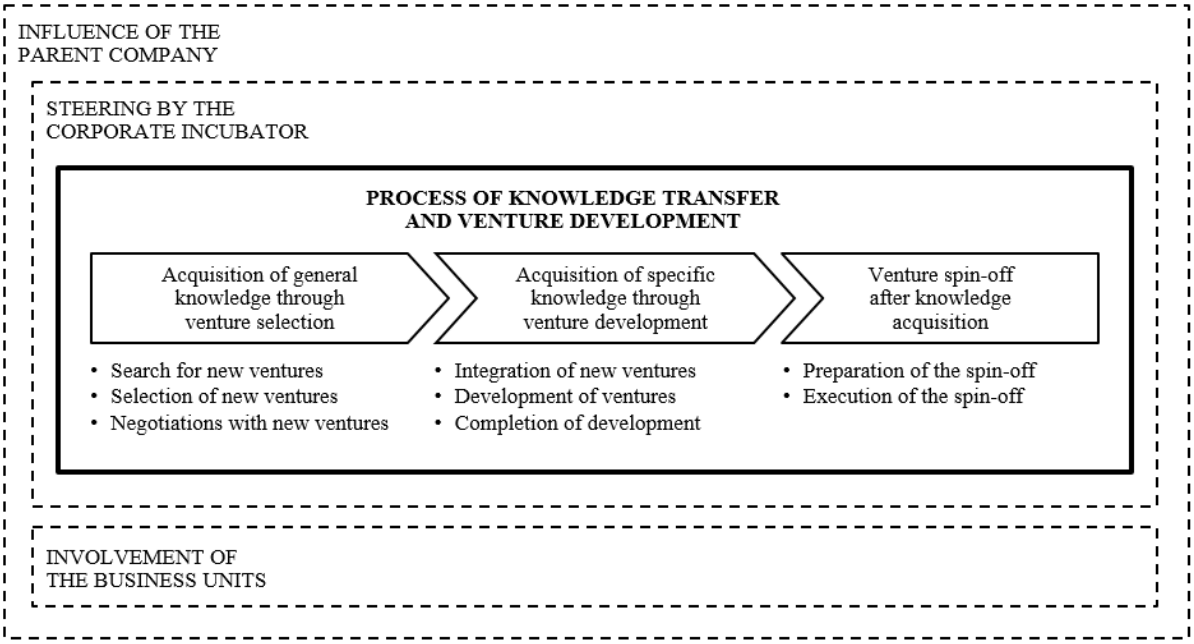


Figure 3-3: Process of knowledge transfer and venture development

Gassmann & Becker (2006), in a scientific study, examined the transfer of knowledge between the corporate incubator, the business units, and the ventures as well as the interfaces among the

different entities. Following their contribution, we divide the following section into three phases: During venture selection, ventures will be selected, and contractual agreements will be concluded (Chen & Kannan-Narasimhan, 2015; Ginsberg & Hay, 1994). The following venture development phase is characterized by the integration of the ventures into the governance structure of the corporate incubator, supporting venture development and establishing links between ventures and business units (Gassmann & Becker, 2006). During the venture spin-off phase, ventures are spun off from the corporate incubator's governance and are organizationally restructured (van Burg et al., 2012).

3.3.4.1. Acquisition of general knowledge through venture selection

The selection of suitable ventures is a significant aspect of realizing the strategic goals of the parent company. However, selection turns out to be very challenging because, on the one hand, the potential of the ventures must be assessed at a very early stage while on the other hand, the fit in accordance with the objectives of the parent company should be assured simultaneously (Pauwels et al., 2016). After the selection of promising ventures, the incubator must negotiate with the ventures regarding the support provided and the associated compensation (Becker & Gassmann, 2006b). Thus, the following sections specifically discuss the aspects of the search, the selection and the negotiation with new ventures.

Kim et al. (2012) found that ventures arrived in two ways. On the one hand, employees of the corporate incubator were actively seeking suitable ventures in conversation with entrepreneurs, venture capitalists, and engineers and managers. Additionally, the studied companies received information regarding exciting ventures from the business units as well as the R&D department. In the case study by Ford et al. (2010), the incubator in particular supports internal ventures. Venture sources are hereby designed very similarly to those described by Kim et al. (2012). In the study by Ford et al. (2010), the internal ventures are specifically identified in conversation with R&D departments. Additionally, many opportunities arise from informal conversations and a strong network within the company. While searching for new ventures, the corporate incubator acquires much knowledge of new market trends and new technologies. This knowledge helps the incubator assess new ventures but can also be vital for the business units (O'Connor & DeMartino, 2006). To guarantee the exchange of acquired knowledge between incubator and business units, business

units should be involved in the search for new ventures (Chen & Kannan-Narasimhan, 2015; Ford, 2010).

A study comprising 38 corporate ventures of 18 large Japanese manufacturing companies led Ohe et al. (1992) to conclude that new ventures are associated with many uncertainties and that the 'common sense' knowledge that each individual will apply in dealing with these uncertainties is less common than is often anticipated. For this reason, the authors recommend that incubators place much emphasis on the definition of suitable and comprehensible selection criteria. This advice is also given by Chesbrough (2003), who based his study on 35 spin-offs by a large American technology company, arguing that a selection process must be implemented to exercise strong selection pressures against those ventures that yield unpromising results. The results reported by Ford et al. (2010) highlight a Netherlands-based technology company that applies strict selection criteria such as (1) the protectability of the intellectual property governing the technology; (2) the potential of the technology to create a $100 million market; (3) the potential disruptiveness of the technology to an industry; (4) the strategic alignment of the technology with the parent company's long-term corporate strategy; and (5) a motivated and capable team. The significance of the strategic fit with the goals of the parent company is also discussed by Becker & Gassmann (2006b), who conclude that the fit with the corporate strategy is of the utmost importance for corporate incubators. The study by Branstad (2010) provides an additional viewpoint to the work already discussed. Branstad observed that one of the criteria for selecting new ventures was that the observed company had something to offer to the ventures. The company herewith explicitly considered the aspect of mutual creation of value.

After the selection of a venture and before the final acceptance, the venture and the corporate incubator negotiate the aspects of their potential cooperation. Becker & Gassmann (2006b) explain in this context that compensation for support services often occurs through medium equity stakes or through payment for services. These legal arrangements also include the ventures' potential length of tenancy in the incubator and the kind of support they will receive, as well as the possible exits to aim at. Their explanation is supported by Grimaldi & Grandi (2005), who studied different types of incubators and found that compared to other types, corporate incubators have their services specifically paid through equity stakes in the ventures.

3.3.4.2. Acquisition of specific knowledge through venture development

Once a venture has been selected and integrated into the corporate incubator, it will be supported as part of the development process (Allen & McCluskey, 1990; Becker & Gassmann, 2006b). This support is coordinated by the corporate incubator and can be carried out by the incubator solely or with the involvement of a business unit. If a business unit considers a venture as promising, the involvement is especially recommended to ensure a direct knowledge transfer between the venture and the business unit, without the corporate incubator as an intermediary (Branstad, 2010). In the following sections we will discuss the phases involving the integration of new ventures, the development of the ventures, and the completion of that development (see Figure 3-4).

To ensure an appropriate transfer of knowledge, a corresponding governance structure is needed. In his pioneering work on transaction cost economics, Williamson (1991) examines hybrid structures, in addition to market structures and hierarchical structures. Williamson concludes that hybrid structures are especially suitable in cases where transaction-specific dependencies favor the integration of transactions into the organization, while efficiency advantages point to market coordination. The pros and cons of different governance structures can be determined by taking a closer look at the characteristics of knowledge. The literature distinguishes between tacit knowledge and explicit knowledge, where the difference between the two lies in their transferability. While explicit knowledge can be disclosed, coded, and transferred via communication, tacit knowledge can, for the most part, only be disclosed through its specific application (Fryges & Wright, 2014; Grant, 1996). Due to these circumstances, the transfer of tacit knowledge proves to be tedious and risky (Kogut & Zander, 1992). The transmission of tacit knowledge via market transactions is therefore not appropriate. Rather, a close collaboration and regular interaction between ventures and the business units of the established business is needed (Chen & Kannan-Narasimhan, 2015). Therefore, hierarchical or hybrid structures are recommended for the transfer of knowledge (Williamson, 1991).

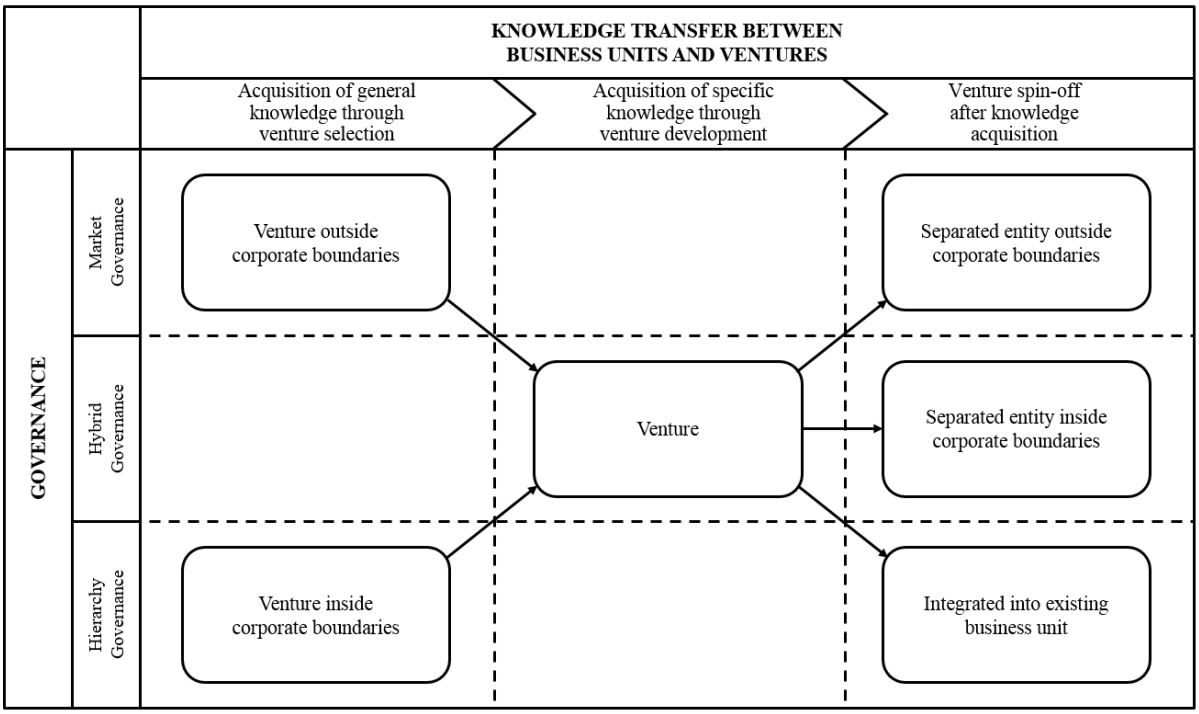


Figure 3-4: Governance structures during venture development

One counterargument against hierarchical structures is the overbearing influence of the business units over ventures (Vanhaverbeke & Peeters, 2005). Innovation is often hindered by formal and standardized structures (Euchner & Ganguly, 2014). Moreover, even hierarchical structures do not seem to optimize knowledge flow, since it must often be transferred across and beyond various hierarchy levels (Trompenaars & Woolliams, 2002). Interdisciplinary developments among various departments are stifled by a chain of command that must be followed. Furthermore, it should be noted that promoting innovation is still a risk-prone activity (Ford et al., 2012). Due to the development of innovation within an entity that is detached from the established company, the risks can be gradually minimized through the progressive development of ideas (Powell, 2010). After market and hierarchical structures prove unsuitable, hybrid structures present the governance structure of choice for the transfer of knowledge (Chen & Kannan-Narasimhan, 2015; Gassmann & Becker, 2006). Since corporate incubators are established as a hybrid structure, new ventures must be integrated (Becker & Gassmann, 2006b). Depending on their origin, ventures go through integration processes that are in part significantly different (Chesbrough & Brunswicker, 2014). While internal ventures must be transferred from their existing hierarchical structure and

subsequently integrated into the corporate incubator (Trompenaars & Woolliams, 2002), external ventures must be transferred from their market structure and integrated into the corporate incubator (Becker & Gassmann, 2006a). The objectives behind the integration are identical: With the choice of a hybrid organizational structure, the established company should be enabled to better access the ventures' knowledge to make it accessible for its business units (Becker & Gassmann, 2006b).

Following Becker & Gassmann (2006b), the development of ventures is one of the most important and longest phases in the incubation process. The managers and the staff of the incubator support the ventures by providing management assistance via an extensive flow of resources, of which knowledge is the most important. Hence, knowledge flow is bidirectional, and the involved employees of the incubator or the business units also acquire knowledge from the ventures (Fryges & Wright, 2014). One of the greatest challenges surrounding knowledge transfer is the transfer of tacit knowledge (Grant, 1996). While the respective organizational conditions were created during the integration of new ventures, the transfer of knowledge must be supported with appropriate measures. The most common measures are personal exchange and active collaboration between business units and ventures (Ahmad, 2014; Becker & Gassmann, 2006b; Gassmann & Becker, 2006; van Burg et al., 2012). This exchange can be assured with regular meetings or workshops, for example, where the current developmental progress of ventures is discussed (Branstad, 2010). Temporary staff postings to support ventures are also an appropriate opportunity to transfer knowledge through active collaboration (Branstad & Saetre, 2016). Another challenge manifests itself in the absorption and usage of the knowledge gained through transfer. In this context, Cohen & Levinthal (1990) refer to absorptive capacity, describing the capacity of organizations to recognize new knowledge and combine it with existing knowledge with the goal of further expanding the organization's knowledge base. The authors conclude that to a certain extent, the absorptive capacity is dependent on the similarity of two companies. Hence, this finding underlines the argument that ventures that better address the core business of the established company are more suitable for collaboration with business units than ventures targeting adjacent business segments (Chen & Kannan-Narasimhan, 2015).

The timing of the completion of the development is highly relevant. Becker & Gassmann (2006b) found that many corporate incubators have specific exit criteria. Depending on the incubator, these criteria may depend on achieved milestones or unachieved objectives. O'Connor & DeMartino (2006) argue that a venture is ready for spin-off when the first revenues are generated and the

dependency from support services provided by the corporate incubator decreases. In addition to achieving defined goals, however, the end of a predefined incubation period or limited space in the incubator itself may be a reason for the spin-off. However, it could be considered that if the spin-off occurs too early, many uncertainties regarding the market and technology remain unresolved and the strategic value of the venture, including the best spin-off option, cannot be assessed in definitive terms (Chen & Kannan-Narasimhan, 2015). In contrast, if the spin-off occurs too late, the established company could miss its opportunity to establish strategically relevant ventures as a first mover in the market (van Burg et al., 2012).

3.3.4.3. Venture spin-off after knowledge acquisition

After deciding on the completion of the development of a venture, the corporate incubator must decide on the future development of the venture, taking into account the objectives of both parent company and venture (O'Connor & DeMartino, 2006). After deciding on the spin-off, it must be prepared and executed accordingly (van Burg et al., 2012). In the following section, therefore, the phases involving the preparation and execution of the spin-off are described by taking the scientific literature into account.

After deciding on the timing of the spin-off, the best spin-off option should be chosen in accordance with the venture (see Figure 3-4). On the one hand, the venture can be completely outsourced from the corporate boundaries (Fryges & Wright, 2014). However, it can also be integrated into an existing business unit or continued as an independent organizational unit within the corporate boundaries. Ford (2010) and O'Connor & DeMartino (2006) report that ventures with strategic value to the parent company should be integrated into one of the business units of the company, while those without any or with little strategic fit must either remain independent organizational units within the boundaries of the parent company or operate as an independent company (Powell, 2010; Weiblen & Chesbrough, 2015). O'Connor & DeMartino argue that while some ventures may be strategically relevant for the parent company, they must not be aligned with the current activities of the business units. These ventures may fit within the strategic intent of the parent company but may lead to the commercialization of projects that do not fit nicely into existing operating units and that challenge current business models. The assessment of the strategic value and the appropriate organizational structure is thus extremely relevant because the choice of an inappropriate structure can greatly hinder the further business development of the ventures (Trompenaars &

Woolliams, 2002). Christensen et al. (2016) argue, for example, that ventures transferred into an existing business unit without a strategic fit cause massive conflicts within the business units. In addition, Powell (2010), in an exploratory case study, found that the integration of ventures can also have a significant impact on the established business and involves administrative costs. A conglomerate of independent ventures may go hand in hand with high flexibility but also entail high administrative costs. The CEO of the observed company stated that the complex structure resulted in operational inefficiencies, reduced stock market liquidity, and reduced coverage by analysts. Their spin-off strategy produced a structure that was complex and expensive to maintain in terms of both managerial attention and money. The author argues that unrelated units should have been consequently sold off–even if they were successful. Related units that proved successful should have been integrated into existing business units. Whether related or not, unsuccessful units should have been promptly disposed of as profitably as possible by selling them to an acquirer. The strategy of permanently holding majority stakes in its ventures led the company to become a holding company in spite of senior management's attempts to distinguish the structure produced by the spin-off strategy from that of a holding company.

Performing a spin-off is very complex. Ford (2010) reports that this is particularly the case if the venture is integrated into an existing business unit. Business units have been found to resist quite fiercely the introduction of new technologies not invented within their purview. Resistance arises especially when the new venture represents a threat to established positions. In addition, managing the transition into the business unit may also require the removal of some of the venture team leaders when they no longer have the competences required for operating the venture within the business unit. To overcome resistance and to increase the success of the spin-off, van Burg et al. (2012) conducted an empirical study of six corporate venture transition processes and derived design principles for a successful venture transition. The authors discovered that, on the one hand, the venture transition should be prepared by assembling a dedicated transition team, conducting a readiness and capability assessment, and developing a transition plan, serving to enhance the integration process and avoid integration problems afterwards. On the other hand, the corporate organization and the corporate venture should identify and empower strong champions in the established organization who should be active in all phases of the venture transition process. The receiving business unit should maintain a degree of autonomy and flexibility regarding the venture in the post transition phase by using direct reporting lines that enable quick decision making.

3.4. Discussion

The framework presented in the previous chapter offers a comprehensive overview of the scientific field of corporate incubation. Although some elements of the framework have been discussed extensively in the scientific literature, other elements remain largely unexplored. The discrepancy between the elements gives rise to open questions of scientific inquiry, which are discussed below. To contribute to the advancement of the scientific field, these questions demand both conceptual and empirical answers.

3.4.1. Integration into the organization

Corporate incubation is not a ready solution. Rather, it is a concept that lays out crude guardrails for the realization of innovation in established companies. The concrete implementation is a highly individualized matter and adheres to the objectives of the parent company (Becker & Gassmann, 2006b; O'Connor & DeMartino, 2006). On top of it, conflicts and political interests within the established company add to the complexity of organizational adjustments (Evald & Bager, 2008). Taking into account the high failure rates of corporate incubators (Becker & Gassmann, 2006a, 2006b), the following questions should be considered for future research:

(1) What are the organizational conditions an established company should exhibit to ensure the success of a corporate incubator?

(2) How can the conflicts and political interests that go hand in hand with the implementation of corporate incubators be addressed?

A major decision with the implementation of corporate incubation is the degree of autonomy on the side of the incubator (Evald & Bager, 2008; Ginsberg & Hay, 1994). The literature agrees that a corporate incubator can be organized along a continuum from low to high autonomy (see Figure 3-5). A tight linkage of the corporate incubator can ensure an intense transfer of knowledge between the incubator, the ventures and the business units of the established company, on the one hand (Chen & Kannan-Narasimhan, 2015; Gassmann & Becker, 2006). On the other hand, the established company can exert direct influence on the operation of the incubator (Kohler, 2016). Due to a tight collaboration with the entities of the established company, the integration of ventures into business units will meet greater acceptance (Zedtwitz et al., 2004). In contrast, high autonomy complicates the transfer of knowledge with the established company and its business units (Chen

& Kannan-Narasimhan, 2015). Due to the distance to the business units, votes during the incubation process are impeded. During the integration process of ventures, a lower acceptance should be expected (van Burg et al., 2012).

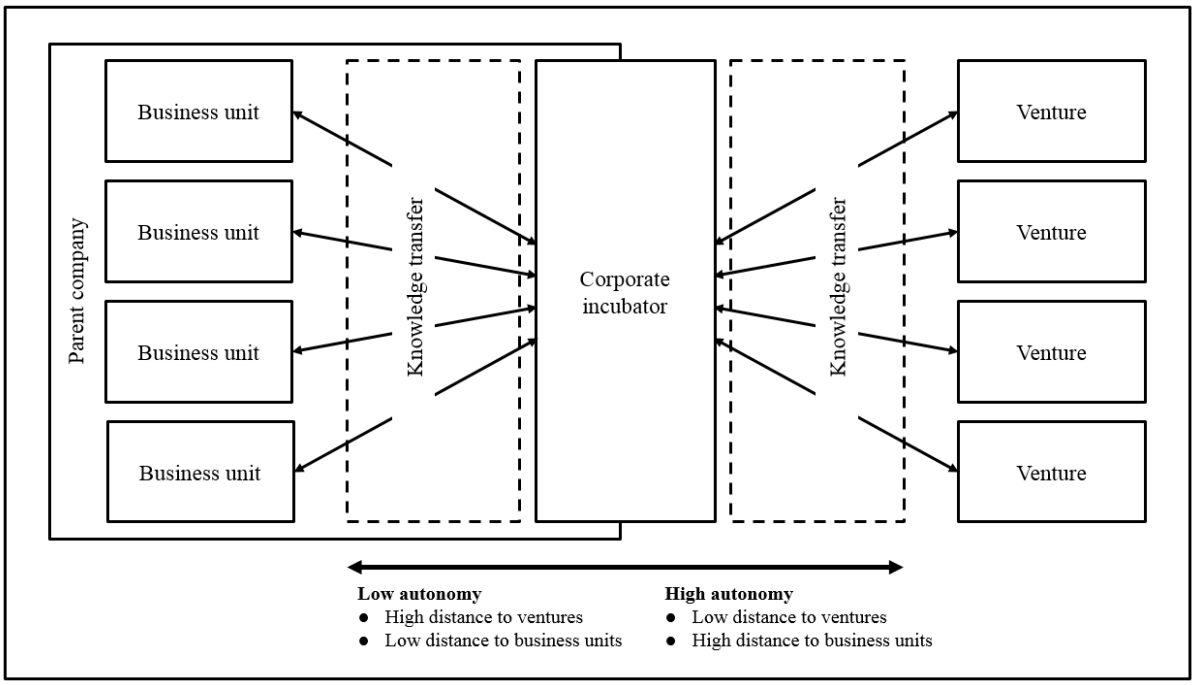


Figure 3-5: Corporate incubator as knowledge broker between business units and ventures

The mentioned positions result in a dilemma for established companies: For one part, they can pursue a tight linkage with the corporate incubator, ensuring an intense transfer of knowledge and increasing the acceptance of ventures by the business units. It must be assumed, however, that the incubator's operations are directly and indirectly impacted by the tight linkage. It is expected that solutions that are developed during the incubation will be less innovative and more aligned with the existing core business. On the other hand, an incubator can be structured in a substantially autonomous way. This approach offers great freedoms and can promote innovation detached from the existing business model – including innovation that attacks the existing core business (Chen & Kannan-Narasimhan, 2015; Euchner & Ganguly, 2014; Gassmann & Becker, 2006). The disadvantage, however, is that the distance to the established company makes an intense transfer of knowledge more difficult and forces ventures struggle with less acceptance (Zedtwitz et al., 2004).

