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MASTER THESIS

Investment decision making of corporate venture capitalists: the importance of multiple startup evaluation criteria in high-tech industries

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Abstract

Purpose:
Corporate venture capitalists are of growing importance to fund high-tech startups. Their selection procedure is however until today not fully understood. This research provides a detailed picture of how CVCs evaluate startups before an investment and why certain attributes are used. Furthermore, a computer-based model is built based on the gained knowledge.

Design and methodology:
The research focusses on German CVCs which invest in series A startups in high-tech industries. A single case study is used for several pre-tests, followed by 14 verbal protocol analysis with investors from the most important investment regions of Germany.

Findings:
Corporate venture capitalists apply 8 criteria, characterized by 30 attributes to gain a profound picture on a startup. Therewith they are able to decide on an investment and build their post-investment strategies based on the identified strength and weaknesses. The ‘go to market strategy’, the ‘strategic fit’, the ‘unmet need’, and the ‘development to be accomplished’ belong to the most important attributes of CVC decision making. Furthermore, several attributes have knock-out impacts. The main motivations to take attributes into consideration are the expected impact on the startup’s success and the contribution to the fulfillment of the corporate’s investment strategy.

Implication and value:
By providing a detailed view on the decision-making process behind investments, the study contributes to filling the literature gap on corporate venture capitalists and enables researchers better comparison between the kind of investors as well as to identify further impactful variables in future research. For praxis, the computer-based decision-making model developed with this paper is of high relevance to support structured startup evaluation.

Acknowledgment

I want to appreciate the support I received from my lead supervisor Drs. Bliek, as well as the inspiring feedback provided by Dr. Löwik, and Mr. Grosse during the last months. Sincere appreciation goes to Danny, thank you for the motivating discussions and the valuable input during the whole process. Last but not least, I want to thank Andreas and Susanne for the outstanding support throughout my years of study. This accomplishment would not have been possible without you.

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List of abbreviations

BVCA	British private equity & venture capital association
BVK	Bundesverband Deutscher Kapitalbeteiligungsgesellschaft / German venture capital association
CVC	Corporate venture capitalist
M&A	Merch and acquisition
PoC	Proof of concept
USP	unique selling point
VC	Venture capitalists also called independent venture capitalist
VPA	Verbal protocol analysis
MCDA	Multiple criteria decision analysis

List of key definitions

Corporate venture capital:	A form of venture capital, where the funding for a startup is provided by a company that is not from the financial sector.
Startup:	A young company which is not yet established on the market with the goal to establish a new business idea.
Series A:	An early funding round in which a startup collects money to finish the product development, and to get on the market.
Criteria:	A topic of interest on which a startup gets evaluated, characterized by multiple attributes
Attribute:	A finer grained feature belonging to one criteria, used to evaluate a startup on a specific aspect.
Knock-out attribute:	An attribute where a bad performance will motivate the investor directly to not place an investment in the startup.

1. Introduction

General perspective on the topic

Corporate venture capitalists are an important and growing source of startup funding. Their strategic interests in the new venture make the selection of the most promising and fitting candidate an important task, which however got for high-tech CVCs till today not attended by the literature. Several differences to business angles and independent venture capitalists make the available theories inapplicable. To understand the corporate venture capitalist's behavior and their motivations better, this research is required. To begin with, the following chapter will highlight the importance of the topic by explaining the key concepts and conclude with the research goal and research questions.

High-tech companies and innovativeness

High-tech corporations nowadays face major challenges to keep their leading positions in the markets. The best strategy to ensure this leadership is creating new and improved products to be sold in future markets (Chesbrough, 2003) however, corporations face major challenges to be innovative. Researcher as Chesbrough (2003) state that the environment of knowledge has changed that drastically in the last decades, that corporates require new strategies to stay successful innovators. Emden, Calantone, and Droge (2006) who research collaborative innovation strategies name on page 331 several reasons why the traditional internal development of new products is reaching its limitations in the current world. The authors state that internal industrial research got less effective, referring to (Chesbrough, 2003), external environments are more turbulent, referring to (McCann & Selsky, 1984); global competition has increased, referring to (Basil & Samuel, 1991); and product life cycles are shrinking, referring to (Chen & Li, 1999). Furthermore, the complexity of technology needed to innovate has increased, and R&D costs are exploding, referring to (Rindfleisch & Moorman, 2001). All those factors lead corporations to a situation, in which they need to apply new strategies to support their internal R&D.

The potential of corporate venture capital

One strategy to overcome these barriers to innovation is the collaboration with startups (Bannerjee et al., 2016). One form of this interaction is corporate venture capital. It refers to any equity investment performed by non-financial organizations in startups and can be for strategic or financial objectives (Maula, 2001)

There are multiple forms of collaboration between startups and corporates which can be differentiated by the number of resources invested on both sides in the collaboration. (Bannerjee et al., 2016) Typical settings include single projects where corporations and startups work together for a limited period of time to achieve a well-defined goal, accelerators where the experienced business people provide support, knowledge, and resources as office spaces to help the startup to succeed the early stages (Radojevich-Kelley & Hoffman, 2012), corporate venture capital investments where the corporate support the startup with larger amounts of finance and further resources, (Dushnitsky, 2006), and finally acquisitions, where the corporate purchases the startup to fill gaps in the current

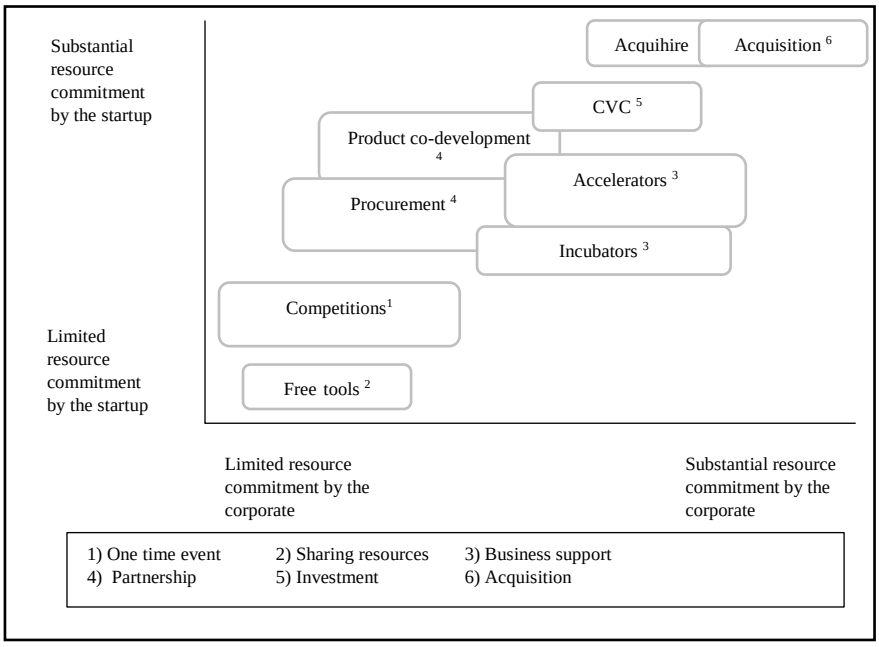


Figure 1 Modes of interactions between corporations and startups, differentiated on the invested commitment: source: Bannerjee, Bielli, and Haley (2016)

portfolio (Narayanan, Yang, & Zahra, 2009). Which form of collaboration is the most promising one is a strategic decision which depends on the overall goals of the investor as well as on the respective startup case. This research will focus on the corporate venture capital form of financing.

