Analysis of the Transition from Traditional Closed Innovation Systems to Open Innovation

Master Thesis

Zur Erlangung des Grades eines Master of Science im Studiengang Wirtschaftsinformatik

Vorgelegt von

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Abstract in English

The erosion of the closed innovation paradigm in conjunction with increasing competitive pressure has boosted the interest of both researchers and organizations in open innovation. Despite such rising interest, several companies remain reluctant to open their organizational boundaries to practice open innovation. Among the many reasons for such reservation are the pertinent complexity of transitioning toward open innovation and a lack of understanding of the procedures required for such endeavors. Hence, this thesis sets out to investigate how organizations can open their boundaries to successfully transition from closed to open innovation by analyzing the current literature on open innovation. In doing so, the transitional procedures are structured and classified into a model comprising three phases, namely unfreezing, moving, and institutionalizing of changes. Procedures of the unfreezing phase lay the foundation for a successful transition to open innovation, while procedures of the moving phase depict how the change occurs. Finally, procedures of the institutionalizing phase contribute to the sustainability of the transition by employing governance mechanisms and performance measures. Additionally, the individual procedures are characterized along with their corresponding barriers and critical success factors. As a result of this structured depiction of the transition process, a guideline is derived. This guideline includes the commonly employed actions of successful practitioners of open innovation, which may serve as a baseline for interested parties of the paradigm. With the derivation of the guideline and concise depiction of the individual transitional phases, this thesis consequently reduces the overall complexity and increases the comprehensibility of the transition and its implications for organizations.

Abstract in German

Aufgrund der fortschreitenden Erosion des Closed Innovation Paradigmas in Verbindung mit einem stetig wachsendem Wettbewerbsdruck, ist ein steigendes Interesse unter Forschern und Unternehmen bezüglich Open Innovation zu verzeichnen. Trotz allem stehen interessierte Organisationen der Implementation des Open Innovation Paradigmas mit einer ausgeprägten Zögerlichkeit und Abneigung gegenüber. Gründe dafür sind unter anderem die hohe verbundene Komplexität, die eine Transition zu Open Innovation und die damit verbundene Öffnung der Unternehmensgrenzen mit sich bringt, sowie ein Mangel an Verständnis der dazugehörigen Prozeduren. Daher hat sich diese Arbeit zum Ziel gesetzt, die Öffnungsprozesse von Unternehmen im Bezug einer Transition zu Open Innovation anhand einer Literaturanalyse zu untersuchen. Dabei werden die Transitionsprozesse anhand eines dreistufigen Veränderungsmodels, nämlich „unfreezing“, „moving“, und „institutionalizing“, klassifiziert. Prozesse der „unfreezing“ Phase legen den Grundstein für eine erfolgreiche Transition, während Prozesse der „moving“ Phase den tatsächlichen Wechsel zu Open Innovation beschreiben. Schließlich umfassen Prozesse der „institutionalizing“ Phase die Sicherstellung der Nachhaltigkeit der Transition. Im Fokus stehen insbesondere die kritischen Erfolgsfaktoren und Barrieren der einzelnen Prozessphasen. In der Folge dieser Betrachtung wird schließlich ein Leitfaden für die Transition nach Open Innovation abgeleitet, welcher interessierten Parteien als Anhaltspunkt für die Transition dienen kann. Der Leitfaden fasst sowohl die identifizierten Erfolgsfaktoren sowie die zur Realisation dieser Erfolgsfaktoren benötigten Maßnahmen übersichtlich zusammen. Mittels der Strukturierung der einzelnen Transitionsphasen sowie der Ableitung des Leitfadens wird die übergreifende Komplexität der Transition nach Open Innovation reduziert und das grundlegende Verständnis der Transition sowie seiner Implikationen ausgebaut.

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1. Introduction

The concept of innovation is not a new one; throughout history, many inventions such as airplanes and automobiles originate from the human desire to think of novel and improved ways of doing things (Fagerberg, 2004, p. 1). In the past few years, both academics and companies have paid considerable attention to the innovation concept due to its potential to create sustainable competitive advantages and establish a more stable position in the marketplace (Johannessen et al., 2001, p. 20). For instance, Tohidi and Jabbari (2012, p. 535) describe innovation as the "success key" (Tohidi and Jabbari, 2012, p. 535) for organizations, whereas Ahmed (1998) depicts it as the "lifeblood of the company" (Ahmed, 1998, p. 30). Gallouj and Djellal (2016) further emphasize the role of innovation by designating it as a condition for the survival of not only businesses and companies but also entire territories and nations (Gallouj and Djellal, 2016, p. 1).

Firms traditionally abide to the credo that in order to innovate successfully control is of the essence, meaning that companies must source and distribute innovations and ideas from within themselves by heavily investing in their internal research and development (R&D) divisions. Thereby, these firms can gain a competitive edge over less innovative companies, which they escalate by reinvesting profits generated from such innovative ideas and products in further internal research. This innovation paradigm, labeled as "closed innovation" by Chesbrough (2003b), is a commonly employed organizational strategy for staying competitive throughout the end of the 20th century and even to date (Chesbrough, 2003b, p. 36).

However, several developments and erosion factors in recent times have questioned the viability of the exclusive reliance on a fully closed innovation approach within a company (Chesbrough and Crowther, 2006, p. 229; Huizingh, 2011, p. 2). For one, globalization and the consequential increase in competitiveness in markets compel companies to steadily and constantly innovate to survive as well as retain their competitiveness in these fierce conditions (Elbanna, 2008, p. 423; Julie et al., 2015, p. 2). Consequently, companies need to reevaluate their internal R&D procedures for creating value and ascertain their capacity to satisfy customer demands despite the external pressure from other firms (Henkel et al., 2014, p. 10). In addition to the evolving customer demands and the increased competitive threat caused by

globalization, factors such as the growing technological complexity and the acceleration of new product developments challenge the status quo of closed innovation (Traitler et al., 2011, 62). Finally, Gassmann and Enkel (2004) cite shorter innovation cycles, rising R&D costs, and scarcity of resources in some industries as emerging developments that have further eroded the closed innovation paradigm in recent years (Gassmann and Enkel, 2004, p. 1).

Recognizing the need for change, companies and scholars found potential remedy in an entirely converse approach to innovation, one that Chesbrough coined as "open innovation" in 2003. Instead of solely relying on generating new ideas and innovations from within the company, open innovation reinforces the belief that valuable ideas can also be sourced from outside the company. Internal ideas in conjunction with internal paths to market are the prevalent approach of the closed innovation paradigm; by contrast, open innovation extends this line of thinking by attributing the same value to external ideas and paths to market (Chesbrough, 2003a, p. 43).

Several authors believe that adopting the open innovation paradigm is a means of combatting the current market threats. For instance, Julie et al. (2015) suggest that companies can increase their innovative competitiveness by relying on networks of companies and competences not only to become more innovative but also to innovate more rapidly than before (Julie et al., 2015, p. 2). Rohrbeck et al. (2009) indicate that opening up the firm's boundaries is a method of preventing its possible extinction due to the loss of competitive advantage (Rohrbeck et al., 2009, p. 420).

Nonetheless, in their study, Lichtenthaler and Ernst (2009) revealed a reluctance of companies to open up their innovation procedures, as most of the examined firms still relied on the traditional closed innovation approach (Lichtenthaler and Ernst, 2009, p. 49). Harro van Lente et al. (2003) provided a possible insight into the rationale, identifying the transition to an innovation system as a barrier to adoption: *"Transitions to more sustainable ways of production and consumption involve, by definition, long-term and complex changes in the way firms, research institutes, public agencies, intermediaries and others operate and innovate. Indeed, transitions involve major changes in innovation systems*" (Harro van Lente et al., 2003, p. 253). Reluctance to transition to a more competitive innovation system such as open innovation could also be a contributing factor, as opening up the innovation process and successfully

managing it is currently more akin to a trial-and-error process rather than a professionally managed one, with only some best practices and strategies for companies to rely on (Gassmann et al., 2010, p. 216; Miller et al., 2014, p. 321).

Considering these aspects and the high complexity of opening the innovation process and the transition from a closed innovation approach to an open innovation, further research on this matter is required to eliminate reservations toward the open innovation paradigm by decreasing the overall ambiguity. Therefore, this thesis aims to examine the open innovation paradigm, focusing on the transition itself. The underlying research objectives and research questions are the subject of the subsequent chapters.

1.1 Research Objectives

The overarching goal of this research is to analyze the current state of open innovation transition, present the findings in a structured manner, and derive a recommended course of action (i.e., set of guidelines) from these findings. Three research objectives are formulated to accomplish this goal.

First, by examining the processes required for a transition from a closed to an open innovation approach, this thesis aims to enhance the understanding of the complexity and implication of opening a company's innovation system. In part, this research objective is achieved by identifying various core processes from successful transition projects and classifying them into three different phases: before the transition, during the transition, and after the open innovation implementation. Each phase requires various managerial decisions and steps that are outlined in a dedicated chapter.

Second, the common barriers and challenges that companies encounter both during and after the transition are illustrated. The most commonly used methods for eradicating such transitional barriers are also examined as a part of this objective.

Third, the thesis proceeds with the identification of critical success factors from the literature on open innovation. Their identification assumes a critical role in the establishment of a transitional set of guidelines for open innovation.

1.2 Research Questions

To accomplish the research objectives presented in the previous section, this subchapter outlines below the underlying research questions (henceforth abbreviated as "RQ").

RQ 1: **Which steps and core processes do companies employ for executing the transition from closed to open innovation systems?**

> **1.1** Which processes, considerations, and decisions are essential for laying the foundation for the initiation of the transition process toward open innovation?
>
> **1.2** Which steps are undertaken during the actual open innovation implementation?
>
> **1.3** Which processes and arrangements are necessary after the transition to successfully practice the implemented open innovation system?
>
> **1.4** Which open innovation tools and instruments do companies employ for implementing open innovation?

RQ 2: **What are the common barriers and challenges that companies encounter during the opening of their innovation systems?**

> **2.1** Which countermeasures and managerial levers help companies to deal with barriers during the open innovation implementation?
>
> **2.2** What is the role of change management procedures in dissolving transitional barriers?

RQ 3: **What are the critical success factors of an open innovation implementation?**

The findings and insights derived from these research questions serve as the basis for the critical discussion. Additionally, the development of the recommended course of action and constitutes the contribution of this thesis.

1.3 Methodology

The employed research strategy and the literature analysis of secondary qualitative data are outlined in this subchapter. Secondary research is generally suited for the investigation of new or additional research questions and for the verification of findings from previous studies. It recapitulates qualitative data gathered in preceding studies, mostly qualitative in nature, such as interviews and open-ended queries in questionnaires (Heaton, 2008, pp. 34–35). Cheng and Phillips (2014) further differentiate the types of secondary data analysis. The current thesis is based on the research question-driven approach, in which the researcher already has preformulated research questions and scans existing pieces of literature with the goal to answer these questions (Cheng and Phillips, 2014, p. 373).

Open innovation is a highly explored field, with many authors contributing to the knowledge base. Many case studies have been conducted in different industries, specific countries, and certain areas, or simply with another research objective in mind. However, a few case studies have tackled the subject of transition, briefly discussed it, or even dedicated the investigation to it. Thus, the analysis of the preexisting secondary data sources was selected as the primary research method, with research questions centering around the transition with a broader viewpoint as well as the depiction of the current state of research regarding this paradigm. The strategy of collecting these secondary data sources is presented below.

To initialize the research, the following list of databases to be browsed and searched through was compiled:

- Google Scholar
- Springer Link
- Google
- IEEE Xplore Digital Library
- ACM Digital Library
- Wiley Online Library
- Emerald Insight
- ResearchGate

A list of keyword strings, with which these databases were scanned through, was subsequently compiled. These keyword strings include various combinations of the terms “open innovation” and phrases that were found to be used synonymously (“collaborative innovation”, “innovation 2.0”, “crowd innovation”) in combination with more specific, topic-related expressions such as “implementation”, “transition”, “adoption”, “strategy”, “development”, and “use-case”.

The emanating literature from this search strategy constituted the basis for further and deeper literature searches. A backward search as described by Weber and Watson (2002) was applied, in which the basis comprised pieces of literature from the first search process. The backward search process mostly consists of a review process, where citations from already identified articles and papers are further examined to identify more relevant literature in that area (Webster and Watson, 2002, xvi). Once the knowledge base was compiled of a plurality of relevant academic writings, an examination and extraction of relevant pieces of content regarding the transition from closed to open innovation were performed. Relevancy of the content is determined by a potential contribution to any of the research questions (see chapter 1.2). By compiling and structuring such content, the final objective of this thesis, the basis for a set of guidelines regarding the implementation of open innovation into existing closed innovation systems, is assembled.

According to Webster and Watson (2002), a literature review “facilitates theory development, closes areas where a plethora of research exists, and uncovers areas where research is needed” (Webster and Watson, 2002, xiii). The description of a literature review by Fettle (2006) complements the aforementioned definition by adding the purposes of integrating, gathering, and analyzing the results of existing surveys and examinations (Fettke, 2006, p. 259). This description aligns with the introduced research objectives (see chapter 1.1), which in summary aim to consolidate the findings of open innovation implementation projects, structure and classify them to finally derive a set of guidelines for performing a transition to open innovation systems. By highlighting and extracting the key findings related to transitions from closed to open innovation, companies should have enhanced their understanding of the underlying processes, success factors, and barriers.

1.4 Structure of the Thesis

Figure 1 depicts the structure of this thesis. Building upon this introductory chapter, chapter 2 aims to establish the theorical foundation for subsequent chapters by characterizing the underlying concepts of this thesis, such as the general concept of innovation. Moreover, the traditional form of practicing innovation, labeled as closed innovation, as well as the subject of analysis in this thesis, namely open innovation, are explored in this chapter. Chapter 3 encompasses the main body of this thesis, the analysis of the transitional processes from closed to open innovation, along with applicable barriers and success factors. Additionally, the transitional procedures are segregated into three consecutive phases, and each individual phase is explored in a separate subchapter. Chapter 4 focuses on the aggregation of the findings from the individual phases of chapter 3 by outlining the key findings. By summarizing and illustrating the key insights from chapter 3 (with an emphasis on the success factors and corresponding implementation measures), the main research objective of compiling a general guideline is realized. The thesis concludes with chapter 5 that recaps the findings and deduces implications for practice and further research.

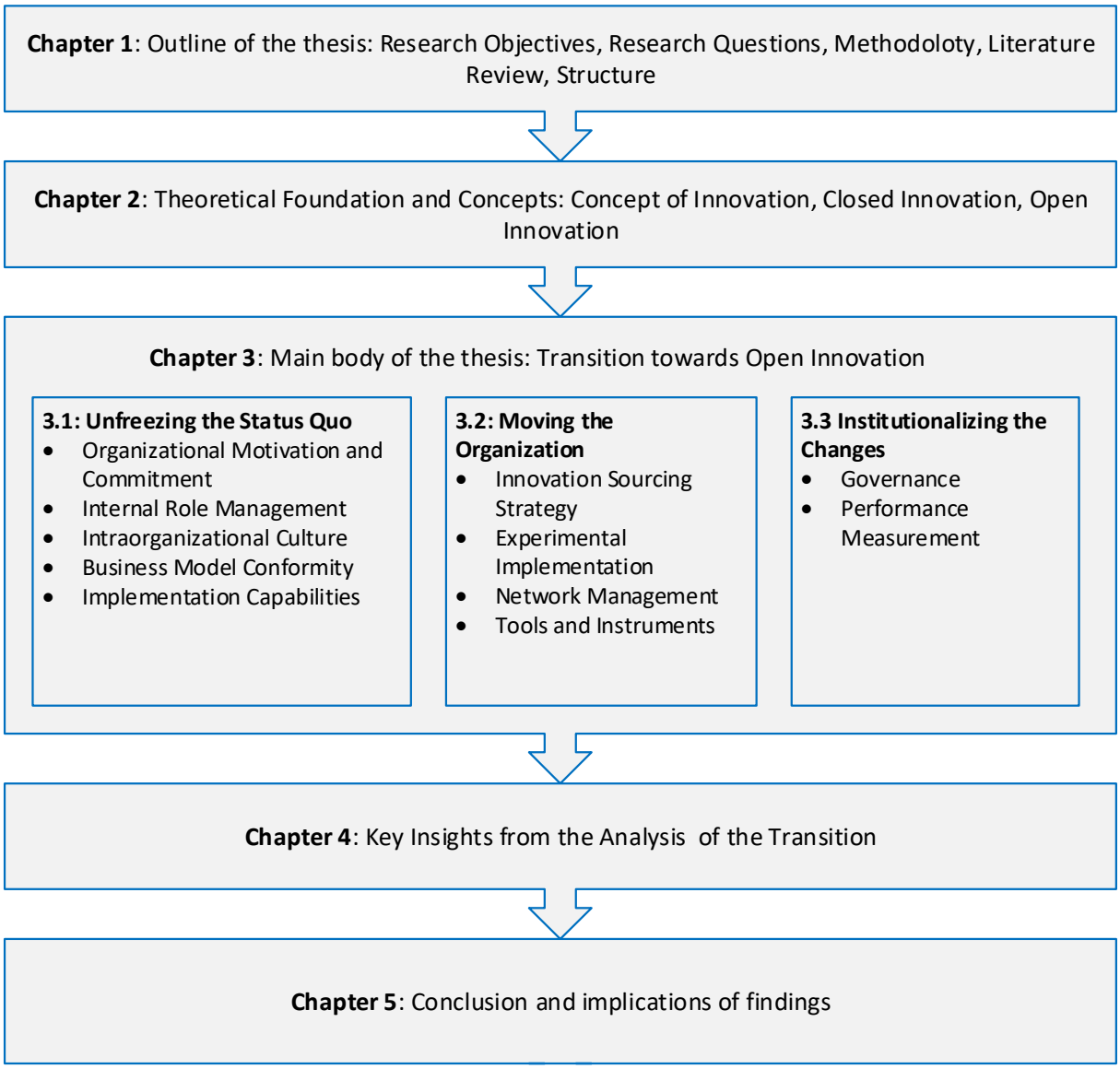

***Figure 1**: Structure of this thesis (Source: Own figure)*

Following the structure as presented in figure 1, the following chapter proceeds to outline the theoretical foundation and key concepts of this thesis.

2. Theoretical and Conceptual Foundation

Considering the underlying objective of examining and answering the research questions (see chapter 1.2), this chapter aims to provide the theoretical foundation required for understanding the subsequent sections of this thesis. This chapter starts with a general definition of the term and concepts of innovation. The next subchapter examines the traditional approach to innovation sourcing (i.e., closed innovation) and reviews the reasons for its erosion. The open innovation paradigm and its procedures are subsequently explored. The chapter concludes with the theory of organizational change and its context in open innovation. A general framework is outlined, which serves as the general structure for the main body of this thesis, as the identified transition processes are classified into different phases of that framework.