Considering depressed knowledge transfer and less acceptance within the established company, questioning the value added by the corporate incubator is legitimate. The following questions should further guide future research:

(3) *How can a best-possible balance be ensured between innovation (high autonomy) and acceptance (low autonomy)?*
(4) *How can good knowledge transfer and high acceptance be ensured in spite of high autonomy?*
(5) *How can radical innovation irrespective of direct and indirect influence occur in spite of low autonomy?*
(6) *Do organizational structures exist that would allow an established company to circumvent this dilemma?*

The business units of established companies usually operate as cost centers. This means that the entities are managed in a strongly cost-focused manner and must achieve defined goals by drawing from an annual budget that is available to them (Becker & Gassmann, 2006a). This controlling of business units often reflects negatively on cooperation with the corporate incubator and the ventures. Thus far, the scientific literature has not engaged in the discourse on how established business units can be motivated to participate in corporate incubation. The business units often face the problem that by offering support services, e.g., marketing activities or production capacities, the corporate incubator or venture should be charged the cost. Therefore, the established company must create appropriate mechanisms that allow these costs to be balanced. With the increasing autonomy of the incubator, however, the disinterest of business units seems to mount. Therefore, future research should focus on the following question:

(7) *How can the business units be motivated to actively collaborate with the corporate incubator?*

3.4.2. Needs of ventures

The basic support processes for ventures are well-documented in the scientific literature regarding business incubators (e.g., Markham et al., 2005). The needs of ventures in the context of corporate incubators, however, require a more differentiated approach. Internal ventures often have no alternative for the development of their ideas other than the corporate incubator (Neck et al., 2004;

Zedtwitz et al., 2004). From the perspective of external ventures, the corporate incubator is in competition with business incubators and other supporters, e.g., business angels or venture capitalists (Carayannis & Zedtwitz, 2005). The literature on corporate incubation, however, presumes that there is an abundant pool of eager external ventures. The potential ventures pursue their own interests and represent those interests in negotiations with corporate incubators (Zedtwitz & Grimaldi, 2006). Potential ventures with promising ideas can display particularly marked self-confidence due to the competitive nature of the situation.

Consequently, established companies must clearly emphasize their advantages in the competition for the best ventures. Ventures with complementary ideas can profit from the resources of an established company (e.g., Becker & Gassmann, 2006b; Kohler, 2016; Maine, 2008). At the same time, ventures must worry that the established company will consider acquiring and exploiting critical knowledge, which in most cases would rob the venture of its right to exist (Alvarez & Barney, 2001). Moreover, due to its capital stake, the established company can control more or less the venture's future direction. Especially in cases where the interests of both parties diverge, this proves to be critical. Potential ventures often view corporate incubators with skepticism because of these mentioned aspects. Hence, future research should address the following questions:

(8) *What are the primary objectives pursued by external ventures in collaborating with a corporate incubator?*
(9) *What are the internal and external factors swaying external ventures to collaborate with a corporate incubator?*
(10) *How do the needs of internal and external ventures differ during collaboration with a corporate incubator?*
(11) *How can the corporate incubators align interests between the parent company and the ventures?*

3.4.3. Spinning off the ventures

The spin-off and tracking of ventures presents other critical aspects. Following a successful incubation, established companies have the option to integrate the ventures into one of their business units or to continue operating them as independent entities (Chen & Kannan-Narasimhan, 2015; Powell, 2010). Should a venture remain an independent entity, an additional question is whether

it should remain within the company network or be operated outside the boundaries of the company.

In a situation where ventures are increasingly operated as independent entities within the boundaries of the established company, they will have to react with a holding structure (Christensen et al., 2016; Ford et al., 2010). Although this type of organization ensures the high flexibility of individual entities, the established company must define interfaces per entity, which will increase transaction costs. Moreover, the operative management of a holding structure comes with high administrative and financial burdens (Powell, 2010). Hence, the following questions should be considered in future research:

(12) In what specific instances do established companies operate ventures as independent entities within corporate boundaries?

(13) What circumstances promote the future spin-off or integration of ventures?

3.5. Conclusion

This work aimed to systematically analyze the scientific literature regarding the topic of corporate incubators. Based on the findings, a comprehensive framework was deduced, categorizing corporate incubation in a broader context and explicitly examining knowledge transfer. It became clear that some elements of the framework were extensively discussed in the scientific literature, whereas other elements still require more thorough examination. Subsequently, the discussion offered and debated open questions of scientific inquiry.

3.5.1. Implications

The present work has implications for the scientific field and for practice. Attention is drawn to underrepresented areas of research that should be the focus of future efforts. As can be derived from the analysis of the identified literature (see Table 3-1), most of the literature on corporate incubators is based on qualitative methods (Cunningham et al., 2017). In addition to a more intensive consideration of corporate incubation as a research field as a whole, an increased use of quantitative methods should be used in further research to verify specific findings.

Moreover, the present work emphasizes that corporate incubators represent a sub-category of business incubators, but nevertheless, significant differences exist between the two disciplines (Evald & Bager, 2008; Pauwels et al., 2016; Uittenbogaard et al., 2005). A major driver of the complexity

of the corporate incubator is its embeddedness in the organizational structure of the established company and the knowledge transfer among the business units (Gassmann & Becker, 2006). As could be demonstrated with this work, these questions in particular should become the focus of future analysis. Moreover, closer links with other lines of research should be intensified. Many well-researched theories, such as the knowledge-based view, transaction cost economics, organizational learning and interfirm relationships may provide important insights to advance the research field of corporate incubators.

Important findings can also be deduced for practice. The basic prerequisite for the successful operation of a corporate incubator is awareness about the objective of the parent company. If this objective is defined, the strategy and structure of the corporate incubator should be consistently derived from it (Becker & Gassmann, 2006a). It is therefore important to balance the embedding of the incubator under consideration of the associated pros and cons. Moreover, established companies should pay increased attention to the needs of potential ventures. This applies particularly to collaborations with external ventures because in this case, corporate incubators find themselves competing with business incubators and other sponsors, such as venture capitalists and business angels (Carayannis & Zedtwitz, 2005).

3.5.2. Limitations

The limitations of the present work result from the collection of the relevant literature. While it was done systematically, comprehensibly, and transparently, some restrictions have been placed in the process. The search is based on only three databases and was limited to journals in the English language in the areas of business, management, and accounting. This was, however, a calculated measure to ensure the quality of content. A second limitation was the search query. An attempt was made to include an ideally large number of contributions, but due to the inconsistent terminology in the scientific literature, it was not possible to capture every relevant contribution in the query output. Finally, it should be mentioned that the contributions were subject to content analysis by the author, which could have led to a subjective bias in the selection of contributions. To counteract this effect, the analysis process was standardized using a data extraction sheet (Tranfield et al., 2003). Despite these limitations, the author is confident that the present work and the deduced framework present a good starting point to gain a deeper understanding of corporate

incubators and the questions that remain open. The paper can thus contribute a valuable impulse for the further development of the scientific field.

3.6. Appendices

Appendix 3-1: Research methods and samples of the analyzed literature

Author(s)	*Research method*	*Sample*	*Region*
Aaboen (2009)	Qualitative (Multiple case study)	Six incubators	Sweden
Ahmad (2014)	Qualitative (Ethnographic study)	Two incubators (one university campus incubator, one community enterprise center)	Ireland
Allen and McCluskey (1990)	Descriptive (Survey)	127 incubators	US
Barbero et al. (2012)	Quantitative (Analysis of variance)	70 incubators (33 basic research incubators, 17 university incubators, 11 economic development incubators, nine private incubators)	Spain
Barbero et al. (2014)	Quantitative (Chi-square test)	80 incubators (37 basic research incubators, 21 university incubators, 13 economic development incubators, nine private incubators)	Spain
Becker and Gassmann (2006a)	Qualitative (Case study, analysis of archival data, survey)	25 large technology-intensive corporations with corporate incubators; quantitative database of 950 European incubators; five researchers and heads of technology transfer offices of two top ten universities	Europe / US
Becker and Gassmann (2006b)	Descriptive (Survey); Qualitative (Case study)	77 incubator managers; 25 corporate incubators	Europe / US
Block et al. (2017)	Conceptual	N/A	N/A
Branstad (2010)	Qualitative (Case study)	One hybrid corporate incubator (Kongsberg Innovation)	Norway
Branstad and Saetre (2016)	Qualitative (Case study)	One hybrid corporate incubator (Kongsberg Innovation); one venture project (Ballast Water Treatment)	Norway
Carayannis and Zedtwitz (2005)	Conceptual	N/A	N/A
Chen and Kannan-Narasimhan (2015)	Qualitative (Multiple case study)	Nine organizations with venture units	US
Chesbrough (2003)	Qualitative (Analysis of archival data, interviews)	35 spin-off organizations from the Xerox Corporation	US

Author(s)	*Research method*	*Sample*	*Region*
Chesbrough and Brunswicker (2014)	Descriptive (Survey)	125 large firms with annual sales in excess of $250 million	Europe / US
Chesbrough and Socolof (2000)	Qualitative (Case study)	Two corporate research laboratories (Bell Laboratories, Lucent New Ventures Group)	US
Christensen et al. (2016)	N/A	Nine companies undertaking business model innovation efforts	N/A
Euchner and Ganguly (2014)	Conceptual	N/A	N/A
Ferrary (2008)	Qualitative (Case study)	One corporation (spin-off program and corporate venture capital unit of France Telecom)	France
Ford et al. (2010)	Qualitative (Case study)	One corporate incubator (Technology Incubator of Philips)	Netherlands
Ford et al. (2012)	Qualitative (Interviews and focus group workshops)	17 senior technology managers and commercial lawyers	N/A
Fryges and Wright (2014)	Conceptual	N/A	N/A
Ginsberg and Hay (1994)	Conceptual	N/A	N/A
Grimaldi and Grandi (2005)	Qualitative (Multiple case study)	Eight incubators (four non-profit incubators, four for-profit incubators)	Italy
Hausberg and Korreck (2018)	Literature review (Bibliometric and co-citation analysis)	347 articles regarding business incubation	N/A
Hughes et al. (2007)	Quantitative (Cluster analysis, multivariate analysis of variance)	211 ventures from incubators	UK
Kambil et al. (2000)	Qualitative (Interviews)	Companies practicing fast venturing (Staples, Nordstrom and Wal-Mart); managers at venture capital firms, banks, securities firms; professional-services firms	N/A
Kim et al. (2012)	Qualitative (Multiple case study)	Two corporations practicing corporate venturing (LG CNS, LG Electronics)	Korea
Kohler (2016)	Qualitative (Interviews)	40 interviews with managers and participants of corporate accelerators	N/A
Maine (2008)	Qualitative (Case study)	Corporate venturing within a large chemical firm (Evonik Degussa)	Germany
Markham et al. (2005)	Qualitative (Interviews and focus group workshops)	15 managers from industrial research institutes	N/A

Author(s)	*Research method*	*Sample*	*Region*
Neck et al. (2004)	Qualitative (Semantic structure analysis)	15 founders of spin-off firms	US
O'Connor and Ayers (2005)	Qualitative (Multiple case study)	Twelve radical innovation project teams in ten large, established companies; twelve companies with strategic intent to develop a radical innovation competency (Air Products, Albany International, Corning, Dupont, GE, IBM, Johnson & Johnson Consumer Products, Kodak, Mead-Westvaco, Sealed Air, Shell Chemical, 3M)	US
O'Connor and DeMartino (2006)	Qualitative (Multiple case study)	Twelve companies with strategic intent to develop a radical innovation competency (Air Products, Albany International, Corning, Dupont, GE, IBM, Johnson & Johnson Consumer Products, Kodak, Mead-Westvaco, Sealed Air, Shell Chemical, 3M)	US
Ohe et al. (1992)	Quantitative (Constraint analysis)	38 corporate ventures of 18 companies	Japan
Pauwels et al. (2016)	Qualitative (Multiple case study)	13 accelerators	Europe
Powell (2010)	Qualitative (Case Study)	One organization (Thermo Electron)	US
Robeson and O'Connor (2007)	Qualitative (Multiple case study)	Twelve radical innovation project teams in ten large, established companies; twelve companies with strategic intent to develop a radical innovation competency	US
Simpson and Hill (2004)	Conceptual	N/A	N/A
Trompenaars and Woolliams (2002)	Conceptual	N/A	N/A
Uittenbogaard et al. (2005)	Qualitative (Multiple case study)	Five multinational high technology companies, containing a separate corporate entrepreneurship function	N/A
Vanhaverbeke and Peeters (2005)	Qualitative (Case study)	One company (DSM)	Netherlands
von Burg et al. (2012)	Qualitative (Case study)	Six corporate venture transition processes at two established technology firms	Netherlands
Weiblen and Chesbrough (2015)	Qualitative (Case study)	Two outside-in startup programs (AT&T Foundry, Siemens TTB); two inside-out platform startup programs (Startup Blueprint by PayPal, SAP Startup Focus)	Europe / US

Author(s)	*Research method*	*Sample*	*Region*
Zedtwitz and Grimaldi (2006)	Qualitative (Multiple case study)	Ten incubators (two regional business incubators, two university incubators, two independent incubators, two company-internal incubators, two virtual incubators)	Italy
Zedtwitz et al. (2004)	Qualitative (Multiple case study)	18 technology-intensive multinational companies (ABB, Canon, Ciba, Daimler-Benz, DuPont, Hewlett-Packard, Hitachi, Hoffmann-La Roche, IBM, Kao, Leica, MTU, Nestle´, SAP, Schering, Schindler, Unisys, and Xerox.)	Multinational

4. THREE CONFIGURATIONS OF CORPORATE INNOVATION PROGRAMS AND THEIR INTERPLAY: A THEORY-BUILDING CASE STUDY ON INNOVATION PROGRAMS[7,8]

Abstract

The success of corporate innovation is based less upon the success of a single innovation program than on a holistic and overarching corporate innovation system integrating various activities. Taking this perspective, this study extends existing research on the design of innovation programs, which seems far too often to focus solely on single innovation programs. Utilizing an embedded case study approach, this study provides a detailed analysis of how one of the largest and most successful German technology companies structures its multiple innovation activities. The analysis identifies the key elements of innovation programs and suggests three configurations that illustrate how these generic elements can be structured in such a way to offer the best fit with the underlying logic of the respective innovation program. Finally, we highlight how the identified configurations come together to deliver overarching strategic innovation goals.

4.1. Introduction

There is a strong consensus in innovation management that a firm's long-term success depends on its ability to constantly renew itself by exploiting existing competencies and resources and simultaneously exploring new ones (Levinthal & March, 1993; March, 1991). However, both explorative and exploitative activities are characterized by fundamental design differences and therefore require different mindsets and organizational routines (Gupta et al., 2006). To ensure the effective use of explorative and exploitative activities, organizations must meet certain prerequisites and

[7] This study is published with the kind permission of Emerald Publishing Limited. The study is published under Kötting & Kuckertz (2019) and appeared in European Journal of Innovation Management, 23(1), 90–113. An online version can be found at the following address: https://www.emerald.com/insight/content/doi/10.1108/EJIM-07-2018-0142/full/html. Moreover, an earlier version of this study was presented 2018 at the 22nd Interdisciplinary Annual Conference on Entrepreneurship, Innovation and SMEs in Stuttgart and was nominated for the Entrepreneurship Research Newcomer-Award.

[8] Author contributions: Michael Kötting: Conceptualization, Formal Analysis, Investigation, Data Curation, Writing—Original Draft, Project Administration. Andreas Kuckertz: Conceptualization, Validation, Writing—Review and Editing, Supervision.

framework conditions for each activity (Benner & Tushman, 2003; Christensen, 1997; Tushman & O'Reilly, 1996). If an organization meets such conditions, it can avoid the so-called exploitation trap, that is, a situation where an inappropriate alignment of explorative and exploitative activities renders exploration useless as it is stifled by exploitation (Sirén et al., 2012).

Although the simultaneous implementation of exploration and exploitation (commonly termed ambidexterity) is considered a success factor (Gupta et al., 2006; Levinthal and March, 1993; March, 1991), achieving it is challenging owing to the differing requirements and opposing logics of the activities (Gupta et al., 2006). In this context, research specifically focuses on organizational mechanisms to facilitate ambidexterity, such as formal structures or lateral coordination mechanisms (Gibson & Birkinshaw, 2004; Raisch & Birkinshaw, 2008; Tushman & Anderson, 1986; Tushman & O'Reilly, 1996). A prominent approach implementing ambidexterity in this regard is to pursue so-called structural ambidexterity—the organizational separation of explorative and exploitative activities (Benner & Tushman, 2003; O'Reilly & Tushman, 2008). Structural ambidexterity seeks to localize explorative and exploitative activities in distinct organizational units (Gibson & Birkinshaw, 2004; Raisch et al., 2009) so that every activity can be conducted under the circumstances most conducive to its logic.

The concept of structural ambidexterity has also been applied in the corporate venturing (CV) literature (e.g., Burgers et al., 2009; Hill & Birkinshaw, 2006; Hill & Birkinshaw, 2012). Accordingly, CV can be perceived as both an explorative (Basu et al., 2011; Burgelman, 1983; Dushnitsky & Lenox, 2006) and an exploitative activity (Schildt et al., 2005; van de Vrande et al., 2006). This is due to the fact that the goal of both activities should be (strategic) learning (Sirén et al., 2012), which is based on knowledge that has been created in CV units and that is useful to develop both new and existing products and services (Benner & Tushman, 2003; Lubatkin et al., 2006). Because exploration and exploitation are not compatible owing to their different requirements, in particular large organizations need to manage multiple innovation programs addressing these activities. Moreover, coordination between different units must be managed to benefit from potential synergies.

While research on innovation management and CV does already address the design of innovation programs (e.g., corporate incubators, corporate venture capital, strategic partnerships), it often focuses only on single innovation programs (e.g., Allen & Hevert, 2007; Dushnitsky & Lenox, 2006;

Maula et al., 2013; Röhm et al., 2018; Vintergaard, 2005). Although these perspectives are quite informative, they do not usually provide a holistic perspective, meaning that they tend to ignore how the program investigated is embedded in its organizational context (Maine, 2008; O'Connor & Ayers, 2005). We therefore adopt the perspective that the promotion of explorative and exploitative innovation is based less on a single process or the activities of a single innovation program but is more often embedded in the form of a holistic and overarching corporate innovation system. The innovation system usually consists of several innovation measures that are strongly interdependent. For this reason, an analysis of single innovation programs is not conducive to understanding the innovation mechanisms within an organization. Instead a holistic view of a corporation's innovation activities is required because the elements of the innovation system must also be coordinated. We therefore aim to explore the following research question: What elements constitute successful innovation programs, how are those configured, and do different types of programs have the potential to enrich each other? This work addresses the research question applying an approach designed to generate theory (Ketokivi & Choi, 2014).

Using an inductive theory-building case study approach (Eisenhardt, 1989), the research contributes to the academic literature on innovation programs and innovation culture in two ways. Based on an extremely detailed analysis of the way one of the largest and most successful German technology companies structures its innovation activities we first identify the key elements of its innovation programs and suggest three configurations that illustrate how the generic elements of an innovation program can be structured in such a way as to best fit the underlying logic of the respective program. Second, and most importantly, we highlight how the identified configurations come together to achieve the overarching strategic innovation goals of the corporation. Consequently, by adopting an overarching and holistic perspective, this article contributes to understanding the identified gap in the literature that too often focuses on single innovation programs and adds to our understanding of how different innovation programs can be combined to form a corporate innovation system.

4.2. Literature review

4.2.1. Multiple innovation programs to implement structural ambidexterity

4.2.1.1. Structural ambidexterity to balance explorative and exploitative activities

Successful organizations are characterized by the simultaneous utilization of explorative and exploitative activities (Levinthal & March, 1993; March, 1991; Tushman & O'Reilly, 1996). Following this prominent concept of March (1991), the exploration of new opportunities alongside the simultaneous exploitation of existing certainties are essential elements of organizational learning and therefore a major factor for a firm's long-term success. However, the simultaneous utilization of these fundamentally different activities is highly complex, due to the significant design differences of both modes (Andriopoulos & Lewis, 2009). Explorative activities aim to generate new competencies and innovative products and services (March, 1991) and Tushman & Smith (2002) consider fundamental research, experimenting, and prototyping as appropriate measures for the implementation of exploration. The proposed measures are characterized by a high degree of creativity and a decentralized and flexible organizational structure (Benner & Tushman, 2003; Christensen, 1997; Tushman & O'Reilly, 1996). Exploitation, on the other hand, aims to leverage existing competences to improve products and services (March, 1991). To realize this intent, measures such as optimization, standardization, and refinement are appropriate (Tushman & Smith, 2002). The measures are characterized by centralized and rigid processes and structures (Benner & Tushman, 2003; Tushman & O'Reilly, 1996). Only by ensuring the different requirements for each activity, can organizations avoid the so-called exploitation trap, the situation where an inappropriate alignment of explorative and exploitative activities renders exploration useless because it is stifled by exploitation (Sirén et al., 2012).

