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Master thesis

Identification of Startups as Innovation Partners – Analyzing Complex Search Strategies within the Automotive Industry

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Declaration of Authorship

I hereby declare that I have written this Master's Thesis independently, that I have completely specified the utilized sources and resources and that I have definitely marked all parts of the work, including tables, maps and figures, which belong to other works or to the internet, literally or extracted, by referencing the source as borrowed.

Enschede, 25th of August 2017 _____

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Abstract

Startups have the potential to transform industries as they follow partly divergent business strategies and have the ability to develop new innovative products. The evolving fields of digitalization, sustainability and urbanization highlight the direction of change. Due to enormous time pressure and lack of knowledge, corporations rely heavily on external sources of knowledge to increase innovativeness. Therein, startups take a special role. Joint R&D projects, investments or strategic buyer-supplier agreements with startups grant corporations access to their innovative technologies. This paper gives insights into the organization of search processes to identify innovative startups and highlights approaches to initiate collaborations. Therefore, a multiple-case study among automotive OEMs and suppliers was conducted. The research ends with organizational structures, an identification process, and various instruments developed for the identification of startup innovations. Furthermore, propositions are made for a successful collaboration between startups and established corporations, displaying the role of purchasing in startup management, the need to take fast decisions, secure technical support by experts within their organization and build strong relationships with partners within their supply chain and new partners, as for example venture capitalists.

Keywords: startups; corporations; external technology sourcing; organizing search; structure; processes; instruments; collaboration.

Preface

Today's automotive industry is one of the fastest changing industries in world economics. New firms enter the market and change the automotive industry environment with their partly divergent business strategies and their ability to develop new innovative products. For established corporations the rising competition in the market represents a huge threat to their current business and engender the need for established multinational corporations (MNCs) to develop new capabilities initialing the ability to change. The evolving field of digitalization, sustainability and urbanization gives some indication of the direction of change. Representing a threat to established corporations, but also new opportunities in the highly competitive environment of the automotive industry.

Due to the enormous time pressure and the lack of knowledge corporations rely heavily on external sources of knowledge to increase their innovative capabilities. In order to do so corporations need to open their R&D department to the external environment and search for innovation within the market. Furthermore, corporations need to select innovations best fitted to their organization and strategy. In consequence, the open innovation concept serves new opportunities and risks, making it necessary for corporations to develop sufficient identification processes and prepare for collaboration with new, unique business partners. Especially in today's automotive market environment where young and innovative firms hold knowledge and abilities to make a difference in the competition.

In order to explore search processes used to find innovative startups, the proposed master thesis will give insights into identification process within the context of the automotive industry. First of all, the research reviews the current state of literature on innovation management in the open innovation (OI) environment, specifically focusing on the knowledge search process. Search processes for not yet identified and maybe hidden knowledge will be analyzed theoretically. Second of all, a multiple-exploratory-case study will be conducted to give insight into the identification process to detect innovation within the automotive industry context. To increase the practical relevance of the research the study will further address the first aspect of selection and collaboration with startups. Based on the observed practice the thesis will contribute to the body of knowledge by discussing obtained practices to the current state of literature. This study closes with best-practices for the identification of and collaboration with innovative startups within the automotive industry.

During the practical implementation of the master thesis the student will be located at a German OEM in the automotive industry. The sample for the explorative multiple-case study will be extracted from several automotive first-tier suppliers and OEMs. Depending on the design and structure of the identification and collaboration approach within each case one or several interview partners will be questioned. All interviews will preferably be recorded and transcribed. Furthermore, transcriptions will be analyzed to develop best-practices from automotive industry practices. The study will address corporations need towards growing new innovation suppliers and granting access to innovative technologies in their supply base. Here some implications for purchasing and supply management practices will be made. Analyzing on the one hand purchasing´s contribution in the identification of innovative startups and on the other hand purchasing´s contribution in supporting the industrialization of startup innovations.

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List of Abbreviations

CVC	Corporation Venture Capital
FFE	Fuzzy Front End
IP	Intellectual Property
MNCs	Multinational Corporations
NPD	New Product Development
OEM(s)	Original Equipment Manufacturers
R&D	Research and Development
VCs	Venture Capitalists
OI	Open Innovation

1. Introduction: Startups as Innovation Partners within the Automotive Industry

1.1. Startups as new Source of Innovation

Today's corporations require continuous innovation to respond to increasing globalization and speed in their highly competitive market environment.[1] Therefore, corporations need to ensure an ongoing stream of innovation. In order to innovate, corporations rely on in-house research and development (R&D) and increasingly on external sources of knowledge.[2] However, today's corporations struggle with several strategic challenges: which R&D activities to outsource, where to outsource them to, and how to make the knowledge transfer between external knowledge sources and their organization work.[3] In recent literature knowledge sourcing from upstream suppliers received great attention.[4] Especially, original equipment manufacturers (OEMs) from the automotive industry recognized huge innovation potential from external partners as for example established suppliers.[5] Where, a close relationship between corporations and suppliers is found as precursor for successful innovation sourcing.[6] However, there is still room for improvement in the way how corporations collaborate with other, especially smaller, business partners for external innovation sourcing.[7]

In the past decade, corporations from the automobile industry have increasingly recognized the opportunity to source innovation from ambitious startups.[8] Due to the difference in startups business practices and structure, in comparison to established suppliers, corporations face the challenge to utilize startups as new innovation partners to increase their innovativeness.[9] OEMs in the automotive industry need to adapt their organization and processes in order to identify and collaborate with startups in a fast changing business environment.[10] Recently, scholars stress supply management practices to have a significant contribution in developing startups as new business partners, particularly in the field of new product development (NPD), pointing out the strategical position of purchasing and the impact on the success of a corporation.[11] To further elaborate on established corporation and

[1] See Björk and Magnusson (2009, pp. 662-663)
[2] See Cui, Loch, Grossmann, and He (2012, p. 29)
[3] See Cui et al. (2012, p. 29)
[4] See Aune and Gressetvold (2011, p. 123)
[5] See Ili, Albers, and Miller (2010, pp. 248-253)
[6] See Schiele (2010, pp. 142-150)
[7] See Weiblen and Chesbrough (2015, pp. 66-67)
[8] See Gassmann, Zeschky, Wolff, and Stahl (2010, p. 640); Zaremba, Bode, and Wagner (2016, p. 152)
[9] See Weiblen and Chesbrough (2015, pp. 68-69); Zaremba, Bode, and Wagner (2017, pp. 41-42)
[10] See Homfeldt et al. (2017, pp. 2-3); Zaremba et al. (2017, p. 58)
[11] See Cavinato (1999, p. 75); Luzzini, Amann, Caniato, Essig, and Ronchi (2015, p. 117); Schiele (2010, pp. 149-150)

startup collaboration within the automotive industry, the following section addresses, first, the automotive industry as field of interest, and second, unique characteristics of startups as potential future business partners.

1.2. Highly Competitive and Fast Changing Automotive Industry as Field of Interest

The automotive industry is one of the most innovative industries in world economics, having structural characteristics similar to the aircraft, aircraft engine, semiconductor, medical device, and consumer products industries.[12] In the past, OEMs in the automotive industry relied heavily on internal R&D practices, spending huge amounts of resources to stay ahead of the competition.[13] In the so-called closed innovation paradigm, corporations closed internal R&D to the external environment, holding knowledge, ideas, and potential innovations under corporation control.[14] However, due to rising competition, shorter product life cycles, and price erosion, OEMs are forced to reduce R&D cost drastically.[15] At the same time, higher demands and expectations by customers forced OEMs to search for new unique selling points for their products, showing an increasing need for ideas for future innovation. In recent decades, OEMs have opened their R&D to new external sources of knowledge, including users, customers, suppliers, universities, and even competitors.[16] Today, within the open innovation paradigm OEMs source innovation from various actors in their business environment.[17] Past scholars have found that OEMs trusting suppliers with NPD have increased their corporation's innovativeness with moderate cost, by sourcing innovation from the supply base.[18] Furthermore, scholars and practitioners have noticed that established suppliers are able to cope with the automotive industry's specific conditions, such as strict environmental protection regulations and safety standards.[19]

Today, OEMs form the automotive industry are known to have strong vertical R&D alliances with their suppliers.[20] OEMs have become increasingly professional in managing buyer-supplier relationships to foster NPD, by developing abilities to leverage supplier potential,[21]

[12] See Hüttinger, Schiele, and Schröer (2014, p. 713)
[13] See Ili et al. (2010, p. 246)
[14] See H. W. Chesbrough (2003, p. 16)
[15] See Ili et al. (2010, p. 246)
[16] See Felin and Zenger (2014, p. 914)
[17] See H. W. Chesbrough (2003, p. 16)
[18] See Schiele (2010, pp. 149-150)
[19] See Ili et al. (2010, p. 246); Lazzarotti, Manzini, Pellegrini, and Pizzurno (2013, p. 41)
[20] See Gassmann et al. (2010, p. 639)
[21] See Wu, Melnyk, and Flynn (2010, p. 721)

including for example practices of supplier identification, evaluation, selection, and development.[22] However, despite several advantages of a strong vertical integration, these R&D partnerships come with several drawbacks, such as increased dependence on alliance partners in NPD, losing control over a corporations' innovation, and losing technical know-how in core competences.[23] To reduce this dependency, OEMs are looking for new R&D partners in cross-industry alliances with established firms, organizations, institutes, and startups.[24] New partners have the opportunity to provide innovation in a wide range of automotive products, including interior, cockpit, multimedia, electronics, engine, body, chassis, and powertrain.[25] In today's changing market conditions, specifically the evolving fields of digitalization, sustainability, and urbanization highlight the direction of change. Here, startups emerged as a new source of innovation, where OEMs are particular attracted by startups capabilities to innovate, as it is described in the following.