2.1 Concept of Innovation

The increasing dynamics of various marketplaces have intensified the interest in the concept of innovation among organizations. The areas where the increasing dynamics of marketplaces manifest themselves include constantly evolving customer demands, new technological opportunities, and changing marketplace structures and forces (Baregheh et al., 2009, p. 1323). Žižlavsk (2013) defines innovation as a "basic prerequisite for economic development and the preservation of competitiveness" (Žižlavský, 2013, p. 1). The importance of innovation is apparent in the manifold business disciplines on which practitioners and researchers operate, such as human resource management, entrepreneurship, R&D, and information technology (Baregheh et al., 2009, p. 1324).

A survey conducted by Urbancová in 2012 fortifies the impression of various other authors regarding the significance of innovation for an organization by quantifying its value for companies. According to this survey, about 94.5% of the consulted companies place a high importance on innovation for their respective organizations, with 81.7% recognizing the necessity of creating an innovation culture to increase the output of innovations (Urbancova, 2013, pp. 86–87). Nevertheless, this finding raises the question of how innovation can be defined and how exactly organizations practice it. Thus, the next sections of this chapter aim to provide a definition approach based on the understanding of various innovation researchers.

The Austrian economist Joseph Schumpeter first used the term “innovation” at the beginning of the 20th century (Urbancova, 2013, p. 83). From Schumpeter’s perspective, innovation can be summarized as a new product, process, or organizational change of all types; innovation does not necessarily need to stem from scientific discoveries but it can also originate from the application of improvements to existing technologies as well as practical applications (Žižlavský, 2013, p. 2). In addition, Schumpeter proposes the following classification of innovation into five different types:

- Manufacturing and creation of previously unknown products or products of unprecedented quality levels
- Introduction of a new production method that was previously unknown to the industry sector in question
- Opening entirely new markets that were previously inaccessible
- Creation of new sources of supply of certain resources that are unavailable or were nonexistent before its development
- Undertaking a reorganization to create or break through a monopoly (Schumpeter, 1993, pp. 100–101)

In summary, all types of innovations are based on a novel idea or concept, which provides value for the organization in any form. More recent definition approaches from modern economists and scientists expand the understanding of Schumpeter. For instance, Zairi (1994) recognizes that the main emphasis of innovation lies on the customer by focusing on what the customers desire and providing them with value. Moreover, high complexity is not necessary for the product or service to qualify as an innovation as long as customer needs are served in a new and practical manner (Zairi, 1994, p. 27). Preez and Louw (2008, p. 546) add that innovation must be deeply ingrained in the design process of an enterprise to be successful. The general preconditions to that end include effective knowledge management and sound collaboration and management of the said design process (Preez and Louw, 2008, p. 546).

The growth of the business lies at the center of innovations; however, Chesbrough (2003, p. 185) describes the innovation process as the growth of a new business, which offers the potential to expand the current business beyond its boundaries, but not without acknowledging

that this process is risk-prone (Chesbrough, 2003a, p. 185). Urbancova (2013) highlights the human element as an integral part of every innovation, although not in the same sense as Zairi (1994), who illustrated the importance of customers in innovations. According to Urbancova, the innovation process heavily relies on the human factor; without people's knowledge, skills, and creativity, no innovation can take form (Urbancova, 2013, pp. 83–84). Finally, Amabile et al. (1996) state that the basis of every innovation is formed by creativity and ideas that are ideally transferred into successful product or service implementations. Idea generation is indeed the essential process that initiates the entire innovation endeavor (Hamdani and Wirawan, 2012, p. 229). Novel creative ideas mostly originate from individuals and various teams within an organization. By providing encouragement of creativity, autonomy of freedom, and sufficient amount of resources, companies can create an assisting working environment for their creativity sources, thereby fostering their overall innovative output and ensuring organizational competitiveness (Amabile et al., 1996, pp. 1154–1159). The concept of open innovation, which is the subject of subsequent chapters, builds upon this insight from Amabile et al. by expanding the potential sources of creativity from within an organization's boundaries to external sources (see chapter 2.3).

Although often used synonymously, invention and innovation are distinct, and these terms must be clearly distinguished. On the one hand, inventions can be described as a precondition for innovations, and they take the form of abstract ideas without any economic value. Once invented, an invention may lie dormant for years without seeing practical use, unless an entrepreneur takes it to market in the form of a marketable product that offers value (Hacioglu et al., 2017, pp. 204–205). On the other hand, an idea that is fully commercialized is commonly referred to as an innovation. The realization requirements constitute another distinguishing characteristic between invention and innovation. Although inventions can stem from a wide variety of sources without major constrictions, such as universities and even individuals, the transformation of an invention into an innovation is far more demanding in resources. Companies need to have the required capabilities and skills to successfully achieve an inventive transformation, which might explain the severe time lag between inventions and innovations (Fagerberg, 2004, p. 3). Developing and nurturing those takes organizations a considerable amount of time, which generally causes a time gap between the transformation from the initial invention to the commercial innovation (Grimaldi et al., 2013, p. 201).

Figure 2 illustrates this three-step innovation process and visualizes the differentiation between innovation and invention.

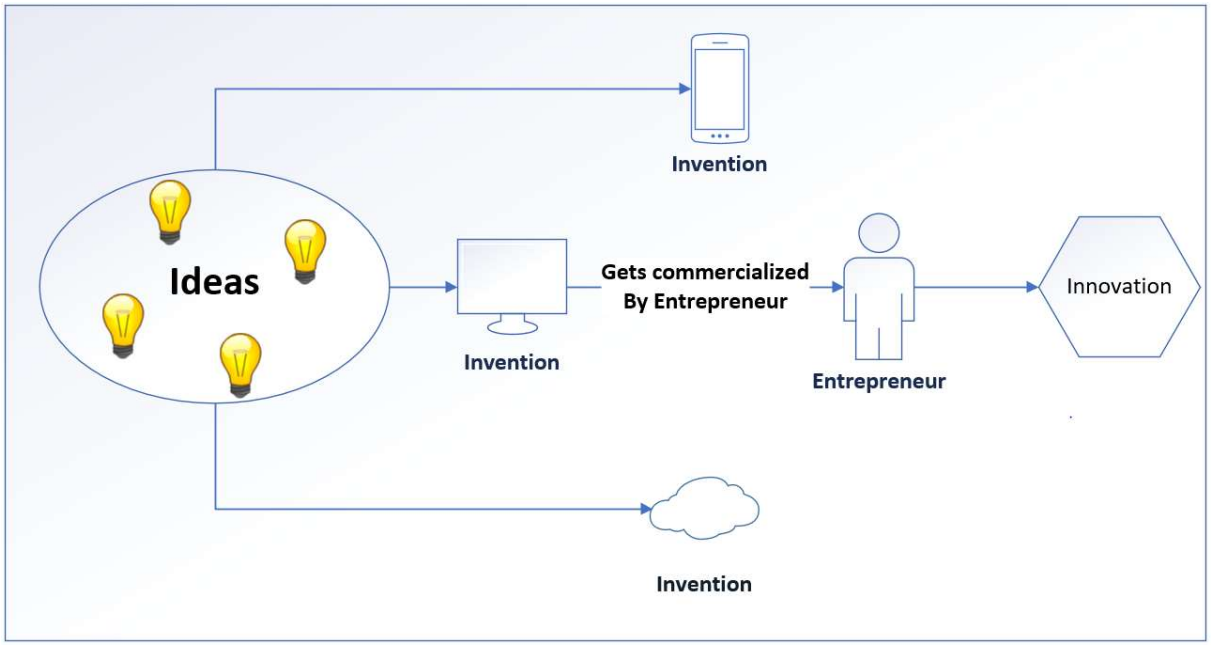

***Figure 2**: Three-phase process from invention to innovation (Source: Own figure based on Amabile et al., 1996, pp. 1154–1159, Hacioglu et al., 2017, pp. 204–205, Fagerberg, 2004, p. 3)*

Although Figure 2 depicts the general stages of innovation with a coarse granularity, the innovation processes cannot be generalized completely due to their complexity and variances in different application areas (Preez and Louw, 2008, p. 552). Nonetheless, Preez and Louis (2008, p. 552) attempted to synthesize the characteristics and processes of innovation models found in the innovation literature. Their observations can be summarized as follows:

- Idea generation and identification: This process initiates the innovation process, in which potential ideas are sifted and evaluated based on pre-formulated filters. Ideas deemed promising are further developed in the second process.
- Concept development: Promising ideas are combined and transformed into workable concepts, which are further refined by the input from several people. Concepts with the most positive reception proceed to further evaluation to assess their feasibility.

- Concept refinement: Concepts from the previous stage are further developed through iterative enhancements and adaptations. Prospective candidates for innovation projects are selected and further developed.
- Concept development: This process involves the assignment of resources and responsibilities. The design is finalized under continuous monitoring to ensure its alignment with the strategic objectives of the project.
- Concept implementation: As a final step, the new innovation undergoes a rollout as well as continuous monitoring and evaluation to ensure its performance alignment with the concept specifications (Preez and Louw, 2008, pp. 552–555).

Most other innovation process models found in the current innovation literature exhibit strong similarities (see Baregheh et al., 2009, pp. 1333–1334, who conducted a keyword frequency analysis on this subject).

Garcia (2014) further distinguishes three different grades of innovativeness into which a product, service, or process can be classified. Incremental innovations can be described as refinements to the existing innovation of an organization to sustain or raise its competitiveness. Incremental innovations build upon existing knowledge, which in most cases makes them low-risk endeavors with a high reliability. By contrast, radical innovations are prominent for providing massive and profound improvements in the performance of existing products and services. They account for about 10% of all types of innovations and demonstrate the potential to impact entire industry sectors (Garcia, 2014, p. 4); internet protocol and email are common examples of radical innovations (Latzer, 2009, p. 600). The bases of radical innovations are new technological discoveries that have the potential to offer high-value propositions for prospective customers. Although radical innovations are high in potential, the risk and effort associated with commercializing them are of high relevance and thus in need of consideration (Garcia, 2014, pp. 3–6). In the literature, radical innovations are also commonly referred to as “disruptive innovation” due to their nature to disrupt the status quo in markets and predominant technologies (Latzer, 2009, pp. 604–605).

2.2 Closed Innovation Paradigm

The preliminary subchapter illustrated that ideas form the basis of all innovations. This subchapter raises the issue of how companies traditionally tap into the idea pool to create and develop new innovative products and services. Traditionally, the internal R&D departments of companies are deemed valuable assets, which not only serve as a market entry barrier for new entrants but also provide a company with the competitive competence to continue competing with existing rivals. Those companies with the most R&D efforts also reap the most profits, as such firms are capable of consistently generating new and innovative products that offer significant benefits over competing ones derived from less intense R&D efforts (Chesbrough, 2003b, p. 35).

The internal sourcing of innovative ideas and concepts from a company's R&D departments is often referred to as "*closed innovation*" in the literature (Almirall and Casadesus-Masanell, 2010; Worsnop et al., 2016; Zhou and Gao, 2018 - 2018). Moreover, it follows the prevailing thought process at the time that successful innovation requires control. Businesses are hesitant to outsource the process to third parties due to their reliance on the strategy of staying competitive through innovation; they consequently relinquish control over the process and make them vulnerable to competitor exploitations. In summary, companies adopting the closed innovation paradigm adhere to the saying, "*If you want something done right, you've got to do it yourself*", which induces a pronounced self-reliance, in which most businesses aim to have in-house development, manufacturing, distribution processes (Chesbrough, 2003b, p. 36).

The fact that companies are risk averse by nature merely serves to enhance the thinking process (Greenwald and Stiglitz, 1990, p. 7). Moreover, companies go out of their way to keep patents internalized, even without any intention to utilize or license them out in the near future to deprive competitors of the opportunity to take advantage of these patents (Hossain, 2013, p. 32).

Docherty (2006) describes the closed innovation process as the funneling of ideas, in which only internal ideas are developed and commercialized while outside sources do not participate

at any point. IBM, Intel, and GE are among the notable examples of companies that successfully incorporated such a paradigm in the 1970s and 1980s (Docherty, 2006, p. 14). Figure 3 illustrates the pipeline analogy of idea funneling.

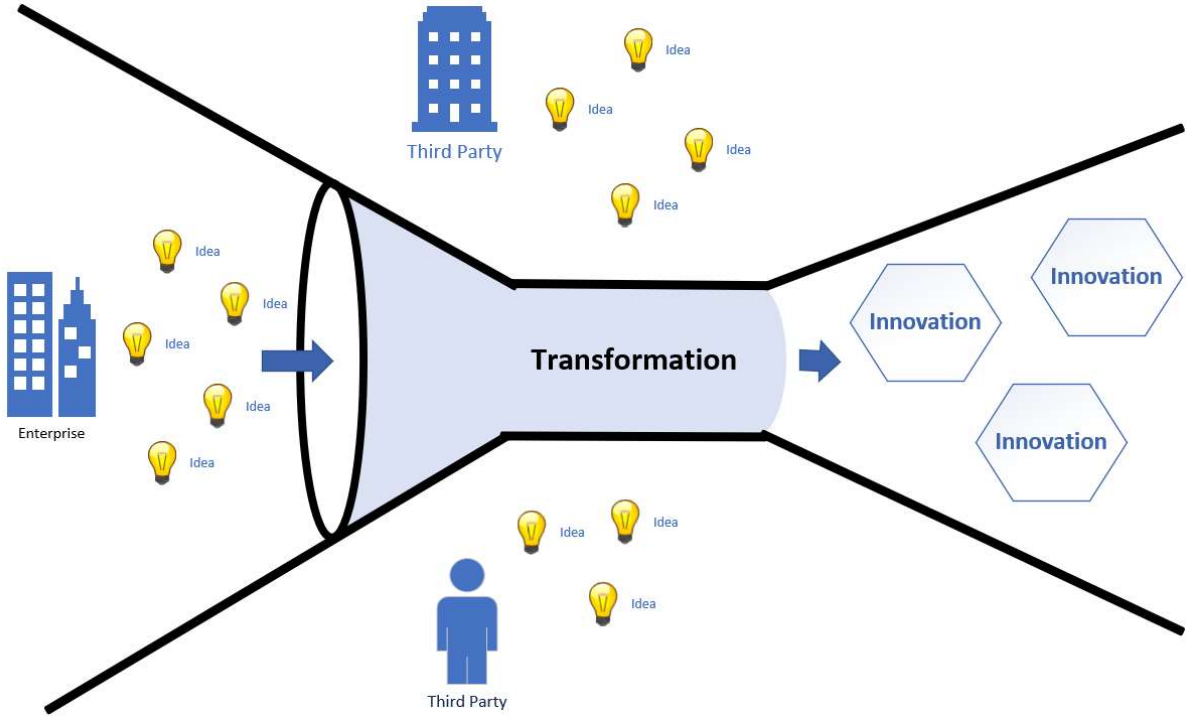

***Figure 3**: Closed innovation paradigm model (Source: Own figure based on Docherty, 2006, pp. 13–14)*

Certain industries such as the nuclear and military sector strongly favor this innovation model due to its lack of public disclosure (Gassmann, 2006, p. 224). Nevertheless, the notion that the closed innovation paradigm with its self-reliant mentality seems outdated for most industry sectors has emerged in recent studies (Elbanna, 2008, p. 424; Gassmann, 2006, p. 223).

Companies are gradually realizing that closed innovation and its isolation from outwards is not the universal solution to common challenges of organizations, as mentioned in the introduction (see chapter 1, e.g., the increasing competitiveness from globalization and constantly evolving customer demands) (Elbanna, 2008, p. 425). Chesbrough (2003b) examined the closed innovation strategy of the Xerox research institute PARC (Palo Alto Research Center), specifically its underutilized developments of the graphical user interface (GUI) and the Ether-

net. Both technologies were in-house sourced but were not fully pursued due to Xerox's adherence to the closed innovation mindset; fully developing and commercializing these promising innovations would require their combination with external technologies due to a lack of capabilities. On this account, Xerox decided to halt further investments in the development of GUI and Ethernet despite their promising commercial value. Nowadays, more open-minded companies such as Apple and Microsoft have successfully commercialized the GUI technology in their operating systems while reaping massive profits (Chesbrough, 2003b, p. 37).

The realization that the closed innovation paradigm does not suit every industry contributed to the transition to a more open-minded innovation mindset: open innovation. Several "erosion factors", as Chesbrough coined the term, further contributed to the diminishing popularity of closed innovation (Chesbrough, 2003a, pp. 34–39). These erosion factors include the following:

- Increase in the availability of skilled workers: Due to the exploding number of college graduates, partly resulting from fostering educational programs (e.g., the G.I. Bill that fostered World War Two veterans' college education (John Bound and Sarah Turner, 2002, p. 784)), an increase in the supply of highly skilled workers can be observed. These well-trained workers would often float from one company to another in search of the best compensation for their talent, while firms would actively poach such talents with backgrounds from R&D departments, universities, startups, and consultancy companies.
- Growing presence of private venture capital (Gompers, 1994, p. 11), which fostered startups that focused on commercialized external research, often feeding off and building on the extensive and costly research of industry leaders: The growth of such highly skilled competitors poses a massive threat to established companies.
- Reduction in the shelf life of most products and services, as time-to-market has decreased over time: Hence, companies would have overall less time to generate profits from their costly R&D efforts.
- Proliferation of the internet and its services (e.g., social media platforms): This development provides companies with previously untapped sources of knowledge and ideas (Bogers and Chesbrough, 2013, p. 10). New information and communication

technologies allow even customers and suppliers to easily participate in the innovation process and offer their input (Gassmann, 2006, p. 223).

To summarize, the closed innovation paradigm is under constant pressure due to its incapacity to cope with current developments in the market. Companies are no longer able to ignore sources of innovation outside their boundaries to stay competitive; on the contrary, Docherty (2006) asserts that companies "*don't have a choice*" (Docherty, 2006, p. 1). Switching to more open models of innovation, which leverage external sources and promote cooperation to maintain or create a competitive edge, provides a remedy (Docherty, 2006, pp. 1–2).

The next subchapter covers the basics of open innovation and contrasts it with the closed innovation approach. It aims to provide the fundamentals needed for subsequent chapters, in which the transition process from closed innovation to open innovation is examined.

2.3 Open Innovation

Brunswicker and Chesbrough's study in 2018 emphasizes the importance and dissemination of open innovation. Results of the questionnaire filled in by 2,445 executives of large companies demonstrated that more than 78% of the respondents have by now implemented open innovation practices in some form, with most of them having dedicated full-time employees to support the open innovation endeavor. Regarding intraorganizational support, over 60% of the participants indicated rising financial support in the past two years in terms of open innovation (Brunswicker and Chesbrough, 2014, pp. 36–37).

A commonly cited instance of an open innovation endeavor is the case of Procter & Gamble (P&G), particularly its open innovation platform "Connect and Develop". Created in 2001, the main purpose of this platform is to collect and manage external ideas as a response to slowing sales in the late 1990s. The idea behind Connect and Develop is to obtain as many external input sources as possible to avoid a one-dimensional perspective on P&G products and services. Meanwhile, unnecessary innovation efforts through the R&D department can be minimized, making the overall innovation sources considerably more cost efficient. Although P&G struggled in the 1990s with its closed innovation approach, the platform proved to be relatively successful; by 2005, more than 50% of all innovations originated from Connect and Develop (Agafitei and Avasilcai, 2015, pp. 2–4).