The academic literature often cites the concept of ambidexterity as an appropriate measure to aid the simultaneous implementation and balancing of explorative and exploitative activities, (Gibson & Birkinshaw, 2004; Raisch & Birkinshaw, 2008; Raisch et al., 2009; Tushman & Anderson, 1986; Tushman & O'Reilly, 1996). The concept of ambidexterity describes different behavioral (contextual ambidexterity), processual (sequential ambidexterity) and structural mechanisms (structural ambidexterity) to separate and balance explorative and exploitative activities within an organization (Gibson & Birkinshaw, 2004; O'Reilly & Tushman, 2013; Raisch & Birkinshaw, 2008). The approach of structural ambidexterity thus describes the separation of explorative and

exploitative activities in different organizational units (Benner & Tushman, 2003; Gibson & Birkinshaw, 2004). O'Reilly & Tushman (2004) concluded, that whereas a more organic structure should be implemented in exploration-oriented units, structures that are more mechanistic should be applied for exploitation-oriented units. Following this concept, every activity can be utilized under the circumstances most conducive to its logic.

4.2.1.2. Structural ambidexterity through multiple innovation programs

Following literature on innovation management and CV, the use of innovation programs is supposed to advance goals like providing a window on new technological opportunities, creating new growth options, and fostering a more entrepreneurial culture (Burgelman, 1983; Basu et al., 2011; Dushnitsky & Lenox, 2006; Miles & Covin, 2002; Schildt et al., 2005). To this effect, innovation programs are usually bundled in separate organizational units, so that their activities are not influenced by the daily operations of other business units (Block & Macmillan, 1993). However, the design of innovation programs is very individual and can take various forms (e.g., Keil, Maula, et al., 2008; Schildt et al., 2005; van de Vrande et al., 2011). For example, based on transaction cost theory, van de Vrande et al. (2006) differentiates governance modes for (external) technology sourcing based on the degree of commitment and the degree of reversibility. Following this distinction, innovation activities such as idea contests, hackathons and corporate accelerators are associated with a low degree of commitment and a high degree of reversibility, while corporate incubators and corporate venture capital units are associated with a high degree of commitment and a low degree of reversibility.

The use of multiple innovation programs to implement structural ambidexterity within an organization has already been proven successful in the academic literature (e.g., Burgers et al., 2009; Hill & Birkinshaw, 2006; Hill & Birkinshaw, 2012). This success is due to the fact, that depending on the design of a innovation program, organizational activities can be perceived as both explorative (Basu et al., 2011; Burgelman, 1983; Dushnitsky & Lenox, 2006) and exploitative (Schildt et al., 2005; van de Vrande et al., 2006). The suitability of an innovation program for the implementation of explorative or exploitative activities is very much dependent on the design and configuration of the respective program. Owing to the presence of high uncertainty—regarding the technical realization and the marketing potential of an innovation—in the context of explorative activities, innovation programs with a low degree of commitment and a high degree of reversibility are

particularly recommended (Nooteboom, 2004). In addition, the innovation programs should have a high degree of creativity, organic structures, and flexible processes to meet the requirements of exploratory activities. Exploitative activities, on the other hand, focus on existing competences and the improvement of existing products and services (March, 1991). Therefore, innovation programs with a high degree of commitment and a low degree of reversibility, such as corporate incubators and corporate venture capital are more appropriate (Nooteboom, 2004).

4.2.2. Multiple innovation programs as part of a corporate innovation system

Organizations are complex systems whose elements are highly coherent and therefore there is a high dependence between their elements (Tushman & Nadler, 1986). Accordingly, if organizations use different innovation programs to implement structural ambidexterity, there must be a high level of interconnectedness between these programs, but also between the innovation programs and other business units of the organization. For that reason, innovation programs should be considered less as autonomous and isolated actors within an organization and more part of a holistic corporate innovation system (Maine, 2008; O'Connor & Ayers, 2005). Furthermore, the business units of the organization should also be seen as an essential component of the corporate innovation system, since innovation programs are highly dependent on their support (Heller, 1999). Therefore, a key success factor of the corporate innovation system is the alignment between the various actors (O'Connor & Ayers, 2005). In this systemic consideration, elements such as leadership and culture, governance and decision-making, skills and personal development and also structures and processes are highly relevant and need to be considered within and across the different innovation programs and business units (O'Connor & DeMartino, 2006).

While the academic literature has for many years been concerned with the design of innovation programs, research often focuses solely on single innovation programs like corporate venture capital (e.g., Dushnitsky & Lenox, 2006; Dushnitsky & Shaver, 2009; Keil, Maula, et al., 2008; Maula et al., 2013; Röhm et al., 2018; Siegel et al., 1988; Sykes, 1990), corporate incubators (e.g., Barbero et al., 2014; Becker & Gassmann, 2006b; Branstad, 2010; Ford et al., 2010; Gassmann & Becker, 2006) or strategic partnerships (e.g., Alvarez & Barney, 2001; Colombo et al., 2006; Doz, 1988; Eisenhardt & Schoonhoven, 1996; Narula & Hagedoorn, 1999; Rothaermel & Deeds, 2004). Although these works often examine interactions and interfaces between the single innovation programs and other business units (e.g., Chen & Kannan-Narasimhan, 2015; Gassmann & Becker,

2006; Robeson & O'Connor, 2007), there are very few papers with an overarching orientation, considering also other innovation programs within the organizational boundaries and their interplay (Maine, 2008; O'Connor & DeMartino, 2006). The embedding of innovation programs in an overarching corporate innovation system is thus rarely discussed in the academic literature. One of the few exceptions is the work of O'Connor & DeMartino (2006) examining the structures and mechanisms available to commercialize radical innovation as a management system and investigating the underlying structures and logics. Another study examining multiple innovation programs of an organization is that of Maine (2008), which analyzes the structure und interaction of the internal CV measures of an established company in the chemical industry.

Following the call for further research on corporate innovation systems, we adopt the perspective that the promotion of corporate innovation is less based on a single innovation program than it is embedded in the form of a holistic and overarching corporate innovation system. Against the background of the research question of this paper, we will therefore examine the innovation programs of one of the largest and most successful German technology companies and analyze how those programs are structured and how they interact.

4.3. Case study design: Corporate innovation programs

We employed an inductive theory-building case study approach to answer our research question (Eisenhardt, 1989) on how firms employ different innovation programs and how these programs differ and potentially affect each other. This research approach—advocated by Eisenhardt (1989) in—is well established in the academic literature (Welch et al., 2011) and appropriated for work such as this when a research question is not satisfactorily answered in existing academic literature and therefore the generation of new theory is required (Ketokivi & Choi, 2014). A major challenge associated with this theory-building approach is to ensure an appropriate degree of generalizability (Langley, 1999; Welch et al., 2011). Ketokivi & Choi (2004) argue using the term duality criterion, that it has to be guaranteed that generated theory is both close to the empirical observations and at the same time seeking a sense of generality, which involves attempting to abstract from the specific empirical context and thus to create a broader theoretical understanding (Gioia et al., 2013). In order to guarantee the duality criterion in our work, we adapted the strict interpretation of the grounded theory approach proposed by Glaser (1992), which prohibits considering existing knowledge during the analysis. Instead, we opted for a research design that accounts for prior

knowledge and compared the observed empirical context in an iterative analysis with the general theory presented in our literature review (Strauss & Corbin, 1998). Accordingly, the results of our analysis are based on accepted general theory, but do not neglect our specific empirical findings (Ketokivi & Choi, 2014). To ensure transparency of analysis and theorizing, the results of the multi-step coding are documented in the form of a hierarchical data structure (Gioia et al., 2013; Welch et al., 2011).

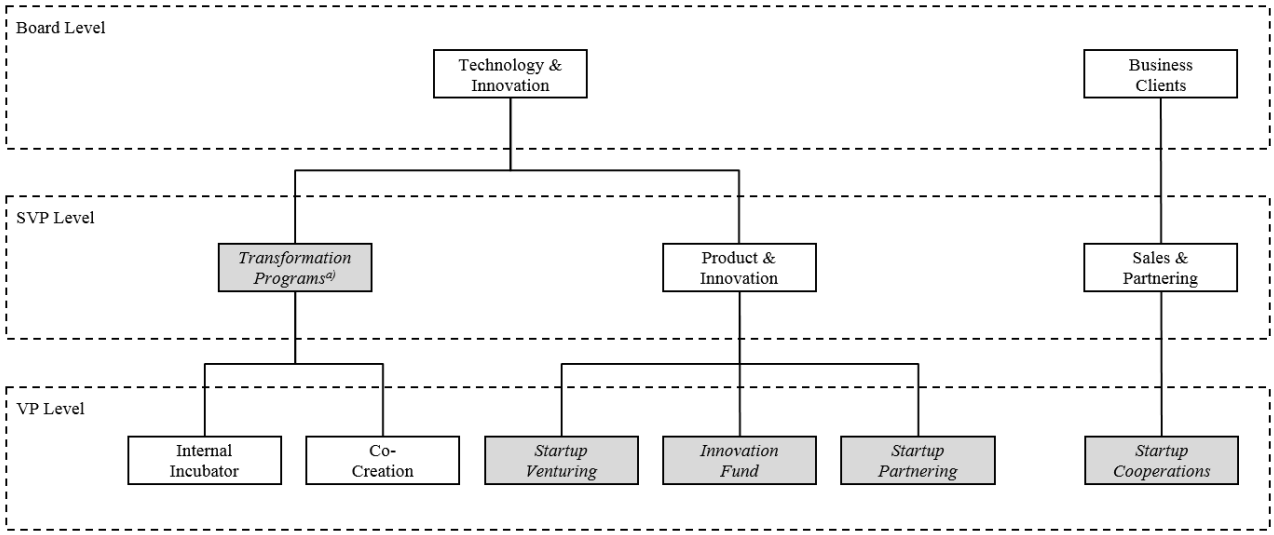
4.3.1. Research design and case selection

4.3.1.1. Design

The basis of our analysis is an in-depth, longitudinal analysis of an embedded case study (Yin, 2003). Accordingly, we will analyze several innovation programs as sub-cases embedded in the overarching case of one large corporation. Case studies, in contrast to other research methods, are particularly appropriate for the investigation of dynamic and complex objects of investigation and can help develop a comprehensive understanding of the analyzed phenomena (Eisenhardt, 1989). The appropriateness of this approach is also supported by the academic literature, which records it being widely used in the fields of innovation management and CV (e.g., Gassmann et al., 2012; Macher & Richmann, 2004; O'Connor & DeMartino, 2006; Vintergaard, 2005).

4.3.1.2. Case selection

This research seeks to explore the interplay between different innovation programs run by a corporation and to analyze their design, and their dependencies both with the parent corporation and among each other. Meeting this objective first demands the careful selection of a suitable case (Yin, 2003). To do that, we searched for accepted success factors in the academic literature and used them as selection criteria. At the level of the innovation program, there is a consensus that successful programs are operated on a long-term basis (Vanhaverbeke & Peeters, 2005) and are based on strategic objectives (Covin & Miles, 2007).



a) The Internal Incubator and Co-Creation are highly integrated, so that a differentiated analysis of the two programs was not expedient. The two programs are grouped and analyzed as Transformation Programs.

Figure 4-1: Overview of the innovation programs examined

The success criteria identified led us to select a large German technology corporation as our unit of analysis. The organization has more than 20 years' experience with corporate venture capital and currently operates a portfolio of five strategic innovation programs, most of which have been in place for several years (see Figure 4-1). With a long and successful history of operating innovation programs, more than 200,000 employees and sales of more than EUR 70 billion in 2017, the corporation offers a suitable case to study. A researcher contacted the office of the board member responsible for technology and innovation. The office considered our research highly relevant and put the research team in contact with the executives responsible for the innovation programs. Descriptive information about the innovation programs is provided in Table 4-1. As is customary, we have disguised names to protect the identity of the selected corporation (Gioia et al., 2013).

Table 4-1: Descriptive information about the analyzed innovation programs

	Transformation Program	*Startup Venturing*	*Startup Cooperation*	*Startup Partnering*	*Innovation Fund*
General information					
Year of establishment	2011 (Extension in 2017)	2012	2017	2013	2016
Orientation					
Target group	Employee teams (Ideation Phase)	Startups (Startup Phase)	Startups (Expansion Stage)	Startups (Expansion Stage)	Internal innovation projects
Strategic objective	Transformation of corporate culture	Promotion of relevant innovations	Revaluation of existing products and services	Revaluation of existing products and services	Funding of relevant innovations
Success criteria	Number of program participants	Development of invested startups	Number of sold products/services	Number of sold products/services	Number of marketable products
Fit with core business	No specifications	Relevance must be assured	Complementary to core business, no cannibalization	Complementary to core business, no cannibalization	Relevance must be assured
Governance					
Processes	Barely structured, very individualistic	Semi-structured processes	Structured processes	Structured processes	Semi-structured processes
Structure	Protected space within organization	Autonomous organization unit	Unit integrated in organization	Unit integrated in organization	Unit integrated in organization
Alignment with business units	Selective cooperation	Selective cooperation	Selective cooperation	Regular cooperation	Regular cooperation
Development					
Support Services	Mentoring, infrastructure	Mentoring, infrastructure, small investments	Technical infrastructure, joint marketing	Joint product marketing	Moderate to high investments
Participant development	Development via business unit	Individual development	Strengthening of partnership	Strengthening of partnership	Transfer to business unit

4.3.2. Data collection and sources

4.3.2.1. Interviews

To support our analysis, we conducted 12 interviews in two waves, to allow for a longitudinal perspective and to mitigate bias by combining retrospective and current data (Burgelman, 2011; Leonard-Barton, 1990). The first wave of interviews took place between the end of 2014 and the middle of 2015 while the second wave commenced in late 2017 and continued until the beginning of 2018. Our key informants were either executives from a particular innovation program or senior experts. Diligent selection of key informants (see Appendix 4-1) ensured that they would have sufficient tenure, professional experience, and a comprehensive background knowledge on the topic of innovation management, could offer insights into the strategic orientation of the innovation programs, and would have information about the interplay with the parent corporation (Kumar et al., 1993). In order to obtain an overarching view of all innovation programs, we conducted interviews with an experienced manager acting as a managerial assistant to a board member too. The managerial assistant was responsible for all innovation-related activities within the department of the board member and was therefore a qualified informant for our study. Therefore, our choice of key informants helped mitigate recall problems that could potentially influence the results (Huber & Power, 1985). In a move consistent with the theory-building objective, we adopted a focused approach in which findings from prior research guided the data collection and analytical procedures (Eisenhardt, 1989). Since our research question particularly targets gaining new insights into the design of innovation programs and their interplay with each other, our data collection was focused on, but not limited to, these aspects. We developed a semi-structured interview protocol, which was further developed in the course of the study (Gioia et al., 2013). Open-ended questions concerned the following topics: (1) history and development of the program, (2) program objectives, (3) selection and promotion of innovation opportunities, (4) interplay with business units and (5) interplay with other innovation programs. Each of the 12 interviews lasted for at least one hour and was recorded and transcribed. On two occasions the interviewees did not consent to recordings being made, and in those cases, we rely on extensive interview notes. In sum, we conducted a total of 12 interviews with a combined transcript length of 243 pages. In addition to the interviews, we gathered further information from the key informants via email exchanges and phone calls and thus validated the research results.

4.3.2.2. Archival data

We supplemented the interview data and follow-up information with extensive archival data about the parent corporation and its innovation programs. The information was collected from a variety of sources such as parent firm annual reports, company websites, and press databases. Such diverse sources helped triangulate the primary data (Jick, 1979) and encouraged the authors to examine them from multiple angles (Yin, 2003). In total, we examined 694 pages of archival data to add to the information provided by our key informants (see Appendix 4-2).

4.3.3. Data coding

As part of the data analysis, we consistently followed the inductive theory-building case study approach (Eisenhardt, 1989). First, we carried out an iterative within-case analysis of each of the five innovation programs and derived insights from the collected interview data (Strauss & Corbin, 1998). Subsequently, we used the identified theoretical concepts to compare the different innovation programs in a cross-(sub-) case analysis (Miles & Huberman, 1994).

4.3.3.1. Within-case analysis

All collected data were compiled in an embedded case study and then subjected to intensive analysis (Miles & Huberman, 1994). Using the QDA software MAXQDA 12, we followed prior research and coded each section that picks up a particular thought with one or more in-vivo codes (Charmaz, 2006) and grouped them in the first step into first-order codes (Strauss, 1987; Strauss & Corbin, 1998). The coding was led by the researcher who had the most experience of working with the case corporation (Pratt, 2009), while several discussions within the research team helped to increase the validity of the initial coding before proceeding to the next round of analysis.

The subsequent axial-coding pursues the identification of links among first-order codes (Locke, 2001). Associated first-order codes were then grouped into more general second-order concepts (Glaser & Strauss, 1967). These second-order concepts represent our preliminary proposition which we tested against all available data using the constant comparison method (Glaser & Strauss, 1967). As a last step, we linked second-order concepts into aggregated dimensions. While considering relevant general theory (Strauss & Corbin, 1998), we refined the clustering of codes and higher-level concepts within the research team in numerous iterations until we reached theoretical saturation (Miles & Huberman, 1994), that is, no new conceptual categories emerged from

analyzing the data. The outcome of the within-case analysis (see Appendix 4-3) is structured in form of a hierarchical data structure (Gioia et al., 2013).

The results of the within-case analysis were systematically compared with the information from the archival data, to substantiate our findings from the coding, but also to identify differences between the coding and the archival data. Whenever differences between coding and archival data were detected, the research team discussed the findings in question with the key informants to ensure their reliability and validity. Doing so allowed informants to suggest adjustments if our theoretical insights and their experiences did not correspond and the process thus enhances the internal and external validity of our data structure (Gioia et al., 2013). We revised the structure multiple times based on the suggestions of the informants and those of academic colleagues.

4.3.3.2. Cross-(sub-)case analysis of the innovation programs

Based on the findings from the within-case analysis, we conducted a cross-(sub-) case analysis to systematically compare the different innovation programs (Eisenhardt, 1989). In the first step, we combined the identified theoretical concepts in a case-ordered descriptive matrix (Miles & Huberman, 1994), selecting the aggregated dimension of innovation-related goals as the lead criterion (see Appendix 4-4). Next, we determined the specific characteristics of each theoretical concept for the five innovation programs. Based on the lead criterion of innovation-related goals, we subsequently grouped the innovation programs and compared the different configurations. Prior research indicates that the selected approach can promote a comprehensive understanding of different configurations and identify recurring patterns (Miles & Huberman, 1994).

4.4. Case study analysis: Understanding corporate innovation programs

4.4.1. A meta model for corporate innovation programs

The within-case analysis in the previous section illuminates the theoretical findings based on the implementation of different innovation programs. This section presents our empirical observations and the theoretical insights they generated (Eisenhardt & Graebner, 2007). The results can be found in Figure 4-2, presented in the context of a meta model.

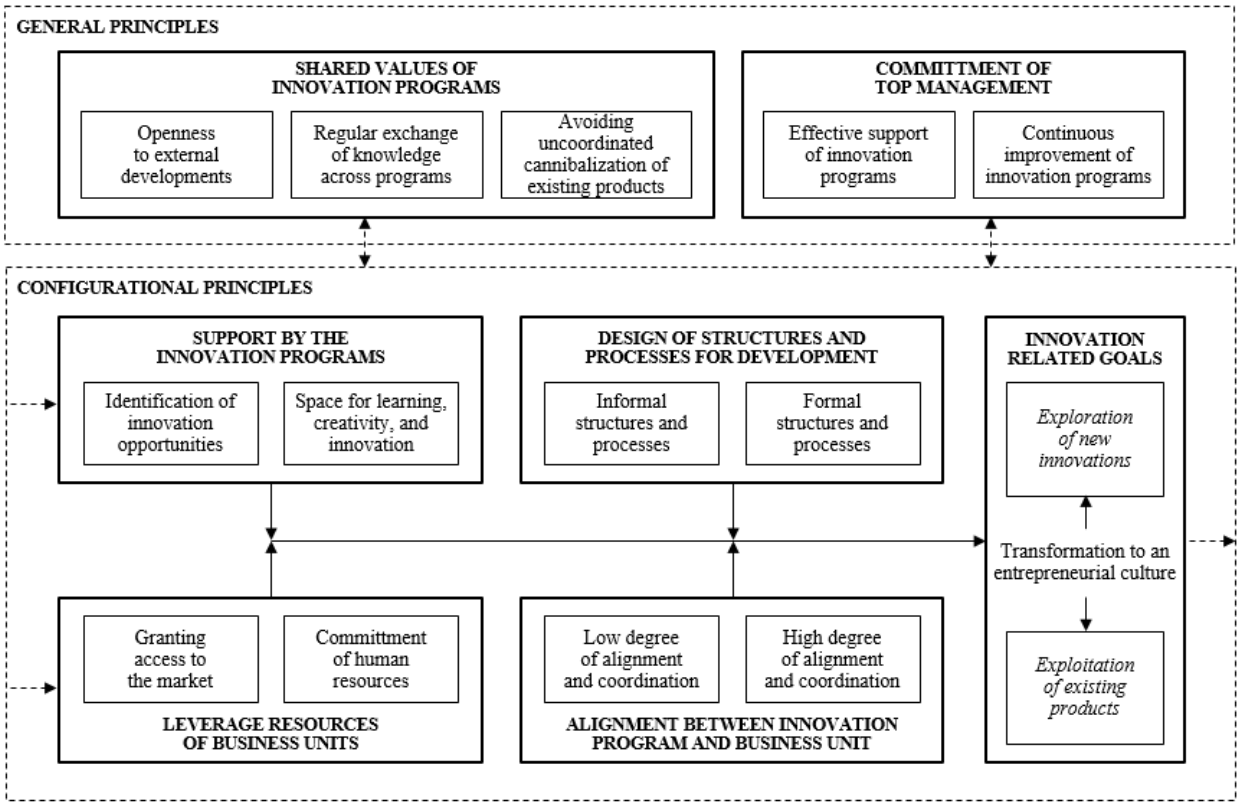


Figure 4-2: Meta model for corporate innovation programs

The meta model consists of seven overarching principles that are subcategorized as two general principles and five configurational principles. Whereas the general principles are valid across the various innovation programs, the design of configurational principles varies depending on the respective goals of an innovation program.