1.3. Startups Unique Characteristics and Capabilities as Precursor for Innovation

This research addresses the relationship between two fundamentally different business partners, distinguishing between established corporations as buyer and startups as suppliers of innovation. Within this section the unique characteristics of startups are explored, which have significant implications for established corporations and startup relationships. Past scholars named new firms, firms which have not been existing for a longtime, in various different ways as for example the term startups,[26] new ventures,[27] nascent firms,[28] or emerging firms.[29] However, all alternative terms for startups have various characteristics in common, most notably the startup's short time of existence. According to literature startups age differ between a minimum of six years, or less, to a maximum of 12-15 years.[30] Song, Podoynitsyna, Van Der Bij, and Halman (2008, p. 9) find that most primary studies select a cutting-off age between six and eight years, whereas only about one third of all studied startups with more than five employees, survive the age of four to five years.[31]

[22] See Hoetker (2005, pp. 92-93); Ramsay (2001, p. 41); Schiele (2010, pp. 138-139)
[23] See Gassmann et al. (2010, pp. 639-640)
[24] See Gassmann et al. (2010, p. 640); Zaremba et al. (2017, pp. 41-42)
[25] See Lazzarotti et al. (2013, p. 43)
[26] See Colombo, Grilli, and Piva (2006, p. 1168); Waguespack and Fleming (2009, pp. 210-211)
[27] See Bantel (1998, p. 210); McGee and Dowling (1994, p. 34)
[28] See Santos and Eisenhardt (2005, p. 496); Sebastiao and Golicic (2008, p. 76)
[29] See Katz and Gartner (1988, p. 429); Patel (2011, p. 143)
[30] See Zaremba et al. (2016, p. 153)
[31] See Song et al. (2008, p. 8)

Due to their short time of existence, startups suffer from several shortcomings, including their small size, low level of manufacturing capabilities, lack of labor, and few resources available.[32] Stinchcombe (1965) coined startups shortcomings as their "*liabilities of newness*."[33] Recent scholars have found several liabilities faced by startups at the beginning of their business, especially when *"founders try to assemble resources, create effective routines and defensible organizational boundaries, and cope with difficult environments."*[34] Additionally, besides their limited resources, startups have a low level of legitimacy in the marketplace, suffering for example from the lack of any track records, which weaken startup's ability to raise funds.[35] In addition, startups lack a certain degree of management skills, due to their inexperience in doing business, where most of their management skills are based on founder's entrepreneurial capabilities.[36] Finally, Zaremba et al. (2016, p. 153) consider the startup's new role as social actor.[37] However, besides their shortcomings, which lead to a certain level of uncertainty for future business partners, startups offer potential benefits in new business partnerships.

Due to their small size and short chains of command, startups offer a high level of flexibility in their business practice.[38] For startups it is essential to respond to changes in their new and still uncertain environment, where searching for new business opportunities, investments, and business partners is one of startups core activities.[39] Besides their highly dynamic capabilities, startups are willing to take risks and invest their limited amount of resources in new opportunities to accelerate growth.[40] Here, the founder's entrepreneurial capabilities are crucial for future success.[41] Most future business partners perceive startups as highly interesting due to their creativity and high innovation capabilities, especially for breakthrough and radical innovations.[42] Therefore, past scholars have found an increasing interest of established corporations for collaboration with startups to increase established corporation's growth and innovativeness.[43] Further incentives of established corporations

[32] See Bhidé (2003, pp. 182-185); Gans and Stern (2003, p. 333)
[33] See Zaremba et al. (2017, p. 41)
[34] Yang and Aldrich (2017, p. 50)
[35] See Aldrich (2006, p. 89)
[36] See Karra, Phillips, and Tracey (2008, p. 443)
[37] See Zaremba et al. (2016, p. 153)
[38] See Aldrich (2006, p. 61ff); Zaremba et al. (2017, p. 43)
[39] See Kickul, Griffiths, Jayaram, and Wagner (2011, p. 79)
[40] See Criscuolo, Nicolaou, and Salter (2012, pp. 324-331); Freeman and Engel (2007, pp. 101-103)
[41] See Karra et al. (2008, p. 443)
[42] See Gassmann et al. (2010, p. 648); Lin and Li (2013, pp. 105-108)
[43] See Weiblen and Chesbrough (2015, p. 67)

will be addressed later. In the following the identification and collaboration with startup will be defined in terms of this research.

1.4. Definition: Identification of and Collaboration with Innovative Startups

1.4.1. Identification of Startup Innovations

Today, OEMs struggle to collaborate with innovative startups, starting with the identification of suitable startups appropriate for corporations' strategic targets and characteristics.[44] Due to the simple reason that startups are significantly different to established, incumbent, corporations the search for innovative startups requires a special approach.[45] In most cases the identification of innovative startups is strongly related to their product or service.[46] Further, startup's innovations should relate to a specific idea which is significantly different to existing ideas in the market. Thus, OEMs search for new ideas potentially increasing competitiveness in the market by contributing to their existing business portfolio.[47] However, to identify these opportunities OEMs need to screen the market on a detailed, idea specific, level.[48] To be able to do so, corporations need to develop an appropriate organizational structure, processes, and instruments to identify startup innovation. These components need to be structured in such, that an alignment between external innovations with internal capabilities and demands is possible.[49] Due to the strong link between innovative startups and their innovation, identifying startups will be addressed in the following parts of this research as searching for innovation on an idea level. Furthermore, it will be assumed that corporations organize the identification of startups in organizational structures, processes, and instruments, enabling a wide screening of the market,[50] where the identification instruments are designed to support the search process for innovation, including for example pitch events, innovation contests, and desk research.[51]

[44] See Homfeldt et al. (2017, p. 14)
[45] See Monteiro and Birkinshaw (2017, pp. 342-343); Rohrbeck (2010, pp. 169-170)
[46] See Rohrbeck (2010, p. 171)
[47] See Zaremba et al. (2017, p. 41)
[48] See Homfeldt et al. (2017, p. 16)
[49] See E. Lichtenthaler (2005, p. 707)
[50] See Homfeldt et al. (2017, pp. 17-22); E. Lichtenthaler (2005, p. 707)
[51] See Boudreau, Lacetera, and Lakhani (2011, pp. 860-861); Felin and Zenger (2014)

1.4.2. Initiation of Collaboration between Corporations and Startups

Besides the identification of innovative startups, the initiation of collaboration is an important next further foundation for innovation sourcing success.[52] However, in this research, the initiation of collaboration will be discussed in less detail by addressing only several first steps in the collaboration process, including first contacts, selection, and first rudiments to collaboration. Further, some collaboration approaches within the automotive industry will be explored. To give some insights into how established corporations start the collaboration with startup, this research will first address the selection process and several selection criteria within the automotive industry. After a startup is identified and selected as a potential future business partner, corporations face the challenge of binding the startup´s innovation to their organization. Most challenging for the initiation of collaboration is the uniqueness of all startups, making it impossible to design a one process fits all strategy. This research explores several industry specific characteristics influencing corporation and startups collaborations. Addressing startup's demands according to their current business development stage, as in seed-, early-, and late-stage startups. During this research the cooperation between suppliers and OEMs will be explored in detail, taking into account established suppliers capabilities for startup´s innovation industrialization. In short, this research addresses the identification of innovation in the market and the collaboration between corporations and startups.