The idea that open innovation is the way forward for companies seems undisputable. To create a basic understanding of the open innovation concept, the subsequent sections define the term itself, contrast it from the closed innovation paradigm, and outline some common open innovation procedures.

2.3.1 Defining the Term "Open Innovation"

The term "open innovation" can be described as an "umbrella concept" for sophisticated collaborative innovation processes of all types. Thus, different definitions that share similarities and concepts can be found in the open innovation literature (Gallouj and Djellal, 2016, p. 4).

According to Piller and Reichwald (2006), open innovation pertains to the process of interactive value creation, in which sources external to the company function as co-producers of innovative ideas and concepts. This procedure is made possible by a systematic integration in the innovation processes and coordination of interaction processes of these external sources of the company. From idea generation and first concept development to prototype creation, people unassociated with the company contribute by giving their input to the product or service (Piller and Reichwald, 2006, pp. 95–96). Customers of the company, rivals, academics, and even firms completely unrelated to the company are among the common external sources (West and Gallagher, 2006, p. 319).

Gassman and Enkel (2004) define open innovation as the process of opening the company's boundaries to the outside world to allow knowledge flow both inside and outside the business. The aim is to provide opportunities to co-create with external actors to accelerate the time to market of products and services, thus gaining a competitive advantage over rivals and satisfying market needs in a timely manner (Gassmann et al., 2010, p. 2).

For West and Gallagher (2006), open innovation refers to the systematic exploration and exploitation processes of innovative opportunities from external sources and their conscious integration with the business. They further state that open innovation goes beyond a simple collaboration with external actors, as it also has significant implications on how companies use, manage, and employ intellectual property (IP) (West and Gallagher, 2006, p. 320).

A more recent approach for defining open innovation comes from Lichtenthaler, who describes the concept as "systematically performing knowledge exploration, retention and exploitation inside and outside and organization's boundaries throughout the innovation process" (Lichtenthaler, 2011, p. 77). This approach exhibits similarities to the definition of West and Gallagher (2006) in the sense that both refer to open innovation as the process of exploring and exploiting external knowledge sources.

To add to the definition of open innovation, Dahlander and Gann (2010) argue that the classification of a company's innovation process is not of a binary nature (e.g., either closed or open), but rather it follows various degrees of openness. Each degree comes with a distinct process and complexity associated with it (Dahlander and Gann, 2010, pp. 702–703). For instance, Julie et al. (2015) differentiate between three levels of openness and open innovation practices: two partial levels (topic- and partner-oriented openness) and a fully embraced openness at a third level. However, these levels can also co-exist across different projects inside the same organization, and they are not mutually exclusive (Julie et al., 2015, p. 10).

In contrast to the closed innovation paradigm, open innovation is built upon entirely different principles. Companies have realized that a pronounced self-reliance, which is prevalent in a closed innovation mindset, is not the one-fits-all solution. Instead of a sole reliance on internal R&D, the cognition that external R&D is also capable of creating significant value has begun to spread. Rather than commercializing and developing only ideas sourced from in-house R&D, companies have become aware that every idea need not originate from within the firm. Finally, companies have acknowledged that they do not have a monopoly of smart employees, and outside sources such as universities, consumers, competitors, and suppliers offer equally valid ideas (Chesbrough, 2003b, p. 38).

To summarize, different authors have used various terms for open innovation, but the general idea of open innovation is to employ a more open-minded strategy for utilizing external actors of all types in the innovation process to create or maintain a competitive advantage. Open innovation represents a complete paradigm shift on how companies act, think, and produce value in the aspect of innovation.

2.3.2 Open Innovation Process

According to a study of open innovation practices of 124 companies conducted by Gassmann and Enkel (2004), most open innovation strategies can be classified into one of three process archetypes, as described below.

(1) **Outside–in process**: As the term suggests, companies that adopt this open innovation approach aim to integrate external knowledge sources into their own research projects. By investing in cooperation with external sources such as customers and suppliers, for instance through investments in startup firms, patent acquisitions, or creating joint ventures with partners, companies gain access to otherwise unavailable competences. To create value from external knowledge sources, sourcing and acquiring such sources is also a crucial part of the process (Dahlander and Gann, 2010, p. 700). Overall, the outside–in procedure not only boosts companies' project success rates but also enables businesses to create innovative products and services outside their own scope. In particular, low-tech and small companies with insufficient resources for constantly operating their own costly R&D are typical beneficiaries of such an open innovation approach (Gassmann and Enkel, 2004, pp. 7–8). Although the outside–in process has the potential to be of high value for companies, some authors express their concerns regarding the challenges associated with it. For instance, there is no guarantee that the external supply of ideas may not dry up suddenly and without warning, leaving overly reliant companies in a poor position (West and Gallagher, 2006, p. 321).

(2) **Inside–out process**: Contrary to the inside–out approach, companies that employ the inside–out procedure externalize their internal knowledge to generate value from it. The objective is to create profits by licensing out internal IP and technologies to other companies, which in turn bring the innovation to market themselves. The inside–out process is specifically a good fit for research-focused companies, as it provides them with ways to subsidize their R&D and distribute the risks associated with developing and commercializing a product by outsourcing parts of the innovation processes that may not align with core competencies (Gassmann and Enkel, 2004, pp. 10–12). Notably, companies planning to adopt this open innovation approach need to establish managerial procedures to protect and maintain their IP; otherwise, unintended knowledge drain may occur (Eppinger, 2012, p. 83). Another critical success factor for outside–in processes is the capacity to identify highly promising technologies that the

company can license out in a timely manner due to the short-lived nature of some technologies. This identification process is particularly challenging for small organizations with limited resources that they may dedicate to open innovation (Bianchi et al., 2010, pp. 414–415).

(3) **Coupled process**: The coupled process constitutes a combination of the inside–out and the outside–in processes. Hence, companies utilizing this approach both internalize external knowledge and externalize their ideas and concepts to other companies. The companies cooperate with others in the form of strategic networks and alliances across different industries. Information and knowledge sharing across such networks is a key component of the process to successfully co-create and coordinate. A company's capacity to integrate foreign knowledge, find complementary partners, and communicate own concepts determines the degree of success of such an endeavor (Gassmann and Enkel, 2004, pp. 12–13).

The three process archetypes of open innovation are visualized in Figure 4 to provide an overview of their basic functionality. Contrary to the procedure depicted in Figure 3 (see chapter 2.2), the company's boundaries illustrated in Figure 4 are permeable for external sources of knowledge.

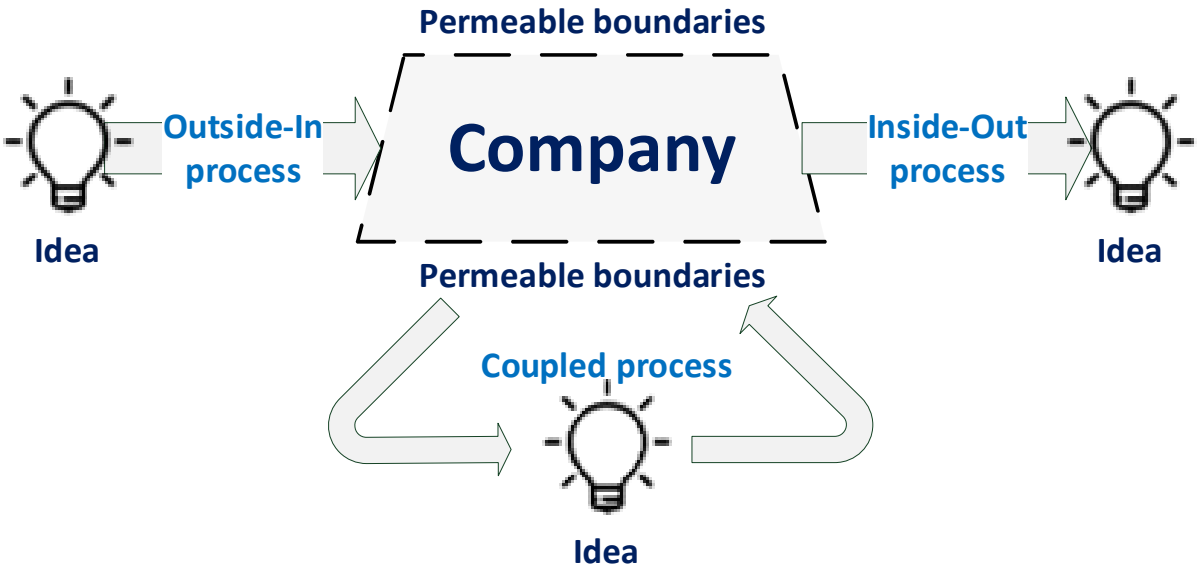

***Figure 4**: Open innovation process archetypes (Source: Own figure based on Gassmann and Enkel, 2004, p. 7)*

All three archetypes of open innovation processes can generate value for the business; however, a preference for the outside–in archetype is evident in both research and practice. Thus, the outside–in paradigm archetype is primarily better understood than both the inside–out and the coupled paradigms (Enkel et al., 2009, p. 313).

2.3.3 Organizational Change and Transitions

The potential of open innovation to offer a multitude of benefits to the implementing organization (e.g., keeping up with the challenge of remaining competitive throughout time and reacting to market changes) has been repeatedly established thus far. However, open innovation is not a *"firefighting strategy"*, as De Minin et al. (2010) describe it. To transition to open innovation, build-up time is necessary due to the massive implications and reforms that the paradigm entails for an organization, such as changes in the networks of customers and partners. The transition also entails shifts in human resource management, project planning, as well as the layout and structure of the organization (Di Minin et al., 2010, p. 157).

Consequently, every organization that aims to innovate its products and services needs to have a strategic approach for managing the resultant changes by developing an efficient change management strategy throughout all the phases of innovation, starting from idea generation up to the final innovation (Kenneth Chukwujioke Agbim et al., 2013, p. 1). Salameh and Hmeidiyeen (2015) define innovation as a "structured practice" that invariably precedes change, thus highlighting the necessity of quickly recognizing the need for change and applying appropriate measures (Salameh and Hmeidiyeen, 2015, p. 60).

To manage change in fast-paced environments, some authors in the innovation literature suggest the well-explored procedures and methods of the *change management* paradigm (Bucciarelli, 2015; Greguš et al., 2012; Kenneth Chukwujioke Agbim et al., 2013; Salameh and Hmeidiyeen, 2015). Successful entrepreneurs and corporations are commonly characterized by their ability to adapt to change quickly and manage it effectively (Paton and McCalman, 2008, p. 24).

Change management can be defined as "[…] *a process of directing, navigating, caretaking, coaching, interpreting and nurturing organizational change so as to achieve a desired change outcome, maintain the status quo or adapt to the emergent outcomes"* (Kenneth Chukwujioke

Agbim et al., 2013, p. 2). The utilization of change management procedures for innovation practices is expected to raise the overall innovation success rates (O'Connor, 2009, p. 118), as innovations are high-risk endeavors and most innovations end in failure (Chesbrough, 2003a, p. 185). An organization's failure to create successful innovations may be attributed to a failure of not only the innovation itself but also the implementation approach of the aforesaid innovation (Michaelis et al., 2009, p. 400). The transition toward open innovation is fundamentally an intended organizational change process, and thus it can be positively influenced by change management procedures. In particular, the persuasion of key stakeholders of the intended change, mostly interorganizational personal and management, can be effectively undertaken through change management applications. For instance, chapter 3.1.1 discusses the way of driving commitment to the move toward open innovation, in which change management procedures such as employee empowerment are identified as a tried and tested method in the open innovation literature. In many other phases of the transition, change management procedures are also introduced and examined as they prove to be a valuable asset in eliminating human-related barriers (Bucciarelli, 2015, pp. 37–39).

In an effort to provide structure to the analysis of the transition towards open innovation, the identified processes were classified into one of three phases in accordance to Lewins three-phase model. As early as in 1947, Lewin depicted the process of organizational change as a progression of three consecutive phases, which are in order 1) unfreezing, 2) moving and 3) institutionalizing (Lewin, 1947, pp. 34–35). This three-phase model is well established in organizational change literature and serves as a foundation of modern models of organizational change, which either extend upon it with additional phases or depict the individual phases with a finer granularity (Achilles A. Armenakis and Arthur G. Bedeian, 1999, p. 301). For the scope of this thesis, a division in accordance to Lewins three phase model is sufficient. Chiaroni further extend on Lewins three-phase model by applying it in an open innovation context, while outlining general open innovation procedures during each phase (Chiaroni et al., 2010, pp. 225–242).

As stated, the first phase of organizational change is called "*unfreezing*". In this phase, the company, and most notably its top management, has to realize the need for change, communicate this need to all the affected stakeholders, and gain support for the transition. Full commitment to the intended change is required to create a sense of urgency and build an

environment of excitement. Unfreezing the organization also entails the re-design of organizational structures to facilitate innovations and the establishment of relationships with external sources. The key is to create awareness of open innovation and its intended benefits, as well as preparation for anticipated repercussions (Chiaroni et al., 2010, pp. 225–241).

Phase two of the transition encompasses "*moving"*, which consists of processes to actually implement open innovation by establishing new procedures and behavior patterns in line with the new vision of the organization. Chiaroni et al. (2010) describe moving as experimental in nature, in which the solution that suits the organization best is identified through a trial-and-error approach (e.g., pilot projects (Boscherini et al., 2010)). In this phase, the relationship-building efforts from phase one should result in an extended network with external partners who are valuable to the open innovation endeavor (e.g., by providing new ideas or capabilities) (Chiaroni et al., 2010, pp. 225–241).

Finally, the organization rigidifies the implemented changes and procedures in the *"institutionalizing"* phase of the transition. Common processes in this phase are continuous performance evaluations through the establishment of key performance indicators of the open innovation endeavor. Relationships formed in the second phase are further fostered with long-term collaboration in mind. The underlying purpose of this phase is to prevent the organization from regressing into previous mannerisms and structures (Chiaroni et al., 2010, pp. 225–242).

Considering this three-phase structure of Lewin (1947), the current thesis identifies open innovation implementation practices by allocating and classifying them into their logically appurtenant phase. The subsequent chapter that constitutes the main body of this thesis presents an examination of unfreezing open innovation practices.

3. Transition to Open Innovation

This chapter commences the depiction of the transition from closed to open innovation. Its structure is based on Lewin's three-phase model of organizational change, as presented in chapter 2.3.3. Thus, the following chapter examines procedures of the first phase.

3.1 First Transition Phase: Unfreezing the Status Quo

In the presented processes, the foundation is laid for the organization to successfully practice open innovation. The chapter commences with an examination of the organizational motivation and commitment from both common employees and top management, followed by an outlining of the importance of internal role management. As the chapter proceeds, the significance of establishing an appropriate open innovation culture and a business model is explained. Finally, the chapter concludes with an overview of essential open innovation capabilities as identified in the literature.

3.1.1 Organizational Motivation and Commitment

Implementing open innovation typically starts with an organizational self-assessment of the status quo, while attempting to answer questions such as the viability of the current innovation strategy going forward and the practicability of an open approach of innovation. If by the end of this critical self-assessment the necessity of changing things up to stay competitive emerges, the organization needs to establish readiness and a vision on the future innovation model (Barett et al., 2011, p. 10). Profound questioning of whether open innovation aligns with the corporate strategy and gauging how the specific organization may benefit from open innovation over other alternatives are imperative. Even though motivating factors are not lacking (see chapter 1), a comprehensive evaluation is mandatory, as open innovation is taxing in terms of resources and capabilities (Lindegaard, 2010, pp. 189–200).

Transitioning to a new paradigm such as open innovation involves manifold organizational changes, affecting the company's structure, culture, and procedures (Greguš et al., 2012, p. 27). On an individual level, internal resistance to such new procedures, although common, often results in the failure of the entire endeavor (Bucciarelli, 2015, p. 38). Change manage-

ment literature in an innovation context states that individuals are prone to a fear of redundancy and lacking in trust in top management due to their perception of dishonesty toward the latter. These fears are fueled by high unemployment rates in some regions in addition to low workforce mobility. Employees consequently tend to have an aversion toward non-accustomed procedures and environments, negatively affecting their overall motivation to innovation and change in general. Thus, Greguš et al. (2012) highlight honesty and clear communication as a motivational factor toward organizational change and a first step to successful implementations (Greguš et al., 2012, pp. 26–27). Sharing success stories of other open innovation endeavors may also serve the purpose to reduce negative biases and improve the employee engagement level (Hosseini et al., 2017, p. 97).

Boosting employee morale and motivation by reducing potential resistance factors is therefore among the first key steps toward open innovation. A study by Paton and McCalman (2008) also revealed adverse repercussions and high failure rates during change procedures, in which low employee morale due to little participation and integration in the overall process negatively affected the endeavor. The authors also noted that such discontent could be resolved by increasing the degree of integration into the process, for instance through employee consultations, joint discussions among the stakeholders, training, and establishment of a clear implementation strategy, thus reducing uncertainty fears (Paton and McCalman, 2008, p. 362).

High participant integration is also cited as a potential cure for the concept of resentment toward external inventions and knowledge (Mortara et al., 2009, p. 71), commonly referred to as the *"not invented here syndrome (NIH syndrome)"*, which is also a well-known barrier to adoption in the literature. Efforts to undermine this mindset should be undertaken to successfully integrate external knowledge (Julie et al., 2015, p. 13). The NIH syndrome is not limited to individuals, but it can also spread in group environments, where they pose a major threat to the project (Lichtenthaler and Ernst, 2006, p. 383).

Another issue to address regarding the internal staff, particularly the employees of R&D departments, is a "*dominant inward-facing*" culture, as working with the organization's external actors is characterized as more demanding than dealing with internal parties, thus inducing a preference for the simpler closed innovation model. Although work motivation is commonly

a non-issue among researchers, collaborations with external sources are largely circumvented wherever possible, resulting in a loss of external knowledge and insights, which are identified as the source of innovations (see chapter 2.1 Given the reluctance toward external cooperation, additional efforts to internalize external knowledge through translation should therefore be undertaken, as each company organizes and structures pieces of knowledge differently. Moreover, traditional rewards systems are focused on closed innovation models, rewarding based on the quantity and quality of inventions sourced by an individual, and placing lower value on the simultaneously more demanding open innovation models of innovating, as individual contributions are difficult to quantify in a collaborative invention (Salter et al., 2014, p. 82). As open innovation requires new sets of skills and competences, which individuals must build and acquire, the importance of appropriate rewards systems promoting the adoption of new skill sets is further underlined (Parida et al., 2014, p. 383). A survey by Breunig et al. (2014) regarding the incentivization of open innovation efforts revealed that collaborative efforts, as is the case in open innovation, require performance measures on a collective level to properly facilitate collaborative inventions (Joachim Breunig et al., 2014, p. 52).

As open innovation is associated with high upfront investment requirements (e.g., by having to build the necessary skills and high investment requirements to evaluate the viability of open innovation for the organization in light of the overall strategy), implementation reluctance from the firm's leadership is also predominant. The responsible party (e.g., the head of the R&D department) needs to convey a sense of urgency for the necessity to change by clearly communicating such an urgency (Bucciarelli, 2015, p. 41; Susman et al., 2006, pp. 29–30). Chesbrough and Brunswicker (2013) identify a positive correlation between the level of top management support and a firm's dedication to opening up the innovation process through financial investments and increased dedication of human resources, further emphasizing the requirement of creating and communicating a sense of urgency (Chesbrough and Brunswicker, 2013, p. 23). A respondent from a study conducted by Parida et al. commented on this topic: "If we lack top management's support, it is difficult to motivate employees and to integrate open innovation at an overall organizational level." The allocation of time and resources is part of the scope of duties of top management; hence, a successful implementation depends on top management support (Parida et al., 2014, p. 382).