4.4.1.1. General principles of the meta model

4.4.1.1.1. Shared values of innovation programs

Despite design differences between innovation programs, they are subject to a set of shared values and beliefs. For example, the programs seem to be open to external impulses and developments (*openness to external developments*) and nurture a culture of openness and intense exchange among themselves (*regular exchange of knowledge across programs*). As the managerial assistant to the board member remarked:

> *It essentially requires openness from the people. They need to talk to each other and get a feeling of what is going on in the other areas. (A-BM)*

Communication between the programs does not follow standardized procedures but happens informally and on a personal level. The frequency of informal exchange reflects a high level of trust between the individuals involved (Levin & Cross, 2004). To also create a trusting relationship with the business units, an uncoordinated cannibalization of existing products and revenues is not condoned (*avoiding uncoordinated cannibalization of existing products*). The Vice President (Startup Cooperation) noted:

> *At the moment, we are actually rejecting startups for the reason that the business units do not want their revenues cannibalized. (VP-STCO)*

The trusting relationship between the innovation programs and the business units is the prerequisite for the joint and integrated development of new innovation and the targeted revaluation of existing products (Jansen et al., 2009).

4.4.1.1.2. Commitment of top management

The support of top management is a key success factor for the operation of the innovation programs (Sperber, 2017). For example, the Investment Director (Startup Venturing) remarked:

> *The support from the executive board is of course needed at the very highest level. (ID-STVE)*

In our case corporation, top management acts as sponsor of the various innovation programs, secures personal and financial resources, and actively lobbies within the company on behalf of the programs (*effective support of innovation programs*). The participants in the innovation programs recognize the commitment of their top management and acknowledge their involvement as an essential prerequisite for the success of the programs. Moreover, from a higher-level perspective, top management is the driving force for the continuous improvement of the programs, including their synchronization and collaboration (*continuous improvement of innovation programs*).

4.4.1.2. Configurational principles of the meta model

4.4.1.2.1. Support by the innovation programs

One support service offered by the innovation programs is the identification of innovation opportunities (*identification of innovation opportunities*). The Vice President (Startup Partnering B2C) stated:

> *Our scouts are simply in the market and speak to a great number of startups and businesses. (VP-STPA)*

To facilitate identification, innovation programs benefit from their openness to external developments (Vanhaverbeke et al., 2008; Vintergaard, 2005). Additionally, the programs have at their disposal the necessary resources and methodological knowledge for the development of innovations. The Vice President (Co-Creation) noted:

> *We have contacts, space. We have mentors. We have the skills. (VP-COCO)*

In this way, the innovation programs offer the cultural and organizational framework to enable the pursuit of identified innovation opportunities (*space for learning, creativity, and innovation*). However, the specific scope of the support varies depending on the objectives of the innovation programs.

4.4.1.2.2. Leverage resources of business units

Based on innovation opportunities identified, the business units can decide if they would like to participate in the development of an opportunity through the provision of resources. The Investment Director (Startup Venturing) noted:

> *The business unit has the last word because they can object: No, I am not going to introduce this to my market. (ID-STVE)*

While the innovation programs provide the organizational framework, business units must play their part by committing human resources (*commitment of human resources*) or by granting access to the market (g*ranting access to the market*). The objective of the innovation program determines which specific resources are needed. Independent of the nature of participation by a business unit, that objective remains the precondition for the pursuit of an innovation opportunity (Gassmann & Becker, 2006).

4.4.1.2.3. Design of structures and processes for development

Depending on the innovation program, the structures and processes for the development of innovation opportunities can be informal (*informal structures and processes*) or follow formal requirements (*formal structures and processes*). The managerial assistant to the board member stated:

> *If you applied a template to identify the potential next big thing, you would have to throw out 95 percent of all ideas. (A-BM)*

However, the Vice President of Startup Cooperation remarked:

> *We have a rigid application process with clear criteria, although there is a risk of falling through the cracks. (VP-STCO)*

While creative objectives tend to require informal structures and processes, formalized procedures are suited for predictable developments (Benner & Tushman, 2003; Christensen, 1997; Tushman & O'Reilly, 1996).

4.4.1.2.4. Alignment between innovation program and business unit

Like structures and processes, the alignment between the innovation programs and the business units is also designed individually for each innovation program. As the Vice President (Internal Incubator) put it:

> *You […] basically have to leave it to the free play of the forces to see if a collaboration with a business unit results. (VP-ININ)*

The Vice President (Startup Cooperation) however noted:

> *We simply need the exchange with the business units to hear from them: Okay, we need the following... (VP-STCO)*

The interview excerpts above illustrate how a distinction can be made if either a low degree of alignment (*low degree of alignment and coordination*) or a high degree of alignment (*high degree of alignment and coordination*) is evident. While a high degree of alignment is indicated for the specific development of products and services, a low degree of alignment is conducive for the objective of learning (Benner & Tushman, 2003; Christensen, 1997; Tushman & O'Reilly, 1996).

4.4.1.2.5. Innovation-related goals

Over the course of the analysis, the individual goal has emerged as a critical differentiation criterion between the innovation programs. For example, the Investment Director (Startup Venturing) remarked:

> *We intend to develop new business models based on our core businesses, our assets, and our know-how. (ID-STVE)*

Additionally, the Senior Expert (Startup Partnering B2B) had a stronger focus on short-term sales:

> *We are looking for innovations that are so ripe you can sell those products on the market and generate revenue. (SE-STPA)*

Those remarks indicate the programs pursue the exploration of new innovations (*exploration of new innovations*); however, the exploitation of existing products is the primary focus (e*xploitation of existing products*). Hence, they operate in an area of tension between exploration and exploitation where structural ambidexterity is guaranteed through the organizational separation and the individual design of the programs (Gibson & Birkinshaw, 2004; Raisch et al., 2009).

The sustained transformation of corporate culture could be identified as an additional objective (*transformation to an entrepreneurial culture*). In this context, the goal is to create a culture of greater individual responsibility and of openness to new developments. The results of exploration and exploitation (Gibson & Birkinshaw, 2004; He & Wong, 2004; Lubatkin et al., 2006) and specifically of cultural transformation then have significant positive effects on the entire innovation system (Matzler et al., 2013) and on corporate performance. The Vice President (Internal Incubator) stated:

> *The goal is to create innovation and to generate experiential knowledge. And this has a positive impact on corporate culture. (VP-ININ)*

4.4.2. Three configurations of innovation programs

The cross-(sub-)case analysis investigated configurations of innovation programs to identify patterns in their expression. The program objective reflected in the principle *innovation-related goals* was used as the lead criterion within the case-ordered predictor-outcome matrix. The result indicated that each objective featured a distinct configuration, and therefore we grouped those configurations into exploration-oriented programs (startup venturing and innovation fund), exploitation-oriented programs (startup cooperation and startup partnering) and transformation-oriented programs (transformation program).

4.4.2.1. Exploration-oriented programs

The goal of the exploration-oriented programs investigated is the exploration of new innovations (see Figure 4-3). The Investment Director (Startup Venturing) stated:

> *Now we want to take it a step further and invest in innovations that are highly relevant to us. (ID-STVE)*

If they are to benefit the innovation programs, innovation opportunities must be identified and be capable of being developed in a protected space with the involvement of the business units. The business units supply human resources and access to the relevant market. The combination of resources and development of opportunities (Sirmon et al., 2007) must occur in accordance with informal processes that do not hinder the exploration through imposing standardized practices or by exposing them to excessive bureaucracy (Jansen et al., 2006). Moreover, a high degree of alignment between the innovation programs and the business units is required to ensure the targeted development of opportunities and to address the needs of the business units (Jansen et al., 2006). The expression of the configuration is thus in agreement with the current insights in the academic literature regarding the execution of exploratory measures (March, 1991).

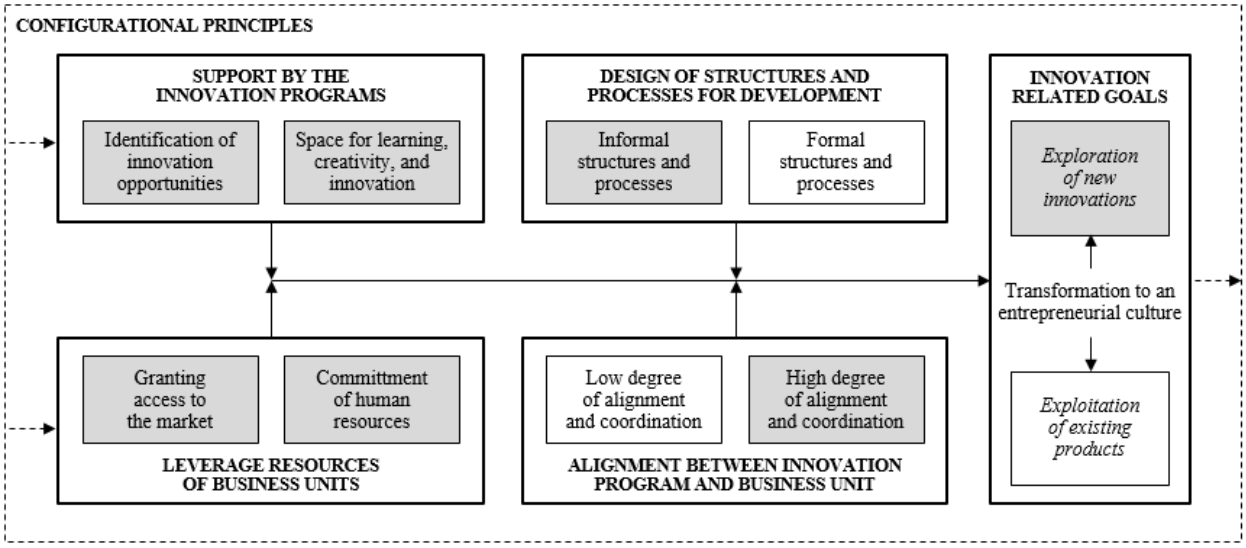


Figure 4-3: Configuration of exploration-oriented programs

4.4.2.2. Exploitation-oriented programs

Exploitation-oriented programs aim to exploit existing products (see Figure 4-4) and use standardized processes and structures to do so. With the involvement of the business unit, innovation opportunities are identified and combined with existing products and then marketed (Kuckertz et al., 2017). At this point, the innovation opportunities will be characterized by advanced market readiness and will be capable of being combined with existing products with little development expense required to subsequently transition to the marketing stage. The fact that the innovation opportunities are highly marketable also results in opportunities that are often less radical than those progressed under the exploration-oriented programs (Bower & Christensen, 1995). Exploitation-oriented programs require an alignment with the business units to ensure a fit between the existing products and the innovation opportunities (Jansen et al., 2006). The formal choice of structures and processes is recommended to maximize the marketing of identified opportunities (Uotila et al., 2009).

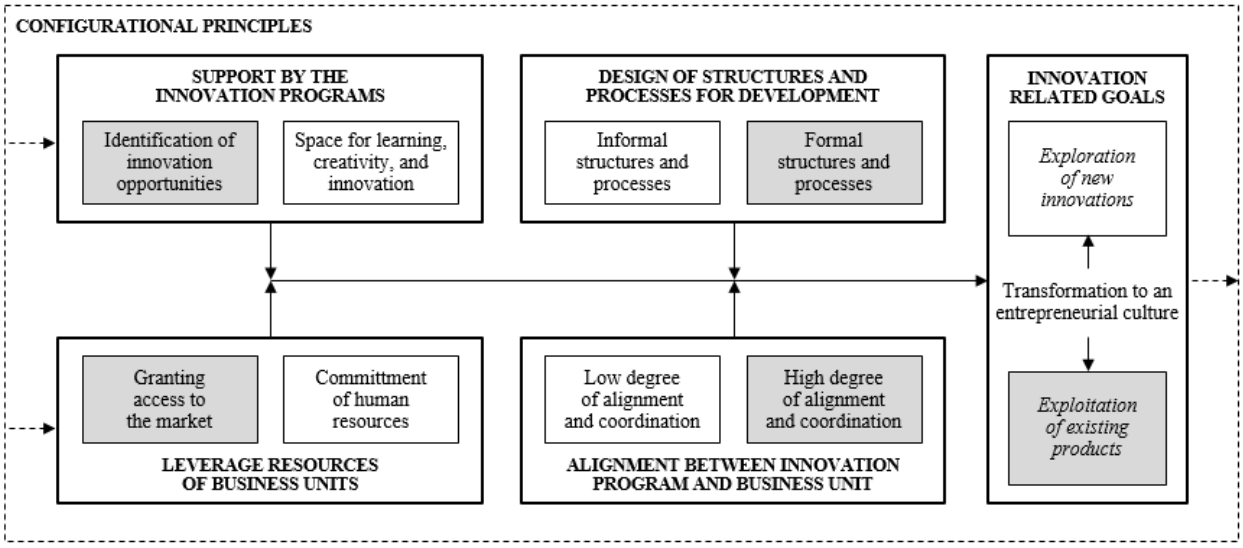


Figure 4-4: Configuration of exploitation-oriented programs

4.4.2.3. Transformation-oriented programs

In contrast to both previously presented configurations, transformation-oriented programs have no market or product focus (see Figure 4-5). Instead, the programs target the transformation of

corporate culture and aim to shape a culture of individual responsibility and openness toward external developments. The Vice President (Co-Creation) stated:

> *Transformation mainly pursues this approach of cultural change, so primarily the training of internal entrepreneurs. (VP-COCO)*

To this end, the transformation-oriented programs provide a protected space, where selected representatives of the business unit can pursue their own ideas over a defined period (Feurer et al., 1996). Given the programs are not focused on marketing ideas, they do not need to be tightly aligned with the business units. Instead the programs benefit from a high level of autonomy (Lumpkin & Dess, 1996). The creativity and culture focus of the programs means their structures and processes are necessarily informal, and accordingly, informal mechanisms used to foster individual employee development suit such an environment (Brand, 1998; Cummings, 1965).

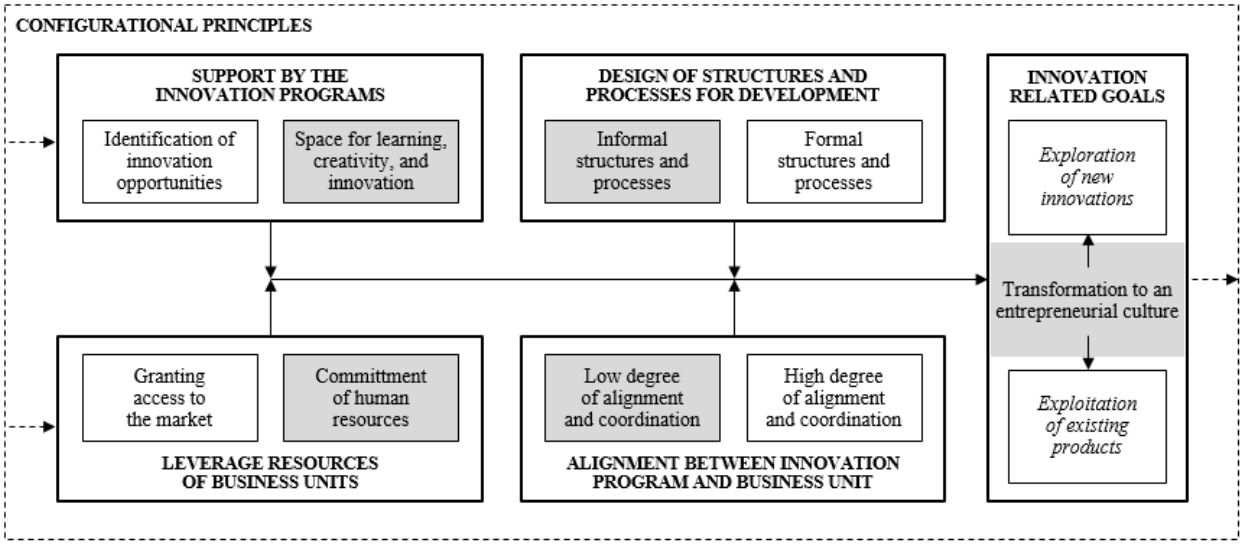


Figure 4-5: Configuration of transformation-oriented programs

4.4.3. Interplay between the innovation programs

We already nominated the exchange of knowledge across the different innovation programs as belonging to the general principles. However, the design of the knowledge exchange between the individual innovation programs differs significantly. While an explicit knowledge exchange in the

form of innovation opportunities takes place between exploration-oriented and exploitation-oriented programs, the knowledge exchange between transformation-oriented programs and exploration-oriented and exploitation-oriented programs is focused on the provision of an entrepreneurial culture (see Figure 4-6).

4.4.3.1. Interplay between exploration-oriented and exploitation-oriented programs

In general, there is a regular and informal exchange of knowledge between exploration-oriented and exploitation-oriented programs. The Vice President (Startup Cooperation) noted:

> *We also give each other hints. Sometimes we pass leads on and simply add: Look, these are interesting. (VP-STCO)*

It is very common that innovations developed out of exploration-oriented programs suit further marketing through exploitation-oriented programs. Such a path of incremental development of innovation opportunities has already been explored in literature via real options theory (van de Vrande et al., 2009; Vanhaverbeke et al., 2008). However, it should be noted that in our case, the onward development of innovations from exploration-oriented programs through exploitation-oriented programs is by no means a predesigned path of development. In fact, the lead actors of the programs decide in each individual situation whether and to what extent opportunities are worth exchanging. So, the Vice President (Internal Incubator) stated:

> *The development [through multiple stages and programs] is not a defined process. There is no example of an innovation that developed in this systematic way. (VP-ININ)*

In the opposite case, however, the results of the exploitation-oriented programs in general are not suitable as an input for the exploration-oriented programs. As the opportunities of the exploitation-oriented programs are already at a very mature stage, the development in the context of the exploration-oriented programs is not appropriate.

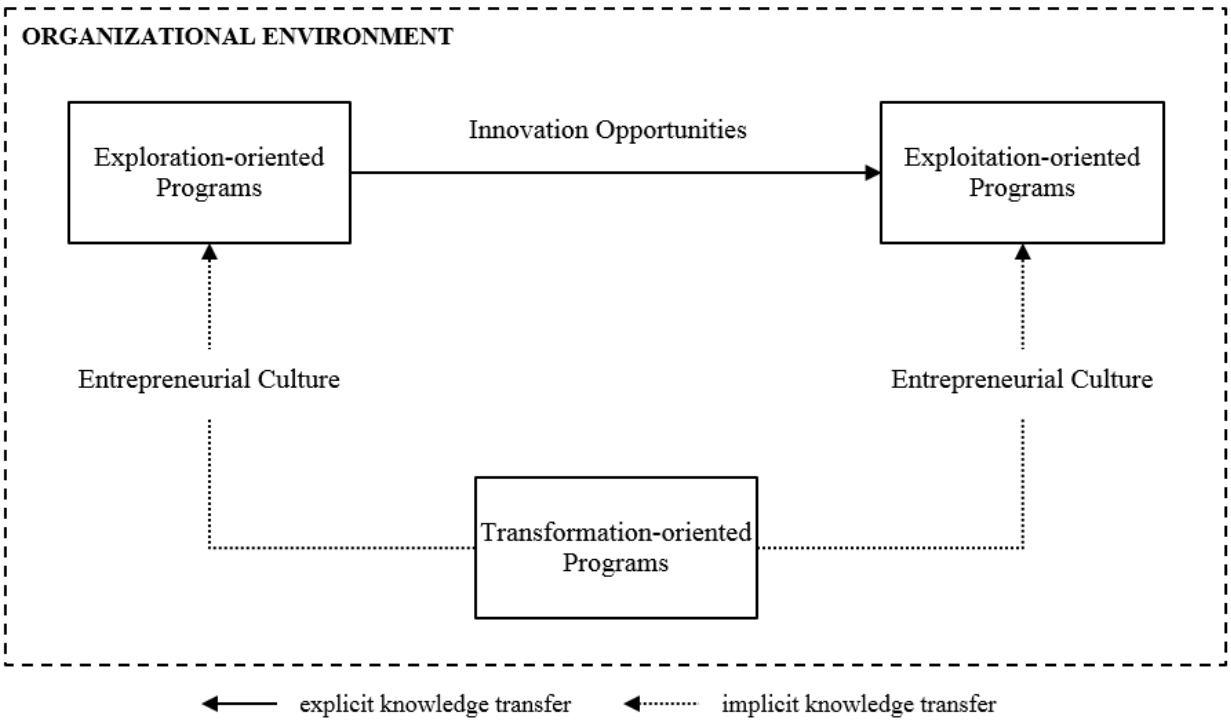


Figure 4-6: Interplay between the configurations

4.4.3.2. Interplay with transformation-oriented programs

Likewise, transformation-oriented programs are part of a constant knowledge exchange with the other programs. In this situation, the knowledge exchange is less explicit than in the case of the interplay between exploration-oriented programs and exploitation-oriented programs. A Senior Expert from an exploitation-oriented program remarked:

> *We don't have a clear interface [to the Transformation Program]. As said before, maybe on an individual basis, but I can presently not recall that there would somehow be an exchange happening. (SE-STPA)*

This can be explained by the fact that the transformation-oriented programs do not usually yield relevant innovation opportunities but rather focus on the transformation of the culture and employee mindset. For this reason, the programs are not limited to related innovations, but give the employees freedom. The Senior Expert (Innovation Fund) noted:

> *The innovations that are driven by [the Internal Incubator] are usually so early or so far away from our strategic goals that in practice, very seldom is a topic from the program so mature that it could be further developed by [the Innovation Fund]. (SE-INFU)*

Nevertheless, transformation-oriented programs represent a crucial element within the trio of our configurations. The transformation of the corporate culture creates the climate for exploration-oriented programs and exploitation-oriented programs. Both configurations derive considerable advantages from an entrepreneurial culture (Gilsing & Nooteboom, 2006; Matzler et al., 2013). As the managerial assistant to the board member stated:

> *Employees have to speak up: Hey, we are market leaders today, and we would like to remain there tomorrow too. Revenues go down, people, wake up. Therefore: Culture cannot be underestimated. (A-BM)*

4.5. Discussion

This study employed an inductive theory-building case study approach (Eisenhardt, 1989; Ketokivi & Choi, 2014) to explore what elements contribute to successful innovation programs, how those elements are configured, and how the different types of programs have the potential to enrich each other. Based on our analysis, through the observation of the empirical context and the iterative comparison with general theory (Strauss, 1987; Strauss & Corbin, 1998), new theoretical insights were generated and theoretical and practical implications and also avenues for further research identified. Limitations associated with this work are also presented in the following section.