Worldwide companies have a growing interest in venture capital activities. While in 2010, corporations provided 12% of the total VC investment their share has grown to 19% in 2017. (KPMG, 2018) A trend, which is also recognizable in Germany (Bundesverband-Deutscher-Kapitalbeteiligungsgesellschaften, 2018). Especially in the high-tech sectors, an increasing number of corporations become active in this field (Bannerjee et al., 2016; Narayanan et al., 2009). Where especially the software business is of high relevance and accounted for 40% of the closed venture financing deals in Europe between 2014 and 2018. (KPMG, 2018)

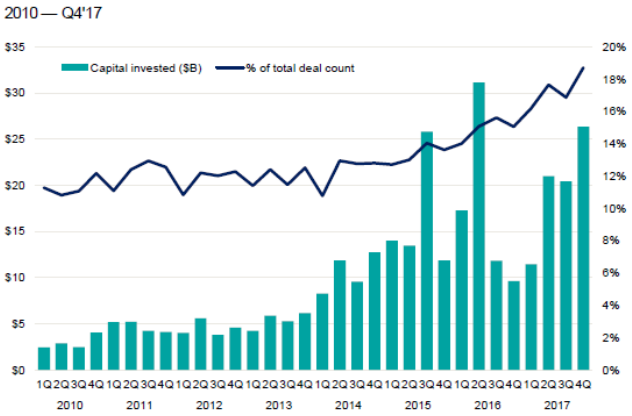


Figure 2 Corporate VC participation in global venture deals. Source: (KPMG, 2018)

By applying an open approach during the search for knowledge, established companies try to increase their innovativeness and can use corporate venturing as a strategy to keep track with the rapid innovation cycles. (Bannerjee et al., 2016; Kohler, 2016; Narayanan et al., 2009) Those collaborative strategies are seen as promising because "startups are a major source of innovation, as they employ emerging technologies to invent products and reinvent business models" (Kohler, 2016, p. 347).

Corporate venture capital can be differentiated according to their most common strategic objectives (Narayanan et al., 2009; Weber & Weber, 2005). Four groups of CVCs can be differentiated. The external CVCs focus on investments outside the corporate and identify promising startups to either receive financial returns, or strategic returns while the internal oriented CVCs invest in company internal startups that either are meant to grow within the corporate, or have the strategy to build the business and separate it from the core operations to spinning the business out. (Weber & Weber, 2005) referring to (Birkinshaw, van Basten Batenburg, & Murray, 2002). As explained later in more detail, the most corporate venture capitalists belong to the external strategics (Dushnitsky, 2006; Mohammadi & Khashabi, 2016; Siegel, Siegel, & MacMillan, 1988) and also this research focus on the external oriented corporate venture capitalists.

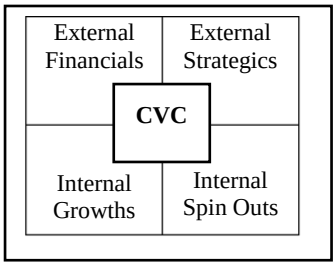


Figure 3 Strategic orientations of corporate venture capitalists, adapted from Weber and Weber (2005)

Corporate venture capitalists and their motivations

As identified in the previous paragraph, corporate venture capital has several objectives. The literature agrees on the largest motivation for companies to participate being strategic returns and using CVC programs as a route to innovation. (Dushnitsky, 2006; Mohammadi & Khashabi, 2016; Siegel et al., 1988). In many cases, the motivation is to gain insights into new technologies which are relevant to the corporate activities (Dushnitsky, 2006) and is claimed to be even more important than the financial returns. (Mohammadi & Khashabi, 2016)

Furthermore, the entrance to new fields, industries, or markets is a common motivation (Dushnitsky, 2006; Narayanan et al., 2009). The novelty, however, has to be correlated with technology or product aspects while a geographic expansion is less common (Dushnitsky, 2006). This might be correlated to the support a corporate can offer, where the business network, the market access, and the brand awareness play a role (Bannerjee et al., 2016). Next to taking direct advantages of the investment, the contact to the startups can also stimulate the internal R&D and promote further development of their technologies (Chesbrough, 2003; Dushnitsky & Lenox, 2005). In addition to that, the interaction with the venture capital community can improve the internal venturing program (McNally, 2002). To sum it up corporate venture capital activities "funnel important information about market and competitive dynamics, making corporations aware of opportunities for innovation" (Yang, Narayanan, & Zahra, 2009, p. 263)

To become attractive investors, corporates offer several sides of support to startups. The investments often exceed financials, since large corporations can furthermore offer "resources, scale, power, and routines needed to run a proven business model efficiently" (Weiblen & Chesbrough, 2015, p. 66). In the high-tech industry, CVCs often invest in startups operating in similar areas as the core business and support the startup with their technological experience, their market knowledge and access, and the reputation needed to get in contact with further partners. (Munari & Toschi, 2015)

Stages of a Startup

Startups are classified in certain growth stages, on their development path to a successful company, which differ in their key characteristics, as well as the faced risks, and the main goals of the stage. (Landström, 2007) The seed stage is used to complete the team, and to formalize a plan for the business. Typically the entrepreneurs have only a concept and are working on a prototype. Their task is to assess the market and to create proof of concepts. Typical problems in this early stage are a fail to develop the prototype or the realization that the market or addressable market share is not large enough to build an attractive business. (Dorf et al., 2008; Landström, 2007) The following stage, called development or series A financing stage is meant to develop the product far enough to bring it to launch. The market typically has signaled an acceptance of the product and the entrepreneurs need funding to fill the last gaps in the team and to ramp up their company. Market penetration and the break-even point are major goals in this stage, while wrong market assumptions, a not sufficiently competitive product, and bad market strategies are risking these goals. Typical investment sizes in this stage are above 500k Euro up to one digit millions. (Dorf et al., 2008; Landström, 2007) Having successfully entered the market, the next stage is meant to grow the business. Funding rounds in this stage can be repetitive, depending on the business. The capital is now needed to fulfill the market demand and to increase the sales further. The cash flow needs to be improved here, to run the business more efficiently. If the startup takes too long to achieve this stage, a major risk is the obsolescence of their technology which can close potential exit channels. Further attention needs to be given to an adequate management and to not get run over by unanticipated competition. (Dorf et al., 2008; Landström, 2007) This research focusses on corporate investors who make investments in the series A, which is a typical entry point for CVCs who want to avoid the unpredictability of the seed stage while getting early traction on new technologies (Weiblen & Chesbrough, 2015).

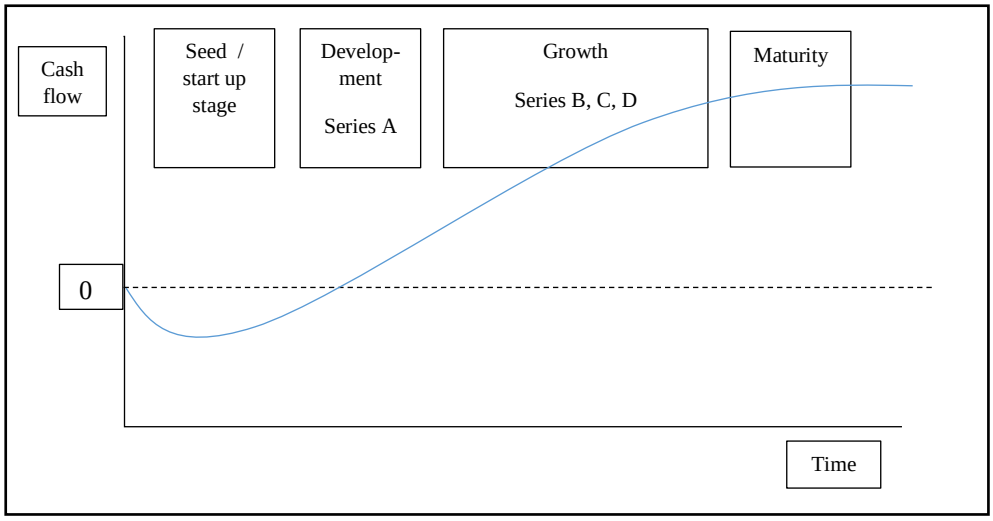


Figure 4 Startup development stages, adapted from Dorf, Byers, and Nelson (2008)

The high-tech startup

Startups are nascent companies which have the intent to bring new opportunities to the marketplace wherefore they are commonly established in an uncertain environment. (Radojevich-Kelley & Hoffman, 2012) As previous research has done, see: Lockett, Wright, and Franklin (2003); Vohora, Wright, and Lockett (2004), this research will follow the definition of high-tech industries proposed by the British private equity & venture capital association (2018). The BVCA relates high-tech to computer hardware, computer software, communications, internet, computer semiconductors, and other electronics related. Furthermore, to medical, medical pharmaceutical, and biotechnology. This definition will come back in the startup case used for the verbal protocol analysis, and the sample selection methods, as explained in the methodology. A high-tech startup is thus an emerging company which targets a technology-intensive market.

Startups and their motivation

Startups can provide insights into new technologies and offer promising ideas which are combined with a high willingness to take the risk (Weiblen & Chesbrough, 2015). The small ventures can typically make benefit of the characteristics which differentiate them from established corporations as being agile in their organization (Weiblen & Chesbrough, 2015). First of all, the startups can massively profit from the access to financing and further resources, market knowledge, and technological expertise. Furthermore, the backup by a larger brand name can be supportive to convince customers (Bannerjee et al., 2016; Munari & Toschi, 2015). Thus several startups search for corporate backup.