However, several characteristics of senior executives make gaining their support for the open innovation endeavor quite challenging. Most senior executives are focused on short-term gains, as their own performance is measured on strong quarterly financial results. Supporting open innovation as an unknown quantity, which may temporarily cause losses, is thus unthinkable for some executives. As open innovation is a novel phenomenon, top executives who assumed their position through a business degree additionally lack the required education. The acknowledgement of open innovation in research and practice has only intensified in recent years through the efforts of numerous scholars such as Chesbrough. Another point that has already been raised is the natural risk aversion of companies and consequently their top executives (see chapter 2.2, chapter 2.3.3). As open innovation encompasses a journey into the unknown, with a profound risk of failure, the consensus among top executives seems to be the avoidance of such uncertainties. Finally, executives have high preferences to maintain control over the internal innovation procedures. Opening up the innovation process of a company connotes a loss of control, as the overall open innovation success is interdependent with other organizations (Lindegaard, 2010, pp. 80–83). Consequently, gaining top management support can be classified as a key success factor of open innovation. This management support can be achieved, for instance, by road mapping the endeavor in detail, thus reducing the uncertainties and risks of the endeavor. The focal points should revolve around what matters most to the executives, as some of these executives are focused on cutting costs, whereas others put the emphasis on growing sales (Lindegaard, 2010, pp. 85–86). As an example, the open innovation team at the company *Amway,* which successfully produced new products without open innovation, had to persuade members of the organization and senior management through promoting presentations, which illustrated the need for the open innovation approach. This persuasion was an ongoing process with the aim to ensure continuous support for the project (Miller et al., 2014, p. 332).

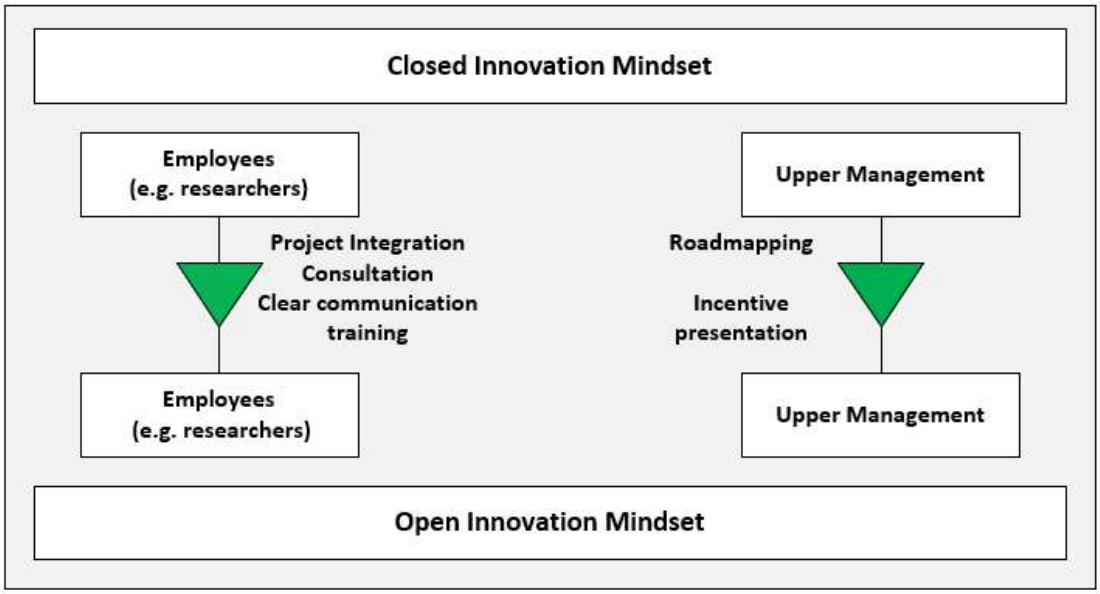

***Figure 5**: Mindset shift from closed to open innovation (Source: Own figure based on the literature cited in this chapter)*

Figure 5 illustrates some of the key insights from this chapter. It visualizes the move from a closed innovation mindset to an open innovation mindset and the corresponding activities that may facilitate this shift.

3.1.2 Internal Role Management

Managing innovation projects requires dedicated personnel who are committed to the new process, product, or service. Such personnel largely come from other roles within the organization and undertake their responsibilities in the innovation project in addition to their standard tasks. They play a central role in fostering innovation projects and thus considerably affect the failure or success of innovation endeavors (Gemünden et al., 2007, pp. 408–409). Brunswicker and Chesbrough (2018) also observe that firms resort to the deployment of several full-time employees for the open innovation implementation and management, ranging from five to more than 30 people (Brunswicker and Chesbrough, 2014, p. 37). Another observation on this topic is that high-tech and more mature industries are particularly willing to dedicate staff to open innovation projects compared to less technical ones (Julie et al., 2015, p. 12).

Although new positions are created within the organization, mostly the significance of internal R&D does not diminish, as both paradigms may simultaneously exist. An exception in this case concerns the outside–in approach, as Schroll and Mild (2011) notice a reduction in R&D intensity in companies that practice such approach (Schroll and Mild, 2011, p. 491). On the contrary, Ades et al. (2013) revealed that the company *Siemens* for instance has approached the matter of open innovation implementation quite differently; instead of allocating dedicated staff to the project, Siemens did not put into practice new organizational roles. Instead, Siemens assigned the responsibility of the endeavor to the internal R&D department consisting of a multidisciplinary team of researchers (Ades et al., 2013, p. 20).

Di Minin (2010) further observes that utilizing dedicated open innovation staff with clearly assigned tasks and responsibilities is a key success factor in transitioning toward open innovation (Di Minin et al., 2010, pp. 155–156). Therefore, this chapter examines some commonly employed organizational roles for open innovation endeavors as part of the transition procedures.

The broad agreement in the open innovation literature is that the establishment of a dedicated open innovation unit facilitates the transition process (Ades et al., 2013; Chiaroni et al., 2010; Mortara et al., 2009). Dedicated open innovation implementation teams are indeed considered to be the "starting point" of the initiation of change within the organization (Mortara et al., 2009, p. 8). Having an internal, dedicated, central unit that drives the open innovation procedures forward enables the business to maintain accountability for the projects, while also undertaking the open innovation strategy with direction and continuity (Miller et al., 2014, p. 325). One instance of the establishment of a dedicated open innovation unit is the case of the cosmetics group *Natura* from Brazil. The unit is composed of 11 people and divided into a threefold function: intellectual protection, enactment of innovation processes, and network management. Establishing a dedicated unit is generally an effective means of concentrating the responsibilities of the open innovation endeavor (Chiaroni et al., 2010, pp. 240–241). In most cases, the CEO and other top management personnel are involved in the formation of such dedicated open innovation units (Buganza and Verganti, 2009, p. 322).

A commonly established role is the *technology scout*, as companies increasingly struggle to identify and assess external technologies that meet their requirements, while aligning with

the strategic initiatives and goals of the overall company. Technology scouts are specialized in precisely identifying relevant technologies for a business by researching technological trends and changes (Wolff, 1992, pp. 10–11). Such technologies have the potential to clear the way for new business opportunities such as new business ideas and products on the basis of the new technology (Spitsberg et al., 2013, p. 34).

Once identified, the technology scouts are responsible for convincing the management of a company about the potential of technology by providing a detailed justification of its benefits, while ideally underscoring the alignment with the strategic goals and compliance with the business model (Wolff, 1992, pp. 10–11). Another part of the technology scouts' skill set is building and managing a network consisting of experts and scientists in the fields of interest to source technologies from them (Rohrbeck, 2010, p. 171). The selection of technology scouts should be based on the size of their associated social networks to maximize both the quantity and the relevance of identified technologies due to a high information input from such networks (Heuer et al., 2006, p. 982).

As has been clarified in chapter 3.1.1, motivation plays a pivotal role in the success or failure of open innovation. One method of boosting employee morale is the appointment of a so-called *innovation champion* (Gemünden et al., 2007, p. 409). Innovation champions are defined by an achievement-oriented nature with a willingness to take risks, as they promote the open innovation endeavor by sharing their excitement about and positivity toward the project with other members. They actively promote benefits and positive aspects to "keep innovations alive and thriving" while raising and maintaining high employee morale (Howell et al., 2005, pp. 641–642). Open-minded managers with a high degree of cultural experience are typically selected for such a role (Boscherini et al., 2012, p. 236). Fichter (2009) disputes that actively and enthusiastically promoting innovation (e.g., through a dedicated promoter such as the innovation champion) can help to offset several barriers such as administrative-, knowledge-, opposition-, and cooperation-based hurdles. The role of an open innovation promoter can be further split by dedicating a specialized promoter to each barrier type (Fichter, 2009, p. 360).

Michaelis (2009) similarly describes a concept of a *charismatic leader* as a means of pushing innovation forward. The charismatic leader drives the employees' commitment to change via

trust-building measures and their active enthusiasm for the endeavor (Michaelis et al., 2009, p. 413). Among the mechanisms for attaining high levels of commitment and enthusiasm are the maintenance and enhancement of employee self-esteem and self-worth as well as an increase in the intrinsic value of goal accomplishments by clearly expressing and presenting a vision, thus enhancing the perceived meaningfulness of their actions (Shamir et al., 1993, pp. 581–583).

Referencing the barrier of a prevailing preference to work in closed R&D environments rather than working with external sources due to the additional effort regarding the integration and transformation of knowledge (see chapter 3.1.1), the establishment of an *integration expert* is a potential solution. By acting as an interface between internal departments and external knowledge sources, integration experts arrange incoming knowledge, such that any absorption barriers are minimized (e.g., through adjustments to internal formats). To illustrate this issue, an interviewee in a study by Selter et al. (2014) expressed that most external knowledge from academic sources is "too complex," and it needs months of work to figure out the meaning behind it. An individual specifically trained to retranslate such knowledge sources substantially improves the organization's overall receptiveness toward information and the effectiveness of the information integration process (Salter et al., 2014, p. 88). Integration experts' responsibility further extends to managing the existing network of open innovation partners and fostering and extending it by partners whose collaboration is expected to offer potential business opportunities (Dąbrowska and Podmetina, pp. 105–112). Integration experts have an extensive skill set, as they combine technical, marketing, and legal competencies (Di Minin et al., 2010, p. 156).

Table 1 summarizes the different roles inside an organization and the associated functions and responsibilities as identified in the open innovation literature.

Table 1: intraorganizational roles in open innovation projects (Source: Own table based on the insights of this chapter)

Intraorganizational Role	Function and Responsibility	Sources
Internal R&D employee	Repurposed for open innovation; undertaking certain responsibilities in addition to day-to-day tasks	(Ades et al., 2013, p. 20; Schroll and Mild, 2011, p. 491)
Dedicated open innovation unit	Maintaining accountability for projects; concentration of responsibility; IP protection and project enactment	(Buganza and Verganti, 2009, p. 322; Di Minin et al., 2010, pp. 155–156; Mortara et al., 2009, p. 8)
Technology scout	Identifying relevant promising technologies; articulating benefits to management; building networks of scientists from which to source	(Heuer et al., 2006, p. 982; Rohrbeck, 2010, p. 171; Spitsberg et al., 2013, p. 34; Wolff, 1992, pp. 10–11)
Innovation champion	Promoting open innovation activities; charismatically leading the endeavor; motivating personnel	(Boscherini et al., 2012, p. 236; Gemünden et al., 2007, p. 409; Howell et al., 2005, pp. 641–642)
Integration expert	Integrating and transforming external knowledge; managing and maintaining partnerships	(Dąbrowska and Podmetina, pp. 105–112; Di Minin et al., 2010, p. 156; Salter et al., 2014, p. 88)

3.1.3 Intraorganizational Culture

The concept of organizational culture includes the company's values, ideas, attitudes, and beliefs, which rub off on its employees and strongly influence how they think and act. Organizational culture is a shared mindset of how to approach procedures and problems inside the organization, which is imparted to the personnel of a company and conveyed to newcomers. Influencing the corporate culture is recognized an asset that may exert a positive influence on the business (Tharp, 2009, p. 5). Managers can particularly shape and influence explicit culture, which pertains to the typical behavior patterns of individuals of an organization. For instance, implementing reward systems may induce employees to act in a specific manner to reap benefits from them. On the contrary, implicit culture is considered to be more difficult to assert influence over, as it consists of an individual's intrinsic beliefs and values (Ahmed, 1998, p. 32).

Morcos (2018) also underscores that the culture of an organization can significantly affect the morale and engagement rate of its employees, which can serve as a source of a competitive advantage if facilitated and deliberately built to the needs of the organization. Some organizations fail to modernize their culture and are thus weighed down by legacy systems and ineffective and ingrained procedures and rigid organizational structures, which considerably aggravate the coping mechanisms with new trends and developments. On the contrary, organizations that promote modern cultural values such as teamwork and increased information flow are in a much better position to cope with today's challenges (Morcos, 2018, pp. 3–4).

In the open innovation literature, organizational culture has also been characterized as a critical success factor that needs to be shaped. Hosseini (2017) states that the closed innovation paradigm and its associated culture do not offer a facilitation environment for openness. This characterization as a critical success factor is substantiated by Brunswicker and Chesbrough (2013); in the authors' survey, the respondents provided the adoption of an open innovation-conforming culture with the second highest significance of all the managerial practices that were investigated (Brunswicker and Chesbrough, 2014, p. 25). Meanwhile, Kirschbaum (2005) considers an innovation-promoting culture as a prerequisite for open innovation practices (Kirschbaum, 2005, p. 28). Closed innovation adopts a mindset of self-reliance, which is particularly inward-facing regarding the procedures and knowledge generation; by contrast, open innovation promotes an outward-facing mode of thinking (see chapter 2.2 and chapter 2.3).

Therefore, the intraorganizational culture must be adapted to the mindset that is receptive to the open innovation paradigm (Hosseini et al., 2017, p. 93).

Sirito and Hasan (2018) present an instance of a more open culture, which facilitates change and cooperation. They identify three factors that an open innovation culture should consider, namely the encouragement of openness throughout the organization, the creation of a trust- and enthusiasm-ingrained climate, and an open-minded approach toward partners and the project strategy (Sirito and Hasan, 2018, p. 357). Chris Thoen, R&D director at P&G, has included in the discussion other requirements and factors that constitute an innovation-supportive culture (Lindegaard, 2010, p. 22). Some of these requisites are as follows:

- Creating an understanding that outside sources may provide equal value to the business as inside ones, contradicting the prevalent closed innovation mindset of self-reliance. This requirement includes dismissing the NIH syndrome (see chapter 3.1.1).
- Supporting employees in building competencies and knowledge regarding new technologies
- Reducing fears of failure by adopting the notion that failures provide the business with opportunities to learn from while increasing the willingness to take risks rather than being strictly risk-averse
- Abolishing the idea that going to market first without preparation, and instead primarily focusing on building the necessary framework for successful open innovation
- Building trust; as trust is of the essence, practicing both internal communication regarding the implications of open innovation and external communication to successfully cooperate is a mandatory part of an innovation culture (Lindegaard, 2010, pp. 22–23).

Figure 6 depicts an overview of the elements of an open innovation culture.

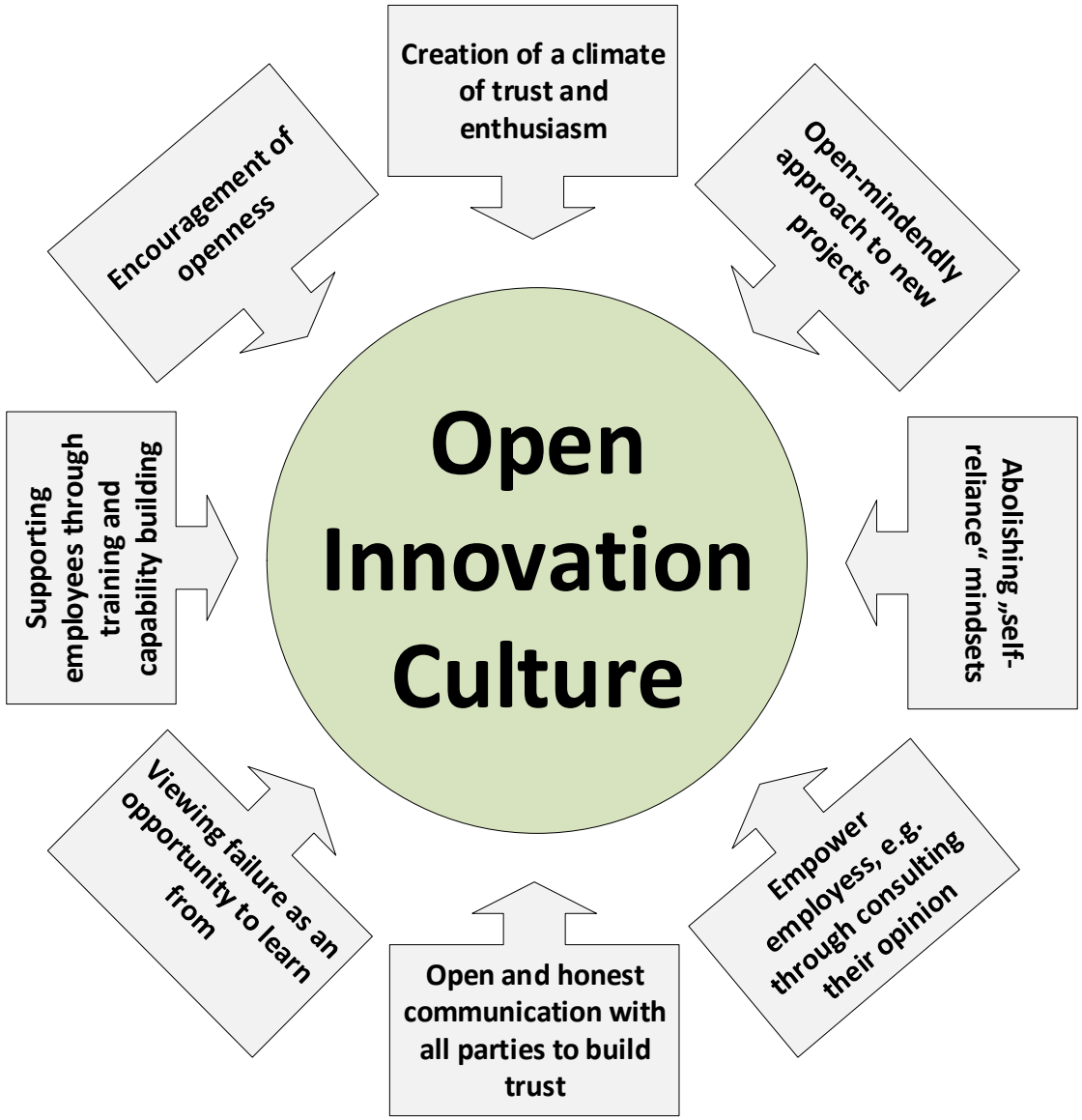

***Figure 6**: Elements of an open innovation culture (Source: Own figure based on Sirito and Hasan, 2018, p. 357, Lindegaard, 2010, pp. 22–23)*

Another requirement derived from the insights in chapter 3.1.1 indicates that employee integration and participation may result in overall motivation and thus increased success rates of open innovation projects. Moreover, insights from a study by Çakar and Ertürk (2010) suggest a connection between employee empowerment and consistency with the corporate culture. Empowerment that is inconsistent with the culture of an organization causes the employees' skepticism and distrust as an unintended outcome. In cultural environments with a high power distance, participative techniques such as empowerment are considered ineffective due to a general expectancy of management roles to control information and strictly dictate the course of action. However, in low power distance environments, empowering personnel can be an

effective tool for generating motivation and commitment. Thus, companies chiefly need to consider the culture in which they operate before enacting coping measures and organizational changes (Çakar and Ertürk, 2010, p. 330).