4.5.1. Theoretical implications

The results of this work have two major theoretical implications for the literature on innovation programs and the literature on innovation culture, respectively. These implications are based on our in-depth analysis of how one of the largest and most successful German technology companies structures its innovation activities. Following this approach, we were able to identify the key elements and the innovation-related goals of the corporation's innovation programs. The key elements were then structured using a meta model and subdivided into seven principles. Two of the principles feature overall applicability and are thus equally relevant for the innovation programs. Five principles, however, are individually configured depending on the respective innovation program.

First, this study contributes to our understanding of how different innovation programs are configured and how the identified principles of an innovation program can be structured to best fit the underlying logic of the respective program. With regard to exploration-oriented programs, members of the business units implementing the innovation programs develop and subsequently market innovation opportunities that have been identified in the programs. The development process of innovation opportunities is based on informal structures and processes and occurs with a high degree of alignment and coordination with the business units. With regard to the less formal design of the processes, our observations are in line with existing literature (Benner & Tushman, 2003; Christensen, 1997; Tushman & O'Reilly, 1996). What is atypical, however, is the tight alignment with the business units: It is typically argued that exploration-oriented innovation units should act as autonomously as possible in order to develop innovations without prejudice to existing business units (Uittenbogaard et al., 2005; Vanhaverbeke & Peeters, 2005). However, this is deliberately not done in the analyzed case in order to achieve greater acceptance within the organization. This leads to less disruption and avoids cannibalizing innovations within the core business but supports the organization in the case of advances into adjacent business areas (Ford et al., 2012). The findings of our analysis thus contribute to the question on how autonomously an organizational unit entrusted with the exploration of new services and products can be designed. As shown in our case, companies can choose a moderate level of autonomy to leverage synergies with existing business units while simultaneously producing radical innovations. If innovations are developed without any relation to the existing core organization, a conglomeration of diverse independent initiatives will emerge. This may in turn lead to high financial inefficiencies (Powell, 2010) and thus needs to be avoided.

Exploitation-oriented programs on the other hand focus on the development of existing products. To that end, the programs identify relevant opportunities that are subsequently marketed by the business units alongside existing products. The revaluation of products relies on formal structures and processes and occurs with a high degree of alignment and coordination with the business units. The observations within the exploitation-oriented programs coincides with the findings of existing literature. Thus, exploitive processes follow formal structures and are characterized by a high degree of centralization (Benner & Tushman, 2003; Christensen, 1997; Tushman & O'Reilly, 1996). Conflicts between the innovation programs and the business units are unusual due to the high level of alignment (Chesbrough & Socolof, 2000).

Transformation-oriented programs aim to transform the corporate culture. For this purpose, business unit staff are tasked with the development of new products through innovative approaches within the framework of the programs. Owing to the focus being less on the marketing aspect of the products than on the experience of innovative work methods, close alignment to business units is not necessary. Through the transformation of corporate culture, transformation-oriented programs have an indirect impact on exploration-oriented and exploitation-oriented programs. While Benner & Tushman (2003) argue that different cultures are appropriated for the types of programs due to their fundamental design differences, they also claim, that cultures within different organizational units should not diverge too much to maintain compatibility between them. Therefore, in order to increase the innovativeness within exploration-oriented programs and concurrently avoid the divergence of cultures, the whole innovativeness of the corporate culture should be increased. In the analyzed case, this is the primary objective of transformation-oriented programs. Regarding transformation-oriented programs within an innovation system, we contribute to the existing literature by illustrating the importance of an innovative corporate culture as a fundamental requirement..

As a second contribution, and most importantly, we highlight how the identified configurations interact with each other to achieve the overarching strategic innovation goals of the corporation. We were able to show that the various programs maintain regular exchanges with each other. While van de Vrande et al. (2006) discovered how different forms of innovation programs can be used to incrementally increase the degree of commitment in respect to an innovation, such a predefined and structured way of development was in the observed case neither planned nor supported by appropriated formalities and structures. Instead, the programs act in a semi-coordinated but largely autonomous manner. An exchange between the programs takes place regularly but is not formalized and only on the initiative of individual employees. Nevertheless, regular knowledge exchange is pivotal for the programs, in that such exchanges both communicate innovation opportunities and experiences, and also create an innovation culture.

Consequently, the paper addresses the perceived gap described in the literature, in that research too often focuses on single innovation programs, by adopting an overarching and holistic perspective. It also adds to our understanding of how different innovation programs can be combined into a corporation-wide innovation system.

4.5.2. Practical implications

The findings of this work also have practical implications. When implementing innovation programs in the future, companies should explicitly consider different objectives and choose configurations in accordance with those objectives. The implementation of multiple innovation programs for different objectives is therefore useful. Our findings should encourage companies to create the overarching framework conditions that facilitate openness with respect to external developments and a constant knowledge transfer between innovation programs. Moreover, top management will be required to stand behind the measures and to strive for a continuous improvement of the innovation programs and their interplay. Being aware of the potential interplay of innovation programs seems to be of utmost importance: Not only are innovation programs mostly path dependent, but also dependent on the approach and success of other, simultaneously conducted innovation programs. This calls for a holistic perspective, even from the viewpoint of managers responsible for just a single innovation program.

4.5.3. Further research and limitations

Our meta model of a corporate innovation system encompassing 16 elements encapsulated in seven principles proposes a unique dimension for future theoretical and applied research in the field of innovation management. The identified principles represent a starting point for further research. While the focus of this work already includes initial first steps toward identifying details of the element *regular knowledge exchange across programs*, many of the other principles and elements represent promising avenues for further research. Alongside the characterization and in-depth discussion, testing our results using quantitative methods is also particularly noteworthy.

Furthermore, the configurations shown in this work offer considerable research potential. Whereas the presented configurations have proven successful in the context of the analyzed company, the generalization of the findings is possible but limited (Ketokivi & Choi, 2014; Welch et al., 2011). Therefore, research could be conducted replicating the parameters of this work with the goal of confirming the presented configurations in the context of other companies and industries, or of identifying further configurations. Taking the findings of this work, but also the above-mentioned limitations into account, we believe this paper offers promising avenues for further research.

4.6. Conclusion

Innovation programs, and in particular the interaction of various innovation programs within a corporate innovation system, play an important role for established organizations. Despite this importance, prior research provided only limited insights into this field of research. So far, previous work has focused mainly on the consideration of individual innovation programs, but without placing them in a larger and overarching corporate context. The present work addresses this gap in academic literature. We have presented a meta model for a corporate innovation system, shown how this meta model is designed for different types of innovation programs, and how different innovation programs interact. With this focus, this work is the first of its kind.

4.7. Appendices

Appendix 4-1: Interviews with key informants

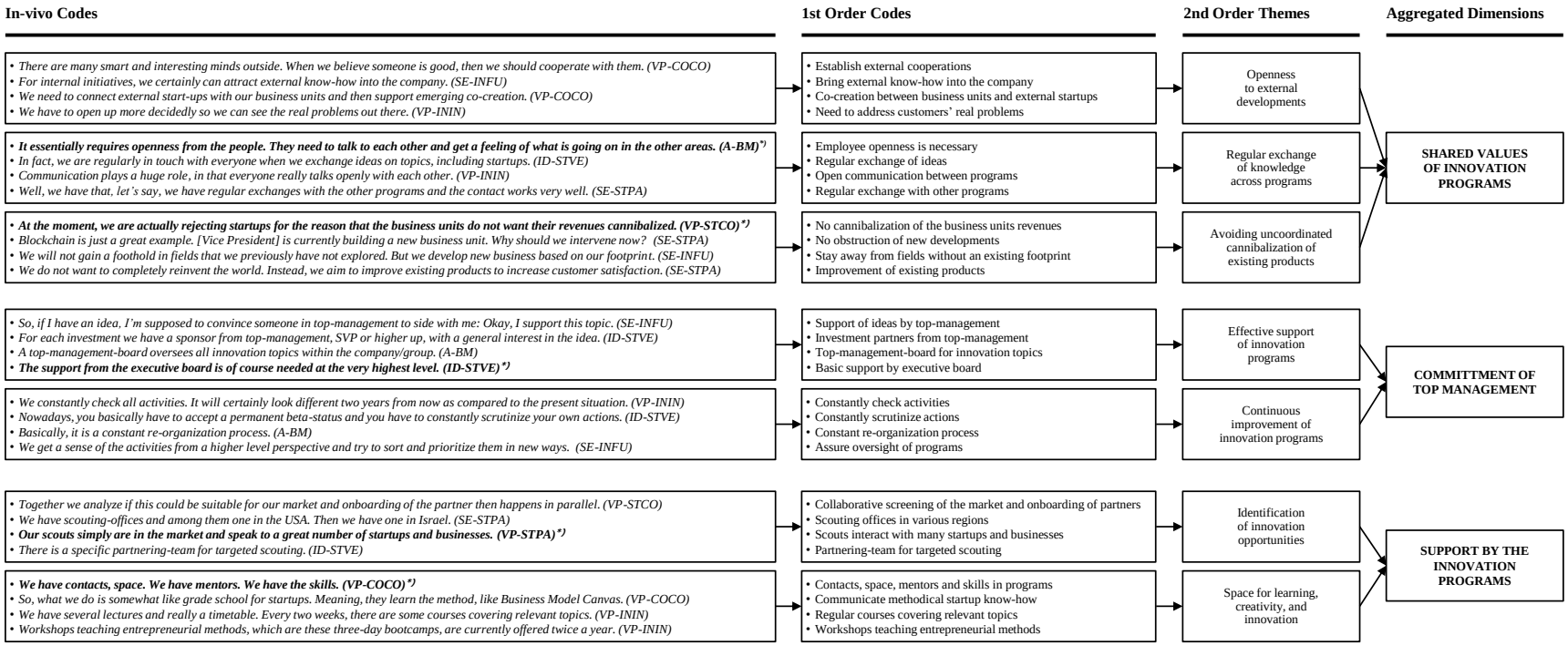
Interviews	*Pages*	*Overarching perspective*	*Transformation Program*	*Startup Venturing*	*Innovation Fund*[a)]	*Startup Cooperation*[a)]	*Startup Partnering*
2014/2015							
Vice President Internal Incubator (VP-ININ)	16,0	0,0	16,0	0,0	-	-	0,0
Senior Expert Startup Venturing (SE-STVE)	12,0	0,0	0,0	12,0	-	-	0,0
Vice President Startup Partnering B2C (VP-STPA)	8,0	0,0	0,0	0,0	-	-	8,0[b)]
Investment Director CVC (ID-CVC)	6,0	0,0	0,0	6,0[b)]	-	-	0,0
Sum 2014/2015	42,0	0,0	16,0	18,0	-	-	8,0
2017/2018							
Managerial Assistant to the Board Member (A-BM)	21,0	6,3	10,9	0,9	1,1	0,0	1,8
Vice President Internal Incubator (VP-ININ)	41,0	8,2	31,5	1,3	0,0	0,0	0,0
Vice President Co-Creation (VP-COCO)	16,0	0,9	13,9	0,2	0,2	0,0	0,9
Investment Director Startup Venturing (ID-STVE)	38,0	6,6	0,0	29,8	0,7	0,0	1,0
Vice President Startup Cooperation (VP-STCO)	21,0	2,3	0,0	0,0	0,0	18,4	0,3
Vice President Startup Partnering B2C (VP-STPA)	10,0	0,0	0,0	0,0	0,0	0,0	10,0
Senior Expert Startup Partnering B2B (SE-STPA)	26,0	0,0	0,0	0,0	0,0	0,0	26,0
Senior Expert Innovation Fund (SE-INFU)	28,0	0,8	0,0	2,8	24,5	0,0	0,0
Sum 2017/2018	201,0	25,0	56,3	34,9	26,4	18,4	40,0
Sum	*243,0*	*25,0*	*72,3*	*52,9*	*26,4*	*18,4*	*48,0*

a) Innovation programs were set up after mid-20152015, so they could not be considered in the first wave of interviews
b) Recording was not allowed by these interviewees; instead interview notes were produced

Appendix 4-2: Details of archival data

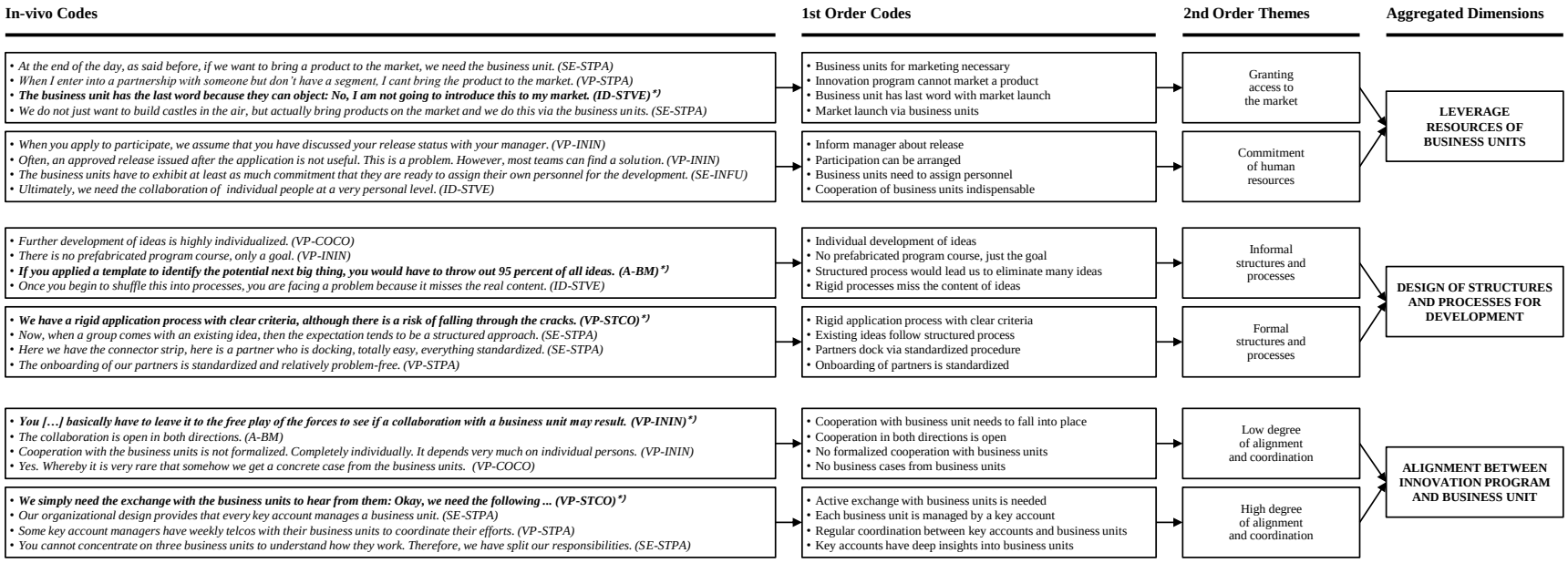
Source / Audience	*Pages*
External / external	
News articles (since 2010)	387
Internal / external	
Annual reports (since 2010)	147
Press releases (since 2010)	99
Websites (actual version)	61
Sum	*694*

Appendix 4-3: Data structure



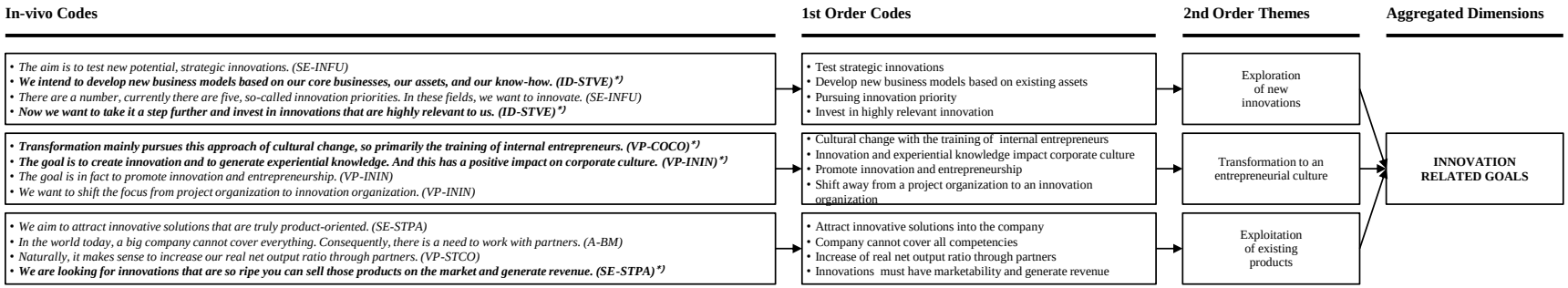
*) Quotes were also cited in the analysis section

Continued Appendix 4-3



*) Quotes were also cited in the analysis section

Continued Appendix 4-3



*) Quotes were also cited in the analysis section

Appendix 4-4: Case-ordered descriptive matrix

	INNOVATION RELATED GOALS			*SUPPORT BY THE INNOVATION PROGRAMS*	
	Exploration of new innovations	*Exploitation of existing products*	*Transformation to an entrepreneurial culture*	*Identification of innovation opportunities*	*Space for learning, creativity, and innovation*
Transformation-oriented Programs					
Transformation Program	-	-	+	-	+
Exploration-oriented Programs					
Startup Venturing	+	-	-	+	+
Innovation Fund	+	-	-	+	+
Exploitation-oriented Programs					
Startup Cooperation	-	+	-	+	-
Startup Partnering	-	+	-	+	-

Continued Appendix 4-4

	LEVERAGE RESOURCES OF BUSINESS UNITS		*DESIGN OF STRUCTURES AND PROCESSES FOR DEVELOPMENT*		*ALIGNMENT BETWEEN INNOVARTION PROGRAM AND BUSINESS UNIT*	
	Granting access to the market	*Commitment of human resources*	*Informal structures and processes*	*Formal structures and processes*	*Low degree of alignment and coordination*	*High degree of alignment and coordination*
Transformation-oriented Programs						
Transformation Program	-	+	+	-	+	-
Exploration-oriented Programs						
Startup Venturing	+	+	+	-	-	+
Innovation Fund	+	+	+	-	-	+
Exploitation-oriented Programs						
Startup Cooperation	+	-	-	+	-	+
Startup Partnering	+	-	-	+	-	+

5. SHORT-, MID-, AND LONG-TERM EFFECTS OF INNOVATION ACTIVITIES: A CONFIGURATIONAL ANALYSIS ON CONTINUITY, COMPETENCE, AND COOPERATION[9,10]

Abstract

The constant generation of innovation is a major factor in explaining a firm's long-term success. Accordingly, previous literature has identified several organizational, processual, and cultural factors enabling firms to promote successful innovation. Although these success factors seem to be very different, most of revolve around continuity, competence, or cooperation. As little prior research has focused on the complexity and interdependence of these various interlinked theoretical concepts, we adopt a configurational and longitudinal approach to analyze the effect of continuity, competence, and cooperation on the innovation performance of a firm on a short-, mid-, and long-term basis. Based on a longitudinal data set capturing the innovation behavior of 220 firms from 2009 to 2015, we find that continuity is the basic requirement for constant innovation performance. In addition, cooperation will be supportive of innovation performance in the short-term, while competence supports innovation performance in the long-term.

5.1. Introduction

Current developments such as the increasing digitalization and globalization of the economy are accelerating the dynamics of markets, technologies, and innovation (Abernathy & Utterback, 1978; Tushman & Anderson, 1986). In order to sustain their position in such an environment, established firms in particular must continually adapt to their surroundings and be able to generate new competitive advantage, especially in the form of innovative technologies and products (Berger et al., 2019). However, doing so involves the continuous assessment of the environment and thus determining appropriate strategies requires great effort and discipline (Bower & Christensen,

[9] This study by Kötting & Kuckertz was during the doctoral review process still under review at the International Journal of Innovation Management. A revised version of the study has meanwhile been published under Kötting & Kuckertz (2020). An online version can be found at the following address: https://www.worldscientific.com/doi/10.1142/S1363919621500535.

[10] Author contributions: Michael Kötting: Conceptualization, Formal Analysis, Investigation, Data Curation, Writing—Original Draft, Project Administration. Andreas Kuckertz: Conceptualization, Validation, Writing—Review and Editing, Supervision.

1995). How challenging this it is to do so can be demonstrated by looking at many examples in practice, as in the recent past, many formerly very successful—sometimes even market-leading—firms did not anticipate new relevant developments at an early stage, with the result that their market position was significantly threatened (Christensen, 1997; Christensen & Raynor, 2003).

Although the generation of innovation is requires momentous effort and is a very complex task, the literature reviews of Ernst (2002) and van der Panne et al. (2003) reveal numerous scientific studies have identified success factors driving the process, analyzed them, and empirically scrutinized their effectiveness. Those success factors examined often involve concepts such as *continuity*, *competence*, and/or *cooperation*. *Continuity* is understood as the continuous practice of R&D activities in order to be able to react to market and technological developments (Boer & Gertsen, 2003; Steiber & Alänge, 2013). *Competence* describes a firm's ability to monitor, evaluate, integrate and leverage new knowledge to generate innovation (Gibson & Birkinshaw, 2004; O'Reilly & Tushman, 2008; Quintana-García & Benavides-Velasco, 2008). While *competence* is based on the internal knowledge base of a firm, *cooperation* describes liaising with strategic partners to acquire their knowledge and using that knowledge to expand the acquiring firm's internal knowledge base (Cohen & Levinthal, 1990; Ireland et al., 2002; Mowery et al., 1996). The three concepts are thus strongly interlinked and have various interdependencies. For this reason, it is necessary to analyze them in combination and consider them in interaction with each other.