The right startup selection

Baum and Silverman (2004) investigate whether venture investors in biotech industry actually select specific startups or whether the success of venture-backed startups is purely based on the support which the entrepreneurs can enjoy after the investment. While the support should not be underestimated as a success factor, Baum and Silverman (2004) conclude that the selection of a proper startup is an important task of venture capitalists. This is in line with further research which addressed this selection process, as explained in the following paragraph. Since strategic oriented CVCs are meant to support the innovativeness of its mother company. (Bannerjee et al., 2016; Kohler, 2016; Narayanan et al., 2009), the same rule as for traditional R&D projects in technology-centered organizations apply. Coldrick, Longhurst, Ivey, and Hannis (2005, p. 185) formulate it the following way: "Technology centered organizations must be able to identify promising new products or process improvements at an early stage so that the necessary resources can be allocated to those activities. It is essential to invest in targeted R&D projects as opposed to a wide range of ideas so that resources can be focused on successful outcomes." In a nutshell, it would simply be too expensive and most likely not worth the investment to invest in all available startups without a selection of the promising candidates.

Coming from the field of traditional merge and acquisition, scientists, as well as investors, have tried to evaluate startups in alliance with financial models (Miloud, Aspelund, & Cabrol, 2012). Discounted cash flow and the multiples method are widely spread methods. However, those financial models strongly depend on the data quality. Due to the lack of historical data and uncertainty about several elements, the financial data of early-stage startups are forecasts and thus can lead to questionable results. (Festel, Wuermseher, & Cattaneo, 2013) Research on business angles and independent venture capitalist has shown that investors look for further signs of future success (Baum & Silverman, 2004) and management-, further than financial theories are promising fields. (Miloud et al., 2012) Several studies tried to investigate how investors as business angels, venture capitalists, and corporate venture capitalists select the startups of their interest. Wherefore an overview is shown in table 1.

Table 1 startup selection literature overview

Author	Business Angels	Venture capitalists	Corporate Venture Capitalists	Main message
(Munari & Toschi, 2015)		X	X	Core-technology patents held by the startup are important during the investment decision of VCs, as well as CVCs. Especially when the investor is specialized in a certain industry.
(Franke, Gruber, Harhoff, & Henkel, 2008)		X		The team plays a major role during startup evaluation and certain attributes can have a knock-out impact on the investor's decision.
(Jell, Block, & Henkel, 2010)		X		German venture capitalists take several criteria into account when evaluating startups, which differ in their level of impact and can be classified into "Muss – Soll – Wunsch – Abwägungsfaktoren"
(Kakati, 2003)		X		The authors identify 38 criteria, grouped into 6 categories which play a role to identify successful ventures. The entrepreneur's strategy, in combination with their capabilities, and the meet of a customer need are success factors for new ventures.

(Knockaert, Clarysse, & Wright, 2010)		X		Venture capitalists in high-tech industries take a specific look at startups and apply a set of criteria to evaluate those. Three different groups of investors can be identified, differentiating on the level of importance they allocate to the criteria.
(Mason & Stark, 2004)	X	X		While all groups of investors integrate multiple parts of the business plan in their investment decision, the importance of the respective criteria differs between business angels, bankers, and VCs.
(Miloud et al., 2012)		X		Venture capitalists valuation of startups can be explained by criteria that indicate firm performance. Industry attractiveness, the team, and external relationships are identified as most important.
(Sharma, 2015)		X		Venture capitalists follow a multiple criteria perspective when evaluating startups, however, differences occur in the level of importance and whether the team, the market, or financials are the preferred criteria.
(Siegel et al., 1988)			X	26 criteria applied by corporate venture capitalists are identified wherefrom the attractiveness to the venture and the long-term strategic fit are of increased importance for CVCs.
(Smith, Mason, & Harrison, 2010)	X			With an increased level of experience, business angels change the information taken into account when evaluating startups and shift their focus on investors fit and the product, without neglecting the less important criteria.
(Yang et al., 2009)			X	Experience has a positive impact on the selection capabilities of CVCs. Industry diverse experience can enhance the selection of startups with financial returns while experience intensity and stage diversity increase the selection of startups with strategic returns.

It becomes visible that several studies have investigated how especially venture capitalists make investment decisions and have developed several evaluation criteria. It is widely agreed that investors do not solely focus on single aspects of the startup, but are trying to gain a broad picture of the new venture. Generally, the criteria taken into account refer to the product or service offered by the startup, the market addressed by the new venture, the entrepreneur's capabilities and his team, and financial indicators which include the exit opportunities. Furthermore, the technology is taken into account, which might be more important in the high-tech sectors. Business angles and corporate venture capitalists tend to also integrate the fit to them as an investor when evaluating a startup. This could depend on the higher rate of interaction and the more strategic orientation of those investors. Another interesting insight delivered by Jell et al. (2010) and Franke et al. (2008), is that few attributes have the potential to knock-out an investment possibility if a startup performs badly in this aspect. While in both articles which have mention knock-out attributes Joachim Henkel was a co-author, none of the other reviewed articles mentioned such a characteristic. The existence of knock-out criteria and whether they also apply for corporate venture capitalists thus needs further investigation.

Overall the current literature gives several insights into the behavior of investors. The field of corporate venture capitalists is however until today not sufficiently researched. Also Yang et al. (2009) state that "we need to examine how to select and apply different criteria in evaluating venture proposals, so as to better capture corporate venture capitalists' investment capabilities." (p.263) To the knowledge of the author, no literature is available which specifically addresses corporate venture capitalists in high-tech industries.

The inapplicability of existing models

Overall, the studies do not develop a highly standardized picture. Even within the studies focusing on venture capitalists the criteria differed, as also recognized by (Yang et al., 2009). The same applies between different business angels (Radojevich-Kelley & Hoffman, 2012) and also between the three groups of investors, business angles, venture capitalists, and corporate venture capitalists. According to the literature, the criteria applied strongly depend on the geography and type of industry the investor is active in, as well as on the stage of the startup

(Kakati, 2003; Landström, 2007; Sharma, 2015). It is thus less surprising that investors develop their very own set of criteria to evaluate startups in their sector (Knockaert et al., 2010; Sorenson & Stuart, 2001). This results in a need to focus research on specific populations, to achieve meaningful results.

That VCs and CVCs apply different sets of criteria becomes comprehensible by taking a look at the differences between both groups. While CVCs, as explained earlier in this chapter, have often a strategic interest in the startup and can offer multiple sides of support, this objective is not shared by VCs. (Mohammadi & Khashabi, 2016). Independent venture capitalists are often managed by banks and work with third-party money. They invest in startups to gain a financial return to be able to pay their shareholders and to raise additional funds for future projects. (Gompers & Lerner, 2001; Metrick & Yasuda, 2010) Thus it is expectable that the chosen criteria and especially their importance will differ. Phan, Wright, Ucbasaran, and Tan (2009) support the statement that theories of venture capital will have limitations to how far they are applicable to corporate venture capital and add that future research should consider these limitations.

The goal

In summary, it is known that startups are a promising source to increase the innovativeness of high-tech corporations and the investment via corporate venture capital units is a commonly applied strategy to achieve this. Even though the selection process is an important field of research, the current literature misses out to address how high-tech corporations evaluate early-stage startups.

To add to the current stage of the literature, the goal of this research is to shed light on the process with which startups become selected by high-tech corporations for investments. The detailed analysis of the process enables the reader to understand the multiple facets of the evaluation well. Through the development of the scales and the further investigations of the attributes, this research goes in its explanatory power beyond the scope of earlier articles and provides the reader a full understanding of the detailed startup investigation. By structuring and summarizing the knowledge in the following in a computer based decision making model, the research is next to its scientific value of high practical relevance. Scientists and practitioners can thus profit from the insights of the research and improve their understanding of pre-investment startup evaluation.

Research question

To achieve this goal, the resulting research question is the following:

How do corporate venture capitalists evaluate early-stage startups in high-tech industries?

To answer the main research question, it is split into four sub-research questions. Firstly, a literature review and a single case study at a German high-tech CVC is conducted, to answer the first sub-question:

Which criteria play a role for startup evaluation by CVCs?