1.5. Research Outline: The Need for Organizing the Identification of and Collaboration with Startups

The purpose of this research is to obtain best practices for corporation innovation sourcing from startup. The identification of innovative ideas is considered here as the first step. This research complements the work of Zaremba et al. (2017) by exploring one processual step before startup evaluation and further contributes to the fuzzy front end (FFE) of innovation, giving some insight and structure to the identification of startup innovation.[53] Furthermore, this research addresses corporations' demand to find new innovation partners in today's highly competitive market environment. In this sense, the results add to the rising stream of literature regarding entrepreneurship and supply management by answering the research question: *How to identify innovative startups as a future innovation partner?* To obtain

[52] See Zaremba et al. (2017, pp. 56-57)
[53] See Zaremba et al. (2017, pp. 56-57)

further insights, today's innovation sourcing from startup by multinational corporations MNCs within the German automotive industry will be explored by four sub-questions: *(1) Who is responsible for the identification of startups?; (2) How is the identification process structured?; (3) Which identification instruments are used to search for innovative startups and how do they look like?; (4) Which selection process and criteria are followed?; (5) How is the collaboration with startups initiated and managed?*

In order to answer the research questions, the research first reviews the current state of literature on innovation management in the open innovation environment, especially focusing on knowledge search processes. Here, different organizational structures for startup scouting will be explored. Search processes for not yet identified and possibly hidden knowledge will be analyzed. To do so, a multiple-exploratory-case study will be conducted giving insight in the identification process within the automotive industry context. To increase the practical relevance of the research, success factors for the identification and of collaboration with startups will be addressed. Based on the observed practice the research will contribute to the body of knowledge by discussing obtained practices to the current state of literature at the intersection between entrepreneurship and supply management. The research closes with several propositions on organizational structures, processes, and instruments for the identification of innovative startups. Further, processes and criteria for startup selection, initiation of collaboration, purchasing´s contribution in startup management, and additional success factors in startup management will be explored.

1.6. Thesis Outline: Explanation of Each Chapter

In order to examine the identification of, and collaboration with startups, the next parts of the thesis will be structured as follows. First, the topic will be discussed from a theoretical perspective developing a theoretical framework for this research. Starting with various sources of knowledge in the open innovation environment. Then addressing purchasing´s contribution in knowledge sourcing. Followed by exploring different search approaches for the identification of innovation using a specific organization structure, process, and instruments to identify innovation. The theoretical part will be closed with the initiation of collaboration between corporations and startups. In the third chapter, the quantitative research methodology is described. In the fourth chapter the results will be shown and analyzed. Chapter five discusses the theoretical and practical implications of the research. The thesis ends with limitations to this research and an outlook on further research directions.

2. Conceptual Background: Organizing External Technology Sourcing

2.1. Open Innovation as Precursor for External Technology Souring

2.1.1. Opening Internal R&D Practices to the External Market

In today's global competition corporations face the challenge of developing new products and services more quickly, at a lower cost, with greater novelty, and with a specific fit to market and customer.[54] Internal R&D practices are often not enough to deal with this complex task, and scholars and practitioners increasingly emphasize a more open approach to NPD.[55] In this context, the open innovation model received increasing attention by both scholars and practitioners.[56] Especially, the work by H. W. Chesbrough (2003) coined the term "open innovation", describing a contrasting phenomenon to "closed innovation", which is supposed to be the open innovation precursor.[57] In the closed innovation model, corporations organize their process from idea generation up to product commercialization solely by themselves, while open innovation relies on external sources, outsourcing parts of the new product development (NPD) process to external partners.[58] According to the open innovation paradigm *"[…] valuable ideas can come from inside or outside the company and can go to market from inside or outside the company as well."*[59] For further illustration of open R&D within the open innovation paradigm see appendix I. However, recent scholars on open innovation addressed the urgent need for corporations to transcend their boundaries and source new ideas, knowledge, and technology externally to ensure future business success.[60] Thus, the combination of internal R&D and external knowledge sourcing requires corporations to systematically perform knowledge exploration, retention, and exploration within and outside the corporate boundaries.[61]

According to the open approach to NPD, corporations reach beyond their organizational boundaries and include external actors from their business environment, including users, customers, suppliers, startups, universities and competitors.[62] The wide range of external knowledge sources creates a so called "market for ideas", also referred to "market for knowledge", resulting in a market based ideas and knowledge trade.[63] The market for ideas,

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[54] See H. W. Chesbrough (2007, pp. 23-24); Gesing, Antons, Piening, Rese, and Salge (2015, p. 424)
[55] See Gesing et al. (2015, p. 424); Schiele (2010, p. 138)
[56] See Lazzarotti et al. (2013, p. 40)
[57] See H. W. Chesbrough (2003, p. 16)
[58] See Lazzarotti et al. (2013, p. 40); Schiele (2010, pp. 138-139)
[59] H. W. Chesbrough (2003, p. 43)
[60] See Felin and Zenger (2014, p. 914)
[61] See U. Lichtenthaler (2011, pp. 77-78)
[62] See Felin and Zenger (2014, p. 914)
[63] See Gans and Stern (2003, p. 334); Gassmann et al. (2010, p. 348)

where newly developed ideas can be bought and sold in an open market environment setting, gives corporations the opportunity to source innovation, rejuvenate their product portfolio and business by external capabilities.[64] However, the market for ideas lacks some imperfections, which corporations need to manage.[65] First, the challenge of hidden knowledge: assuming that several actors in the market hide innovation until commercialization, looking for exclusivity in the market.[66] Second, imperfect intellectual property (IP) protection increases the imperfection of the market, where sellers of innovation are not rightfully remunerated.[67] Third, corporations are challenged by the size and complexity of the market, where MNCs screen and monitor a wide range of possible knowledge providers, including users, customers, supplier, startups, universities, and competitors.[68] In this aspect, large corporations have an advantage in identifying potential innovation, due to high amounts of resources available for innovation scouting.[69] Within this research, the corporations' ability to identify innovation will be further addressed by organizational structure, processes, and instruments to screen the external environment for innovation.

2.1.2. Purchasing´s Contribution in NPD with External Innovation Partners

In recent years, corporations have recognized purchasing´s increasing strategic role, where the procurement department manages more than 50% of corporation's expenditure.[70] Scholars recognized purchasing´s impact on key performance measures, impacting cost, quality, and innovativeness.[71] However, past scholars have ignored the role of purchasing on corporations´ innovation capabilities for a long time.[72] Since recent publications, scholars take the role of purchasing on innovation and NPD more intensely into account, recognizing suppliers as important external source of knowledge and capabilities, impacting a corporation's innovation performance.[73] Recent empirical studies within supply management have shown the significant impact of purchasing activities on innovation

[64] See Gans and Stern (2003, p. 334)
[65] See Felin and Zenger (2014, p. 916); Gans, Hsu, and Stern (2008, pp. 983-985)
[66] See Felin and Zenger (2014, p. 916)
[67] See Gans and Stern (2003, p. 338)
[68] See Felin and Zenger (2014, p. 914); Rothaermel (2002, pp. 395-396)
[69] See Hunt and Morgan (1995, pp. 5-9)
[70] See Luzzini et al. (2015, p. 110)
[71] See Hartmann, Kerkfeld, and Henke (2012, pp. 29-32)
[72] See Schiele (2010, p. 139)
[73] See Homfeldt et al. (2017, pp. 3-4); Spina, Caniato, Luzzini, and Ronchi (2013, pp. 1209-1211)

performance.[74] Compared to past cost-oriented supply chains, recent supply management literature and practice pays more attention to innovation-oriented supply chains.[75] Here, buying corporations benefit from capabilities and resources held by suppliers, tapping into their innovation potential.[76]

Nowadays, purchasing influences a corporation's innovativeness from three different directions: (1) Integration of purchasing in NPD processes, (2) Identifying new products and capabilities in the market, and (3) Guiding employees to focus on the innovation task instead of transactional work.[77] The procurement department can contribute to the innovation performance by participating in the NPD process, for example by cost monitoring in the early design of the innovation.[78] Scholars find that the early integration of procurement can achieve cost benefits for innovation, ensure commercial viability, and increasing the impact of innovativeness on a corporation's performance.[79] Additionally, by early integration of procurement in the NPD, time-to-market can be decreased by co-innovation with suppliers.[80]

Furthermore, purchasing holds a key position in the identification of innovation within the supply base.[81] Here, purchasing detects innovative ideas in the business environment, evaluates their potential, searches for internal field of application, and helps to integrate the idea in new products.[82] Next, procurement helps with the selection of the right partner in the idea and following stages of the innovation process.[83] Here, procurement does not focus only on the lowest possible cost but also builds sustainable relationships with suppliers to secure long-term innovation capabilities.[84] Highly matured procurement departments possess the ability to select partners and manage long-term relationship, due to its birds-eye view over the product life-cycle, reducing the risk of selecting unsuitable partners and risk of project obstruction.[85] Here, the capabilities and responsibility for selecting the right partners, lies in the area of procurement.[86] However, past scholar´s focus lied on procurements capabilities

[74] See Hartmann et al. (2012, pp. 29-32); Nijssen, Biemans, and De Kort (2002, pp. 281-282)
[75] See Tracey and Neuhaus (2013, pp. 103-104)
[76] See McKone-Sweet and Lee (2009, p. 3); Wu et al. (2010, pp. 745-746)
[77] See Hartmann et al. (2012, p. 30)
[78] See Carr and Pearson (2002, pp. 1047-1050); Johnsen (2009, pp. 193-196)
[79] See McGinnis and Vallopra (1999, pp. 11-14); Schiele (2010, p. 149)
[80] See McGinnis and Vallopra (1999, p. 12); Primo and Amundson (2002, pp. 201-202)
[81] See Hartmann et al. (2012, pp. 25-32)
[82] See Hartmann et al. (2012, p. 30); Preuss (2007, pp. 518-521)
[83] See Homfeldt et al. (2017, p. 5)
[84] See Hartmann et al. (2012, p. 25)
[85] See Primo and Amundson (2002, pp. 49-50); Schiele (2007, pp. 282-283)
[86] See Schiele (2010, p. 144)

to collaborate with established suppliers. Only little attention is given to supplier-buyer relationships between established corporations and startups, addressing the intersection between entrepreneurship and supply management.[87] Nevertheless, scholars and practice show significant interest in innovative startups as source for innovation.[88] To further elaborate on established corporations and startup partnerships, the next paragraph describes startups as a source of ideas and knowledge, and new future business partners.