While some companies and authors consider organizational culture and the need to adapt it for the open innovation project as an implementation obstacle, firms with a cultural heritage that facilitates openness can heavily profit from this openness. According to Mortara and Minshall (2011), a firm with a culture conductive to openness can rapidly implement both outside–in and inside–out procedures. Although technological pressure certainly plays a role in the fast adoption of open innovation, organizations can use past experiences (i.e., licensing out of intellectual property as an enabling factor), as their culture is to a certain degree prepared for additional open innovation practices (Mortara and Minshall, 2011, p. 595).

Cultural transformation is essential, but transitioning procedures toward an open innovation culture are characterized by difficulties. Cultural transformation entails complex long-term objectives, given the widespread lack of support and acknowledgement of creating an innovation-supporting corporate culture from the level of both staff and management. According to Greguš et al. (2012), the explanation of such phenomenon is connected with cultural stereotypes and people's natural reservations about changes (see chapter 2.3.3). Addressing such concerns is therefore of urgent necessity, as an innovation-hostile culture not only negatively influences the working environment but also aggravates the hiring of people with an innovative mindset (Greguš et al., 2012, pp. 24–25). The application of change management procedures (e.g., clearly communicating the rationale for cultural change and addressing employee fears) provides potential relief for organizations (Miller et al., 2014, p. 331).

3.1.4 Business Model Conformity

This chapter examines the role of business models in the context of open innovation. Fielt (2013) defines business model as the "value logic of an organization" regarding the way it creates value for its customers. A business model entails the following three strategic choices: the targeted customer group, the value proposition (i.e., the elements that make the product attractive for customers) of its products services, and the model of revenue (i.e., how the company plans to generate revenue) (Fielt, 2013, p. 100). Recent developments in the global

economy, such as the creation and utilization of new communication and computing technologies, constantly changing customer needs (e.g., customers' rising expectations that online services should be free), and reduced cost of information gathering, require a more customer-centric approach. To remain competitive, companies need to re-examine their current value propositions to reflect the newly evolved business environment. This approach is especially important in the open innovation paradigm; innovations are prone to fail without a well-developed business model that does not reflect the requirements expressed from the new environment (Teece, 2010, p. 172).

Open innovation involves the procedures of knowledge gathering and integration from external sources, which represents a new environment for most businesses. However, simply collecting such external knowledge is insufficient; this external knowledge needs to be converted into something of value to be truly beneficial. Generating value from an invention initially involves its commercialization through a business model that dictates how the innovation is managed and how value creation transpires. Commercialization through two different business models generates two disparate economic outcomes; thus, the total value from an invention widely varies depending on the strategic business model decision. In this case, managers need to carefully examine the strategic options of how to proceed with the commercialization of an invention and its subsequent value generation (Chesbrough, 2003a, pp. 155–156). Teece (2010) extends this notion by suggesting that every newly designed product should be paired with a specifically developed business model, with a clear go-to-market strategy and a method of capturing value (Teece, 2010, p. 183).

However, the need for an adapted business model presents companies with an unusual situation. In the traditional way of conducting research (closed innovation), new inventions are constantly created and put on the shelf. Only a few select inventions that are assessed to be profitable essentially proceed to their further development into new innovative products and services. As this approach can be described as quite risk averse, the value generated from a few select innovations could be reinvested into the internal R&D department, maintaining this cycle while making the approach sustainable (Rodet-Kroichvili et al., 2014, pp. 81–83). Prahad and Ramaswamy (2004) not only characterize a user-centric business model with a co-creation focus but also contrast it to a traditional closed innovation model. As depicted in Table 2, co-creation and user-interaction aspects as the focus of the open business model are apparent,

which significantly differ from the aspects in the closed innovation business model, thus highlighting the required change in mindset (Prahad et al., 2004, p. 8).

Table 2: Business model characteristics and differentiation (Source: Adapted from Prahad et al., 2004, p. 8)

Aspect	Traditional Closed Business Model	Open User-centric Business Model
Goals of interaction	Economic value extraction	Value co-creation, economic value extraction
Interaction point	At the end of value chain	Multiple times at different stages
Relationship type	Transaction-based relationship	Co-creation-focused interactions and transactions
Interaction pattern	Firm-initiated interaction	Either firm- or user-initiated interaction
Focus of quality	Internal processes and offerings	Customer–company interactions

The importance of identifying a fitting business model also becomes apparent in the example case of Xerox research center called PARC (see chapter 2.2), where Xerox developed a new promising IP from which the company hoped to obtain some financial returns. Despite the potential of the idea, Xerox was unable to capitalize on it due to its poor fit with the business model. Put in numbers, Xerox's approximately $5 million investment was expected to raise about $10 million in compensation for its efforts. The selected approach was to license out the technology, which earned the company less than $1.3 million, well below expectations. The learning experience in the Xerox case is that inventing new promising technologies constitutes only about half the work, whereas identifying a suitable business model for generating value represents the other half. By licensing out the innovation, Xerox positioned another business with an appropriate business model to benefit from the innovation (Chesbrough, 2003a, pp. 175–176).

The remaining question pertains to how an organization can develop a business model that facilitates and supports value capturing from innovations. Euchner and Ganguly (2014) suggest one method of approaching the business model innovation by describing the procedure as a sequence of six steps (Euchner and Ganguly, 2014, p. 34). Figure 7 roughly illustrates the process, which is subsequently explored and explained in more detail.

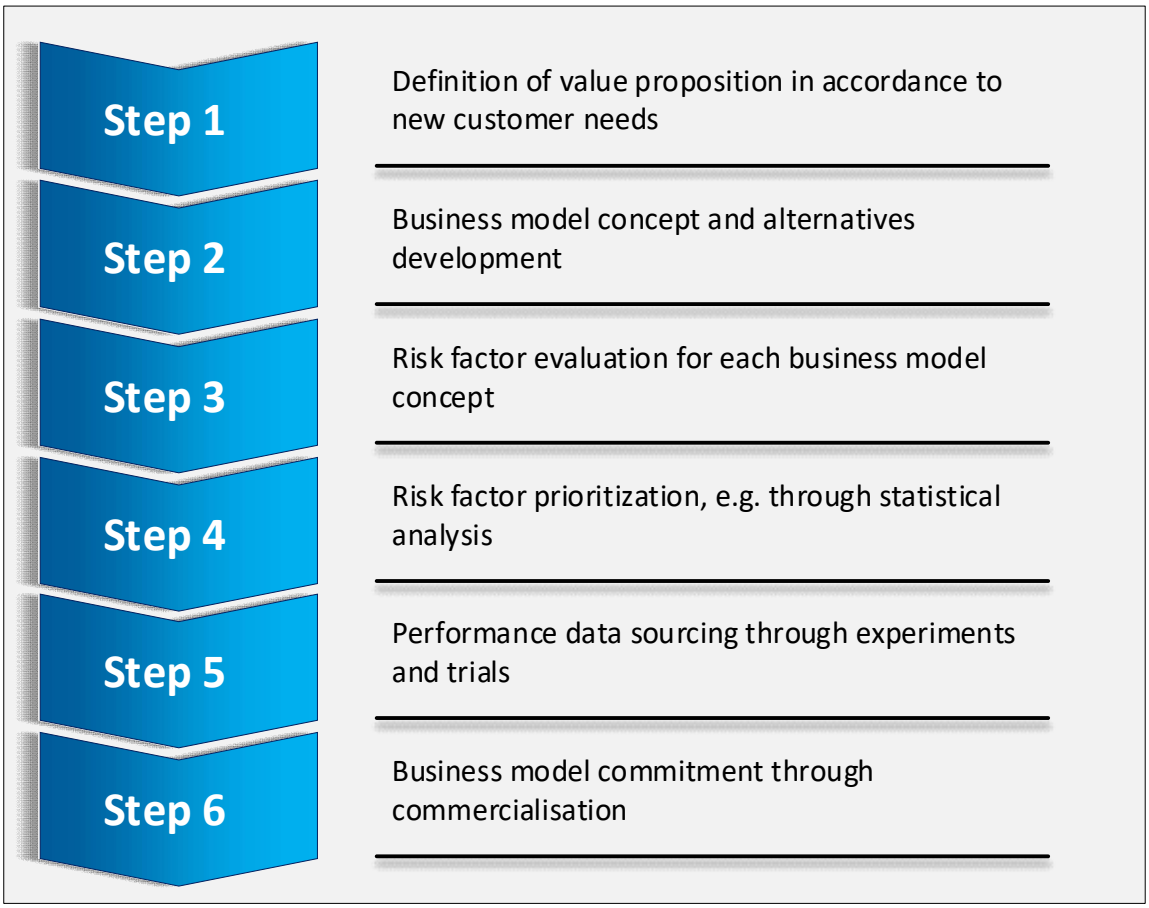

***Figure 7**: Six-step process of business model innovation (Source: Own figure based on Euchner and Ganguly, 2014, pp. 34–38)*

1) In the first step, the focus lies on clearly defining the value proposition that the new innovation offers customers. The definition process is initiated by determining the customer needs and developing appropriate value propositions that are tailored to those needs. Finally, the benefits of the value propositions are quantified for the intended customer groups. Valuable sources of input include the customers themselves, especially the dissatisfied ones who can offer insights into better value propositions (Lindgardt et al., 2009, p. 5).

2) In the second step, the development and evaluation of a set of business model concepts and possible alternatives transpire. The earlier part of this chapter established that value creation from a technology entirely depends on its business model (Rodet-Kroichvili et al., 2014, p. 90). Selecting the most appropriate business model through careful consideration (e.g., comparison of competitor business models with similar value propositions) enables organizations to maximize their innovations. The following quotation from Kirschbaum (2005) precisely captures this point: "*Value creation requires a coherent strategy*" (Kirschbaum, 2005, p. 28).

3) In the third step of the process, the evaluation of the business model concept is advanced by including potential risk factors (e.g., simulating a financial model with estimated costs and expected profits). Although the assumptions made in that financial model may be incorrect, they can prove to be a valuable indicator of the actual innovation performance and constitute evidence of its feasibility (Wirtz and Daiser, 2018, p. 51).

4) In the fourth step following the risk identification, those risks need to be prioritized based on the current knowledge about their potential effect on the innovation performance, for instance by utilizing statistical methods.

5) The fifth step encompasses the collection of real-world data and performance of business experiments (Lindgardt et al., 2009, p. 4; Yun et al., 2016, p. 5) through either prototype developments or pilot projects. Insights from such trials can indicate further directions for business models, as they provide validation of the formulated assumptions or dispute them.

6) The sixth step concludes the process with an expression of commitment to the selected business model; this model was filtered out from the examination of the previous phases by bringing the innovation to market to demonstrate its profitability (Euchner and Ganguly, 2014, pp. 34–38).

This chapter has repeatedly established the inherent value of creating and transitioning to a new business model for innovations. Changing and innovating the business model is also believed to improve the overall performance of the organization (Lambert and Davidson, 2013, p. 678). However, the potential barriers and risks of such procedures are unaddressed thus

far. Hence, the subsequent sections briefly discuss business model-related barriers to open innovation transitions.

New business models require new forms of governance and new business processes to facilitate the open innovation-focused strategy. However, new governance modes also indicate organizational change and the associated resistance from internal employees (see also chapter 2.3.3). Previously discussed change management approaches such as incentives, employee empowerment, and clear and honest communication may provide a remedy (Saebi and Foss, 2015, p. 208). Another major challenge in user co-creation-based business models is the successful motivation of external participants to contribute their knowledge and ideas to the innovation process. Contrary to employee motivation, monetary rewards are deemed ineffective as an incentive method. Instead, external users attach a higher importance to being viewed as equal partners in the value creation as well as peer recognition (intrinsic motivation). Users also attach value to having a user-friendly online platform that facilitates real-time communication and allows them to discuss, comment, and contribute feedback to innovative ideas and concepts. Providing users with such opportunities can be classified as a critical success factor of knowledge sourcing and open innovation endeavors (Hienerth et al., 2011, pp. 354–356). Thus far, an important observation of the current thesis is the recurrence of the necessity of change management practices in open innovation transition projects.

3.1.5 Implementation Capabilities

The successful implementation of any of the aforementioned open innovation process archetypes (inside–out process, outside–in process, and coupled process; see chapter 2.3.2 for more details) is associated with high demands on an organization's knowledge management capabilities (Lichtenthaler and Lichtenthaler, 2009, pp. 1334–1335). For instance, regarding the outside–in (and coupled) paradigm, a firm's absorptive capacity is considered a deciding factor on the success or failure of the endeavor. Absorptive capacity describes the firm's capacity to successfully identify and integrate external knowledge sources, which is affected by the development of dedicated processes and strategies to utilize external knowledge (Lameras et al., 2012, p. 18). Even long before the notion of open innovation spread in the early 2000s, Cohen and Levinthal (1990) established a strong correlation between a firm's absorptive capacity and its innovative capabilities. The concept of absorptive capacity not only refers to interorganizational knowledge transfers but also encompasses the transfer between individuals and departments within an organization (Cohen and Levinthal, 1990, pp. 3–4). Lane et al. (2006) expand the definition of absorptive capacity by dividing it into three sub-capabilities: ability to recognize and understand extraorganizational knowledge boundaries, ability to assimilate external knowledge, and ability to apply assimilated external knowledge. Expanding on these capabilities offers several benefits to the organization, such as an increase in the likelihood of the long-term survival of the business and a reinforcement of the company's knowledge base (Lane et al., 2006, p. 856).

Grimaldi et al (2013) provided a similar approach to open innovation implementation capabilities; they investigated the interrelation and effects of a firm's dynamic capabilities on open innovation processes (Grimaldi et al., 2013, p. 199). Their work is built upon a survey conducted by Teece (2007), who identified and grouped the main dynamic capabilities of firms into three different categories. *Sensing* capabilities refer to a company's capacity to identify changes in the business environment (e.g., changes in process and technology and shifts in customer demands) and the ability to identify new business opportunities. To maximize the detected opportunities, companies also require *seizing* capabilities; these capabilities pertain to the competency to address such opportunities with heavy investments in terms of their development and commercialization. Companies need to be able to decisively commit to the identified opportunities that they estimate would achieve marketplace acceptance. Not every

company possesses this skill due to the prevailing risk aversion and a "program persistence bias," in which the maintenance of the status quo is often given preference. The final dynamic capability is *reconfiguration*, which takes effect after successful sensing and seizing. Companies generally prefer to maintain routine processes that proved to be successful in the past, as changing them is not only costly but also anxiety-inducing due to the unknown nature of ensuing events. Constant reconfiguration ensures a certain evolutionary fitness, which helps businesses to stay attuned and competitive in terms of changes in markets and technologies (Teece, 2007, pp. 1322–1335).

A comparison of the dynamic capability requirements between the closed innovation and open innovation approach reveals the importance of the development of a firm's dynamic capabilities. Table 3 presents this comparison.

Table 3: Dynamic capabilities in open innovation approaches (Source: Own table based on Grimaldi et al., 2013, p. 208)

Approach	Sensing Capabilities	Seizing Capabilities	Reconfiguration Capabilities
Closed innovation	Low	Medium	Medium
Open innovation	High	High	High

Lichtenthaler and Lichtenthaler (2009) further investigated capabilities that provide support for the open innovation implementation and companies' transition toward it. Firms with the aim to externalize and outsource their IP though the inside–out paradigm of open innovation should have highly developed *inventive capabilities*, referring to their ability to source and generate knowledge from within their boundaries (e.g., through internal R&D departments). By contrast, *connective capabilities* can be characterized as the retainment of knowledge outside the organization's boundaries, while disregarding the inward transfer of knowledge. The exploitation of knowledge regardless of its source and its transformation into successful innovations is coined *innovative capacity* by Lichtenthaler and Lichtenthaler. Finally, the *desorptive capacity* of a company is characterized by both the identification of external knowledge

sources and their subsequent transmission to the intended recipients (Lichtenthaler and Lichtenthaler, 2009, pp. 1318–1322).

The purpose of this subchapter is to illustrate the involved complexity of transitioning to open innovation processes by highlighting some of the capabilities that companies need to foster to increase their prospects for success. The development and expansion of these capabilities can therefore be considered as a critical success factor of open innovation projects.

3.2 Second Transition Phase: Moving the Organization

Chapter 3.1 and its subchapters up to this point mostly described the pre-conditions for the successful initiation of the transition toward the open innovation paradigm (e.g., cultural and business model alignment, creation of interorganizational commitment, and dedication of specialized roles to the procedure). By contrast, this chapter adopts a more practical approach by examining innovation strategies that organizations can employ to deploy the open innovation paradigm.

3.2.1 Innovation Sourcing Strategy

The inbound dimension of open innovation (characterized and described as the "outside–in" archetype in chapter 2.3.2) aims to create partnerships with external actors, with the overarching goal to source their technologies and knowledge to improve the performance of the organization's internal innovations (Chiaroni et al., 2010, p. 222). Research reveals that different companies have various strategies for implementing open innovation. For instance, companies generally employ varying degrees of *search breath*, which is defined as the quantity of different types external sources consulted by a company for its knowledge and invention sourcing to facilitate its open innovation processes. The search breadth of a company is hypothesized to have a strong correlation with its overall open innovation performance (Laursen and Salter, 2006, p. 135). Another differentiating factor regarding the strategy of open innovation is the *depth* of knowledge search, which is characterized by the knowledge extraction intensity from external sources. The total number of companies that exert a strong influence on the organization's innovation process (e.g., through massive knowledge or capability contribution) defines the depth of an open innovation strategy (Laursen and Salter, 2006, p. 136). An example of a high depth strategy is an R&D alliance, with the joint purpose of co-creating new innovations, thus setting the requirement for a high partner integration (Saebi and Foss, 2015, p. 206).

Considering these differentiation aspects of open innovation strategies, Saebei and Foss (2015) develop a typology schema, into which organizational strategies are classified based on their level of search breadth and implementation depth. Figure 8 illustrates this typologi-

zation. Based on this schema, four types of open innovation (outside–in) strategies are identified, namely (A) market-based innovation strategy, (B) crowd-based innovation strategy, (C) collaborative innovation strategy, and (D) network-based innovation strategy.