Furthermore, verbal protocol analysis with further German CVCs are conducted to answer the second, and third sub-research questions. Follow up interviews with the VPA participants are applied to generate further insights into the third sub research question, and to answer the fourth sub research question:

How important are the single criteria for the CVC decision making?

Why are specific criteria more important for CVC decision making?

Which attributes can have a knock-out impact?

Significance of the research

Practical relevance

The insights created by this research in the field of corporate venture capitalists in high-tech industries will enable the investors to benchmark their behavior with investors from a similar field. Since the research applies a real-time experimental methodology, the investors can learn about aspects of their decision making, which they are self not aware of. The problem of VCs to not be very good at self-introspection or being not fully aware of their own decision making is recognized in the VC literature (Landström, 2007; Sharma, 2015). An actual decision-making model, as developed by this research, has the potential to explore as well as to improve the investor's decision making (Sharma, 2015). By being consistent and optimally weighting the information, a decision-making model reduces the cognitive load of the decision maker and therewith can improve the accuracy (Landström, 2007; Shepherd & Zacharakis, 2002). The high amount of information investors are confronted with can lead to neglecting certain information while overvaluing others (Landström, 2007; Shepherd & Zacharakis, 2002). By making smaller assessments in accordance with the model, this information overload can get overcome. (Shepherd & Zacharakis, 2002) Furthermore, the knowledge bundling character of such a research can support junior corporate venture capitalists to learn faster about startup evaluation (Shepherd & Zacharakis, 2002). By providing a decision-making framework with clear definitions, the decision accuracy, as well as its consistency will be supported with the developed model and a proper base for discussion in the CVC team will be provided (Belton & Stewart, 2002). Furthermore, the impact of gut-feeling and subjectivity can either be decreased or at least be made explicit (Belton & Stewart, 2002; Proimos & Wright, 2005) which will lead to a more informed decision making. In addition to the advantages CVCs can take out of this research, entrepreneurs can benefit from the insights, too (Sharma, 2015). The knowledge on criteria taken into account while evaluating startups enables entrepreneurs to write better business plans and to put increased efforts in the parts of higher importance.

Academic relevance

Several factors which were already introduced in the previous paragraphs make this research of academic importance. First of all, the current literature offers proper insights in the work of venture capitalists but even for VCs the "why" and "how' questions of selection behavior are not fully understood yet (Knockaert et al., 2010). The literature has begun to integrate corporate venture capitalists, however, CVCs in high-tech industries are not explored yet and form a clear gap in the literature. The available theories from VC cannot simply be transferred to CVCs since there is evidence that CVCs are different from VCs. First of all, both are investing in startups to receive returns, but their initial situation, as well as their strategies and intended outcomes, and motivations differ from each other (Dushnitsky, 2006; Gompers & Lerner, 2001; Metrick & Yasuda, 2010; Weiblen & Chesbrough, 2015; Yang et al., 2009). In support of this statement, Phan et al. (2009) recommend future research to take into account that VC theories may be limited to how far they are applicable to CVCs. In general, we need to better examine how different criteria are applied from corporate venture capitalists in evaluating startups (Yang et al., 2009) and structured approaches as decision-making models can improve the understanding of the investor's policies. (Shepherd & Zacharakis, 2002) To sum it up, the identified gap in the current literature concerns the evaluation criteria and their respective importance applied by CVCs. To research this evaluation topic will deliver important insights and is a valuable and desired addition to the current literature. With the insights delivered by this article, future research could clarify the impact of different industries on the evaluation criteria and on that way work on the generalizability of the model. Furthermore, future research can add to the understanding of the differences and similarities between VCs and CVCs, by using this model as a reference point.

Thesis structure

The first chapter introduces the research and provides explanations and definitions for the key aspects. It imparts the importance of the topic and introduces the first relevant literature. The second chapter approaches a theoretical lens on decision making as well as startup evaluation and identifies how complex decisions are taken and which attributes play a role for investors. The following third chapter explains the methodology of the verbal protocol analyses, the follow-up interview, and furthermore, introduces the case study, as well as the VPA sample. In the fourth chapter the main findings are presented, including the final decision-making tree which provides a good overview of the attributes, their importance, and knock-out character. Lastly, a discussion of the findings, as well as the concluding remarks, are found in chapter 5. The appendix includes the coding scheme, the knock-out attribute overview, additional findings for each attribute and lastly the case study used during the verbal protocol analysis.

2. Theoretical perspective

The previous chapter has shown that investors have a complex task to identify the right startup to invest in. Literature indicates that the process of evaluation follows multiple steps until the investor has a profound picture on the startup and is able to decide on whether he wants to place an investment. This chapter will first explain how complex decision can be conducted, and later on provide a detailed view on how (corporate) venture capitalists evaluate startups.

Detailed perspective on decision making

Intro

Every situation in which a decision is taken requires the balancing of multiple factors. To ponder the information which a decision is based on, as well as the possible outcomes that will result from the decision, can require a different level of commitment wherefore decision-making models are a supportive tool (Belton & Stewart, 2002; Shepherd & Zacharakis, 2002). A decision that is made every day can be performed "in one's head" because the boundaries are easily captured and the impact is limited. Even if mistakes may occur, they are easily revised. (Belton & Stewart, 2002) However, not all situations can be solved that easily.

Taking important decision

Many decisions have substantial consequences, their impact is long-term, and mistakes cannot be easily corrected. Thus they require more intense elaboration. (Belton & Stewart, 2002; McGee, Wilson, & Thomas, 2010) Those decisions are known to "matter" in the decision maker's situation and his future. A decision matters, if "the level of conflict between criteria, or of conflict between different stakeholders regarding what criteria are relevant and the importance of the different criteria, assumes such proportions that the intuitive "gut-feel" decision making is no longer satisfactory" (Belton & Stewart, 2002, p. 2). In those situations, the mental capacity of the human brain can be exhausted. Psychological research agrees on the limited number of information a human brain can take into account when making decisions, also called bounded rationality (Boddy, 2008). Miller (1956, p. 95) conclude that humans have "limitations on the amount of information that we are able to receive, process, and remember." He elaborates further "By organizing the stimulus input simultaneously into several dimensions and successively into a sequence of chunks, we manage to break (or at least stretch) this information bottleneck." (Miller, 1956, p. 95) Thus one can conclude that decisions which matter require tools to be accomplished, generally referred to as decision-making models.

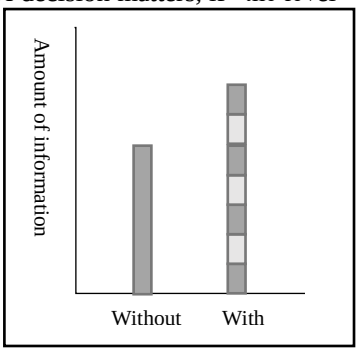


Figure 5 Amount of information taken into account when breaking a decision into multiple chunks.

Recognition-primed decision making

The high amount of expertise which is generally seen in venture capital investors (Shepherd & Zacharakis, 2002) and the by researchers identified presence of gut-feeling in the decision making (Proimos & Wright, 2005) can lead to the assumption that investors perform an expert decision making in form of recognitional decision making. According to this theory, the decision maker performs a rapid assessment of the situation, which can be caused by stress, time pressure, or uncertainty in the environment. Especially uncertainty applies to the forecasts in the business plan, on which a startup gets assessed and the investment decision is based on. The advantage of such a process is a quick decision which will lead to a workable solution to proceed with (Hutton & Klein, 1999) and in the case of investors, he could rapidly decide for one of the investment possibilities. A further characteristic which suits investors is the condition that the decision maker needs to be an expert in his field to apply recognitional decision making. The whole situation needs to be assessed to create mental simulations which evaluate potential outcomes. (Hutton & Klein, 1999) On the other hand, the focus of this research on the stage of detailed startup evaluation should provide the investor enough time to come to his decision. Furthermore, the remarkable long-term impact of an investment decision makes the following approach more feasible.

Analytical decision making

One analytical decision-making approach, where a high amount of information is gathered and intensively analyzed (Hutton & Klein, 1999) is the multi-criteria decision analysis. It deals with circumstances, in which one

or multiple people have to choose one or several options from a wider list. To make a decision, the options are evaluated and compared based on several aspects, so-called criteria. The strength is to consider multiple conflicting criteria simultaneously, to identify the overall preferred options. An MCDA model leads the decision maker through a process of detailed investigation from multiple perspectives. The analyzed options become well comparable through the structured and consistent process. Reflecting on the information provided in the current literature on decision making of investors, as the application of multiple criteria, and the evaluation of several startups to identify the most promising ones, this framework seems the most valuable.