2.1.3. Startups as new Source of Innovation in the Automotive Industry

Past scholars have addressed several possible external knowledge sources, such as users, customers, supplier, startups, universities, and competitors.[89] As mentioned above suppliers, specifically have been recognized as prime partners to advance corporation innovativeness.[90] However, past scholars paid only little attention to buyer-supplier relationships between established corporations and startups.[91] Combining both literature streams of supply management and entrepreneurship opens up new possibilities for research to analyze these kind of relationships and corporations´ innovation performance.[92] Startups are often seen as potentially interesting suppliers, because they can offer a unique set of capabilities, distinguishing them from established suppliers.[93] Startups need to ensure a flexible business structure in order to manage challenges within the fast changing and uncertain business environment they operate in.[94] The startup's flexibility is ensured by its organizational structure, characterized by short chains of command due to its firm's small size.[95] Furthermore, startups have highly dynamic capabilities, a willingness to take risks, and a high growth potential, allowing it to achieve a prime position for innovation, especially disruptive innovation.[96] Thus, startups are often seen as more innovative than established corporations.[97] The collaboration between corporations and startups *"can be an important*

[87] See Kickul et al. (2011, p. 83); Zaremba et al. (2016, p. 152)
[88] See Zaremba et al. (2017, p. 41)
[89] See Felin and Zenger (2014, p. 914); Rothaermel (2002, pp. 395-396)
[90] See Al-Zu'bi and Tsinopoulos (2012, pp. 676-677); Lau, Tang, and Yam (2010, pp. 771-773); Wagner (2010, pp. 1146-1147)
[91] See Kickul et al. (2011, p. 83)
[92] See Ireland and Webb (2007, pp. 917-918); Kickul et al. (2011, p. 81); Shepherd and Patzelt (2013, p. 1420)
[93] See Aldrich (2006, p. 61ff); Kickul et al. (2011, pp. 79-81)
[94] See Kickul et al. (2011, p. 79)
[95] See Aldrich (2006, p. 61ff); Zaremba et al. (2017, p. 43)
[96] See Criscuolo et al. (2012, pp. 324-331); Freeman and Engel (2007, pp. 101-103)
[97] See Kickul et al. (2011, p. 83); Rothaermel (2002, pp. 395-396)

source for innovation and growth for the established firm".[98] Here, buying corporations hope to obtain products and services that can complement to their product portfolio and support corporation competitive position.[99]

Nevertheless, scholars have noticed several obstacles in the collaboration with startups, especially in the supply base of established corporation.[100] In a way, established corporations do not know how to cope with startups, mostly due to organizational differences.[101] Startups have less resources available to them and are socially embedded lower than established suppliers.[102] Previous scholars have described the startup's shortcomings as the startup's "liabilities of newness."[103] Due to the startup's newness in the market, corporations need to put additional efforts into developing innovation, which takes time and comes at additional cost for buying corporation.[104] However, recent scholars, especially in the field of supply management, have noticed that corporations can provide resources, have the capabilities to drive startup´s innovation, and the commercialization innovations.[105] Therefore, collaboration between corporations and startups creates a win-win-situation for both parties.[106] On the one hand, corporations increase innovativeness, and on the other hand, startups receive support by resources, market access, and faster industrialization. However, before any collaboration can take place, both parties need to get in contact with each other. Here corporations or startups should take a proactive role in identifying future business partners. Whereby larger corporations noticed that startups are busy with developing their innovation and maybe yet not have the capabilities to collaborate with larger business partners.[107] In this sense, larger established corporations take a more proactive role by screening their external environment, searching for new business partners for future innovation. These kind of search approaches will be addressed in the following part of this research.

[98] Weiblen and Chesbrough (2015, p. 88)
[99] See Zaremba et al. (2017, p. 41)
[100] See Ozcan and Eisenhardt (2009, pp. 270-271)
[101] See Zaremba et al. (2017, pp. 41-42)
[102] See Katila, Rosenberger, and Eisenhardt (2008, pp. 321-322)
[103] See Zaremba et al. (2017, p. 42)
[104] See Weiblen and Chesbrough (2015, p. 88)
[105] See McGinnis and Vallopra (1999, p. 12); Schiele (2010, p. 149); Zaremba et al. (2017, pp. 56-57)
[106] See Weiblen and Chesbrough (2015, p. 88)
[107] See Homfeldt et al. (2017, p. 14)

2.2. Approaches to Identify Innovation Opportunities

2.2.1. Explorative and Exploitative Search

As mentioned before, the ability to create new products is crucial to future corporation success, having a positive influence on corporation performance.[108] New products boost corporation performance by diversifying, adapting, and reinforcing corporation resources and capabilities, and preparing for changing market conditions.[109] However, despite the attractiveness to develop and commercialize new products, corporations still find difficulties in doing so, which is especially true for innovations developed by startups.[110] To further elaborate on this issue, this research gives insight on a corporation's ability to create new products in relation to its search approach, addressing the field of organizational learning and external knowledge sourcing literature. Past scholars have pointed out different dimensions of search, including, for example, search depth and search scope,[111] search breadth and search depth,[112] and search space and search heuristics.[113] In this sense, a corporation´s search approach gives insight into the level of boundary spanning to identify innovation.[114]

The organizational learning research addressed the trade-off between exploitation and exploration in search strategies.[115] Whereby, corporations need to balance the refinement and extension of existing competences and resources, referring to exploitation, and the experimentation with new alternatives, relating to exploration.[116] Exploitation of existing competences and resources often shows positive and predictable results, due to a close relation between the detected ideas and current business practices, which ensures a fast realization of the innovation.[117] Whereas the exploration of new alternatives often shows negative, uncertain, and distant results, because the detected ideas are distant from the current business practices and more difficult to realize.[118] Exploratory search is often considered by past scholars in terms of its scope, distinguishing between local and distant search practices.[119] Whereby, the concept of exploitation focuses on the depth in which

[108] See Durmuşoğlu and Barczak (2011, pp. 326-327)
[109] See Schoonhoven, Eisenhardt, and Lyman (1990, pp. 201-204)
[110] See Gassmann et al. (2010, pp. 647-648)
[111] See Katila and Ahuja (2002, p. 1191)
[112] See Laursen and Salter (2006, p. 146)
[113] See Lopez-Vega, Tell, and Vanhaverbeke (2016, pp. 126-127)
[114] See Fleming and Waguespack (2007, pp. 165-166); Rosenkopf and Nerkar (2001, pp. 303-304)
[115] See March (1991, p. 85)
[116] See Katila and Ahuja (2002, p. 1183); March (1991, p. 85)
[117] See March (1991, pp. 82-85)
[118] See March (1991, pp. 82-85)
[119] See Katila and Ahuja (2002, p. 1185)

existing knowledge is reused or exploited.[120] Later research builds on and extends the research of Katila and Ahuja (2002), which focused on searching inside a corporation and along a technological trajectory, by addressing a corporations´ external innovation search behavior.[121] The work by Laursen and Salter (2006) examines how a corporation´s innovation performance is influenced by different strategies of searching, focusing on several search channels in external innovation search efforts.[122] Here, search scope, the exploration of search, is defined as search breadth. Search breadth rises as the number of pathways to different search channels, such as suppliers, users, and universities, increases.[123] Laursen and Salter (2006) extends the concept of exploitation by the search depth, which defines how deeply corporations draw knowledge and ideas from different external sources or search channels.[124]

2.2.2. Assessing Corporations´ Search Approach and Search Instruments

In order to assess corporations search approach the framework of Laursen and Salter (2006, p. 146) is used to determine the search breadth and depth.[125] According to Laursen and Salter (2006) search breadth is defined as *"the number of external sources or search channels that firms rely upon in their innovative activities."*[126] For this research the external sources of knowledge are limited to innovation developed by startups. However, search breadth is addressed by the channels used by corporations to identify promising startup innovation. Here, the previously developed instruments to identify innovation within the supply base of a firm developed by Homfeldt et al. (2017) serve as search channels to identify innovation.[127] Therefore, the breadth of a corporations search approach is defined in the number of instruments used to search for startup innovation within corporation's external business environment. A large number of instruments used results in a broad search approach, whereas a narrow search approach is characterized by few innovation search instruments. Further, the work by Laursen and Salter (2006) addresses search depth as *"the extent to which firms draw deeply from the different external sources or search channels."*[128] Again,

[120] See Katila and Ahuja (2002, p. 1184)
[121] See Laursen and Salter (2006, p. 133)
[122] See Laursen and Salter (2006, p. 133)
[123] See Laursen and Salter (2006, p. 133)
[124] See Laursen and Salter (2006, p. 134)
[125] See Laursen and Salter (2006, p. 146)
[126] Laursen and Salter (2006, p. 134)
[127] See Homfeldt et al. (2017, pp. 16-22)
[128] See Laursen and Salter (2006, pp. 134-135)

search channels in this research are addressed as the instruments used to search for startup innovation. Thus, search depth is addressed in the frequency in which search instruments are used to identify innovative startups. Therefore, a corporations´ search approach is considered to be deeply in the case instruments are used frequently. Thus, this research defines search breadth in the amount of instrument used to identify startups innovations and search depth as the frequency this instruments are used (see figure 1).