While the innovation research was initially largely explorative, the number of confirmative statistical studies has recently increased notably (Keupp et al., 2012; Savino et al., 2017). Although these works are informative and valuable, the standard methodological approaches they employ are often not capable of capturing the complexity and interdependence of various interlinked theoretical concepts (Berger, 2016; Greckhamer et al., 2008; Woodside, 2010, 2013). Therefore, it is still unclear how *continuity*, *competence*, and *cooperation* combine and interact and what effects they produce in the short-term and long-term. We therefore adopt a configurational and longitudinal approach to analyze the effect of *continuity*, *competence*, and *cooperation* on the innovation performance of a firm on a short-, mid-, and long-term basis. That choice was motivated by configurational analysis being an appropriate tool to capture logical connections between multiple conditions and an outcome (Kraus et al., 2018).

This leads us to our research question: *How do continuity, competence, and cooperation for innovation together translate into innovation performance?* Although several researchers have already applied a configurational approach (Berger, 2016; Kraus et al., 2018), to the best of our knowledge, this is the first study to analyze the effects of *continuity*, *competence*, and *cooperation* on innovation performance through a configurational approach. That use of a configurational approach to reveal the interactions of *continuity*, *competence*, and *cooperation* and the impact on the innovation performance of a firm constitutes this study's first contribution to the academic literature. The second contribution is derived from the current research being longitudinal, and thus examining short-term results alongside those in the mid-term and long-term, which means the study can develop and support propositions about lead times and the sustainability of different concepts. Overall, therefore, the current research helps fill the identified gap in the literature relating to the interaction of innovation-related concepts and their short- and long-term effects.

5.2. Theoretical Background

5.2.1. Continuity

Owing to the proliferation of market and technological changes, firms are now confronted with an increasingly competitive market environment. To successfully differentiate themselves in such an environment and maintain competitive advantage, firms must develop innovation by continuously adapting to market conditions and technological changes (Nelson, 1991; Tushman & Anderson, 1986), a necessity also reflected in the development of the innovation literature. While innovation literature in the early 1970s focused on success factors behind individual innovation projects (e.g., Myers & Marquis, 1969; Rothwell, 1977), the literature developed during the 1980s to embrace a more process-oriented perspective (e.g., Burgelman, 1983; Cooper, 1983; Tushman & Nadler, 1986); then, from the mid-1990s, new studies emerged, proposing that a focus on a single innovation project would not be sufficient to remain competitive. That wave of research suggested success is more dependent on the continuous exploration of various innovation projects (e.g., Brown & Eisenhardt, 1997; Kötting & Kuckertz, 2019; O'Connor & DeMartino, 2006).

Following the development of the innovation literature, numerous works from the 2000s address continuous innovation (e.g., Boer & Gertsen, 2003; Hargadon, 1998; Steiber & Alänge, 2013; Xu et al., 2010). Most of those studies were grounded on innovation and knowledge management principles and focused on the long-term and repetitive execution of related activities and especially

on (continuous) improvement and (continuous) learning. Many concluded that the continuous practice of these activities leads to sustainable innovation performance (e.g., Boer & Gertsen, 2003). This continuous innovation approach complements the widely used concept of dynamic capabilities in management literature (e.g., Björk et al., 2010; Verona, 2003). Dynamic capabilities are those capabilities of a firm that allow it to continuously integrate, build up, and reconfigure knowledge to deal with a rapidly changing environment (Teece et al., 1997). Therefore, dynamic capabilities, as organizational routines, can be seen as a vehicle to implement continuous innovation within firms, to ensure the repeatability and reliability of innovation activities (O'Connor, 2008; Soosay & Hyland, 2008).

Although empirical studies on the approach to continuous innovation are not yet widespread (Boer & Gertsen, 2003), other innovation studies show that the development, adoption, and commercialization of innovation is associated with a lead time that can extend to several years (Brouwer & Kleinknecht, 1999; Himmelberg & Petersen, 1994; Kostopoulos et al., 2011; Lindner et al., 1979; Mansfield, 1991, 1998). Therefore, if innovation activities do not take place on a continuous basis, appropriate lead times for knowledge acquisition and application must be provided for each time the activities are readopted (Ravenscraft & Scherer, 1982). Considering that market and technological changes usually take place in cycles (Abernathy & Utterback, 1978; Gersick, 1991; Tushman & Anderson, 1986), a short-term reaction to these changes is often not possible when practicing innovation activities on a discontinuous basis. Doing so can lead to innovation activities being initiated at the high point of a cycle and materializing at its low point, which is often too late (Bower & Christensen, 1995). Assimilating the above arguments, we conclude that *continuity* is a key element for the sustainable generation of innovation.

5.2.2. Competence

Competence plays a major role in the management and innovation literature and has done for a long time. In the early 1990s, several studies within the management literature argued that the success of a firm is usually based on its unique set of core competencies (e.g., Prahalad & Hamel, 1990), which serve to differentiate the firm and its products from its competitors and have therefore to be strengthened by the firm's management (Coombs, 1996; Javidan, 1998; Prahalad, 1993). Later works, which increasingly scrutinized the dynamics of technological changes and shifts in market conditions, elaborated the risk of maintaining an overly strong focus on core competencies

(Bower & Christensen, 1995). This stream of research argues that too narrow a focus on existing core competences invites the risk of falling into a competence trap (Dougherty, 1995; March, 1991; Sirén et al., 2012): A situation in which firms concentrate too strongly on the exploitation of their existing competences and products, but thereby neglect the exploration of new competences and innovation (Bower & Christensen, 1995; McNamara & Baden-Fuller, 1999; Raisch & Birkinshaw, 2008). Taking the risk of a competence trap into account and following current literature on ambidexterity—the balancing of exploration and exploitation—we will therefore not define competence solely as the ability to exploit existing knowledge for the improvement of existing products, but instead as the ability to monitor, evaluate, integrate and leverage new knowledge to generate innovation (Gibson & Birkinshaw, 2004; O'Reilly & Tushman, 2008; Quintana-García & Benavides-Velasco, 2008).

The competence of a firm to generate innovation is mainly grounded in it developing a comprehensive knowledge base. Therefore, a firm's knowledge base should to a certain extent be diverse, so as to provide a broad variety of new knowledge to be monitored and evaluated (Katila & Ahuja, 2002; Quintana-García & Benavides-Velasco, 2008). The firm should therefore acquire a knowledge inventory applicable to the future, even though its management cannot know in advance exactly what it will be employed for (Levinthal & March, 1993). Having such an inventory not only prepares firms to react appropriately to future developments, but also strengthens their absorptive capacity, which enables them to better integrate and leverage new knowledge as basis for innovation (Cohen & Levinthal, 1990). If a firm's management, for example, does not have fundamental knowledge of an upcoming technology, it will not be able to evaluate that technology and thus cannot make an informed decision on its relevance. Therefore, a comprehensive and diverse knowledge base plays an essential role in preventing core rigidities for firms, because it allows management to effectively assess upcoming developments (Leonard-Barton, 1992). The regular addition of new knowledge to a firm's knowledge base is thus extremely important for its innovation capability (Danneels, 2002).

If a firm is to broaden its knowledge base, it must constantly review existing, and pursue new, organizational and individual learning processes. Learning processes allow firms to transform information into new knowledge (Crossan et al., 1999; Grant, 1996), whereby the knowledge is transferred from individuals to groups and finally to the organizational level (Huber, 1991; March, 1991) when the entire organization can access the knowledge, and then recombine and leverage it

to generate innovation (Levinthal & March, 1993). Learning processes can be based on among other things a continuous engagement with explorative activities (Cohen & Levinthal, 1990; Huber, 1991), the development and systematic training of employees (Crossan et al., 1999; Sirén et al., 2012; Sirmon et al., 2007; Thomas et al., 2001) and can also be enhanced through strategic cooperation (Alvarez & Barney, 2001; Doz, 1996; Hamel, 1991). In summary, *competence* plays a major role in the generation of innovation.

5.2.3. Cooperation

Firms are dependent on continuously expanding and diversifying their knowledge bases to remain competitive (Katila & Ahuja, 2002; Levinthal & March, 1993). In addition to internal measures to generate knowledge, the acquisition of external knowledge has also proved to be an effective strategy (e.g., Cohen & Levinthal, 1990; Ireland et al., 2002; Mowery et al., 1996). Taking the resource-based view into account, the particular advantage of external knowledge acquisition is the possibility to acquire and internalize complementary knowledge, broadening the acquirer's knowledge base (Das & Teng, 2000; Tsang, 2000). Compared to internal measures, the generation of knowledge from adjacent fields would often be difficult and costly to implement, because knowledge would have to be accumulated from scratch (Danneels, 2002; Lee & Allen, 1982). Common sources for the acquisition of external knowledge are related firms (e.g., parent firms or sister firms), unrelated firms (e.g., suppliers or competitors), regional networks, and research institutes (e.g., Cohen & Levinthal, 1990; Hippel, 1988).

Firms seeking to transfer and internalize external knowledge have various strategic options along a transaction costs economics' continuum between market and hierarchy (Parkhe, 1993; Williamson, 1991). Market transactions (e.g., licensing agreements) are less suitable for knowledge transfer, because the transfer of tacit knowledge can only be secured through its continuous application (Grant, 1996), demanding close collaboration and continuous interaction between the cooperation partners. Hierarchical structures (e.g., mergers and acquisitions) are also only suited to the flexible and temporary transfer of knowledge to a limited extent, owing to their high level of integration and the associated liabilities and risks (Grant, 1996; Harrison et al., 2001). Therefore, hybrid structures (e.g., strategic cooperation agreements) are the most often applied governance structure for the temporary transfer of external knowledge, as they combine the required integration level from

hierarchies with the flexibility of market transactions (Hagedoorn & Duysters, 2002; Madhok & Tallman, 1998; Williamson, 1991).

The above-mentioned characteristics have ensured that strategic cooperation has become increasingly popular in practice (e.g., Dyer et al., 2001; Gulati, 1998) and the effectiveness of such strategic cooperation agreements has also been illustrated in various empirical studies (e.g., Mowery et al., 1996; Parkhe, 1993; Simonin, 1997; Stuart, 2000). Accordingly, strategic cooperation agreements often play an essential role in the innovation management of firms, as they contribute to innovation efforts in several ways, including economies of scale, effective management of risk, cost efficient access to new markets and technologies, and learning from partners (Alvarez & Barney, 2001; Ireland et al., 2002). Following the above arguments, *cooperation* is a recognized strategy to acquire external knowledge to broaden a firm's internal knowledge base, and thus to generate innovation.

5.2.4. The 3C model of innovation performance

Considering the above-mentioned concepts of *continuity*, *competence*, and *cooperation* reveals the high dependency between them. In order to appreciate the concepts and their interdependence, we have combined them in a *3C model* of innovation performance (see Figure 5-1) and will use that model to assess the impact of the elements on a firm's innovation performance. Based on the theory, this study proposes: *Variations of continuity, competence, and cooperation explain short-, mid-, and long-term innovation performance.* Due to the complexity of the individual concepts, the researchers do not expect one dimension of the model to be necessary and sufficient to explain the innovation performance of a firm. Instead the 3C model will reveal the combinations of the concepts that lead to the innovation outcome.

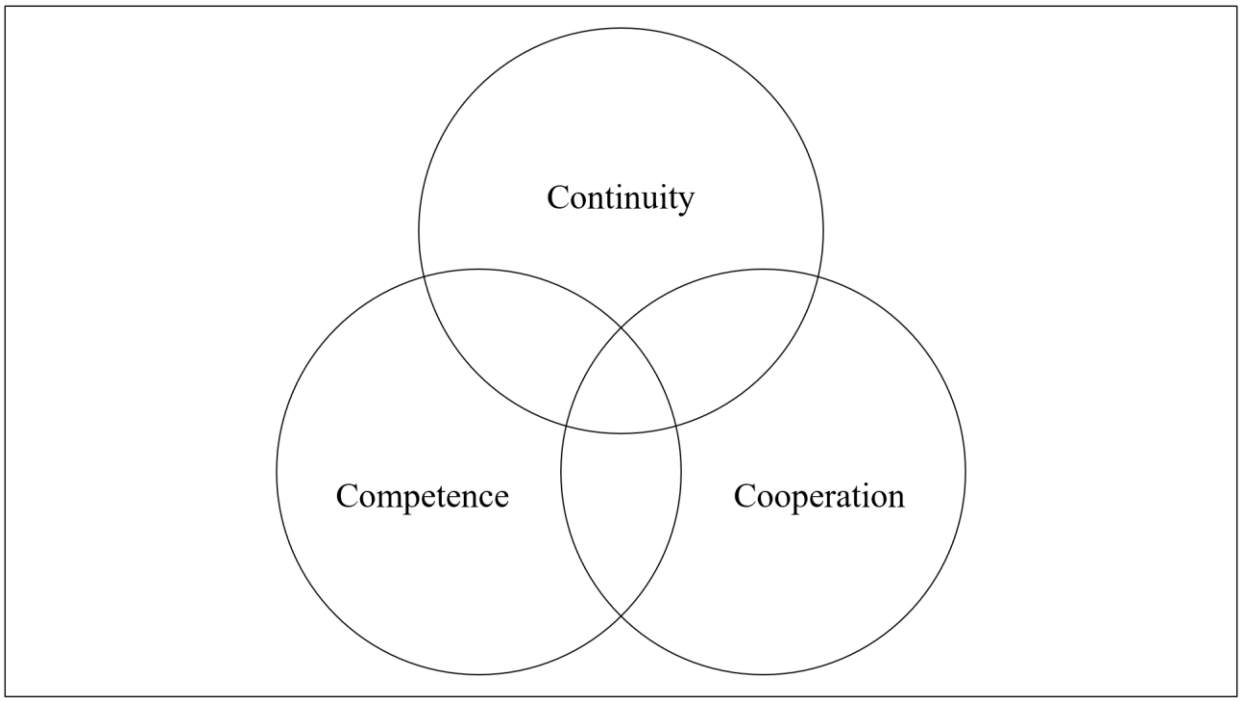


Figure 5-1: 3C model of innovation performance

5.3. Study Design

5.3.1. Research method

This study reports the long-term observation of the interplay of *continuity*, *competence*, and *cooperation* and their combined effect on a firm's innovation performance, which is facilitated by the adoption of an exploratory and configurational research approach. Configurational research approaches like fuzzy-set qualitative comparative analysis (fsQCA) allow the observation of complex patterns and non-linear relationships among small and medium numbers of cases (Ragin, 2000), but have also been used lately to analyze larger samples (Cooper & Glaesser, 2011). Instead of breaking cases down into a series of independent variables, fsQCA considers them as combinations of attributes manifested by their set memberships. Therefore, fsQCA provides a comprehensive understanding of how various causes combine to produce a particular outcome, while accommodating high levels of causal complexity and identifying necessary and sufficient conditions (Ragin, 2008). The analysis of causal relationships with less emphasis on correlations and more on set-theoretical relations offers many advantages for the analysis of complex and dynamic innovation processes (Berger, 2016; Kraus et al., 2018): First, fsQCA avoids the simplistic assumption

of causal symmetry implied by correlation-based statistical analysis. While correlations are inherently symmetric, fsQCA allows the sets of causal conditions to differ (Ragin, 2008; Woodside, 2013); second, fsQCA contributes to equifinality, so that several causal paths may lead to the same result (Mendel & Korjani, 2013), hence doing justice to the complexity of innovation phenomena.

5.3.2. Data

Observing the innovation behavior of firms over a longer period of time requires a corresponding data set. Therefore, this study makes use of the *Mannheim Innovation Panel*, which is a long-term data panel based on an annual survey on the innovation behavior of German firms (e.g., Rammer et al., 2012). Besides general questions on firms' innovation behavior, the survey incorporates an additional focus on specific innovation topics each year. The panels of 2011, 2013, and 2015 have, in addition to a focus on *continuity* and *competence*, a focus on *cooperation* between established firms, making those data panels particularly suitable for our analysis (Rammer et al., 2012, 2014; Rammer et al., 2016).

In total, 5751 firms featured in the panel in 2011, 6208 in 2013, and 5445 in 2015 (see Table 5-1). Given that the aim of this study is a longitudinal analysis, we combined the single years into a multi-year data set. To ensure the quality of the analysis, we cleaned the data set by excluding firms that did not participate in all three years (2011, 2013, and 2015). This led to a sample of 1463 firms. In addition, we further cleaned the data set by dropping all cases that were not fully observed and by excluding incomplete cases. This resulted in a final sample of 220 firm observations, which prior studies indicate is a suitable sample for a fsQCA analysis (Berger, 2016; Kraus et al., 2018).

Table 5-1: Sample size of the data set

Panel	*Total sample*	*Sample after consolidation of years*	*Final sample after data cleaning*
2011	5.751	1.463	220
2013	6.208		
2015	5.445		

To facilitate the long-term perspective of the current study, we divided the analysis into three sub-analyses —one analysis for each period under observation (see Figure 5-2). In the short-term analysis we analyzed the data from the 2011 panel that covers the period 2008–2010. The mid-term analysis also mainly uses the data from the 2011 panel but combines them with innovation performance measured in the 2013 panel (observation period 2010–2012). In the long-term analysis, we again mainly use the data from 2011 but combine them with the innovation performance from the 2013 and 2015 panels (observation period 2012–2014).

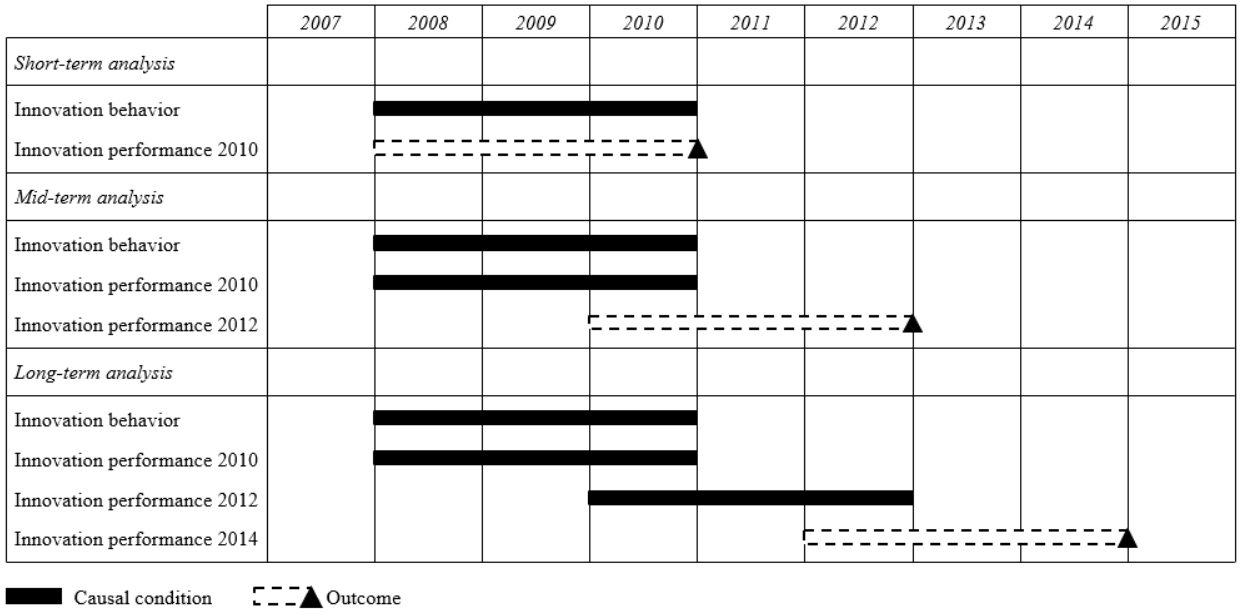


Figure 5-2: Periods of analysis

5.3.3. Measures

An fsQCA analyzes the relationship of several causal conditions with a defined outcome (Ragin, 2000) and accordingly, we define the outcome and the conditions in the following sections.

5.3.3.1. Outcome

In order to observe the impact of *continuity*, *competence*, and *cooperation* on the innovation performance of a firm, the outcome of the fsQCA is defined as the innovation performance. Based on our data panel, we chose to measure innovation performance based on the revenue accruing from new products and services. In this way, the study focuses not only on the generation of innovation,

but also on market relevance and the associated revenue. Therefore, we chose a measure from the panel; the proportion of total turnover derived from new or clearly improved products within the last two years.

5.3.3.2. Conditions

We have chosen five causal conditions[11] to analyze the effects of *continuity*, *competence*, and *co-operation* on the innovation performance of a firm. To ensure a high degree of comparability with prior studies, the definition of our conditions is aligned with the literature (e.g., Cassiman & Veugelers, 2002; Ganter & Hecker, 2014; Grimpe & Sofka, 2009).

- *Continuity*: To measure *continuity* we use the condition *Continuous R&D.* This condition measures the continuous practice of R&D activities of a firm. Additionally, the innovation performance of previous periods is also included as a condition in the mid- and long-term analyses, to reflect prior innovation performance.
- *Competence*: *Competence* is measured by the conditions *Degrees* and *Training.* The condition *Degrees* measures the proportion of all employees within a firm who have a university degree or other higher education qualification. *Training*, on the other hand, measures the proportion of total personnel expenditure used on innovation-related training. As education is appropriated to measure *competence*, both conditions are suitable for our analysis (Grimpe & Sofka, 2009).
- *Cooperation*: To measure *cooperation*, we use the conditions *Close cooperation* and *Distant cooperation*. The condition *Close cooperation* indicates whether cooperation has taken place with other firms within the same corporate group or with related firms (e.g., between subsidiaries), while *Distant cooperation* refers to cooperation agreements with unrelated partners (e.g., customers, suppliers, competitors, consultancies, and universities).

As mentioned, fsQCA allows gradual set membership. Therefore, it is necessary to operationalize the values of variables as membership scores (Kraus et al., 2018). Transforming and calibrating values into membership scores requires variables to be transformed according to their degree of membership in sets of cases to produce scores ranging from non-membership (0.0) to full membership (1.0) (Ragin, 2008). Accordingly, we transformed and calibrated our data by subtracting

[11] For a detailed mapping of the measures from the *Mannheim Innovation Panel* to our conditions see Appendix 5-1.