The Multiple Criteria Decision Analysis

Intro

Multiple Criteria Decision Analysis and the resulting models are valuable decision support mechanisms that guide and support the decision maker. However, a model is not able to make the decision itself and is highly dependent on the expert's input, his judgmental capabilities, and his evaluation.

Value added by MCDA

"The major role of formal analysis is to promote good decision making" (Keeney & Raiffa, 1993, p. 65). By forcing the decision maker or the group of decision-makers to think intensively about the situation, and by forcing the participants to think about the problem from different perspectives, the structured decision analysis leads to a better understanding of the problem and, thus, results in a better and more informed choice. (French, 1986; Keeney & Raiffa, 1993) As highlighted in the previous paragraph, the importance of structured decision making increases with the complexity of the decision to be taken. Investors get "flooded" with information from business plans, reports, consultants, and meetings and are therefore in a situation where a structured model is an opportunity for more accurate decision making. (Shepherd & Zacharakis, 2002) Belton and Stewart (2002) highlight that MCDAs add on multiple ways value to the decision making, since it:

- Takes account of multiple, conflicting criteria in decision making
- Structures the problem and organize and synthesize information
- Provides a common language and a focus for discussion
- Helps decision makers learn about the problem, and about their own and others values and judgments
- Leads to more considered, justifiable, and explainable decisions
- Makes subjectivity explicit and transparent
- Minimizes the potential for post-decision regret by taking all factors properly into account

Limitations of MCDA

The added values of MCDA models directly lead to the limitations of such a model. The decision-making model does actually not take the decision. Keeney and Raiffa (1993, p. 65) formulate it the following way: "Formal analysis is meant to serve as an aid to the decision maker, not as a substitute for him." A MCDA model breaks down the decision into several small and solvable tasks, which however still require "nontrivial skills" (Belton & Stewart, 2002) to fill this framework. A MCDA model can be seen as a platform for discussion that leads to justifiable and explainable decisions because the result is based on an analysis that considers multiple perspectives instead of gut-feeling and irrationality. Belton and Stewart (2002) withdraw three myths about MCDAs, which properly summarize the limitation of the model.

1) Myth 1: MCDA will give the right answer
2) Myth 2: MCDA will provide an objective analysis
3) Myth 3: MCDA will take the pain out of the decision-making

Decision-making models are a supportive tool to structure the decision in a consistent way and to lead the decision maker through the process. Taking multiple criteria into account often leads to conflicting results, which leads to a situation in which the chosen option does not have to be the optimum in the traditional optimization perspective. However, the resulting choice is taken because it is in accordance with the decision maker's values and furthermore not dominated by any other possible choice. (Verheyden & Moor, 2015) To achieve this it is in the focus of MCDA to integrate objective measurements in the analysis by providing scales and frames to be followed, however, the single judgments are conducted by the decision maker, who may base the analysis on intuitive judgments or experience. While the model thus cannot make the decision objectively, it makes the subjectivity explicit and

addressable for discussions. These judgments can still require extensive preparation by the decision maker and may lead to different perspectives in the team. It is in the common for multi-criteria decisions to integrate plenty and partially complex information. To make the right judgments, thus, remains the responsibility of the decision maker, which can be, even though simplified, a painful process and requires extensive discussions. (Belton & Stewart, 2002; Verheyden & Moor, 2015)

Schools of MCDA

In general, there are three schools of thoughts on MCDA models (Belton & Stewart, 2002; Verheyden & Moor, 2015) which categorize the way a model is built and applied.

1) Value measurement models
    a) To evaluate the available choices, scores are initially generated for every single criterion and afterward synchronized into one respective score.
2) Outranking models
    a) A pairwise comparison of the choices based on each criterion is developed to aggregate these preference information afterward across all criteria, seeking to identify favorable choices.
3) Goal aspiration/reference level models
    a) A benchmarking of the choices towards desirable levels of evaluation is applied to identify the most suitable option to reach those desirable goals.

A startup investment decision is a complicated task since several aspects as the technologies might not be well understood, the targeted markets may be niche or evolving, and the organizational capabilities are often not yet complete (Yang et al., 2009). Furthermore, the long planning horizon, the large amount of money involved, and a high amount of information to be taken into account increase this complexity. Belton and Stewart (2002) argue that the complexity of the situation should motivate for simplicity in the model. A simple model can be supportive in complex situations by being transparent and easy to work with to generate further insights and understandings instead of increasing the complexity by being a black box. Verheyden and Moor (2015) state that "the most straightforward approach is to score each alternative on every individual criterion, and then calculate the weighted sum (…) based on the relevant importance of each criterion". Thus to provide the best support in the highly complex situation of startup evaluation, the MCDA method applied in this research is the weighted sum model.

The weighted sum model

Intro

The foundation of a weighted sum model, as for all MCDA models, is a selection of relevant evaluation criteria and the allocation of respective levels of importance. This enables to evaluate choices accordingly and to generate resulting rankings. As just mentioned, a reason to use the additive model is its simplicity, which easily can be explained to - and understood by decision makers, as well as observers. By avoiding in-transparency through overly complex aggregation formulas (Belton & Stewart, 2002). Thus a value measurement MCDA model is from a practical and scientific point of view valuable to understand the process of corporate venture capitalist's decision making.

General setup

A decision is based on multiple key factors, so-called criteria which need to be defined before the decision can be taken. (Belton & Stewart, 2002) The criteria are meant to represent the important aspects to be taken into consideration to come to a solid decision. To achieve this, the criteria are defined by sub-criteria, here called attributes. In the weighted sum model, each attribute receives a value of importance to be appropriately taken into consideration in the decision making. The sum of the weights of the attributes represents the effective weight of the criteria as visualized in figure 6. (Belton & Stewart, 2002)

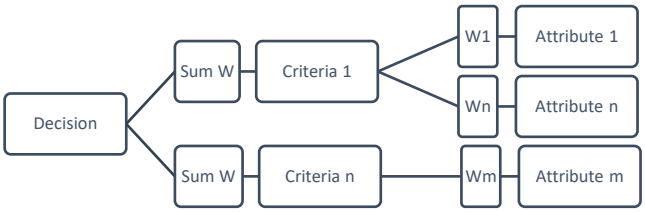


Figure 6 The genral setup of a weighted sum MCDA model

The attributes

To construct an MCDA, the attributes have to meet several requirements. First of all, the attributes need to be relevant for the decision maker to be able to reflect on his goals. Furthermore, it has to be clear how an attribute adds to the decision, thus when it is perceived as positive or as negative. If several decision makers participate in the process, it is important for them to have a shared understanding of the attributes. (Belton & Stewart, 2002) The understandability and the measurability are highly impacted by the definitions assigned to the scale, as explained in the following paragraphs.

Global vs local scales

To ensure a consistent evaluation, the attributes require a scale. In this research, a 5 point global scale is adopted. In general, two scale options are available, a local and a global scale. By aligning the best and worst performance per attribute to the best and worst performance in the sample to be evaluated, a local scale can build a fast assessment tool, which however is hard to generalize and to compare between different sample groups. (Belton & Stewart, 2002). A global scale requires more extensive preparation and defines the endpoints of the attribute scale as the ideal and worst performance that realistically could occur to benchmark the startups on it.

Defining the scale

As mentioned before, the applied global scale is of a qualitative nature. While defining the scores it is important to be precise to achieve reliability, which means two independent raters of one attribute should come to the same score, while also being operational, which means a decision maker has to be able to rate alternatives that got not predefined by the scale. (Belton & Stewart, 2002) This research primarily defined point 1, 3, and 5 on the scale. However, a pretest has shown that the definition of three out of five scores is too imprecise in the CVC context. Thus score 2 and 4 were additionally defined but less strictly than the previous points. The clarification was similar to: "not all aspects of the best score are met, however the startup performs like …"

Weight the scale

The final step required for a multi-criteria decision analysis model is the weighting of the attributes. The output has to reflect the preferences of the decision makers and take into account how strongly the respective attributes

affect the decision. Therefore a percental value is assigned to each attribute and integrated into the score calculations. (Belton & Stewart, 2002). How the scores are calculated will be explained in the methodology chapter. The now following part will explain the decision making as it is performed by investors in more detail.