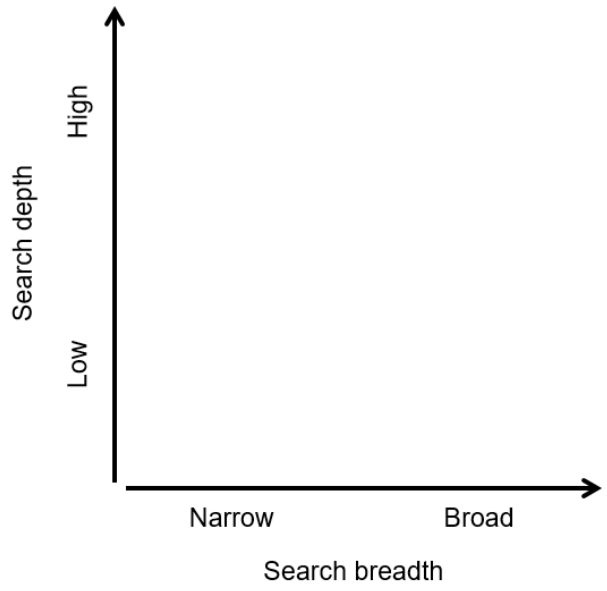

Figure 1: Defining corporations' search approach in terms of breadth and depth

Further, the framework of Lopez-Vega et al. (2016, p. 128) and the work of Wagner and Bode (2014) on open innovation instruments, which is later used by Homfeldt et al. (2017, pp. 6-7) to develop search instruments, serves as theoretical foundation to assess identification instruments.[129] Starting with the search space, Lopez-Vega et al. (2016, p. 128) distinguishes between local and distant search spaces, where *"search may be local, i.e., in the vicinity of the firm's current knowledge, or distant, i.e., farther away from the firm's current knowledge."*[130] Furthermore, Lopez-Vega et al. (2016) define three knowledge categories in which firms can search for new solutions, addressing technology domains,

[129] See Homfeldt et al. (2017, pp. 6-7); Lopez-Vega et al. (2016, p. 128); Wagner and Bode (2014)
[130] Lopez-Vega et al. (2016, p. 126)

industry classifications, and scientific fields.[131] For further parts of this research search space is considered as a local search in the case corporations search for startups with innovative solutions within the automotive industry and distant in case corporations search for startups outside the boundaries of the automotive industry. In the field of boundary spanning a corporation´s search is considered to be narrow for limited search within the industry and broad in a cross-industry setting.[132] Thus, defining the search space is crucial to the understanding of spanning the boundaries of search.[133] For the local search domain it is assumed that range of solutions detected is less novel but provides the opportunity to detect working and in most cases short-term solutions, which leads to minor contributions to competitive advantage.[134] Search in distant knowledge domains, however, is assumed to provide more novel and disruptive long-term solutions as a basis for disruptive innovation and competitive advantage.[135]

Besides the search space Lopez-Vega et al. (2016, p. 127) distinguishes between two search heuristics, *"experimental search"* and *"cognitive search"*, which address the *how* to search for external knowledge in two search heuristics (see appendix).[136] For this research, experimental and cognitive search heuristics are replaced with the concept of pull- and push-instruments, developed by Homfeldt et al. (2017), based on the work of Wagner and Bode (2014), to search for innovation within the supply base of a firm.[137] Here, pull-instruments are defined as "*those where the buying firm is the active party and sets parameters."*[138] Thus, pull-instruments require corporations to develop a specific field of interest, search field, before the search for innovative ideas starts. Further, Homfeldt et al. (2017) describes push-instruments as those *"where the external partner usually takes the initiative to present its ideas to the buying firm."*[139] Therefore, corporations need to search internally for use-cases, which fit the pervious identified startup innovation. Following the work of Lopez-Vega et al. (2016) this research defines search instruments in two dimensions (see figure 2). On the one hand the search space of each instrument, distinguishing between local (within the industry) and distant (cross-industry). On the other hand search strategy, addressing the

[131] See Lopez-Vega et al. (2016, p. 126)
[132] See Rosenkopf and Nerkar (2001, pp. 302-304)
[133] See Fleming and Waguespack (2007, p. 178)
[134] See Carnabuci and Operti (2013, p. 1607); Lopez-Vega et al. (2016, p. 126)
[135] See Lopez-Vega et al. (2016, p. 126); Rosenkopf and Nerkar (2001, pp. 303-304)
[136] See Lopez-Vega et al. (2016, p. 127)
[137] See Homfeldt et al. (2017, p. 6); Wagner and Bode (2014)
[138] Homfeldt et al. (2017, p. 6)
[139] Homfeldt et al. (2017, p. 6)

distinction between pull and push oriented search instruments. Where a further elaboration on push- and pull- instruments to identify innovative startup innovations follows in the next section.

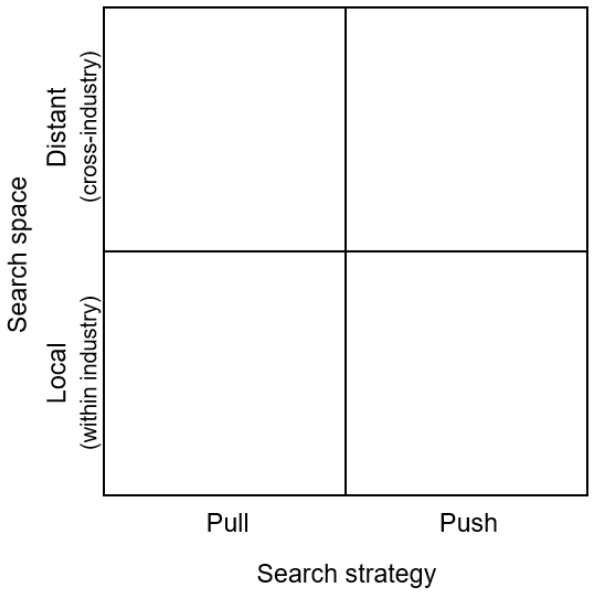

Figure 2: Defining instruments´ search strategy and search space

2.3. Different Processes and Instruments for the Identification of Innovation

2.3.1. Structuring the FFE of Innovation for External Knowledge Sourcing

This research aims to further structure the FFE in innovation. During the FFE phase corporations work on concepts for new products and try to determine whether the organization should invest resources to develop the innovation further and build the product.[140] For an extensive literature review on the FFE see Takey and Carvalho (2016).[141] Khurana and Rosenthal (1998) list various activities, which are included in the FFE, as for example the product strategy formulation and communication, opportunity identification and assessment, idea generation, product definition, and early executive reviews.[142] Murphy and Kumar (1997) structured the FFE into three stages ranging from idea generation, product definition, to project evaluation.[143] Thus, the FFE phase starts with the identification of

[140] See Moenaert, De Meyer, Souder, and Deschoolmeester (1995, p. 243)
[141] See Takey and Carvalho (2016, p. 97 ff.)
[142] See Khurana and Rosenthal (1998, pp. 58-60); Kim and Wilemon (2002, p. 269)
[143] See Murphy and Kumar (1997, pp. 8-13)

development opportunities and ends with the first investments into these opportunities.[144] Further, the FFE has been recognized as a precursor for the success of innovation projects.[145] However, despite FFE impact on innovation performance, less attention has been paid to the involvement of startups in the NPD.[146] Especially the identification of innovation opportunities has not been recognized by past scholars.[147] Recent scholars, as for example the research by Zaremba et al. (2017), start with the selection of possible collaboration partners.[148] So, this research tries to contribute to further structuring of the FFE by developing processes and instruments for the identification of innovation opportunities developed by startups. Previous research on the search processes and instruments to identify innovation opportunities are shown in the following paragraph.