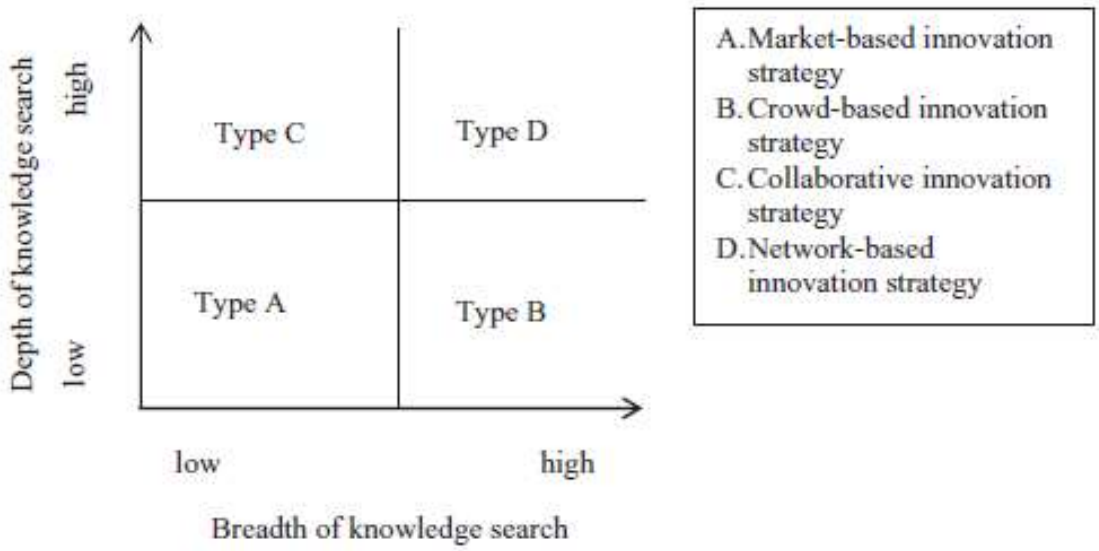

***Figure 8**: Typology of inbound open innovation strategies (Source: Saebi and Foss, 2015, p. 205)*

Dahlander and Gann (2010) define market-based innovation strategies as the gathering of input for the innovation development from a specific external source, the marketplace. In this strategy, the company's boundaries are permeable to the degree that it acquires both external licenses to commercialize them and external expertise required for sourcing value from the in-licensed technologies. This strategy demands high amounts of expertise from an organization, as the organization initially needs to build deep networks from which to source (Chesbrough and Crowther, 2006, p. 233) and identify external licenses and examine them in terms of their economic viability. In practice, companies not only buy the isolated IP of interest itself but sometimes also resort to the acquisition of other companies with a promising IP (Miller et al., 2014, p. 324). Although selecting this approach to transition toward open innovation offers several benefits (i.e., faster time-to-market and reduced R&D expenditures), its effectiveness is limited on the capabilities of partnered organizations from which knowledge is sourced (Dahlander and Gann, 2010, p. 705).

Crowd-based innovation strategies are characterized by actor participation (e.g., communities and anonymous contributors) in the knowledge production processes (discussed in more detail in chapter 3.2.4) through means of information and communication technologies to co-create new products and services (Lakhani et al., 2013, p. 357). A larger pool of scientific contributors, as is the case in crowd-sourcing environments, is believed to find solutions to problems more rapidly and accurately than those that the organization could source by itself (Seltzer and Mahmoudi, 2013, p. 3). This postulation assumes that the type of question is suitable for being solved by a crowd of people (e.g., pattern recognition problems) (Buecheler et al., 2010, p. 682).

Meanwhile, Leimeister and Zogaj (2013) assessed the potential negative effects of crowdsourcing, such as internal resistance to external knowledge from the organizational researchers (NIH syndrome, see chapter 3.1.1), resulting in a reduction in motivation. The other notable potential negative effects are loss of control due to the externalization of the innovation process, which also poses the danger of knowledge drain, and the requirement to provide incentive systems to encourage crowd participation in the first place (Leimeister and Zogaj, 2013, p. 60).

Another direction that companies pursue involves the adoption of a collaborative innovation strategy. In this strategy, interorganizational links and networks are constructed, for instance between public research organizations (e.g., universities) and private industrial organizations. Such an interorganizational relationship can co-create knowledge through various collaborative practices, such as collaborative research, joint research centers, and academic consulting services (Perkmann and Walsh, 2007, p. 259). However, the downsides of collaborative partnerships include potential information asymmetries and trust issues due to differences in size and knowledge, as well as loss of the initial setup costs of the partnership in case it fails (van de Vrande et al., 2006, p. 356).

The final open innovation implementation strategy is the network-based innovation strategy. It can best be described as a hybrid strategy that employs both user-driven (crowd-based innovation strategy) and organization-driven (collaborative innovation strategy) knowledge sourcing. This strategy also heavily relies on building lasting relationships with external actors

and acquiring the corresponding skill set required for it. In particular, consumers who are unrelated to the organization need incentives to feel obliged to contribute their knowledge, for instance by providing them with special statuses (e.g., giving VIP users early access to a product, which is commonly practiced in software-based businesses) or engaging in frequent interactions with them. The complexity of such a cooperation with large external networks often presents organizations with a major management challenge, resulting in organizational restructuring and re-design of activities to cope with the environment (Keinz et al., 2012, pp. 25–26; Saebi and Foss, 2015, p. 207).

Although outside–in strategies are observed to be less common and thus less explored in research, some of the inbound strategies have an outbound (inside–out) component to them. For instance, in the market-based innovation strategy, knowledge is sourced from another company through in-licensing. Thus, another firm must provide the knowledge through an out-licensing strategy, which can be characterized as an inside–out process archetype (Chesbrough and Crowther, 2006, p. 232). A prominent instance of the inside–out licensing business strategy is the case of IBM's open innovation efforts. IBM heavily invested (i.e., approximately $5 billion on a yearly basis) in its eight research labs and 30 development labs, with significant success. These financial research efforts brought IBM profits within the range of $10 billion over roughly a decade (22,357 patents between 1993 and 2002, which were out-licensed). External partners take up the licenses and bring the product to market by themselves, thus sustaining IBM's own research and additionally granting them financial benefits (Gassmann and Enkel, 2004, p. 3). Instead of accumulating IPs to avoid costly litigations (as was prevalent in the closed innovation paradigm, see chapter 2.2), IPs are considered a value asset to be managed to create new revenue streams via this strategy (West et al., 2008, p. 4).

As Teece (2010) emphasizes, a prerequisite for this strategy is the establishment of strong IP rights; otherwise, the out-licensing organization puts itself at risk of relinquishing some of the value captured by the innovation in favor of the one that adopts the license (Teece, 2010, p. 184). On the contrary, the procedures involved in setting up IP rights with external actors can be a major obstacle to reaching partnership agreements, especially with individuals who develop an involvement reluctance requiring high payoffs to overcome (Salter et al., 2014, p. 84).

3.2.2 Experimental Implementation

To achieve transition, the company needs to lay the prerequisite fundament, which has been mostly discussed in previous transition chapters. In chapter 3.1.4, in which the importance of an open innovation business model and a six-step procedure for developing such a business model were illustrated, a key instrument for supporting the transition has been brought to light in step five: collection of real-world performance data through an experimental implementation (e.g., prototype development and pilot projects). As open innovation involves radical organizational changes, the transition procedures are often associated with a high risk. Such risks can be minimized for the organization by using experimental implementations in an isolated environment (e.g., spin-off company). If a spun-off venture proves the viability of a strategy through a prototype, the parent organization can institutionalize the open innovation philosophy and fully employ open innovation in its day-to-day practices (Boscherini et al., 2010, pp. 1072–1073).

Kirschbaum (2005) investigated one instance of such an approach whereby the main organization creates a sub-organization on a trial basis; Kirschbaum specifically explored the procedures of the materials company *DMS* as it attempted to adopt open innovation (Kirschbaum, 2005, pp. 25–26). As a first step, DMS' range of promising business models was evaluated based on different business analysis tools such as a SWOT analysis (i.e., closer look at environmental factors such as the strengths, weaknesses, opportunities, and threats of the business model) (Pickton and Wright, 1998, p. 101). If the business model passes the evaluation procedures, it undergoes refinement and a small company is founded; moreover, this small company is under the constant supervision and continuous observation of its parent organization regarding its performance until it grows into a self-sustaining mature business (Kirschbaum, 2005, p. 27). The process is broadly outlined in Figure 9.

Rohrbeck et al. (2009) describe another real-world approach to the experimental implementation of innovation in the case study of the R&D department of Deutsche Telekom called *T-Lab*, which employed user clinics as a customer insight tool. These user clinics presented customers with several prototypes of a product, each with its own unique characteristics and set of features. Customers were then instructed to select one of the presented prototypes. The most popular prototypes would finally result in a synthesized product that included the features elevated by the customers. These user clinics brought a twofold benefit, as Deutsche

Telekom gained not only real-world performance data of its product but also customer insights that it can utilize in the development of the final product (Rohrbeck et al., 2009, p. 427).

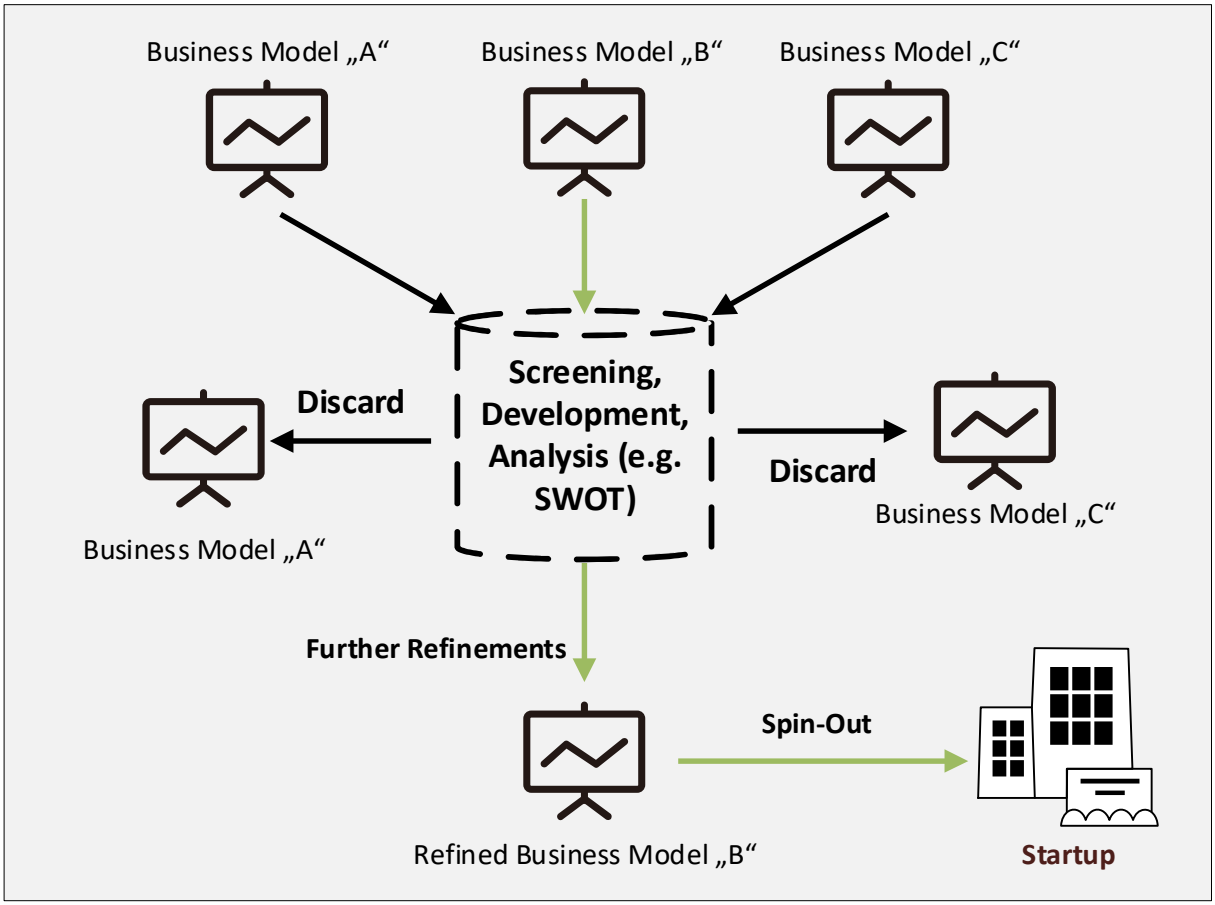

***Figure 9**: Startup establishment based on open innovation business models (Source: Own figure based on Kirschbaum, 2005, pp. 26–27)*

Despite gaining access to real-world performance data, experimentation can also cause risk reductions. Engaging in cooperative relationships is also considered a risky endeavor, as all the involved parties need to be equally committed to avoid potential conflicts between them. Through experimental strategies, organization can gauge their partners' readiness for such commitments before the commercialization of the innovation in a low-risk and comparable manner. Furthermore, financial commitments are kept under control using this approach, as experimentation is a comparably low-cost practice (Barett et al., 2011, p. 7). The inclusion of customers in the product development process may also further benefit the organization

through increased consumer satisfaction ratios. For instance, customer input during the development process includes information about the pricing model and the customer value proposition (Huston and Sakkab, 2007, p. 22).

Boscherini et al. (2010) further examine the following organizational variables for enhancing the understanding of a pilot project venture (Boscherini et al., 2010, p. 1073):

- Source of the pilot project: Screening of the triggering parameter of the pilot project to convey a sense of urgency. Common triggering parties include either intraorganizational personnel (i.e., the organization's management who identified the need) or extraorganizational personnel (e.g., satisfying the needs of key customers).
- Objective of the pilot project: Examination of what the organization hopes to achieve by proceeding with the pilot project. Some of the previously mentioned benefit factors (i.e., risk or cost reduction) may serve as objectives such as the diversification of the business product range.
- Reason for adopting open innovation in the pilot project: Provision of the rationale behind the decision to employ a pilot project, which may involve either the sharing of risks with partners in a cooperative relationship or the enhancement of current product performance
- Scouting of external partners: Scanning potential partners to be involved in the open innovation pilot project venture

As is often the case in open innovation and organizational change procedures, some challenges need to be overcome to fully utilize the experimental implementation approach. Although comparably low in cost, spinning off a startup from the main organization remains an expensive venture, which can be overcome by starting lean and only providing sufficient funds to reach the next milestone. Additionally, the recurring employee motivation factor and the NIH syndrome are potential roadblocks to spun-off startups. Remedy can be created through the inclusion and utilization of an innovation champion from senior management. Finally, the project may become stale due to immobility caused by the large number of people involved in the procedures, thus losing the project's lean attribute. This issue can be addressed by forming small, agile project teams that function as startups and are further empowered to rapidly move the project (Miller et al., 2014, p. 333).

In summary, experimental implementation techniques such as pilot projects and prototyping are a valuable instrument for easing an organization's transition toward open innovation. They also provide valuable insights into the further refinement of the strategy (or rather the selected business model) based on customer feedback in terms of value proposition and pricing, thereby reducing uncertainties that are commonly part of open innovation procedures.

3.2.3 Network Management

Open innovation entails collaboration and cooperation with a broad range of partners of all types in innovation projects. The reasons for such collaborations are manifold; in addition to the development of new technologies, companies engage in strategic partnerships to commercialize their new products or source knowledge from their partners. The facilitation of information and communication technologies further spreads the trend toward networking and connected information systems. However, a remaining major challenge concerns the identification of the right collaborators for the innovation project, as the involved parties often come from various backgrounds (e.g., universities, suppliers, and competitors) and need to have aligning goals. Such collaborations also represent a mindset shift for organizations that traditionally largely considered the internal variable for their innovation projects (Vanhaverbeke, 2006, p. 1). Thus, this subchapter explores the network building and management aspect of open innovation. The issue of whether the focus lies on building a large network or establishing fewer but deeper relationships needs to be answered in open innovation and requires the organization to decide on the approach and manage it appropriately (Julie et al., 2015, p. 11). Regardless of the selected approach, many managerial decisions flow into the procedure, such as with whom the organization prefers to participate, how the technical infrastructure of that participation looks, the overarching aims of the collaboration, and how to manage the resulting IP (Steinfield, 2014, 19).

With regard to the question of with whom to collaborate, Simard and West (2006) identify and characterize some of the key institutions of open innovation partnerships (Simard and West, 2006, pp. 10–12). For knowledge sourcing purposes, *universities* are among the primary choices due to their high research capabilities. *Venture capitalists* are also classified as a central institution with whom organization collaborate due to their involvement in startup developments, giving them insights into potential knowledge and synergies that may be beneficial

to both existing companies and startups. Moreover, venture capitalists often offer new perspectives about technologies and IP, and they can assist in the business model choice of an organization (Chesbrough, 2003a, p. 19; Simard and West, 2006, pp. 11–12). Other potential partners for open innovation endeavors include suppliers (due to their mostly pre-established ties), competitors (highly popular choice due to a high level of understanding of the industry), and customers of the organization (e.g., for insights into customer needs) (Sirito and Hasan, 2018, p. 356).

As the idea that having more collaboration partners signifies more innovative output cannot be generalized, other factors that affect the performance of open innovation and its influence on a network need to be considered in the design. Simard and West (2006) identified some of these factors, which are presented in the succeeding paragraphs (Simard and West, 2006, pp. 15–24).

For one, organizations need to establish both *deep* and *wide* ties with other firms. Strategic networks can serve as a competitive advantage due to knowledge inflows that are otherwise inaccessible to the firm; thus, companies need to create a deep embeddedness into vital markets and technologies, for instance by building strong networks with various partners with strong ties between the actors (Simard and West, 2006, p. 15). Establishing trust is a central element of building such networks (Westergren and Holmström, 2012, p. 212), as the failure to do so is suggested to be the most common barrier to becoming a successful open innovator in a collaborative environment (Hewitt-Dundas and Roper, 2018, p. 10). By contrast, *wide* ties are characterized by a weak association with multiple networks to reduce "overembeddedness" and provide the organization with a wide variety of knowledge sources. Organizational affiliations with frequent interactions are effective examples of such ties (Simard and West, 2006, p. 17).

Formal and *informal* ties require a distinction. Formal ties are based on contractual agreements between organizations, in which information is exchanged through dedicated channels established for that purpose (Vanhaverbeke, 2006, p. 5). On the one hand, formal ties are typically formed in joint research projects and licensing and marketing agreements (Simard and West, 2006, p. 11). On the other hand, informal ties are more difficult to identify because

they are mostly formed between employees connected through formal alliances and endeavors. An organization aiming to exploit informal knowledge sources may hire individuals who bring such knowledge with them through carrier affiliations, for example (Simard and West, 2006, p. 26).

Combining the two presented dimensions of ties (deep and wide, formal and informal) creates different networks, which provide organizations with various strengths and opportunities. For instance, although wide formal networks are more difficult to coordinate, they also provide a wider diversity and thus a higher innovation potential for firms. On the contrary, deep informal ties offer easy access to individuals and their knowledge, with the drawback that most the sourced knowledge may be redundant and therefore less contributing to innovation (Simard and West, 2006, p. 23). Figure 10 summarizes the implications of each network type.