Detailed perspective on startup evaluation

Intro

As a short recap from the first chapter, startup evaluation has two main lines of research. On the one hand, investors use financial models as a discounted cash flow, or multiples with which they use current and future cash flows to assign a Euro value to a new venture. On the other hand, investors use an input evaluation, where factors as the team, the market, the uniqueness, and the strategy of the startup are taken into account to evaluate the quality of the startup. (Leach & Melicher, 2011) Miloud et al. (2012) find in their research that the evaluation of startups by observable strategic variables make the evaluation less dependent on "unreliable financial calculations", an approach especially helpful for early-stage ventures. As indicated beforehand, this research will focus on the second stream of research, identifying high-quality startups based on multiple criteria.

The evaluation process

To identify the most promising startups is a multi-stage process, visualized in figure 7, that starts with an initial screening of the cluster of interest (a) to gain knowledge about the available startups, followed by a detailed investigation of the promising candidates (b). (Shepherd & Zacharakis, 1999; Smith et al., 2010)

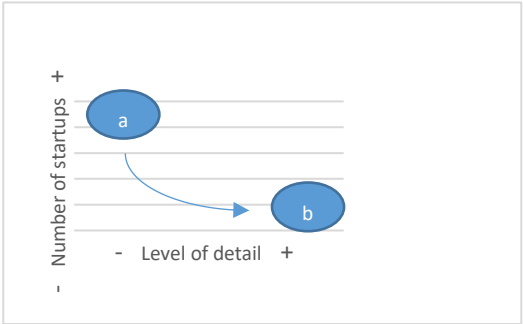


Figure 7 Initial screening (a) and detailed evaluation (b)

"The purpose of the initial screen is to filter out 'no hopers' in order to focus their time on those opportunities that appear to have potential. These are subject to more detailed appraisal." (Smith et al., 2010, p. 10) Typical steps during the detailed evaluation are the in-depth study of the business plan and the financial forecasts, to get in personal contact with the startup, and to perform own research on the market, the competitors, and further startup-specific relevant information. (Smith et al., 2010) This research focusses on the later stage of detailed investigation and researches how CVCs base their decision during this late stage.

Order of the evaluation criteria

Until now, research on VC and CVC investment has neglected the impact of the order of the criteria by which a potential candidate gets assessed. However, research of the more general field of business collaboration indicates that partner selection of successful collaborative development projects follows a common order (Emden et al., 2006) as visualized in figure 8.

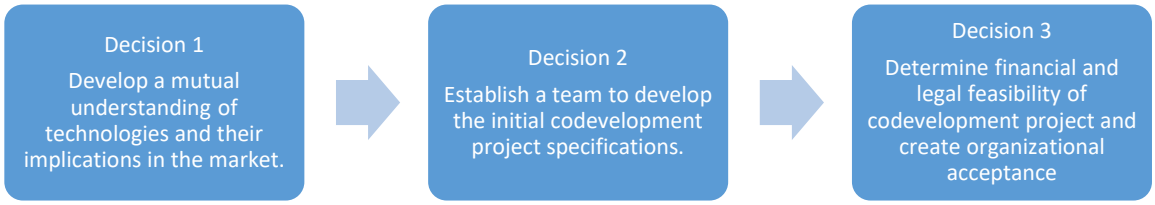


Figure 8 Emergent theory of partner selection for creating product advantage through collaboration, adapted from Emden et al, (2006)

To integrate the insights of Emden et al. (2006) the criteria of the startup assessment will be ordered as follows: 1) product/service; technology; market 2) Investor fit; entrepreneur/team 3) exit attractiveness; finance. These findings potentially can support also startup selection, even though the impact has to be validated in future research.

(C)VC startup evaluation

Intro

As explained in the first chapter, the evaluation process of startups follows the investigation from multiple perspectives. Several criteria, which are further broken down to attributes are used to evaluate the startups of interest. The following chapter will explain which criteria and respective attributes are to be used by corporate venture capitalists in high-tech industries and will furthermore explain these attributes which is necessary for developing later on the global scale.

Criteria used in this research

Since the focus of this research is characterized by 1) corporate venture capitalists; 2) high-tech startups; and 3) early stage (series A) investments, the research of Knockaert et al. (2010) and of Siegel et al. (1988) are taken as lead articles to identify the relevant attributes.

Table 2 focus of this research and the lead articles

	This research	Knockaert et al. (2010)	(Siegel et al., 1988)
Industry	High-tech	High-tech	Undefined
Geography	Germany	Europe (incl. D)	USA
Stage	Early	Early	Undefined
Investor	CVC	VC	CVC

To the knowledge of the author, no research has yet been conducted on high-tech CVC investors, thus a combination of the mentioned articles is the most promising foundation. Knockaert et al. (2010) identify in their research the attributes applied by venture capitalists when evaluating high-tech startups in an early stage and thus provide valuable insights for this research. The missing focus on corporate venture capitalists is complemented by the integration of the work by Siegel et al. (1988) who investigated American CVCs. Siegel et al. (1988) and Knockaert et al. (2010) identified multiple attributes which play a role during the evaluation, as shown in table 3:

Table 3 attributes relevant for high-tech, early-stage startup evaluation by CVCs according to Siegel et al (1988) and Knockaert et al (2010)

Attribute	Article
The product has been developed to point of the functioning prototype	(Siegel et al., 1988)
Product enjoys demonstrated market acceptance	(Knockaert et al., 2010; Siegel et al., 1988)
Product fits with the corporation's long-term strategy	(Siegel et al., 1988)
Uniqueness	(Knockaert et al., 2010)
Protection	(Knockaert et al., 2010; Siegel et al., 1988)
Technology purpose	(Knockaert et al., 2010; Siegel et al., 1988)
Market size	(Knockaert et al., 2010; Siegel et al., 1988)
Market growth	(Knockaert et al., 2010; Siegel et al., 1988)
The venture will stimulate an existing market	(Siegel et al., 1988)
The venture will create a new market	(Siegel et al., 1988)
Competition in the market will be minimal during the first three years	(Siegel et al., 1988)
The venture is in a market or industry which is attractive to my company	(Siegel et al., 1988)
Geography of the market	(Knockaert et al., 2010; Siegel et al., 1988)
The entrepreneur is capable to sustain the effort	(Knockaert et al., 2010; Siegel et al., 1988)
The entrepreneur is able to evaluate and react well to risk	(Siegel et al., 1988)
The entrepreneur articulates in discussing the venture	(Siegel et al., 1988)
Attention to detail	(Siegel et al., 1988)
Ability to accept criticism	(Siegel et al., 1988)
The entrepreneur has a personality compatible with mine	(Siegel et al., 1988)
Good contact with the entrepreneur	(Knockaert et al., 2010; Siegel et al., 1988)

Thoroughly familiar with the product	(Siegel et al., 1988)
Thoroughly familiar with the market	(Siegel et al., 1988)
Demonstrated leadership ability in the past	(Knockaert et al., 2010; Siegel et al., 1988)
Has a track record relevant to venture	(Siegel et al., 1988)
Has assembled a functionally balanced management team	(Siegel et al., 1988)
The team is complementary and has business experience	(Knockaert et al., 2010; Siegel et al., 1988)
Return on investment	(Knockaert et al., 2010; Siegel et al., 1988)
The investment can easily be made liquid	(Siegel et al., 1988)
My company will be the leading investor	(Siegel et al., 1988)
My company will have a minority position in the venture	(Siegel et al., 1988)
Venture's long-term sales potential will have a material impact on corporate performance	(Siegel et al., 1988)
Size of specific investment should be no greater than 10% - 20% of total funds available to venture activity	(Siegel et al., 1988)
Time to break even	(Knockaert et al., 2010; Siegel et al., 1988)

Both authors are in line with further research, that multiple attributes play a role during the startup evaluation. To integrate the insights from Siegel et al. (1988) as well as Knockaert et al. (2010) in this research, the attributes identified got merged to the following decision making tree. For a better structure, the identified attributes are grouped to the criteria identified in the literature, as explained in the first chapter.