2.3.2. Organizing Innovation Sourcing by Organizational Structure and Processes

In order to further structure the FFE this research addresses processes to identify and select startup innovations under the support of various open innovation instruments to identify potentially interesting innovations. However, before such a process can be developed some insights in organizational structures to promote boundary-spanning are given.[149] Corporations choose different kinds of structures to link internal processes to external sources of knowledge.[150] Especially in the field of boundary-spanning the link, and thus the closeness to external knowledge providers, is vital, searching a balance between facilitating search and maintaining integration.[151] On the one hand, so-called boundary-spanners, for example as individuals or whole departments, can be placed close to current business practice to ensure a close link to internal experts.[152] On the other hand, boundary spanners can be located outside the corporations, for example as scouting satellites, close to external sources of knowledge.[153] Nevertheless, both configurations need structured processes to ensure external knowledge sourcing success, which will be explored in the following. In order to identify interesting startups ideas the work of E. Lichtenthaler (2005) is used to

[144] See Kim and Wilemon (2002, p. 268)
[145] See Verworn, Herstatt, and Nagahira (2008, pp. 8-9)
[146] See Markham and Lee (2013, p. 37); Schoenherr and Wagner (2016, p. 101)
[147] See Ende, Frederiksen, and Prencipe (2015, pp. 482-483)
[148] See Zaremba et al. (2017, p. 51 ff.)
[149] See Lin and Li (2013, pp. 105-108); Rosenkopf and Nerkar (2001, pp. 287-290)
[150] See Basu, Phelps, and Kotha (2015, p. 130)
[151] See Basu et al. (2015, p. 130); Souitaris, Zerbinati, and Liu (2012, pp. 500-501)
[152] See Hill and Birkinshaw (2014, pp. 1902-1904)
[153] See Keil, Maula, Schildt, and Zahra (2008, pp. 895-896)

develop a systematic identification process.[154] E. Lichtenthaler (2005) developed a six step search process to search for diversification opportunities as shown in figure 3.[155]

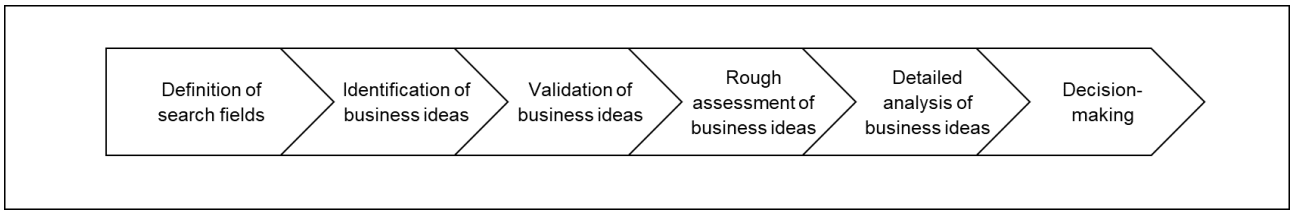

Figure 3: Process to identify diversification opportunities according to E. Lichtenthaler (2005, p. 707)

Noticeable is that the six step search process, developed by E. Lichtenthaler (2005), is not limited to the detection of diversification opportunities, but describes a funnel process to eliminate less interesting and not-suitable opportunities, ending in the selection of best opportunities in the decision-making phase.[156] For further parts of this research the process to identify interesting ideas is separated from the process to select most promising innovations. Referring to the process developed by E. Lichtenthaler (2005), the identification process addresses: (1) *definitions of search fields*, (2) *identification of business ideas*, (3) *validation of business ideas*, and (4) *rough assessment of business ideas*.[157] After the identification process the selection process will follow, which includes: (1) *detailed analysis of business ideas* and (2) *decision making*.[158]

2.3.3. Identification Instruments Used to Search for Startup Innovations

First, a list of open innovation instruments is composed from literature to develop a standardized instrument, which can be used to identify startup innovations. A consolidated list of instruments from literature is shown in table 1.

[154] See E. Lichtenthaler (2005, p. 701 ff.)
[155] See E. Lichtenthaler (2005, p. 707)
[156] See E. Lichtenthaler (2005, p. 707)
[157] See E. Lichtenthaler (2005, p. 707)
[158] See E. Lichtenthaler (2005, p. 707)

Instrument	Description	Author
Network	Network of business partners, communicating interesting startup ideas with possible industrialization partners, especially by venture capitalists	(Björk & Magnusson, 2009; Cruz-González, López-Sáez, & Navas-López, 2015; Leiponen & Helfat, 2010; Monteiro & Birkinshaw, 2017; Weiblen & Chesbrough, 2015)
Webpage	Website as online presents and landing page for startups	(Kohler, 2016; Weiblen & Chesbrough, 2015)
(Technology-) scouts	External scouting services	(Pauwels, Clarysse, Wright, & Van Hove, 2016; Rohrbeck, 2010)
Scouting-unit	Scouting partners close to startups as for example in hot-spots for startups	(Monteiro & Birkinshaw, 2017)
Startup pitch events	Pitch events where startups present their business and ideas. Can take place at startup location, firm side or fairs	(H. Chesbrough & Brunswicker, 2014; Cruz-González et al., 2015; Felin & Zenger, 2014; Hellmann, 2007; Leiponen & Helfat, 2010; Lopez-Vega et al., 2016)
Startup competition events	Competition events, where startup compete to a specific problem and develop tailored solutions	(Boudreau et al., 2011; H. Chesbrough & Brunswicker, 2014; Felin & Zenger, 2014; Lopez-Vega et al., 2016)
Venture-Capitalist scouts	Search for industrialization partners and exit opportunities for startups within their investment portfolio	(Monteiro & Birkinshaw, 2017; Rohrbeck, 2010)
Desk-research	Scouting for startups from within the corporation, web-based search	(Cruz-González et al., 2015; Leiponen & Helfat, 2010)
Investments in funds	Screening market deal-flow by investing into funds	(Monteiro & Birkinshaw, 2017)

Table 1: Identification instruments abstracted from literature

Noticeable is that there is only little research on instruments used to identify startup innovations. Most research show only aspects and only some practical insights, for example based on a single case study, on how corporations identify innovative startups. For example the research done by Weiblen and Chesbrough (2015) described how AT&T Foundry identifies interesting startups *"through the foundry's network or through a response to a call for proposals in a certain problem area - get the chance to pitch their idea at a Foundry event."*[159] However, no consolidative and extensive list of open innovation instruments to identify innovative startups exists.

To further extend the theoretical base, open innovation instruments have been abstracted from supply management literature. Here, the work by Homfeldt et al. (2017) gives an

[159] Weiblen and Chesbrough (2015, p. 73)

extensive list of instruments to identify innovation from the supply base of the corporation, as shown in table 2.[160] Further, Homfeldt et al. (2017), based on Wagner and Bode (2014), distinguished between pull- and push- instruments to identify innovation.[161] Where pull-instruments include instruments which are used by firms to pull innovations into the organization based on previous developed demands. In the search process described by E. Lichtenthaler (2005) pull instruments respond to demands developed in the first phase in the process.[162]

Tool	Description	Target-group
Pull instruments:		
Scouting Activities	Needs-based search for new partners or Technologies (scouting trips, fair visits, regional sourcing offices)	- Automotive & non-automotive suppliers - Startups
Innovation Pitch	Short presentation of startup ideas and technologies based on predefined (nonautomotive) search fields	- Startups
Predevelopment Idea Dialogues	Discussions on supplier ideas aiming to close identified "white spots" in predevelopment portfolio	- Automotive & non-automotive suppliers
Innovation Days	Multi-day discussions with experts and top management on vehicle-related innovations based on predefined search fields	- Automotive & non-automotive suppliers
Forum Innovation	Competition for the best (concept) ideas based on one specific task	- Automotive & non-automotive suppliers
Push instruments:		
Concept Competition	Competition for the best concepts based on a specification book	- Automotive suppliers
FAST Strategic Dialogues	Confidential discussions on innovation roadmaps and technological search fields with top-management	- FAST suppliers
Innovation Meeting	Presentation of innovative ideas by one supplier (no prior definition of search fields or tasks)	- Automotive suppliers
Web-Based Idea Platform	Web-based solution for idea submissions	- Automotive & non-automotive suppliers - Startups

Table 2: Screening instruments according to Homfeldt et al. (2017, pp. 16-17)

For a visualization of the theoretical research framework see figure 4. Here, identification process and instruments, selection process, and collaboration are placed in context within a funnel process. Further, after the identification and selection of promising startups, established corporations start to collaborate in various ways with startups, growing a new business partner. Various collaboration approaches are described in the following section.