Table 5-2: Descriptive statistics (not calibrated) and calibration criteria

Variable	*Variable*	*Descriptive statistics (not calibrated)*				*Calibration criteria*		
	Values	*Min*	*Max*	*Mean*	*Std. Dev.*	*Non-member*	*Cross-over*	*Full-member*
Innovation performance 2014	Ordinal (0 to 8)	0.000	8.000	1.209	2.139	0.000	4.000	8.000
Innovation performance 2012	Ordinal (0 to 8)	0.000	8.000	0.973	1.979	0.000	4.000	8.000
Innovation performance 2010	Ordinal (0 to 8)	0.000	8.000	1.118	2.197	0.000	4.000	8.000
Close cooperation	Interval (0 to 2)	0.000	2.000	0.064	0.280	0.000	1.000	2.000
Distant cooperation	Interval (0 to 12/16)[12]	0.000	12.000	0.645	1.428	0.000	6.000	12.000
Continuous R&D	Binary (0, 1)	0.000	1.000	0.182	0.387	0.000	0.500	1.000
Training	Ordinal (0 to 0.1)	0.000	0.010	0.012	0.016	0.000	0.005	0.010
Degrees	Ordinal (0 to 8)	0.000	8.000	3.382	2.466	0.000	0.400	8.000

[12] For the dataset 2011 there are 12 binary cooperation measures that we combined to an interval from 0 to 12. For the datasets 2013 and 2015 the cooperation measures were extended to 16 binary measures, which were combined by us to an interval from 0 to 16. For more details see Appendix 5-1.

Table 5-3: Configurations explaining innovation performance

Configuration / Conditions	*Short-term analysis*			*Mid-term analysis*	*Long-term analysis*				
	S-C1	*S-C2*	*S-C3*	*M-C1*	*L-C1*	*L-C2*	*L-C3*	*L-C4*	*L-C5*
Innovation performance 2012	n/a	n/a	n/a	n/a	-	○	-	●	●
Innovation performance 2010	n/a	n/a	n/a	●	●	○	-	•	•
Close cooperation	•	○	○	○	○	○	○	-	○
Distant cooperation	●	○	○	○	○	○	○	○	○
Continuous R&D	•	●	●	-	-	●	●	●	-
Training	○	○	-	○	○	-	○	○	○
Degrees	○	-	○	●	●	○	-	○	-
Raw coverage	0.080	0.600	0.351	0.646	0.545	0.240	0.523	0.268	0.545
Unique coverage	0.045	0.250	0.001	0.646	0.014	0.108	0.056	0.030	0.015
Consistency	0.873	0.743	0.771	0.825	0.864	0.824	0.699	1.000	0.912
Overall solution coverage	*0.646*			*0.646*	*0.728*				
Overall solution consistency	*0.733*			*0.825*	*0.739*				

the minimum data and dividing the outcome by the difference between the maximum and minimum data (Ganter & Hecker, 2014). The process produces membership scores ranging from 0.0 to 1.0 (see Table 5-2).

5.4. Research findings

The result of the fsQCA analysis is presented in Table 5-3. Within the solution table, filled circles indicate the presence of a condition and empty circles indicate its absence. Furthermore, the size of the circles indicates whether the condition acts as a core or as a peripheral condition. This classification, introduced by Fiss (2011), makes it possible to differentiate the conditions according to the strength of evidence in relation to the outcome. While core conditions (large circles) occur in the parsimonious and intermediate solution and are therefore central to the solution, peripheral conditions (small circles) appear only in the intermediate solution (Fiss, 2011). In addition to the presence and absence of a condition, dashes indicate that the presence or absence of a particular condition is not important to a particular configuration.

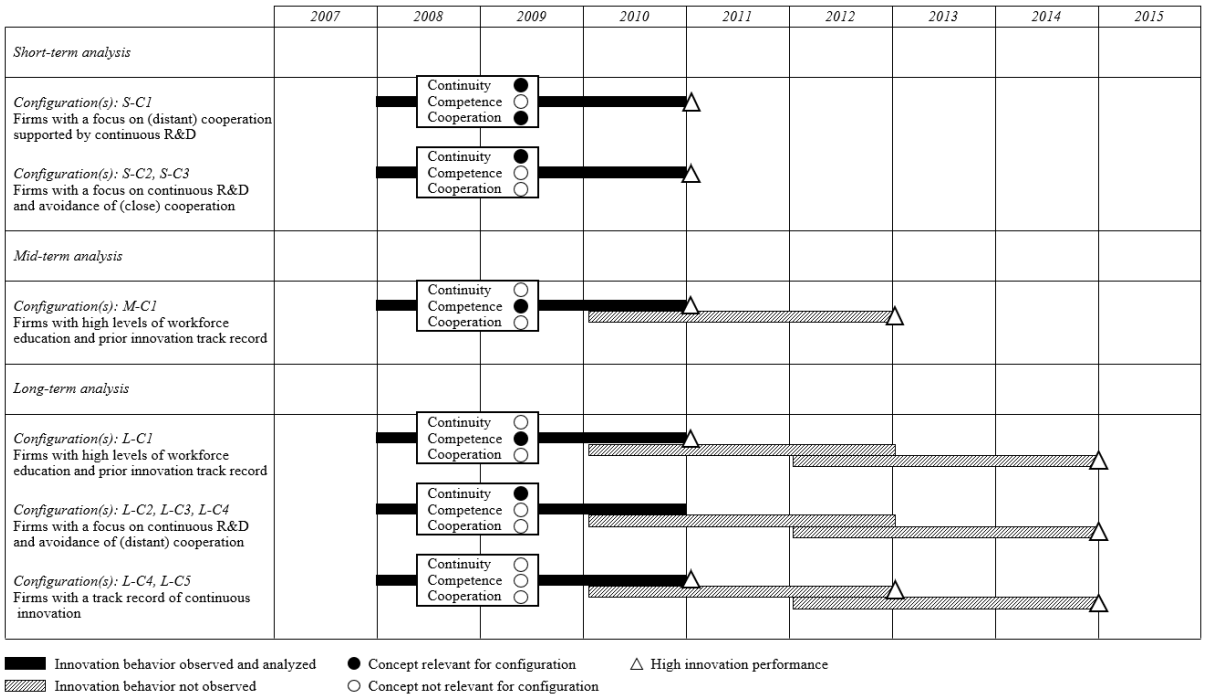


Figure 5-3: Mapping of configurations to timeline

To address the requirements of a longitudinal study, we have grouped similar configurations and presented them on a timeline (see Figure 5-3):

5.4.1. Short-term analysis

With regard to the outcome *Innovation performance 2010* three configurations can be observed. The solution set displays an overall consistency level of 0.733 and a coverage level of 0.646.

- *Configuration(s): S-C1 – Firms with a focus on (distant) cooperation supported by continuous R&D*: The configuration states that 87% of all firms with the characteristics of *Distant cooperation* (core condition), *Close cooperation*, and *Continuous R&D* (both peripheral conditions) between 2008 and 2010 were able to generate marketable innovation in 2010. The conditions *Training* and *Degrees* were not relevant within *S-C1* to explain the outcome, as both conditions were absent as peripheral conditions.
- *Configuration(s): S-C2, S-C3 – Firms with a focus on continuous R&D and avoidance of (close) cooperation*: The configurations are very similar in that both feature the presence of the core condition *Continuous R&D* and the absence of the conditions *Close cooperation* (a core condition) and *Distant cooperation* (a peripheral condition). In addition, consistency between the two configurations is very similar, as *S-C2* reveals that 74% of all firms practicing continuous R&D while omitting cooperation between 2008 and 2010 were able to generate marketable innovation in 2010, *S-C3* reveals that this applies to 77% of the firms. An overarching perspective also indicates that the conditions *Training* and *Degrees* are of only minor relevance for the outcome, since in all configurations these conditions only appear as a peripheral condition and are either absent or have a neutral permutation.

5.4.2. Mid-term analysis

Considering *Innovation performance 2012* as an outcome while retaining the conditions, only one configuration emerged. The solution set displays an overall consistency level of 0.825 and a coverage level of 0.646.

- *Configuration(s): M-C1 – Firms with high levels of workforce education and prior innovation track record*: The configuration shows the presence of the core conditions

Innovation performance 2010 and *Degrees*. Conditions *Close cooperation*, *Distant cooperation*, and *Training* are absent as peripheral conditions, while *Continuous R&D* shows a neutral permutation. Taking this result into account, the configuration states that 82% of all firms who generate successful innovation in 2010 and who have maintained a high level of workforce education – measured by the proportion of all employees who have a university degree or other higher education qualification – in at least the years 2008–2010 were able to generate marketable innovation performance in 2012. The configuration does not show any similarities with the configurations from the short-term analysis.

5.4.3. Long-term analysis

For the outcome *Innovation performance 2014*, we observe five configurations. The solution set displays an overall consistency level of 0.739 and a coverage level of 0.728.

- *Configuration(s): L-C1 – Firms with high levels of workforce education and prior innovation track record:* This configuration is more or less similar to the *M-C1* from the mid-term analysis. The configuration states that 86% of all firms with the characteristics of *Innovation performance 2012* and *Degrees* (both core conditions) between 2008 and 2010 were able to generate marketable innovation in 2014, while the other conditions are absent as peripheral conditions or are neutrally permutated. It is noticeable in comparison with *M-C1* that *innovation performance 2012* has a neutral permutation. This observation is reviewed in detail in the discussion section.
- *Configuration(s): L-C2, L-C3, L-C4 – Firms with a focus on continuous R&D and avoidance of (distant) cooperation*: Each of the three configurations shows the presence of the core condition *Continuous R&D* and a simultaneous absence of the core condition *Distant cooperation*. All other conditions are absent as peripheral conditions or are neutrally permutated. Given this heterogeneity, it is not possible to extend the generalizability. Therefore, each of the three configurations reveals strongly (*L-C2*: 82%; *L-C3*: 70%; *L-C4*: 100%), that firms practicing continuous R&D and avoiding distant cooperation between 2008 and 2010 were able to generate marketable innovation in 2014.
- *Configuration(s): L-C4, L-C5 – Firms with a continuous innovation track record*: *L-C4* and *L-C5* are similar in terms of the presence of the core condition *Innovation performance 2012* and of the peripheral condition *Innovation performance 2010*. In addition, *L-C5* does

not show any conditions that permit further conclusions, as all other conditions are absent as peripheral conditions or are of a neutral permutation. Therefore, *L-C5* states that 91% of all firms with innovation performance in 2010 and 2012 were able to generate marketable innovation in 2014. In contrast, *L-C4* also shows the presence of the core condition *Continuous R&D* while the core condition *Distant cooperation* is absent; it is therefore in part similar to *L-C2* and *L-C3*. *L-C4* states that 100% of all firms with high innovation performance in 2010 and 2012 and practicing continuous R&D and avoiding distant cooperation between 2008 and 2010 were able to generate marketable innovation in 2014.

5.5. Discussion

5.5.1. Theoretical implications

Based on our analysis, similar configurations were grouped and summarized within the *3C Model* (see Figure 5-4). That exercise reveals that *continuity*—in the form of continuous R&D activities and in the form of prior innovation performance—is of the utmost importance, as it is included in all configurations in each observed period. It should be noted that although *continuity* appears in some configurations in interaction with *competence* (M-C1, L-C1) and *cooperation* (S-C1), it is also solely responsible for short-term (S-C1, S-C2) and long-term innovation performance (L-C2–L-C5). This observation illustrates the great importance of continuous R&D and prior innovation performance and is in line with current research, as previous works have also examined their considerable importance (e.g., Boer & Gertsen, 2003; Hargadon, 1998; Xu et al., 2010). Moreover, this observation also suggests that although *competence* and *cooperation* can be important elements in the generation of innovations, they play only a subordinate role compared to the continuous prosecution of R&D. Therefore, *continuity* is an essential prerequisite for the successful generation of innovations, whether in the short-, mid-, or long-term.

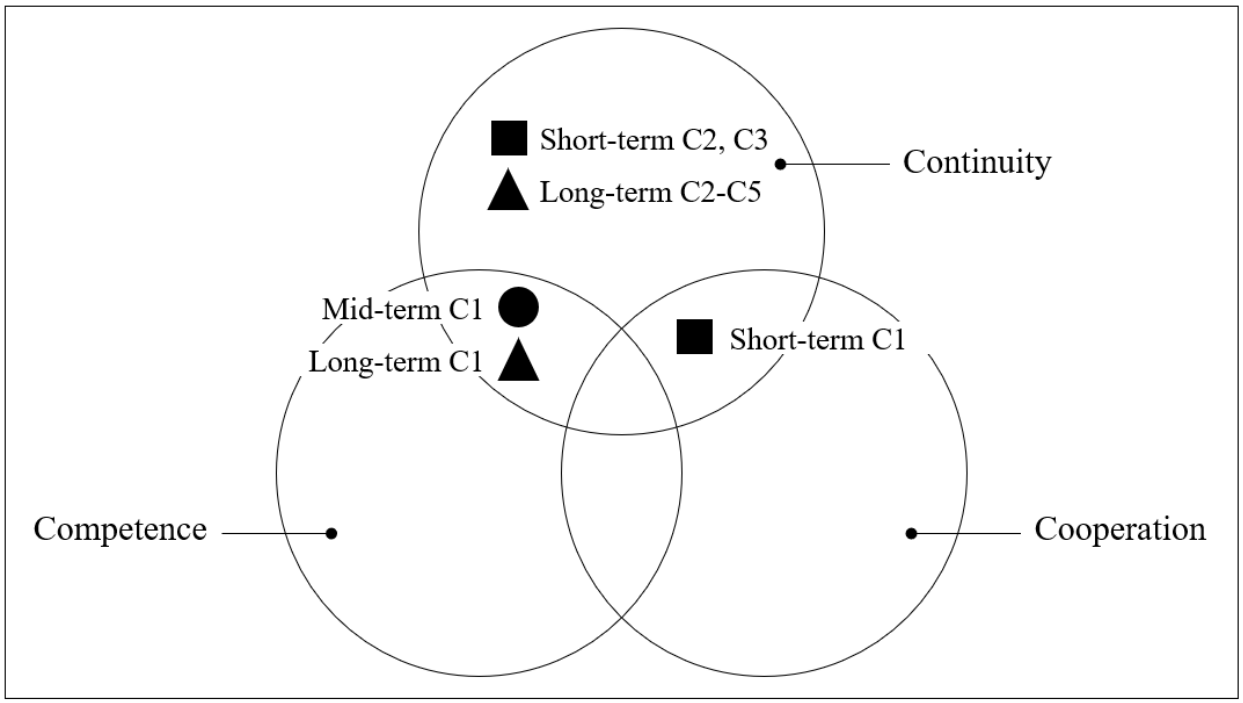


Figure 5-4: Mapping of configurations to 3C model

Competence is important for the mid- and long-term generation of innovation. However, in our analysis *competence* does not occur in isolation in any observed configuration, but in both configurations exclusively in combination with *continuity* (M-C1 and L-C1). The preliminary conclusion is that the continuous prosecution of R&D supports the development of internal competencies and enables a firm to generate successful innovations. This finding supports current literature, as the development of competence and related knowledge is only possible if pursued continuously (Crossan et al., 1999; Grant, 1996). Furthermore, the continuous practice of R&D is a core activity required to expand a firm's knowledge base and therefore helps to avoid a competence trap (Dougherty, 1995; March, 1991; Sirén et al., 2012). However, considering the lead times observed in our analysis it takes at least two years until the combination of *continuity* and *competence* lead to successful innovation. A further observation lies in the measures used for the operationalization of *competence: Training* and *Degrees*. It is striking, however, that *Training*, even if innovation related, has no relevance to innovation performance. In all cases where *competence* is represented, this is due to the proportion of employees with high-level educational qualifications. This leads us to the conclusion that training has no relevance to competence; instead, *competence* is based on a

high degree of pre-existing knowledge in the form of educated employees. This may be due to the fact that higher educated employees already have the skills to acquire and process new relevant knowledge on their own and are therefore more successful in terms of generating innovation (Koellinger, 2008; Romero & Martínez-Román, 2012). Therefore, an appropriate volume of highly educated employees, who participate in continuous R&D activities, will support mid- to long-term innovation performance.

Cooperation particularly affects short-term innovation performance. However, the corresponding configuration—similar to *competence*—does not occur in isolation, but only together with *continuity* (S-C1). Here, too, we must conclude that only cooperation agreements operating simultaneously with the continuous prosecution of R&D will lead to success. This can be explained by the fact that for the successful development and marketing of innovations merely acquiring external knowledge through cooperation is insufficient on its own, and the additional transfer of that knowledge into innovative technologies and products through appropriate R&D measures must also be actioned (Hamel, 1991; Mowery et al., 1996). Furthermore, several studies have found that the management of strategic cooperation agreements is associated with a high degree of complexity. However, continuous practice can produce learning effects, which make cooperation agreements and their output more successful (Ireland et al., 2002). A closer examination of the truth table reveals differences between *close cooperation* and *distant cooperation*. While, in the short-term, there is a stronger focus on distant cooperation agreements, in the long-term, the stronger focus is on close cooperation agreements. This finding reinforces our previous assumptions that in the short-term external knowledge must be acquired (distant cooperation), while in the long-term innovation must be generated primarily through internal knowledge (where required through close cooperation agreements in addition to a firm's own competence).

The results also make it clear that there are no configurations where both *competence* and *cooperation* are jointly present. This might be because we have included time as an additional dimension within our analysis. Therefore, both concepts evidently influence innovation performance, but at different points in time. Nevertheless, this does not mean that the measures are fundamentally mutually exclusive but that *competence* and *cooperation* should be regarded as complementary concepts each with specific advantages and disadvantages.

5.5.2. Further research and limitations

Despite its determining the short-, mid-, and long-term effects of *continuity*, *competence*, and *co-operation* on the innovation performance of a firm, there are limitations to this study that pave the way for potentially interesting future research. First, the time intervals of this longitudinal study were determined by the availability of data in the *Mannheim Innovation Panel* rather than being based on concrete theoretical reasons. Albeit the data analyzed did make it possible to differentiate between short-, mid-, and long-term effects and using the three different time intervals mitigates this issue, future research could follow research designs with time intervals grounded clearly on theoretical assumptions. Second, the configurational analysis does justice to the complexity of the phenomenon, but it is not possible to relate the results based on the *Mannheim Innovation Panel* to specific firms. Hence, it is not possible to illustrate certain configurations with concrete cases that might also be informative. Therefore, future research could investigate case studies based on our configurations.

5.6. Conclusion

The generation of innovation plays a major role for firms, especially in times marked by burgeoning market and technological dynamics. Although prior research is quite informative and valuable, methods like case studies and regression analyses are often not able to capture the complexity and interdependence of various interlinked theoretical concepts. Using a configurational research approach, the present work addresses this gap in the academic literature. Considering the topics of *continuity*, *competence*, and *cooperation*, we observed different configurations and analyzed how they interact with each other and how they affect the innovation performance of a firm on a short-, mid-, and long-term basis. In particular *continuity* of innovation efforts proved to be of utmost importance.

5.7. Appendices

Appendix 5-1: Mapping of measures from the Mannheim Innovation Panel

Constructed Variables			*Mannheim Innovation Panel*			
Variable	*Year*	*Values*	*Name*	*Dataset*	*Description*	*Values*
Innovation performance	2011, 2013, 2015	Ordinal (0 to 8)	umneu	2011, 2013, 2015	Proportion of total turnover from new or clearly improved products	Ordinal (0 to 8)
Close cooperation	2011, 2013, 2015	Interval (0 to 2)	kod1	2011, 2013, 2015	Cooperation with other firms within the same group of companies or related companies in Germany	Binary (0=no, 1=yes)
			koa1	2011, 2013, 2015	Cooperation with other firms within the same group of companies or related companies in abroad	Binary (0=no, 1=yes)
Distant cooperation	2011	Interval (0 to 12)	kod2	2011	Cooperation with clients in Germany	Binary (0=no, 1=yes)
			kod3	2011	Cooperation with suppliers in Germany	Binary (0=no, 1=yes)
			kod4	2011	Cooperation with competitors or other firms in the same sector in Germany	Binary (0=no, 1=yes)
			kod5	2011	Cooperation with consultancy firms and private R&D firms in Germany	Binary (0=no, 1=yes)
			kod6	2011	Cooperation with universities and other higher education institutions in Germany	Binary (0=no, 1=yes)
			kod7	2011	Cooperation with public and non-profit-making private research institutions in Germany	Binary (0=no, 1=yes)
			koa2	2011	Cooperation with clients abroad	Binary (0=no, 1=yes)

Constructed Variables			*Mannheim Innovation Panel*			
Variable	*Year*	*Values*	*Name*	*Dataset*	*Description*	*Values*
			koa3	2011	Cooperation with suppliers abroad	Binary (0=no, 1=yes)
			koa4	2011	Cooperation with competitors or other firms in the same sector abroad	Binary (0=no, 1=yes)
			koa5	2011	Cooperation with consultancy firms and private R&D firms abroad	Binary (0=no, 1=yes)
			koa6	2011	Cooperation with universities and other higher education institutions abroad	Binary (0=no, 1=yes)
			koa7	2011	Cooperation with public and non-profit-making private research institutions abroad	Binary (0=no, 1=yes)
	2013, 2015	Interval (0 to 16)	kod2	2013, 2015	Cooperation with customers from the private sector and private households (Germany, abroad)	Binary (0=no, 1=yes)
			kod3	2013, 2015	Cooperation with customers from the public sector in Germany	Binary (0=no, 1=yes)
			kod4	2013, 2015	Cooperation with suppliers in Germany	Binary (0=no, 1=yes)
			kod5	2013, 2015	Cooperation with competitors or other firms in the same sector in Germany	Binary (0=no, 1=yes)
			kod6	2013, 2015	Cooperation with Consultants or consulting engineers in Germany	Binary (0=no, 1=yes)
			kod7	2013, 2015	Cooperation with universities or universities of applied sciences in Germany	Binary (0=no, 1=yes)
			kod8	2013, 2015	Cooperation with public research institutions in Germany	Binary (0=no, 1=yes)
			kod9	2013, 2015	Cooperation with private research institutions in Germany	Binary (0=no, 1=yes)

Constructed Variables			*Mannheim Innovation Panel*			
Variable	*Year*	*Values*	*Name*	*Dataset*	*Description*	*Values*
			koa2	2013, 2015	Cooperation with customers from the private sector and private households abroad	Binary (0=no, 1=yes)
			koa3	2013, 2015	Cooperation with customers from the public sector abroad	Binary (0=no, 1=yes)
			koa4	2013, 2015	Cooperation with suppliers abroad	Binary (0=no, 1=yes)
			koa5	2013, 2015	Cooperation with competitors or other firms in the same sector abroad	Binary (0=no, 1=yes)
			koa6	2013, 2015	Cooperation with Consultants or consulting engineers abroad	Binary (0=no, 1=yes)
			koa7	2013, 2015	Cooperation with universities or universities of applied sciences abroad	Binary (0=no, 1=yes)
			koa8	2013, 2015	Cooperation with public research institutions abroad	Binary (0=no, 1=yes)
			koa9	2013, 2015	Cooperation with private research institutions abroad	Binary (0=no, 1=yes)
Continuous R&D	2011, 2013, 2015	Binary (0=R&D never or occasional conducted, 1=continuous R&D)	fuekon	2011, 2013, 2015	Continuous R&D activities	0=R&D never conducted, 1=continuous R&D, 2=occasional R&D
Training	2011, 2013, 2015	Ordinal (0 to 0.1)	wbp	2011, 2013, 2015	Proportion of total personnel expenditure used for further training	Ordinal (0 to 0.1)
Degrees	2011, 2013, 2015	Ordinal (0 to 8)	bhsp	2011, 2013, 2015	Proportion of all employees who have a university degree or other higher education qualification	Ordinal (0 to 8)

6. DISCUSSION AND CONCLUSIONS

6.1. Results and contributions

This thesis started by emphasizing the importance of innovation for the economy and society (Nelson, 1993; Nelson & Winter, 1982), but it also points out the challenges corporations face regarding the development of new innovations (Christensen, 1997; Christensen & Raynor, 2003). As a solution, the theoretical concept of ambidexterity was cited, which addresses various possibilities to facilitate corporate innovation while at the same time exploiting existing products (Gibson & Birkinshaw, 2004; Raisch & Birkinshaw, 2008). For example, the organizational separation of explorational and exploitational activities is intentional in order to avoid interference between them. Taking these theoretical findings into account, different forms of corporate venturing (e.g., corporate incubators, corporate venture capital) are particularly suitable as a basis for explorative organizational units (Hill & Birkinshaw, 2006, 2012).