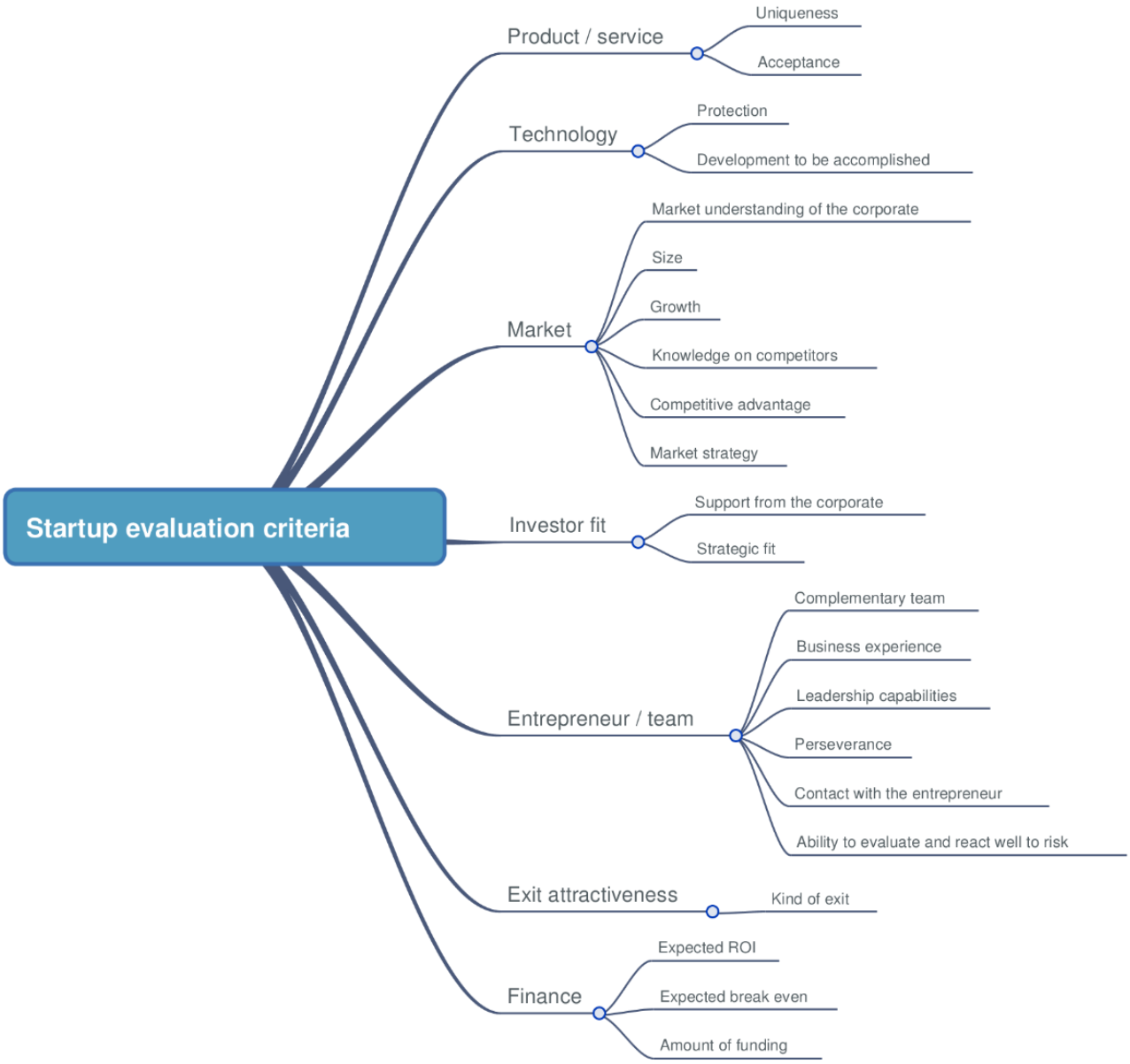


Figure 9 Preliminary decision-making tree - according to theory merged

The decision making tree provides a good overview on which aspects are to be taken into account when evaluating startups. The following paragraphs will explain each attribute in a greater level of detail.

Definitions of the attributes

As shown in the previous chapter, a decision-making model requires a high level of detail. The following paragraphs will define the attributes according to the literature. These definitions are required to develop a global scale later on. Previous research conducted on venture capitalists is a valuable source therefor, since it provides in the most cases a definition for the optimal case, a startup can perform. Therefore, it is used to define the five-point rating. In several cases, the current literature mentions attributes used for startup evaluation but does not provide

sufficient definitions of those. In these cases, the case-study which is conducted as a pre-test in this research got used as support. Due to space limitations and readability, the definitions will get explained only once. The resulting five-point scales can be found in the findings.

1) The product/service

The first attribute of this criteria is the product uniqueness. Knockaert et al. (2010) refer to a situation, in which the customers perceive no alternatives for the product which can according to (Mason & Stark, 2004) be based on the distinctiveness, and the concept of the product. This can include the quality, the performance, appearance, aesthetic appeal, style, and ergonomics of the product, (Mason & Stark, 2004).

Furthermore, the acceptance plays a role. Knockaert et al. (2010) and Siegel et al. (1988) refer to a demonstrated market need, that can be shown by first sales through the startup or the company's competitor. If no sales are yet generated, market studies or proof of concepts are positive indicators of market acceptance.

2) Technology

The protection of the technology is a commonly referred attribute in the literature. Knockaert et al. (2010), as well as Siegel et al. (1988), mention it and get further supported by Jell et al. (2010). The latest authors indicate that VCs see patents as a potential knock-out attribute for high-tech startups in "patent-heavy industries" as many of the high-tech industries are. Further research has shown, that VCs are more likely to invest in startups that won patents (Baum & Silverman, 2004) while the value added of the patent depends on its relevance to the core technology (Munari & Toschi, 2015).

Research has shown that investors evaluate the technology on its current level of development. Often, the indicator of a functioning prototype is used by corporate investors (Siegel et al., 1988), as well as by independent investors, who tend to prefer startups with a sophisticated development (Jell et al., 2010) to decrease the level of uncertainty.

3) Target market

Knockaert et al. (2010) refer to the geographical market which a startup addresses as an attribute for evaluation. The pre-test has shown that the geography is of importance since it majorly impacts the knowledge the investor has on the market. If the corporate operates in a country and was able to build experience, as well as an infrastructure it is of great advantage for the investment. Since geography does not capture this complexity, the attribute got renamed to the market understanding of the corporate.

In addition to that, the market size plays a role in evaluating startups. If no reliable numbers can be found, whether it is a mainstream or a niche market can be used as an indication (Knockaert et al., 2010). The single case study supports an interest of CVCs in the current size, as well as in the future potential of the market, referring to the next attribute.

The growth of the market is next to the case study also recognized by Siegel et al. (1988) as well as Mason and Stark (2004) to play a role in startup investment. At which growth rate a market is seen as attractive is not researched for startup investments and might differ between the sectors the CVC operates in. In praxis, a "high" and a "stable" growth are valued positively.

Next to the characteristics of the market itself, the other players in the market are of importance, too. According to Jell et al. (2010), a low knowledge of competitors makes startups unattractive for investors and can in drastic cases be a knock-out factor for venture capitalists since a large knowledge gap in this field is often not accepted (Jell et al., 2010). Siegel et al. (1988), as well as the CVC unit, investigated in the case study imply proper knowledge on competitors by asking specific questions to test the team's knowledge in this field.

In addition to the knowledge of competitors, the competitive advantage hold by the startup is relevant, too. Siegel et al. (1988) state the competition has to be minimal in the upcoming three years for an attractive investment opportunity. Furthermore, Mason and Stark (2004), as well as the investigated CVC, ask for entry barriers and sustainable competitive advantages which will make the investment more attractive.

Knowing about the competitors, the last identified attribute belonging to the market is the market strategy. According to Siegel et al. (1988), corporate venture capitalists differentiate their investment opportunities whether they address a new market, or whether they address an existing market. His study found out that startups following

a market strategy of addressing new markets with new technologies are the preferred choice, while a process improvement in existing markets is the least attractive option for CVCs.

4) Investor fit

An investor has always an impact on the startup that he supports which is not only of a financial kind since he most likely will get active in building the startup. (Baum & Silverman, 2004) The support which a corporation can provide depends on the background and therefrom resulting the knowledge on the market, technology, and industry in which the startup is going to operate as well as the share the investor takes in the startup (Mason & Stark, 2004; Siegel et al., 1988). Furthermore, it is important that the needs are articulated well to ensure that all parties can act on it.

To gain value of an investment in the CVC business, the startup should fit in the strategic direction of the corporate. The strategic fit can result from an attractive market or technology, which suits the long-term orientation of the parent company. (Mason & Stark, 2004; Siegel et al., 1988). (Ivanov & Xie, 2010)stress the importance of this match since it first enables a supportive function the CVC can have.