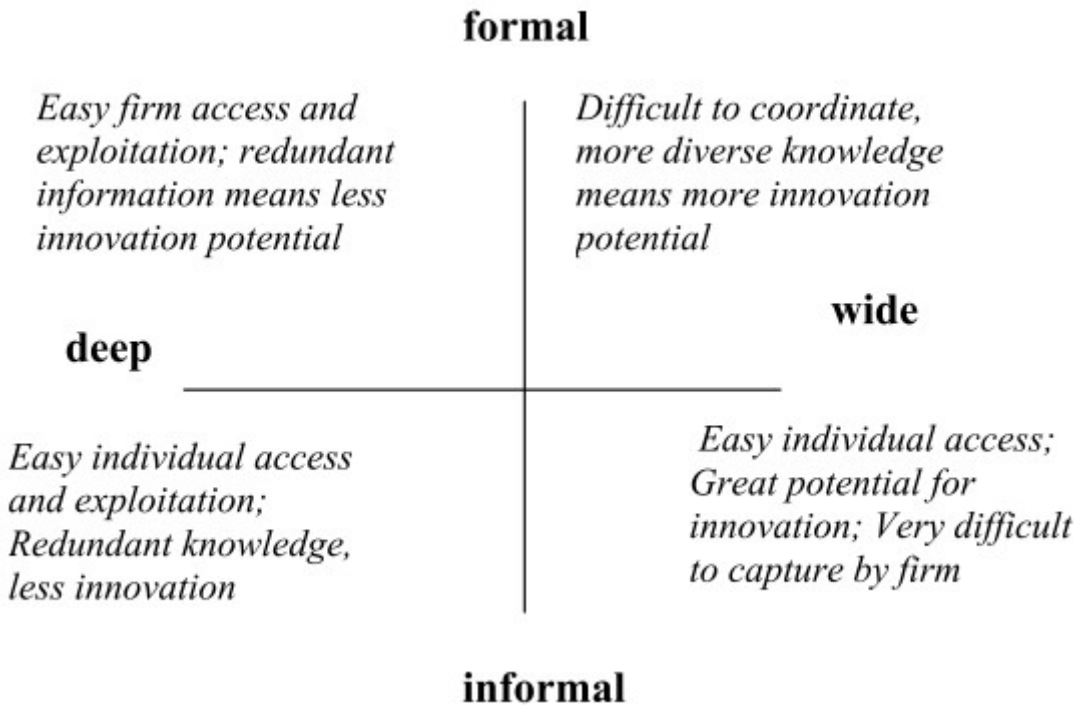

***Figure 10**: Nature of interfirm ties enabling open innovation (Source: Simard and West, 2006, p. 24)*

Interorganizational networks provide all the involved parties with several benefits. In addition to a reduction in the overall development costs, interorganizational networks enable firms to incorporate quality improvements emanating from a collection of expertise, thereby resulting

in overall better products and services (Steinfield, 2014, 23). However, for a networking endeavor to succeed, several factors play a key role, such as eliminating the aforementioned trust barrier between organizations (Hewitt-Dundas and Roper, 2018, p. 10). Trust-fostering measures include team-building efforts and joint regular meetings (Lessl and Douglas, 2010, p. 37). Regarding other critical issues affecting the success of network-building procedures, the assurance of a strategic alignment significantly contributes to the success, which requires trust and openness between partners, such that the goals of the venture are disclosed. Frequent and timely communication also positively affects the outcome of collaborative networks, as conflicts can be identified and resolved much earlier. Commitment and enthusiasm are the most important factors, which constitute a common variable in organizational change procedures (see chapter 3.1.1)(Lessl and Douglas, 2010, pp. 38–39).

The adoption of a structured approach with clearly defined steps allows companies to further increase the success rates of their open innovation collaborations. Traitler et al. (2011) describe one such approach as the "steps to value creation"; they argue that employing this approach results in a more sustainable innovation development process due to the division of risk and pressure between the associated partners. The steps include winning respect, building goodwill, establishing trust, and creating value. In practice, the firm *Nestlé* successfully employed these steps into its network-building procedures and positively influenced the scope and speed of its collaborative innovation processes (Traitler et al., 2011, 64).

Meanwhile, Lee et al. (2010) examined the role of intermediaries that support the organization in the establishment and management of interorganizational networks. They highlighted that the intermediaries' scope of duties includes the support of organizations in identifying appropriate business partners and aiding in establishing network and transferring technologies. In particular, smaller organizations with lower capabilities may profit from outsourcing the networking activities to such an intermediary (Lee et al., 2010, pp. 293–294). The other functions of intermediaries include technological support (e.g., knowledge transfer to systems) and management support (consultative function regarding issues during the transition toward open innovation) (Harro van Lente et al., 2003, p. 252).

In summary, organizations that aim to implement and thus transition to open innovation need to consider their external environment and their means of interacting with it. Companies can

choose from various approaches for forming relationships, and each approach is suitable for a specific use-case. Organizations with neither the capacity nor the willingness to actively practice network management themselves have the option of hiring intermediaries to do in a comparably easier manner.

3.2.4 Tools and Instruments

Organizations can use various tools for capitalizing on the implementation of open innovation. In fact, management and support of innovation procedures through tools is a known and tried and tested approach for boosting innovation output and performance. Open innovation, as a particular case of innovation procedure, is thus believed to also profit from the usage of dedicated tools for driving forward the innovation processes (Meißner and Engelien, 2010, p. 9). This chapter explores the tools and instruments that support the organization in its endeavor toward open innovation by raising its capabilities. As a consequence, organizations can cooperate more effectively in a distributed environment, source information from external actors in an easier manner, and accelerate the interaction between actors through tools based on web 2.0 (social software such as wikis, weblogs and social networking platforms; Back et al., 2009, p. 1) (Meißner and Engelien, 2010, p. 16).

The first tool consists of *innovation contests,* which primarily source innovative ideas from contestants, mostly consumers of the organization. The procedure is initiated by an open call directed toward the general public, with the goal of gathering solution approaches to a given problem. The participating actors ideally include future users of the product derived from the submitted solutions. To motivate participants to submit solutions, both monetary and intrinsic (e.g., public recognition) incentive systems are established (Jamett et al., 2017, p. 79). Innovation contests are an extensively employed approach nowadays, especially in early innovation phases to gather user insights for concept generation (Piller and Hilgers, 2016, p. 338).

Another tool, *innovation marketplaces*, can be characterized as web-based online platforms. On such platforms, companies declare a problem for which they are in search of a solution, while individuals or innovation teams suggest solution approaches. Similar to innovation contests, the main purpose of innovation marketplaces is to source knowledge from external actors. Companies can also engage on such platforms even without having a problem at hand

by browsing innovative ideas presented by the platform's community. The incentives of innovation marketplaces include monetary compensation in the form of a sizeable prize money and the prospect of collaborating on an innovative undertaking. The operators of the platform do not actively participate in knowledge sourcing, but they act as intermediaries between knowledge seekers and providers (Meißner and Engelien, 2010, p. 12). Among the practical benefits observed from the innovation marketplace *InnoCentive* are cost savings of innovation processes, resource savings from the overall accelerated research process through open innovation, and wide variety of knowledge input from the network of experts on the platform (Bishop, 2009, p. 3). However, the drawbacks of innovation marketplaces include the internal labor costs of posting and evaluating challenges, which may considerably vary as each challenge has different degrees of complexity and capability requirements (Bishop, 2009, p. 16).

Lead-user integration is a tool that is believed to be effective in identifying highly complex and technical solutions to given problems, as lead users are specialized experts specifically sourced for their knowledge. Due to their high expertise, lead users are characterized to be one step ahead of market needs by having special requirements that the market has yet to solve. Thus, their incentive stems from the prospect of satisfying their specialized needs beforehand by collaborating with an organization in innovative design processes and offering their insight, rendering the lead-user integration a profitable tool for the involved parties (Piller and Hilgers, 2016, p. 338). The lead-user method can provide value insights early in the product development phases, but it carries some risk with it, as it assumes that lead users and non-lead users have matching preferences that they have not realized yet (Urban and Hippel, 1986, p. 14).

Through *tool kits,* product and service design procedures are delegated from the firm to the customer by empowering the customers with easy-to-use design tools and giving them only general guidelines to which the product must comply, leaving the product characteristics open. Hence, the empowered user undertakes nearly all of the steps of innovation design, from the first design through trial and error to a prototype of that product to the final innovative product. As a result, products are much closer tailored toward user demands with high accuracy in terms of specification alignment with user needs (Hippel and Katz, 2002, pp. 822–823). However, the question of the degree of freedom provided to users and where to establish boundaries can be challenging in effectively employing tool kits (Habicht, Hagen and Moeslein, 2011, p. 8). Wecht and Baloh (2006) further identify four central characteristics of

user tool kits. First, tool kits must be adequately extensive to execute full experimentation cycles to give consumers sufficient playroom. Second, tool kits must be user-friendly so that users can utilize them without having to develop additional skills. Third, tool kits need to encompass all the components and modules deemed useful by the organization. Fourth, tool kits need to contain ample information about the framework therein to further maximize what users can do and thus raise the overall innovativeness of tool kit creations (Wecht and Baloh, 2006, p. 9).

Finally, user input can also be acquired without direct interactions through a technique called *netnography*. Netnography pertains to an online marketing research technique for gathering information about user needs and desires by utilizing web 2.0 technologies such as newsgroups, chat rooms, and user online communities, where consumers openly discuss and share product preferences. The collection and analysis of such consumer data from online sources allow companies to create consumer profiles (e.g., consumption patterns) far more effectively (in terms of costs and speed) than through interviews and focus groups due to the sheer mass of information available. Thus, companies are enabled to precisely tailor future inventions to their consumers' needs (Kozinets, 2002, pp. 1–2). Piller (2016) observed that mostly lead users engage in such online communities, making their input especially valuable for the early phases of the product design phase of innovation processes. The fact that online platforms have low access barriers to participate, such as the provided anonymity through pseudonyms removing potential mental barriers, results in higher participation ratios and more honest user inputs than could be gathered via more direct approaches (Piller and Hilgers, 2016, p. 338).

Many other open innovation tools and instruments are present in the current literature (e.g., foresight workshops for potential innovations and promising technologies are examined and discussed, Rohrbeck et al., 2009, p. 424). Nevertheless, the aforementioned ones are among the most commonly employed and extensively investigated tools (Meißner and Engelien, 2010, p. 9; Piller and Hilgers, 2016, p. 337).

3.3 Third Transition Phase: Institutionalizing the Changes

After an organization successfully moves toward open innovation (see chapter 3.2), the selected collaborative arrangements between the organization and its external partners need to be governed and the performance of the endeavors requires supervision via specifically developed performance measures. Thus, this chapter focuses on the examination of both of these processes.

3.3.1 Governance

Hosseini et al. (2017) define governance in an open innovation context as the requisite activities in establishing and operating procedures for continuously improving the innovation performance. These activities include addressing the decision-making issues in collaborative environments, partner relationship management, and intellectual property management (Hosseini et al., 2017, p. 93). Figure 11 illustrates these three issues along with a key question to be resolved by governance mechanisms. The subsequent paragraphs discuss the three aspects in more detail.

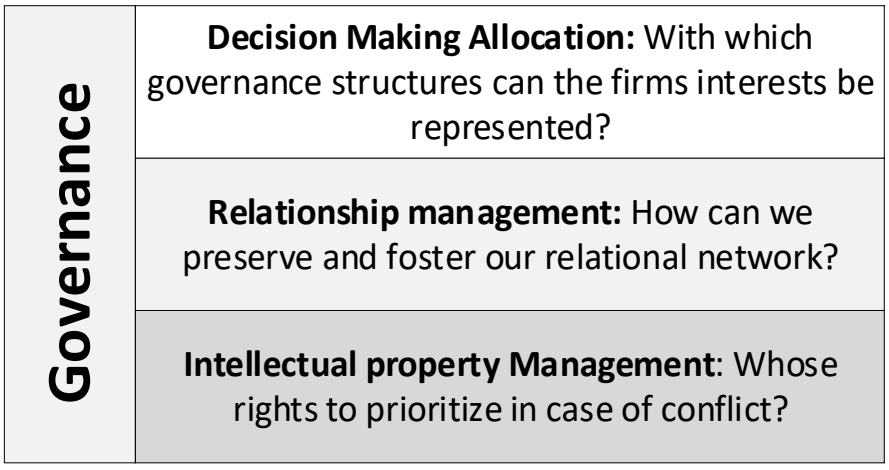

***Figure 11**: Three main aspects of open innovation governance (Source: Own figure based on Hosseini et al., 2017, p. 93)*

As explained in chapter 3.2.3, trust is vital in a collaborative environment, as trust is a critical success factor for building and maintaining open innovation partnerships. However, especially in collaborations involving partners of different sizes (and therefore capabilities and re-

sources) and thus varied degrees of influence, long-term collaborations can be quite challenging. Governance structures that advocate the interests of all the involved parties and enable even smaller collaboration partners to share their voice facilitate trust and mutual respect and thus positively influence long-term relationships. No one-fits-all governance approach exists, as each organization and collaboration is characterized by distinct variables such as company size and strategy (Barett et al., 2011, pp. 9–11).

According to Husseini et al. (2017), the second aspect of governance is partner relationship management (a previously examined concept in chapter 3.2.3). Interorganizational relationships are typified not by "*plug-and-play*" features but rather by "*plug, adjust, adapt, and then play*" ones, essentially denoting that such relationships need to be continuously fostered and polished (Huston and Sakkab, 2007, p. 22). Sirito and Hasan (2018) identify one requirement for maintaining relationships; that is, the parties' need for a mutually beneficial knowledge transfer that complements the partners' knowledge pool. Knowledge can be shared through several means, primarily via regular meetings and document transfers. Organizations also need to constantly consider their collaboration goals and share with their own employees information about the benefits of the collaboration to combat the NIH syndrome (Sirito and Hasan, 2018, p. 355). Furthermore, as the number of collaborating partners increases, the difficulty in coordinating and cooperating grows accordingly. In addition, existing collaborations could fall into patterns due to socialization, as companies prefer to collaborate with known and proven organizations to minimize the pervasive risk in collaborations with unknown entities. However, such preference also limits the organizations' potential knowledge pool and included perspectives, thus reducing the prospect and diversity of their innovations (Dahlander and Gann, 2010, p. 707).

Finally, IP management in the collaboration network needs to be addressed. The prevailing mindset in closed innovation (i.e., all IPs have to be closed off and protected even if the company does not have any plans to commercialize the inventions behind the IPs) (see chapter 2.2) is detrimental to collaborations. A more pressing issue concerns the co-ownership of patents and their governance; having multiple external sources (i.e., partners and consumers) involved in the patent creation procedures results in joint ownership. Effective governance mechanisms, which clearly state who has which claims and whose claim to prioritize, need to

be established to minimize conflicts. Other governance mechanisms include establishing responsibilities in patent-related complications and assigning decision-making rights. These issues can be preemptively resolved by an educated and proactive management that not only adopts appropriate governance mechanisms but also clearly communicates the expectations and rights associated with the created IP (Harris, 2014, p. 2).

Furthermore, managers of organizations need to address other governance-related issues to successfully practice open innovation, as identified by Wallin and von Krogh (2010). These issues cover the following decisions (Wallin and Krogh, 2010, p. 151):

- Procedure of selecting participants and identification of the rationale behind the choice
- Means of evaluating individual contributions
- Process of dividing losses among all the participants of the collaboration
- Way of handling conflict between participants
- Process of formulating important decisions within the collaborative ecosystem

Overall, the aim of addressing these governance issues should be to reduce for both users and partners the access barriers to participation in open innovation endeavors to successfully obtain knowledge contributions. Addressing each issues is expected to increase all the actors' willingness to share and cooperate (Wallin and Krogh, 2010, p. 151).

3.3.2 Performance Measurement

To support the implementation of sustainable open innovation procedures, the continuous output performance measurement of open innovation is essential. The open innovation literature has therefore discussed and examined performance measurement indicators that are applicable in an open innovation context, and it summarizes these indicators under the umbrella term *open controlling* (Piller and Hilgers, 2016, p. 334). To measure the efficiency and effectiveness of innovations stemming from open innovation, organizations must initially develop dedicated indicators of multiple dimensions to capture the performance of open innovation as accurately as possible. This step allows an organization's management to holistically plan, measure, and control the direction of the open innovation endeavor. The financial per-

formance of the innovation is of particular interest in this situation, as it indicates the economic success and its potential realization risks. The value of performance indicators is further emphasized by certain characteristics of innovation, as it is complex and prone to failure by nature due to its future orientation, while the future cannot accurately be predicted (Hilgers and Piller, 2009, p. 8). Management plays a particular role in this regard, as performance measures enable it to identify the difference between the expected reference performance value and the actual performance value arising from the project. Once such a difference has been identified, management can intervene with correcting measures to reach the expected performance. The issue of whether the incongruity in performance stems from underperforming innovation teams, ineffective managerial decisions in the past, or an ineffective innovation strategy can be ascertained with appropriate performance measurement systems and consecutively counteracted (Bösch and Kobe, 2005, pp. 17–18).

Another important aspect of performance measurement indicators is derived from the adoption of reward and incentive systems, especially for employees of an organization (see chapter 3.2.1), as contributions can only be incentivized if measured. Thus, measurement systems can positively influence the performance of employees, as these employees can now receive quantifiable recognition for their work in terms of both peer recognition and monetary rewards. As discussed in chapter 3.1.1, organizational motivation and commitment needs to be established to successfully practice open innovation. However, once established, commitment is not static in nature but changes throughout the venture. The overall commitment of the organization can be examined through performance measurement indicators; commitment that is found to be below a certain threshold is counteracted by management. (Susman et al., 2006, p. 43). The subsequent sections present some indicators applied in case studies to demonstrate potential designs.

A survey by Chesbrough and Brunswicker (2013) aimed to identify suitable open innovation measures and the satisfaction rate of organizations that employ such measures. The satisfactory ones are highlighted in Table 4.

Table 4: Open innovation performance indicators and satisfaction ratios (Source: Own table adapted from Chesbrough and Brunswicker, 2013, p. 31)

Indicator	Satisfaction	Classification
Share of external innovation contributions to R&D projects	High	Network
Cost–benefit evaluation of innovation partners	High	Network, Financial
Number of innovation partners	High	Network
Number of technology areas identified per year	Medium	Patent
Number of patents filed	Medium	Patent
Budget invested in innovation projects	Medium	Financial
Revenue from open innovation results	Low	Financial
Percentage of funded ideas	Low	Other
Revenue from outward licenses	Low	Financial
Patent utilization ratio	Low	Patent

High dissatisfaction is evident in organizations in terms of the measurement of open innovation performance. The financial aspects particularly seem unsatisfactory, whereas network- and partner-related factors reach high satisfaction ratios in comparison. Nonetheless, Chesbrough and Brunswicker (2013) conclude that current metrics are limited in their suitability for accurately measuring open innovation performance, as expressed by several organizations, indicating the need for further research to identify more appropriate measures (Chesbrough and Brunswicker, 2013, pp. 31–32).