Contrary to the theoretical advantages, however, there are numerous examples in academia and practice which question the effectiveness of corporate venturing programs. With regard to corporate incubators and corporate venture capital, for example, a glance at the past shows that about one third of corporations that have established such innovation activities were not satisfied with the results (e.g., Becker & Gassmann, 2006b; Dushnitsky & Lenox, 2006). This dissatisfaction can be attributed to the fact that the strategic goals of the parent corporation often were not achieved with these programs. The resolution of this discrepancy between theory and practice was the goal of chapters two and three of this thesis. We therefore conducted systematic literature reviews on corporate venture capital and corporate incubators.

Both literature reviews revealed that, among other things, the integration of innovation units into corporate structures is associated with a high degree of complexity (Kötting, 2018, 2019). While individual innovation units within a corporation are usually not able to cope with this complexity, a systemic view was adopted in chapter four by examining the interaction of several innovation units within a corporation. Among other things, it was found that the problems identified in the literature reviews can be countered by using a holistic corporate innovation system (Kötting & Kuckertz, 2019). This is because the conflicting goals of the corporation no longer have to be served by a single innovation program but are divided accordingly into multiple programs.

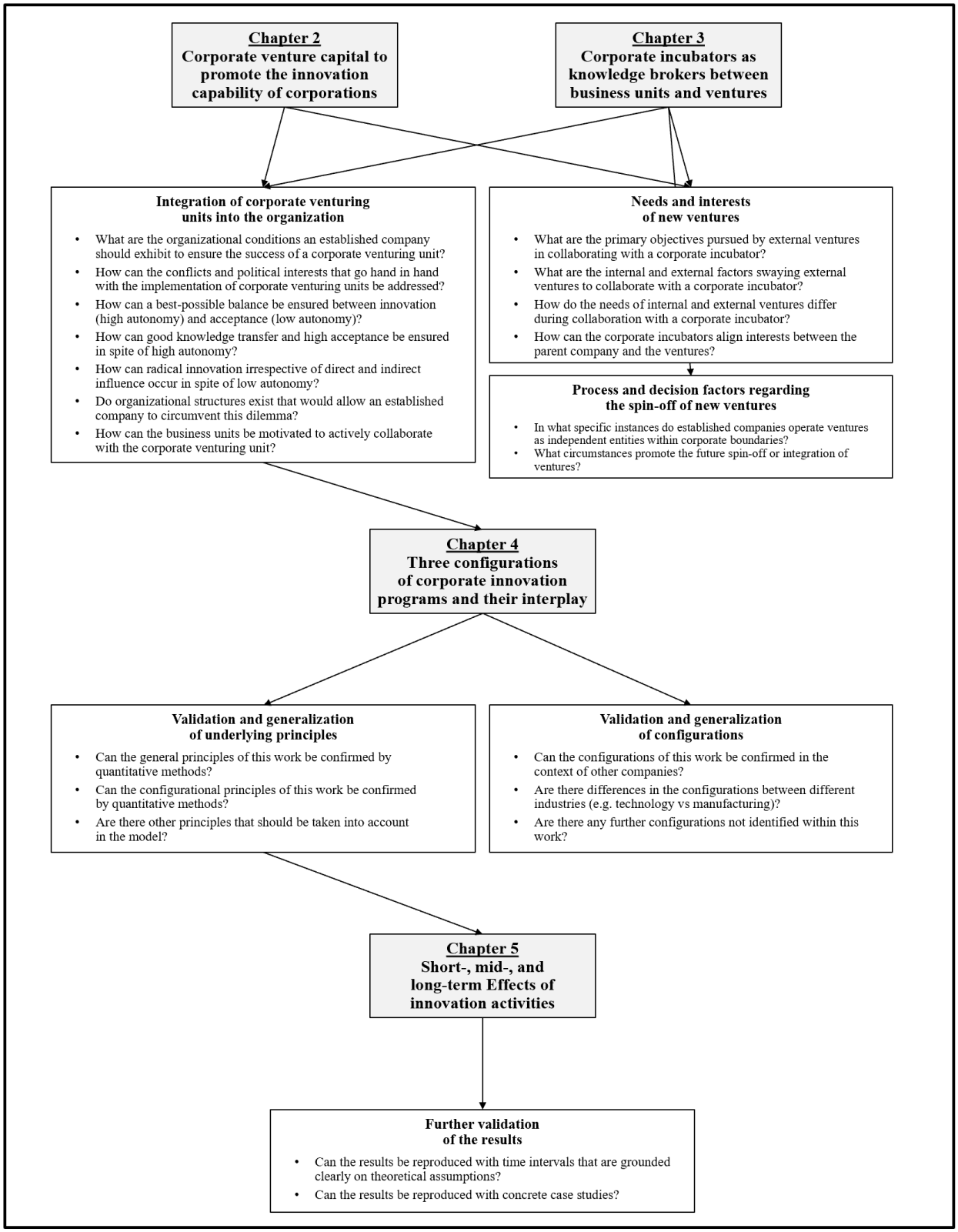


Figure 6-1: Identified avenues for further research

In chapter five of this thesis, overarching factors that have a positive impact on the innovation performance of a corporation were identified. Based on the academic literature, the overarching concepts of continuity, competence, and cooperation were derived from literature (Ernst, 2002; van der Panne et al., 2003) and their impact on the short-, mid-, and long-term innovation performance of a corporation was examined. It was shown that continuity has a large positive influence on a corporation's innovation performance. The insights gained in this chapter contribute to a deeper understanding of the framework conditions for the successful operation of corporate innovation systems. This confirms our previous findings on corporate innovation systems.

Following this brief overview, the contributions of the individual chapters will now be presented below. Practical implications will then be derived and avenues for further research (see Figure 8-1) will be presented. This thesis closes with a conclusion.

6.1.1. Corporate venture capital to promote the innovation capability of corporations

In the chapter *Corporate Venture Capital to Promote the Innovation Capability of Established Corporates: A Systematic Literature Analysis* (chapter two), 51 academic papers were examined and analyzed within the framework of a systematic literature analysis (Tranfield et al., 2003). In 22 cases, the focus of the analyzed papers was on the corporation, in 20 cases on the CVC unit, and in nine cases on new ventures. The greatest need for research within the framework of the analysis was identified as the organizational structure of the CVC unit and especially its integration into the corporation as well as the interests of new ventures.

A CVC unit can be designed along a continuum from low to high autonomy. The degree of autonomy is highly dependent on the goals of the corporation. On the one hand, the literature advocates focusing on financial goals (e.g., Kanter et al., 1990) and argues that this does not require a close link to the corporation and that the CVC unit can thus be very autonomous. On the other hand, the literature argues that a focus on purely financial goals is not appropriate (Dushnitsky & Lenox, 2006). Instead, the CVC unit should be closely linked to the operative units of the corporation so that an intensive exchange of knowledge and resources can take place (Dokko & Gaba, 2012).

The dilemma of CVC can be illustrated by comparing these two approaches. According to the argumentation, corporations have to decide between focusing on strategic goals and the associated lower chances of success or focusing on financial goals and better chances of success. Neither of these two approaches allows CVC to fully exploit its potential. Starting from this dilemma, it is

therefore necessary to explore, in further academic work, how corporations can ensure the best possible balance between financial and strategic goals. It should also be determined how, despite a high degree of autonomy, a good transfer of knowledge can be ensured or, despite a low degree of autonomy, good contact with VC companies and new ventures can be ensured.

Another point for future research is to consider the interests of new ventures (Dushnitsky & Shaver, 2009). For example, the literature largely assumes that new ventures are sufficiently willing to make themselves available for partnerships with corporations. However, new ventures pursue their own interests. CVC units of corporations may indeed represent an interesting alternative to VC companies for new ventures. At the same time, however, new ventures fear that corporations will consider acquiring critical knowledge from them (Dushnitsky & Shaver, 2009; Sykes, 1990). New ventures are therefore often critical of CVC units and decide against a CVC investment when in doubt (Maula et al., 2009). There is therefore research potential regarding the decision factors and negotiating positions of new ventures considering an investment by a CVC unit. Although papers on these topics have been published in the meantime (e.g., Allmendinger & Berger, 2020; Röhm, et al., 2018), this literature review has thus made an important contribution to the identification of further necessary fields of research.

6.1.2. Corporate incubators as knowledge brokers between business units and ventures

The second systematic literature analysis *Corporate Incubators as Knowledge Brokers between Business Units and Ventures: A Systematic Review and Avenues for Future Research* (chapter three) deals with corporate incubators as an additional corporate venturing form besides corporate venture capital. For the analysis, 45 relevant articles were identified in the academic literature and analyzed in detail. The analysis covers the process of knowledge transfer and venture development, which is the core of a corporate incubator (Becker & Gassmann, 2006b). In addition, the actors involved in the process—such as the corporation, the business units, and the corporate incubator—were examined, and their influence on the knowledge transfer was determined. Analogous to the previous literature review from chapter two, the integration of corporate incubators into the structure of the corporation, as well as the interests of the new ventures, were identified as topics requiring further research. Furthermore, the spin-off of mature ventures was identified as an additional field of research.

The results regarding the integration of a corporate incubator into the structure of its parent corporation, as well as the interests of new ventures, are in line with the results of our literature review on corporate venture capital. While different results could have been explained by the differences in commitment and level of capital investment between corporate incubators and corporate venture capital units, the results confirm that the findings can, to some extent, also be generalized to corporate venturing units. This is all the truer in that there are no intersections of the data—respectively the academic papers—on which the literature reviews are based. It can therefore be postulated that the organizational integration of corporate venturing units into the parent corporations, as well as the interests of new ventures, is a fundamental research gap which should be closed in future academic works.

In addition to the research fields mentioned above, another aspect was identified. Corporations usually have the option—after completion of the process of incubation and knowledge transfer—to integrate mature ventures into one of the existing business units or to continue them as an independent company, either within or outside the corporate boundaries (Chen & Kannan-Narasimhan, 2015; Powell, 2010). Since the integration of innovative ventures often involves high organizational and cultural hurdles, many corporations tend to continue the ventures as an independent unit within its boundaries (Ford et al., 2010). Although this is associated with a high degree of flexibility, the interfaces between the individual units and the parent corporation lead to high transaction costs and administrative expenses (Powell, 2010). This leads to two questions: "in which specific situation should corporations operate mature ventures as independent companies within their boundaries?" and "which circumstances warrant a mature venture being continued outside the corporate boundaries?" The literature review made an important contribution to the identification of further research and confirmed our findings from the previous review, which called a further form of corporate venturing.

6.1.3. Three configurations of corporate innovation programs and their interplay

After identifying the integration of innovation units into established firms and noting the resulting dilemma as a research gap in the two literature reviews, we turned to a systemic approach in chapter four: *Three Configurations of Corporate Innovation Programs and Their Interplay: A Theory-Building Case Study on Innovation Programs*. Based on an in-depth case analysis (Eisenhardt, 1989) one of the largest German technology corporations and its innovation units was examined

in detail. Within the framework of the study, around 250 pages of interview transcripts with managers and senior experts as well as nearly 700 pages of archival data were systematically analyzed. The analysis was divided into a within-case analysis and a cross-(sub-)case analysis. This two-stage procedure ensured both an adequate investigation of the individual innovation programs and an uncovering of dependencies and interactions (Miles & Huberman, 1994).

This chapter contributes to our understanding of how different innovation programs are configured and how the identified principles of an innovation program can be structured in a way that best fits the underlying logic of the respective program. Therefore, two overarching principles have been identified: “shared values of innovation programs” and “commitment of top management.” In addition, the configurational principles “support by the innovation programs”, “leverage resources of business units”, “design of structures and processes for development”, “alignment between innovation program and business unit”, and “innovation related goals” were identified—their relevance depends on the respective design of an innovation unit. Based on these principles, three configurations of innovation programs could be derived from the analysis: “exploration-oriented programs”, “exploitation-oriented programs”, and “transformation-oriented programs”. The programs have different focuses: the exploration of new innovations (exploration-oriented programs), the exploitation of existing products (exploitation-oriented programs), and the transformation to an entrepreneurial culture (transformation-oriented programs). These different focuses enable the various innovation programs to cover a wide range of different—sometimes even contrary—goals.

The second key finding of this chapter deals with the high dependencies and interactions between the individual configurations, which are of great importance for achieving the strategic goals of the parent corporation. Thus, the case study showed regular communication between the different programs and that the intensive exchange of knowledge was not structured by predefined processes. Instead, those involved in the programs have, from their experience, communicated regularly with each other informally. This again shows the importance of transformation-oriented programs, which are an essential enabler for this openness. Nevertheless, regular knowledge exchange is pivotal for the programs—it communicates opportunities and experiences and also creates a culture of innovation.

All in all, the chapter succeeds in closing existing research gaps in the literature. It shows that it is helpful to take an overarching and holistic perspective and to view innovation programs not in

isolation but as a holistic corporate innovation system. Furthermore, the communication behavior between the programs makes it clear that a corporate innovation system is more than the sum of its parts and that valuable synergies can be generated through the cooperation of the programs. This also leads us to the conclusion that the dilemma of the organizational integration of innovation programs, which was pointed out in the literature analysis, can be solved by using a corporate innovation system. The different configurations of innovation programs make it possible to perform the necessary balancing act by using such a system. On the one hand, a high degree of commitment to the existing business units (exploitation-oriented programs) and on the other hand, a high degree of autonomy for the development of new innovations (exploration-oriented programs) can be ensured.

6.1.4. Short-, mid-, and long-term effects of innovation activities

In the chapter *Short-, Mid-, and Long-Term Effects of Innovation Activities: A Configurational Analysis on Continuity, Competence, and Cooperation* (chapter five), the interactions between continuity, competence, and cooperation (3C) as well as their effects on the innovation performance of corporations were analyzed. This closes an existing research gap—as extant work using standard methodological approaches has not yet adequately addressed the complexity of the interplay of continuity, competence, and cooperation and their impact on innovation performance (Berger, 2016; Greckhamer et al., 2008; Woodside, 2010, 2013). As the previous chapter four posited, the overarching principles of corporate innovation system have to be validated. For this purpose, a configurational and longitudinal approach was applied (Ragin, 2000, 2008), which allows to capture the complexity of the interdependencies between the concepts continuity, competence, and cooperation. The applied data set covers three time periods from 2011 to 2015 and includes 220 German corporations.

Based on our analysis, similar configurations were grouped together in a 3C model. The analysis concludes that continuity is the most important factor and is found in all configurations. Although continuity interacts with competence and cooperation, it is also independently responsible for the short- and long-term innovation performance. This important observation again illustrates the importance of continuous innovation activities and is in line with current research (e.g., Boer & Gertsen, 2003; Hargadon, 1998; Xu et al., 2010). Moreover, this observation also suggests that although competence and cooperation are important elements in innovation, they play a

subordinate role compared to continuation. Therefore, continuity is an essential prerequisite for successful innovation, whether in the short-, mid-, or long-term.

In addition to the fundamental interaction of the various concepts, our analysis leads to further conclusions. For example, it does not reveal any configurations in which competence and cooperation occur together. We conclude that although both concepts have an influence on the innovation performance of corporations, they occur at different times. While cooperation affects short-term innovation performance, competence affects the mid- and long-term performance. Nevertheless, this does not mean that the measures are mutually exclusive, but competence and cooperation should be regarded as complementary concepts each with specific advantages and disadvantages.

Regarding the previous chapter on corporate innovation systems, the present results are not contradictory. Nevertheless, the overarching principles of chapter four should be reviewed and, if necessary, expanded. While specific characteristics such as “openness to external developments”, “regular exchange of knowledge across programs”, and “continuous improvement of innovation programs” were identified in our case study, the concepts examined in this chapter are more general and cannot be immediately deduced. Nevertheless, the findings of this chapter are very helpful and are also fully valid for corporate innovation systems.

6.2. Practical implications

A major practical implication is that corporations must become aware of their own goals. Only when the goals have been concretely determined can an innovation unit align with these goals. If the corporation aims for radical innovations, it is recommended to establish a largely autonomous innovation unit which can operate uninfluenced by the activities of the parent corporation and other operational business units. If the corporation pursues an intensive transfer of knowledge and resources between the innovation unit and other business units, the autonomy of the innovation unit should be correspondingly lower. However, this means the innovations are closer to the core business and will be more incremental in nature. Creating radical innovations while keeping the innovation unit closely linked to the parent corporation and other business units cannot usually be realized with one innovation unit. If corporations are not aware of this, expectations are often not met and innovation programs are often discontinued.

However, if corporations aim to master the above-mentioned balancing act, they should set up a corporate innovation system. Such a system usually consists of different innovation programs—

at least one exploration-oriented program, one exploitation-oriented program, and one transformation-oriented program—and allows the fulfillment of various goals. In addition, however, corporations must also create the appropriate framework conditions for a corporate innovation system to develop its full potential. This includes openness to external developments and enabling a constant transfer of knowledge between the different innovation programs. Furthermore, top management must be committed, and should also strive for continuous improvement of the innovation programs. Corporations must be aware of the high degree of interdependence and interaction between the innovation programs. The management of a corporate innovation system therefore requires a holistic and comprehensive perspective.

With all the above recommendations, continuity is a key success factor for corporations. Corporations must ensure that the corresponding innovation activities are carried out continuously and that the exercise is not exposed to cyclical fluctuations. The continuous exercise of innovation activities has a proven effect on the short-, mid-, and long-term innovation success of corporations. One of the reasons for this is that the continuous pursuit of innovation activities is associated with certain learning effects and corporations thus become more efficient in the development of innovations. Discontinuing innovation activities is not advisable because they are associated with long lead times.

6.3. Further research

The integration of innovation units into the structures of corporations is an important field of research. While the individual chapters presented in this thesis have already made an important contribution to this (see Figure 8-1), the following section will discuss the avenues for future research that result from this thesis as a whole.

First, the chapters in this thesis—particularly chapter four—focus on fundamental organizational aspects in order to investigate and explain the best possible integration of innovation units in an corporation. In doing so, numerous aspects are disclosed, which could not all be examined in detail. While this thesis empirically investigated the overarching aspects of a corporate innovation system via a configuration analysis, we identified numerous other elements which require further exploration. In addition to standard methodological approaches, configurational approaches could be a particularly suitable tool to carry out this research (Berger & Kuckertz, 2016). This thesis is

therefore a good starting point to further detail the identified aspects and to validate them by means of configurational approaches.

Second, the empirical chapters of this thesis focus on Germany. Both the case study in chapter four and the configuration analysis in chapter five are based on data from German corporations. While this is helpful in establishing consistency of results between the chapters of this thesis, it allows only limited generalizations for other countries and a comparison between them. For this reason, future work should be based on data from other countries in order to establish comparability (Block & Kuckertz, 2018). The situation is similar for the industries studied. The case study examines one corporation from the technology sector in detail, and so only basic conclusions can be drawn for other industries. For the configuration analysis, the industry of the corporations was also not examined further, which is why statements on possible patterns for individual industries are not possible here either. However, since the dynamics and competition of an industry have a demonstrable effect on the innovation behavior of firms (e.g., Basu et al., 2011; Dushnitsky & Lenox, 2005a; Sahaym et al., 2010), the results of this thesis should be verified in addition to the technology industry in more stable and less competitive industries. This thesis thus represents a good starting point for further replicational and comparative studies.

6.4. Conclusion

This thesis has essentially dealt with the integration of innovation units into the structures of corporations and the creation of a supportive framework. For this purpose, it was necessary to link insights from the field of innovation management and corporate venturing with concepts of organizational theory. As a result, this led to new academic findings, which—as discovered in the literature reviews—cannot yet be resolved independently. We are convinced that our findings on corporate innovation systems and the effects of continuity, competence, and cooperation on innovation performance have made an important academic contribution. This is all the truer at a time when successful innovation is increasingly critical for corporations and a growing number of newly emerging innovation units can be observed in practice.

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