[160] Homfeldt et al. (2017, pp. 16-17)
[161] Homfeldt et al. (2017, pp. 16-17)
[162] See E. Lichtenthaler (2005, pp. 700-701)

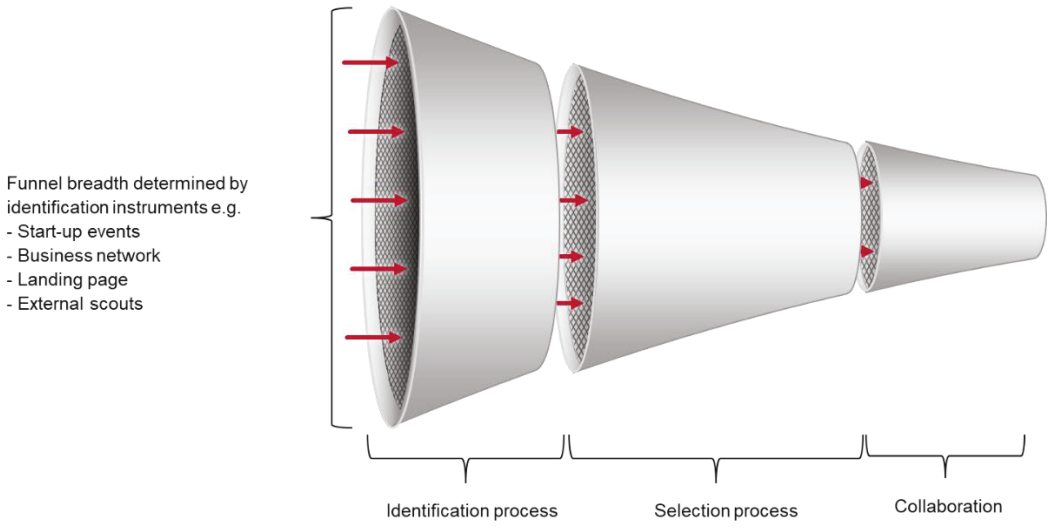

Figure 4: Visualization of the theoretical research framework in abstracted research model

2.4. Collaboration Approaches between Corporations and Startups

After promising startups have been selected corporations are challenged to start further collaboration with startups. On this topic, previous scholars have elaborated on various collaboration approaches between established corporations, also known as incumbents, and startups. However, in this research setting the purpose is not to develop an approach for guaranteed success for collaboration, but rather to give some insights into best practices within the German automotive industry. As mentioned before, corporations are looking for new opportunities to increase competitiveness in the market. Here, large corporations usually grow new business by relying on internal developments and internal corporation venturing.[163] However, in today´s open innovation environment, as it was described by H. W. Chesbrough (2003), external corporation venturing and external technology sourcing plays a crucial part in a corporation's efforts to increase competitiveness.[164] Corporations utilize various collaboration approaches, governance structures, including *strategic alliances*,[165] *equity joint ventures* and *non-equity joint ventures*,[166] *licensing*,[167] *supply*

[163] See H. W. Chesbrough (2003, p. 18); McGrath and MacMillan (2000)
[164] See H. W. Chesbrough (2003, p. 43 ff.)
[165] See Rothaermel (2002, p. 396)
[166] See Butler and Sohod (1995, p. 160)
[167] See U. Lichtenthaler (2008, p. 148)

arrangements,[168] *research and development partnerships*,[169] *mergers*,[170] and *acquisitions*.[171] These different kinds of collaboration approaches each have their advantages and disadvantages for both parties. Where, for example, strategic alliances can offer on the one hand various benefits for startups in terms of office space, mentoring, training, and network opportunities, on the other hand various drawbacks by committing to one partner, leading to dependency and restrictions of own activities, and dependency.[172] However, the detailed analysis of various collaboration approaches is out this research´s scope. In the following the collaboration between corporations and startups will be explored based on the external corporation venturing model developed by Van de Vrande, Lemmens, and Vanhaverbeke (2006, p. 335) as shown in figure 5.[173]

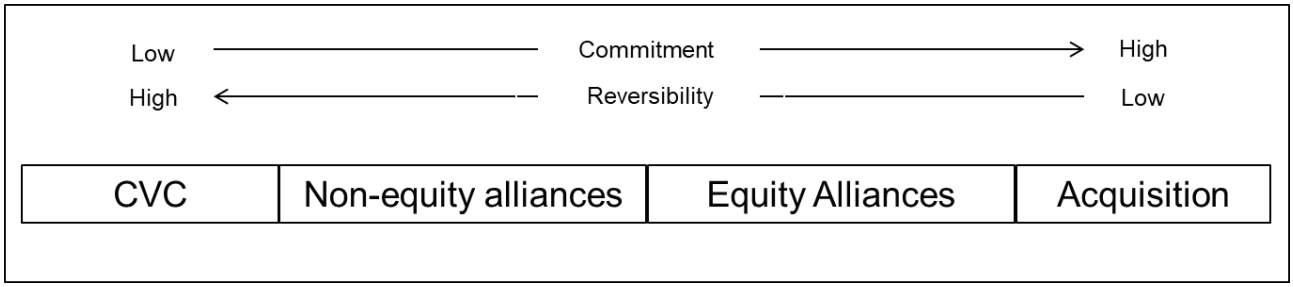

Figure 5: External corporation venturing model according to Van de Vrande et al. (2006, p. 335)

The corporation venturing model developed by Van de Vrande et al. (2006, p. 335) addresses four different collaboration approaches: (1) *corporation venture capital*, (2) *non-equity alliances*, (3) *equity alliances*, and (4) *acquisitions*. Furthermore, Van de Vrande et al. (2006, p. 335) distinguish two dimensions, continuums, within the collaboration. On the one hand, collaboration approaches show a certain degree of commitment.[174] On the other hand, collaboration approaches are rather easy or problematic to reverse, here referring to the reversibility of the collaboration. In this research the model is used to assess collaboration approaches within the automotive industry.

[168] See Kickul et al. (2011, p. 80)
[169] See Inkpen and Currall (2004, p. 586)
[170] See Pfeffer (1972, pp. 384-385)
[171] See Higgins and Rodriguez (2006, p. 318)
[172] See Kanbach and Stubner (2016, p. 1761)
[173] See Van de Vrande et al. (2006, p. 335)
[174] See Van de Vrande et al. (2006, p. 335)

3. Methodology: Conducting an Explorative Multiple-Case Study

3.1. Explorative Multiple-Case Study Design

3.1.1. The Basis for Conducting a Case Study

In scientific research there are different ways to conduct research which are highly dependent on the amount of previous research conducted in the field of interest. As mentioned above the research purpose is to organize a corporations' approach to search for innovative startups, including organizational structure, processes, and instruments. Here, scholars describe various processes and instruments used by corporations in order to identify innovation developed by established suppliers.[175] However, due to the scarcity of research in the field of innovation sourcing from startups, especially in the definition of standardized processes and instruments used to identify startup innovations, this research follows an exploratory research design. Following the twofold definition by Yin (2014), a case study is seen as *"[…] an empirical inquiry that investigate a contemporary phenomenon (the "case") in depth and within its real word context […]."*[176] Thus, in order to develop new insights and limit influencing factors, this research is conducted as an industry benchmark, observing multiple-cases from the automotive industry, assuming that the best insights on this subject can be derived from real-life situations. Yin (2014) describes that a case study can *"[…] benefit from the prior development of theoretical propositions to guide data collection and analysis."*[177] So, an exploratory multiple-case study seems most appropriate. In this sense, the conducted case study observes the behavior of corporations in the automotive industry in the field of established corporations and startup collaboration. Practices from the automotive industry will be examined and developed further to best practices, addressing prior developed theoretical propositions.

3.1.2. Designing an Explorative Multiple-Case Study

As mentioned before, scholars and practitioners in the automotive industry recognized the opportunity to source innovation from external parties, increasing competitiveness by external developments. To do so, corporations systematically search within their business environment by a sophisticated process to identify innovation. However, in identifying suitable startups innovations, corporations often leak a sophisticated way to do so. In order

[175] See Homfeldt et al. (2017, pp. 16-17); (E. Lichtenthaler, 2005, p. 701)
[176] See Yin (2014, p. 16)
[177] See Yin (2014, p. 17)

to further explore this issue, this research conducts a multiple-case study. More precisely, the empirical evidence for this research is based on an explorative multiple-case study. An explorative research design seems most appropriate, due to sparse of literature and experience in practice. In this sense, the case study will examine the *"how"* and *"why"* in searching for innovative startups.[178] Furthermore, in order to develop a full picture of the subject the case study research uses a considerable volume of data within a selected setting. Data will be collected by multiple sources adopting a triangulation method, which is defined as the adoption of different techniques for data collection. Within the triangulation method a combination of data provided by interviews and secondary data is used. Secondary data will be obtained by web-research, which is especially useful for interview preparation. Interviews are conducted to fill the gap between literature and the aims of the research, filling the gap by experience of experts for innovation, technology, and startup management within the automotive industry. More precisely, semi-structured interviews, guided by a questionnaire, are conducted, aiming to combine the advantages of both guided structured and unstructured interviews. In the following section the case selection and selected cases will be described.