In practice, several open innovation organizations apply different performance measures at various stages of the endeavors, while each stage has its own distinct measurement system in place. For instance, Cisco further differentiates between the measures for startups and the core business, such that startup projects are not prematurely terminated due to unrealistically high performance targets. Some of the most important measures accompany each stage; in the case of Cisco, these measures include customer satisfaction and product quality (Miller et

al., 2014, p. 331). IBM focuses its measurement indicators on the financial aspects of its open innovation practice, whereas the organization Nature emphasizes the relationships and their corresponding value for the organization (Ades et al., 2013, p. 23). The theme of these examples conveys the lack of a one-fits-all solution and underscores that performance measurements depend on the focus of the business.

4. Key Insights from the Analysis of the Transition

Driven by the common notion in open innovation literature that organizations lack the knowledge about the means of practicing open innovation (Huizingh, 2011, p. 8), chapter 3 discusses the three main phases of transition projects toward open innovation. In this chapter, the takeaways of these phases are brought together in a structured and concise manner to serve as a general guideline, clarifying the factors to consider in each distinct step. To reiterate, the identified success factors are **not fully generalizable**, as each organization is different in size, structure, strategy, and capabilities (highlighting the cognition that no one-fits-all solution exists). The information presented is gathered from a multitude of authors who conducted surveys and case studies that were largely limited to certain industries, areas (e.g., only organizations from a specific country), and different organization sizes. The individual steps of the phases are loosely in chronological order; nonetheless, **some procedures are overarching and could be classified differently** depending on the viewpoint. For instance, although performance measurement is classified as a measure during the institutionalizing phase of the transition toward open innovation, it is also extensively practiced during the unfreezing phase (e.g., to measure the organization's commitment and readiness to open its innovation processes; see (Miller et al., 2014, p. 331)). As illustrated in chapter 3.3.2, the generation and establishment of organizational change is not a nonrecurring process, but rather one that is initiated around at the start of the open innovation endeavors and stretches until its completion. As the development of organizational motivation and commitment is also characterized as a critical success factor of open innovation, the failure to uphold it at any point of the transition may negatively influence its performance regardless of the transitional phase. These cases are only two examples of the fuzzy boundaries of transitional phases; others may behave similarly, which should be considered during the entire process.

As for the basic insights that the analysis provides, attention is drawn to the **extensive list of prerequisites that an organization needs to establish before a successful transition can commence**. Starting with the issues of organizational commitment and motivation, the range of prerequisites includes addressing issues of internal role establishment and organizational culture alignment up to the development of appropriate business models, and the need to build

appropriate open innovation capabilities that are inexistent in the organization. The right organizational preparation for the open innovation venture consequently exerts a considerable influence (presumably even the largest one in comparison to the second and third phases) on the project's overall success. However, handling phases two and three of the transition is also highly pivotal to the success of open innovation endeavors.

Another insight that can be derived from the transition is **the emphasis of a correct mindset** during the entire procedure, not only from employees and management of the executing organization but also its external environment. Internal variables such as intraorganizational personnel present a substantial barrier throughout nearly all the phases of the transition due to their intrinsic resistance to change procedures. Among the most frequently mentioned catchphrases in the literature are not-invented-here syndrome, absorptive capacity, inward-facing mindset, and fear of the unknown, and the consequences of these factors to the organization are recurring barriers to the transition. Similarly, change management measures are suggested in the literature to create remedial solutions for personnel-related barriers, such as employee training, clear and honest communication and clarification of the consequences, and employee empowerment, either through opinion consultation or responsibility transfer. As a general piece of advice, having awareness of these issues and adopting early counteractive measures could potentially simplify the transition process in numerous ways.

Another actor-related barrier pertains to the **mindset of extraorganizational actors**, in which change management interventions cannot be applied. For instance, various types of collaborators require different motivation systems to maintain such a collaboration. Furthermore, both intrinsic and monetary incentive systems pertinent to consumers of the organization constitute a viable measure for ensuring participation. On the contrary, businesses are more focused on the value provided from the collaboration in the form of knowledge transfer and financial partake of jointly created innovation. The knowledge and the associated procedures regarding the manner of dealing with each actor type, both internal and external, can be characterized as a crucial part of the transition toward open innovation and hence must be established.

As explained in several transitional chapters, **trust between collaborators is among the most commonly mentioned barriers** of interorganizational collaboration. Chapter 3.1.1 discusses

trust in top management as a means of creating commitment, which is an issue due to potential dishonesty in the past. Chapter 3.1.2 examines the creation of dedicated trust-fostering roles (i.e., innovation champion and charismatic innovation leader) as an important precondition for establishing and enhancing trust in open innovation ventures. In chapter 3.1.3, trust is discussed as an essential part of an open innovation culture in the context of building a culture of trust through the clear communication of the implications that the change entails for all the affected groups. Although these concerns are internal trust-related issues, chapters 3.2.1, 3.2.3, and 3.3.1 discuss trust in an external sense as a critical success factor for not only establishing partnerships for collaboration but also maintaining long-term relationships with partners in combination with mutual respect. Hence, organizations planning an open innovation endeavor should consider trust and trust-building measures (e.g., open communication, regular meetings, and frequent information exchange in a timely manner) to boost their prospects of success.

A key organizational step is **massive restructuring to accommodate the requirements of open innovation**. As identified in the transitional changes, organizational restructuring can include several factors. For one, organizations need to adapt their role structure, as emphasized in chapter 3.1.2. Some internal R&D positions may be dismantled (see for instance Schroll and Mild, 2011, pp. 491–492), whereas other positions may be established to take their place. Furthermore, the internal culture needs to be adapted to be more conducive and open to allow knowledge to flow both inside and outside the organization. Accordingly, the organization's boundaries need to be made permeable. The creation of a dedicated business model for innovations (see chapter 3.1.4) also comes with organizational indications, as new business processes are established in the same line. Realizing change and establishing top management's willingness can thus facilitate the adoption of open innovation and hence should be practiced.

Nearly every phase of transition **requires management's key decisions**. These decisions include determining the parties with whom to cooperate, selecting the suitable procedure of open innovation (inside–out, outside–in, coupled process; see chapter 2.3.2 for more details), choosing the business model and innovation strategy, and identifying appropriate governance mechanisms and performance measure indicators for long-term success. Several influencing variables affect such decisions, but no general course of recommendation can be made in this regard because organizations differ in size, capabilities, and resources, among other factors.

Some industries are even considered to be unsuitable for open innovation due to its nature to openly and honestly share and communicate (see for instance chapter 2.2, which mentions the nuclear and military sector as favoring the closed approach to innovation due to an obligation to secrecy; Gassmann, 2006, p. 224). Increasing awareness of whether open innovation is the proper approach going forward and recognizing the specification of open innovation to adopt are the responsibility of top management, and these aspects should be extensively investigated beforehand.

At the start of the thesis, the high complexity of open innovation projects and their corresponding high failure rates were highlighted as a motivational factor for the examination of the transition. Retrospectively, the **sheer variety and volume of procedures involved in the transition from closed to open innovation** confirmed this notion. At the same time, numerous managerial decisions were identified, the organization's need to restructure (especially in terms of its personnel) was underscored, and new tools and technologies as well as the capabilities to move the project forward were described. Additionally, several types of barriers and multiple measures for dealing with such barriers were identified (e.g. change management instruments). The following table highlights the most notable ones, as identified in the literature and discussed in chapter 3. Some barriers, such as trust and the NIH-syndrome, have several occurrences in different transitional phases to note.

Table 5: Notable barriers in the transition towards open innovation (Source: Own table based on the collective insights from sources cited in chapter 3)

Barrier	Description
Employees' reluctance to accept the change	Employees are generally hesitant when faced with organizational change due to insecurities and an inward-facing mindset that disregards external environments.
Managers' lack of commitment to the transition	Managers are mostly focused on short-term gains and are generally lacking in knowledge about the relatively new phenomenon of open innovation.

Reluctance to work with outside sources	Employees perceive the work with outside sources as an additional workload.
Reservation toward new technologies	Managers may have doubts about new technologies.
Difficult-to-use state of external knowledge	Differences in formats make the internalization of external knowledge challenging for some organizations.
Reliance on legacy systems and resistance to change	People and organizations are mostly averse to change, prompting them to rely on ineffective but established procedures and structures.
NIH syndrome	Organizations have difficulties with accepting external knowledge due to a present mindset of self-reliance, which is a remnant of closed innovation.
Business model changes	Companies that fail to adopt or conform to a business model reflecting the new and open environment are prone to failure.
Risk aversion to decisively seize promising technologies	The appropriation of external technologies is accompanied by heavy investments that organizations need to make (i.e., "program persistence bias").
Trust issues between collaborators	Trust issues may arise between collaborators, thereby hindering knowledge exchange.
Incentivization of external actors to participate	External actors require incentive systems (intrinsic and monetary) to contribute their knowledge to organizations.
Management of existing collaborations	A growing number of collaborators are increasingly difficult to manage for organizations. Furthermore, organizations may fall into socialization patterns and thus limit the potential knowledge pool.
Inadequate performance measures	Current performance measures are unsatisfactory for organizations that practice open innovation.

To finally achieve the overarching research objective of this thesis, the compilation of a compendium of activities (a "guideline" so to speak), the subsequent table is compiled based on

the findings of the findings of chapter 3. It summarizes the insights identified from the literature in regard to the critical success factors of the transition in a concise manner as a means to reduce the complexity.

Table 6: Guideline for the transition towards open innovation (Source: Own table based on the collective insights from sources cited in chapter 3)

Phase 1: Unfreezing the Status Quo		
Phase	**Success Factor**	**Realizing Activities**
1a: Organizational motivation and commitment	Generate motivation and commitment for employees	-Build employee capabilities -Consult employee opinions -Clearly articulate the need to change by creating a sense of urgency
	Generate motivation and commitment for management	-Present key variables that are important to management (e.g., financial variables) -Argue a sense of urgency -Create clear roadmaps to ensure management support over time and reduce fears
	Increase employee participation and interest	-Empower employees by giving them responsibilities and including them in planning processes
	Reduce fears stemming from uncertainty	-Honestly and clearly communicate repercussions -Conduct key stakeholder consulting and personal inclusion
	Incentivize personnel for their efforts through rewards	-Employ incentive systems that are suitable for open innovation
1b: Internal role management	Dedicate full-time staff to the endeavor	- Create interorganizational roles with specific tasks
	Clearly assign tasks and responsibilities	-Form a dedicated open innovation team in which responsibilities are concentrated
	Effectively scout technologies through a dedicated role	- Employ technology scouts who identify promising technologies and articulate their value
	Dedicate a role for innovation promoters	-Designate an innovation champion who enthusiastically and positively promotes the project and its need as well as presents the vision

	Effectively internalize external knowledge	-Designate integration experts who transform the knowledge into a usable format for the organization's employees
1c: Interorganizational culture	Establish a willingness to abolish old values, systems, and procedures	-Promote new cultural values such as teamwork and increased information flow -Address employee fears resulting from the impending change via clear communication
	Adopt an open mindset toward outside sources of knowledge and partners	-Adapt the intraorganizational culture to promote an outward-facing culture -Eliminate the NIH syndrome through clear discussion
	Trust establishment and empowerment of employees	-Openly communicate the implications of the transition toward open innovation
	Build on past experiences of openness (e.g., collaborations and previous licensing-out cases)	-Identify the cultural heritage that may benefit open innovation and build upon it
1d: Business model conformity	Avoid relying on traditional business models for commercial success	-Re-examine the value proposition and revenue model by the innovation
	Take into account the outside interactions on the business model	-Develop an open, outward-facing business model (e.g., user-centric)
	Create and identify a fitting business model for the technology behind the innovation	-Develop concepts and alternatives while individually evaluating each concept (e.g., risk analysis, SWOT analysis) -Apply change management procedures (clear and honest discussion, training, and empowerment)
1e: Implementation capabilities	Increase the absorptive capacity of the organization (i.e., competency to integrate external knowledge into the organization)	-Develop dedicated processes and strategies that utilize external knowledge to increase the absorptive capacity
	Build dynamic capabilities	-Develop sensing abilities to identify changes in the business environment, such as new customer demands and promising new technologies

		-Cultivate seizing capabilities (i.e., ability to exploit and internalize external knowledge) -Develop reconfiguration capabilities (i.e., constant re-configuration to ensure organizational "fitness")
	Build various open innovation-related capabilities	-Develop inventive capabilities (i.e., sourcing and generation of knowledge from within to externalize it) -Cultivate connective capabilities (i.e., retainment of knowledge outside of the organization) -Nurture a desorptive capacity (i.e., identification of external sources of knowledge and subsequent knowledge transfer to intended units)
Phase 2: Moving the Organization		
2a: Innovation sourcing strategy	Focus on a specific strategy in alignment with the organization's goals	-Decide among the various alternatives of business models based on their evaluation
	Define how knowledge is sourced and from which parties or entities	-Consider the search breadth (i.e., number of partners from whom knowledge is sourced) -Consider the search depth (i.e., intensity of collaboration and knowledge sourcing from partners)
	Execute the procedures of knowledge sourcing and/or externalization, which are suitable for the selected strategy	-Identify the necessary procedures for the strategy (e.g. build strong IP protection measures in inside–out-based strategies)
2b: Experimental implementation	Test the real-world viability of an open innovation strategy before fully committing to it	-Employ experimental implementation techniques such as pilot projects and prototype building
	Constantly evaluate the performance of the experiment	-Use business analysis tools such as SWOT analysis
	Do not be apprehensive about discarding negatively evaluated business models, while committing to promising ones	-Commit in the long term (e.g., a spin-out of a startup under the umbrella of the core business)

	Ensure commitment from partners in collaborative environments	-Carefully gauge the partners' interests before fully committing to the innovation to avoid potential financial losses due to the lack of commitment afterwards
	Pre-define the objectives of the experimental implementation	-Screen the source of the project to convey a sense of urgency -Communicate what the organization hopes to achieve through the project (e.g., risk or cost reduction and product range diversification)
2c: Network management	Decide on how the organization plans to build the network based on its capabilities	-Identify the decision points (i.e., between formal ties or informal ties, and deep ties or wide ties)
	Ensure strategic alignment between members of the collaborative network	-Select the suitable knowledge sources and collaborators (e.g., university-, user-, and business-oriented knowledge sources and collaborators)
	Counteract conflicts with other collaborators beforehand	-Clear out potential trust barriers between members of the network through frequent communication in a timely manner to hinder conflicts
	Systematically build the network	-Employ a structured approach such as the "steps-to-value-creation" approach (Traitler et al., 2011, 64) -Rely on intermediaries who provide the capabilities and technical support for network-building procedures
2d: Tools and instruments	Increase the performance and output of open innovation through tools	-Identify tried and tested tools to meet the needs of the organization
	Improve the communication with key customers and stakeholders (e.g., regular consumers and lead users)	-Employ web 2.0 tools and technologies such as social media websites, newsgroups, and blogs to establish more effective communication lines with stakeholders
	Motivate users to contribute their knowledge and insights toward the innovation procedures	-Establish both intrinsic reward systems (e.g., public acknowledgement of the contribution) and monetary reward systems (e.g., price money for successful contributions)
	Increase the success rate of open innovation	-Gather user insights through various open innovation tools and instruments such as tool kits and netnography

	through tool-gathered user insights	-Incorporate the gathered insights from open innovation tools into the early phases of the design process of news products or services
Phase 3: Institutionalizing the Changes		
3a: Governance	Allocate decision-making rights in the network of collaborators to decrease potential conflicts	-Establish governance structures that advocate the interests of all the involved parties to ensure long-term relationships
	Continuously foster the relationships built within a network	-Create a mutually beneficial transfer of knowledge for all the involved parties -Establish a means of document transfer between organizations -Hold regular meetings to exchange information and build a relationship based on mutual trust
	Extend the knowledge perspectives and inputs from the network	-Extend the horizon beyond long-term partners to include unknown organizations that may offer entirely new perspectives to the innovation procedures
	Establish governance procedures to handle disputes between collaborators of a network	-Develop clear IP governance mechanisms (e.g., determine the specific rights to prioritize in conflict cases, and identify mechanisms for defining how losses are divided)
3b: Performance measures	Continuously monitor the performance of open innovation projects through performance indicators	-Develop dedicated performance indicators that accurately reflect the particularities of open innovation -Ensure that the developed measures cover as a general guideline multiple dimensions such as financial, network-related, and patent-related aspects
	Act in a timely manner when performance indicators highlight incongruities between expected and actual performance	-Make sure that management intervenes in correcting measures to achieve the expected performance
	Employ different performance indicators at various stages of the open innovation venture	-Examine the focus of the business (e.g., boost customer satisfaction, reap financial gains)

The entirety of the actions described in this table contribute to the realization of their corresponding success factor. Thus, these actions collectively form a guideline for transitioning towards open innovation. Consequently, the overarching goal of this thesis, the derivation of a recommended course of actions in form of a guideline, is attained.

5. Conclusion

This thesis explored the concept of open innovation, with a focus on the transitional procedures required for a transformation from a traditional, closed approach to innovation to an open one. The thesis demonstrated the importance and role of innovations for organizations, which resulted in an examination of how innovations are traditionally sourced in organizations. The traditional approach is aptly called closed innovation because it is conducted behind closed doors, with a prevailing mindset of self-reliance. However, sole reliance on the closed innovation paradigm contradicts one of the fundamental organizational goals, namely to remain competitive and differentiate the firm's offerings from its competitors. Several erosion factors combined with changing environmental variables contribute to this development, highlighting the need to modernize the innovation process of the organization. As explained in the main section of this thesis, such modernization is easier said than done. Although several reasons underlie this situation, the high complexity and broad scope generally characterize the transition to open innovation. The nature of organizational change further complicates the entire process, which typically accompanies the resistance from the organization itself. As a countermeasure, change management procedures are proposed. Other barriers such as trust issues and lack of capabilities are part of the process and need to be tackled.

This thesis also aimed to identify and characterize open innovation transition procedures from the literature, structure them, and explicitly underscore the success factors in each phase to provide a concise and structured overview of these procedures. By clearly outlining the involved procedures, the objective was to reduce the overall perceived uncertainty and complexity. With the conclusion of chapter 4, in which the findings from previous chapters are outlined, this research goal was achieved.

Despite the numerous advantages of open innovation and the erosion of its predecessor, many organizations still struggle with the decision to practice open innovation due to the failure-prone and high-risk nature of this approach. As the knowledge base grows in the future, an increasing number of organizations may choose to adopt the paradigm.

Future research could follow through on this theme by examining specific industries or organization sizes, taking into account the guidelines presented in this thesis and adapting them to

the underlying use-case. New open innovation tools, management paradigms, and procedures may arise, thus further contributing to the proliferation of open innovation and its importance for organizations. This thesis has identified a broad spectrum of actions that facilitate the realization of open innovation success factors. Nevertheless, further research is required for expanding this spectrum to increase the understanding of the measures available to organizations and thus reduce transitional fears. The choice of methodology (i.e., literature analysis) constitutes a limitation of this thesis, as the insights are solely derived from open innovation literature. Supplementing those insights with empirical data could provide new perspectives and findings regarding the transition toward open innovation, which in turn may deepen the understanding of the transition.

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