3.2. Sampling and Data Collection: Evidence from the Automotive Industry

The sample for data collection is abstracted from the German automotive industry. The automotive industry seems most appropriate, having a wider range of opportunities for startup innovation available.[179] Further, the automotive industry is recognized as one of the fastest changing and most innovative industries in the world economy, where corporations spend huge amounts of resources on the identification and development of innovation.[180] Especially the German multinational corporations are leading in industry innovation capabilities.[181] German OEMs invest high amount of resources in R&D to stay above competition.[182] Furthermore, big automotive suppliers have recognized the opportunity to use their specialist knowledge and R&D to develop their products and offer an innovative product portfolio to original equipment manufacturers.[183] However, in the past small businesses, such as startups, started to participate in the development of new advanced

[178] See Yin (2014, p. 4)
[179] See Lazzarotti et al. (2013, p. 43)
[180] See Hüttinger et al. (2014, p. 713); Ili et al. (2010, p. 246); Lazzarotti et al. (2013, p. 43)
[181] See Heneric, Licht, and Sofka (2006, p. 115); Ili et al. (2010, p. 248)
[182] See Heneric et al. (2006, p. 115)
[183] See Al-Zu'bi and Tsinopoulos (2012, p. 667); Lau et al. (2010, p. 761); Wagner (2010, p. 1139)

technologies, triggering automotive suppliers and original equipment manufacturers for collaboration.[184] Moreover, several examples of joint venture cooperation between these parties exist to realize joint product development.[185] Especially big automotive suppliers have started to cooperate with innovative startups to increase innovativeness.[186]

In order to establish a certain degree of variation and maintain comparability in the sample, theoretical sampling is used.[187] First, all selected corporations are listed within the 100 largest automotive suppliers, following the assumption, that larger corporations are the first to develop approaches to collaborate with innovative startups, due to their high amount of resources available. Second, only suppliers from the German automotive industry were selected. Third, the initial list of cases was extended by two original equipment manufacturers from the automotive industry in order to get further insight in the current practice. To select appropriate informants key-accounts were asked to provide suitable informants involved in the field of interest, including employees from innovation management, M&A, strategy, and corporation venture capital (VC).[188] All interviewees received one information slide for preparation of the interview. These information slides addressed the field of interest, the topic which would be discussed, and the purpose of the research (see appendix II). Ideally, after the first interview fruitful cases provided an additional contact person to extend and validate the obtained results. A list of all cases and interview partners, including short business information, interviewee job-title, and duration of the interview is shown in table 3.

[184] See Weiblen and Chesbrough (2015, p. 68); Zaremba et al. (2016, pp. 57-59)
[185] See Dushnitsky and Lavie (2010, p. 23); Hora and Dutta (2013, p. 1290)
[186] See Bartl, Jawecki, and Wiegandt (2010, pp. 1-2)
[187] See Patton (2005, p. 228); Zaremba et al. (2017, p. 46)
[188] See Eisenhardt and Graebner (2007)

Corporation	Product portfolio	Job title interviewee	Turnover (2016 in €)	Duration (in min.)
A (first-tier supplier)	Exterior & chassis components	(1) Head of Strategy and Innovation	> 30 bn.	52:17
B (first-tier supplier)	Electronic & software components	(1) Investment Partner (2) Expert Advanced Purchasing	> 30 bn.	1:08:27 50:18
C (first-tier supplier)	Chassis components	(1) Senior Manager – M&A / Cooperation (2) Expert Corporation Strategic Development	> 30 bn.	51:34 45:23
D (first-tier supplier)	Powertrain components	(1) Coordinator Technology Development (2) Head of Corporation strategy & Head of Corporation Venture Capital	< 30 bn.	43:28 43:28
E (first-tier supplier)	Exterior & interior components	(1) Coordinator Technology Development	< 30 bn.	52:22
F (first-tier supplier)	Electronic components	(1) Expert Technology, Innovation Management & Marketing	< 30 bn.	48:14
G (original equipment manufacturer)	Car manufacturer	(1) Expert General Procurement – Innovation Management (2) Director Partnering & Venturing	< 90 bn.	24:01 44:32
H (original equipment manufacturer)	Car manufacturer	(1) Business Innovation Manager (2) Expert Technology Scouting	> 90 bn.	52:05 22:14

Table 3: Information on selected cases and informants

3.3. Data Gathering: Conducting Questionnaire based Semi-Structured Interviews

3.3.1. Conducting Semi-Structured Interviews

Data for this research was collected in two phases. In the first phase, based on secondary data, first insights on selected cases were obtained and served as case specific preparation for the interviews.[189] Secondary data research exposed that several cases utilize an own corporation venture capital department, use public media to attract startups, organize startup events, and use their online appearance to address startups. Additionally, cases provided information on corporation's field of interest, possible collaboration approaches, and rough selection criteria. In the second phase, 13 in-depth semi-structured interviews were conducted.[190] A previously developed interview guide is used (see for English version

[189] See Yin (2014, p. 4 ff.)
[190] See Yin (2014, p. 4 ff.)

appendix III and for the German version appendix IV). Including 16 main questions, which are asked in each interview and several sub-questions in cases where questions were needed to further moderate the interview. All interviews are supposed to last about 45 minutes and could be conducted as a face-to-face interview or over the phone. All interviews were conducted in German and ideally held with two interviewers to increase the reliability of the research.[191] All interviews were recorded and transcribed. In total, the interviews yielded 10 hours of interview data and 196 pages of transcript.

3.3.2. Development of the Questionnaire

The questionnaire is based on the current state of literature and practical input from the automotive practice. Each question is embedded in literature with a short question outline. The questionnaire used is shown in appendix III and a German translation in appendix IV. In order to increase validity a detailed questionnaire is used and mutual exclusive questions are not excluded. The 16 main questions are shown in table 4.

Question	Question Text
01)	Would you be so kind to introduce yourself and your function?
02)	How do you engage / collaborate with startups?
03)	How do you search for innovative startups?
04)	Where do you search for innovative startups?
05)	Which startups are you looking for?
06)	Do you have a standardized process defined for the identification of innovative startups?
07)	In your process do you use specific instruments for the identification of innovative startups?
08)	How often do you use the specific search instruments in practice?
09)	Please describe the specific focus of your search instruments in more detail.
10)	Which criteria are used in your organization to evaluate the detected innovative startups?
11)	Why do you search specifically for innovative startups?
12)	How is the process structured after the identification of innovative startups?
13)	How do you organize the follow-up process after the identification of innovative startups?
14)	Can you give specific examples of successful or less successful collaborations with startups?
15)	How satisfied are you with the process to identify innovative startups?
16)	Closing the interview could you give some comments on the following points in the first state of collaboration with startups: […]

Table 4: Structure and main questions of the questionnaire

[191] See Eisenhardt (1989, p. 25 ff.)

The first question asks for a short introduction of the participant. Next, the involved stakeholders are addressed. Followed by further questions on the "how" and "where" to search for innovative startups. Question five considers the search scope including which startups the organization is looking for. Question 6-9 focus on the process and instruments to search for innovative startups and each instrument in detail. Next, interest of the organization is addressed by selection criteria and the reason why they search for innovative startups. Question 12 and 13 address the collaboration approach with innovative startups after the identification. For specific examples of successful and less successful collaborations is asked in question 14. To assess the maturity level of the identification and collaboration process the interviewee is asked to give a first personal indication in question 15. The interview closes with some short statement on possible drawbacks and advantages in the collaboration with startups, first contacts for startups and a possible alignment of startups with first tier suppliers.

3.3.3. Assessing the Research Quality in Terms of Validity and Reliability

As with many research methods it is possible to perform an exploratory case study badly. Furthermore, there is a high chance that the quality of the research is biased by the behavior of human beings in the sense of asking questions and answering them according to personal interpretation. The quality of the research depends upon rigor in dealing with validity and reliability. The measures by McCutcheon and Meredith (1993, pp. 241-248) are taken into account to avoid bias and ensure a high quality of research as shown in table 5.

Test for	Requirement
Construct validity	Establish a territory from theory to define the construct.
Content validity	Define how the construct is measured and what it measures.
Internal validity	Establish the right cause-and-effect relationship by using multiple cases.
External validity	Use multiple cases to draw findings applicable to other cases or settings.
Reliability	Use a variety of data gathering methods, third party check on the interview recordings and the summaries.
Validity	Control questions to assure that what is measured reflects what is intended.

Table 5: Test for quality of research based on McCutcheon and Meredith (1993, pp. 241-248)

3.4. From data to theory: Developing Industry Best-Practices

Data was analyzed by software support, using the software Atlas.ti to code obtained secondary and interview data. Atlas.ti was most appropriate for this research to work with the qualitative data and get a structure for the analysis of results. Before coding, the initial review of the data provided a first classification of results. In the next step codes were given and redefined through the research to capture themes that emerged from data. First, each case was analyzed individually to make sense of the data by structuring, defining, and reducing the collected information.[192] In the following, corporations´ organizational structure, processes, and instruments to identify startups were defined (see appendix). After the single case analysis, the cross-case comparison is performed. Here, all interview transcripts were continuously reviewed, in which several patterns and themes were found. Based on detected similarities and differences qualitative statements on corporations' search approach were abstracted. Assuming that larger corporations know best how to identify startups, the analysis includes best-practices in the identification of startups, triggering new research in this field and providing a foundation for hypothesis generation. A summary of the results and the analysis is presented in the fourth chapter of this thesis. The analysis presents all best-practices within the automotive industry for the identification of and collaboration with startups. In the discussion part, all analysis results are assessed by their practical and theoretical relevance and consolidated in the conclusion. However, the thesis aims to provide best-practices from the automotive industry, triggering new research in this field and providing a foundation for hypothesis generation.

[192] See Pagell and Wu (2009, pp. 51-53); Zaremba et al. (2017, p. 50)

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