5) The entrepreneur and team

Several researchers indicate that the entrepreneurial team belongs to the most important evaluation aspects when assessing a startup (Franke et al., 2008; Kakati, 2003; Miloud et al., 2012). It is of importance that the team is complementary and all necessary expertise is represented in a functioning and balanced management team (Knockaert et al., 2010; Siegel et al., 1988) Research has shown that a heterogeneous management and technicians team is the preferred choice of investors, while investors try to avoid teams consisting only of economists or technicians (Franke et al., 2008).

Next, to having a complete team, the business experience of the single members plays a role. The entrepreneurs have to know the market as well as the product they want to sell and need to be experienced in the task which they take in the startup. (Kakati, 2003; Knockaert et al., 2010; Siegel et al., 1988) While missing industry knowledge can be a knock-out criterion (Franke et al., 2008), a good track record is seen as a valuable indicator for such experience (Knockaert et al., 2010; Mason & Stark, 2004) which should be provided by all team members. The kind of experience should as the team itself be balanced and integrated. For example people with startup as well as large corporation experience. (Franke et al., 2008)

The team setup is important to be taken into consideration, but in addition to that, the founder or the founding team are required to have leadership capabilities. They need to be able to motivate people and should have proven their leadership capabilities in the past. (Kakati, 2003; Knockaert et al., 2010; Siegel et al., 1988) While not all team members need to be leaders, it should be taken into consideration that most likely all founding team members will have leading roles in the later business stages. (Franke et al., 2008) If no leaders are part of the founding team, VCs tend to stop further considerations. (Franke et al., 2008) First of all, it is important that someone is willing to be in charge of the startup and to make decisions. (Knockaert et al., 2010) The articulation during presentations and discussions with the venture can be a good indication therefor. (Siegel et al., 1988)

Next to leader capabilities, perseverance, which means to go on when things are getting complicated are personal traits an entrepreneur should have and are thus also an attribute taken into account by investors (Kakati, 2003; Knockaert et al., 2010; Siegel et al., 1988). To build a startup will inquire multiple challenging tasks and thus requires a long breath to be successful.

To make the investment a success, a good contact with the entrepreneur is supportive. In general, it is of advantage if the personalities of the entrepreneur and the investor are compatible to simplify their collaborative work. (Knockaert et al., 2010; Siegel et al., 1988) Probably more important is the entrepreneur's openness towards external help, as well as his ability to accept criticism (Siegel et al., 1988). The case study has shown that whether the startup replies to emails properly and in time, as well as if they take the help of external advisors can be indicators of how the contact will develop.

Finally, the entrepreneur’s ability to evaluate risks and to react properly to them characterizes the entrepreneur and his team. Scenarios in the business plan give a good indication of whether risks are taken into consideration and which conclusions the team draws based on those. Their attention to detail and how many information are taken into account can differentiate those scenarios. (Siegel et al., 1988) In addition to that, the investors use critical questions and create “what if” scenarios during personal discussions to assess the entrepreneur further (Landström,

2007). The reactions the team have prepared in the business plan and their spontaneous reactions during the meeting give the rating of this attribute.

6) Potential exit attractiveness

Literature agrees on the habit of investors to evaluate the kind of exit already before investing in a startup to create an understanding of the returns and how the investment can be liquidized again (Mason & Stark, 2004; Siegel et al., 1988). Corporate venture capitalists, in general, have two options to conduct an exit. The startup can, in the long run, be sold to external or integrated to the mother company. As explained earlier, corporates commonly have a strategic interest when conducting CVC (Dushnitsky, 2006) thus an internal transfer was set as the optimal case.

7) Financial

Coming to the financial considerations an investor conducts, the point of break-even refers in this case to the point of time, where the startup generates its first positive cash flow. Knockaert et al. (2010) defined in his research the worst acceptable timeframe to reach this point as longer than three years, while the optimal expectable point in time is set to below one and a half years. This definition was followed by this research.

The next attribute of financial interest is the expected return on investment for the startups. While Mason and Stark (2004), Knockaert et al. (2010), and Siegel et al. (1988) agree on the attribute, its definition varies in the researches. Siegel et al. (1988) define a positive scenario as "a return equal to at least 10 times the investment within 5 - 10 years" while Knockaert et al. (2010) follow a percentile definition. As for the previous attribute, the definition by Knockaert et al. (2010) gets followed.

Lastly, the amount the corporate has to invest in the startup plays a role during the evaluation. Siegel et al. (1988) indicate that the budget per startup should not exceed 10% to 20% of the total fund budget. A larger investment in one single startup would increase the dependency on its success and limit the investment manager to build a proper portfolio. Mason and Stark (2004) indicate that also the planning is of importance, which gets supported by the conducted case study, where a large focus is placed on a good milestone planning for the funding received.

Having a good understanding of which information are taken into account while evaluating startups, it is now important to control whether high-tech, early-stage CVCs actually use these attributes and whether the list captures all decision influencing aspects. Furthermore, the research will focus on how important the attributes are for CVCs and why they are taken into account. The till now identified attributes are summarized in figure 9, while the after the conducted research updated decision-making tree can be found in figure 11. The next chapter will explain the methodology applied to answer the research questions.

3. Methodology

Literature review

To achieve a holistic picture on startup evaluation, the topic got addressed from multiple sides, with the goal to control for the level which the current literature has achieved and to receive a good understanding on the boundaries of this research. The literature got reviewed in a circular approach, as suggested by Saunders (2011).

The topic of startup evaluation can be researched from multiple perspectives. To sharpen the focus of this study, the literature review got guided by two initial objectives. The first objective concerns the kind of investors, leading to external professional as corporate venture capitalists, independent venture capitalists, and business angles that got combined with the focus on startups in early phases. Having the initial boundaries set, relevant literature got searched with a focus on primary sources. Following the approach by Saunders (2011), the literature found within the initial parameters was used to refine the following round of literature search and to develop more precise keywords. This repetitive approach was followed until an extensive picture of the literature was obtained that enables a critical reflection on the information.

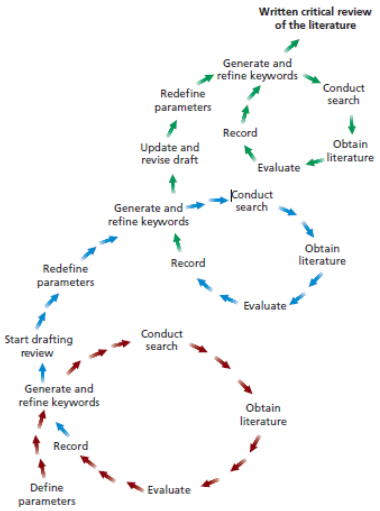


Figure 10 Saunders (2011) process of literature review

Multiple online databases were used, the most frequent ones included EBSCO and google scholar. Furthermore, several identified journals got searched wherefrom the most relevant has been the Journal of Business Venturing. Initially, the main keywords included startup evaluation; venture capital; and startup investments. After reviewing the resulting articles, the keywords got refined to corporate venture capital AND investment; corporate venture capital AND evaluation; corporate venture capital AND criteria; corporate venture capital AND review. Further rounds were undertaken with keywords as criteria weighting; criteria importance; knock-out criteria; investor; decision making; open innovation; CVC; VC; literature review. This list is not exhaustive, and combinations of the previous keywords were used, too.

The literature review lead to the important finding that the evaluation criteria applied by corporate venture capitalists are not yet fully understood while on the same time revealing that the evaluation process of a startup can be structured according to multiple criteria providing the opportunity for this research to close that gap by building a multi-criteria model for CVC startup investments.

Research and research design

As mentioned earlier, this study is of an exploratory nature to create new insights in the decision-making process of corporate venture capitalists, with a focus on high-tech industries and early stage investments. The theoretical framework identified in the literature gets extended by a qualitative research using first a single case study at a German high-tech CVC and secondly 14 verbal protocol analysis. The created insights get analyzed by qualitative and quantitative methods which are suggested by Chi (1997) as a well-suited approach to making use of the full depth of detail, that is provided by verbal protocols.

Pre-test

The first valuable source of information is a single case study at the corporate venture capital arm of a German corporation. The case study is used as a supportive tool to define the scales of the attributes, as a pre-test for the developed decision making tree, and as a pre-test of the verbal protocol methodology.

The case

The interest in soft and hardware solutions for additive manufacturing, the interest in medical technologies, and further tech-intensive fields as robotics classify the corporate in accordance with the definition of the British private equity & venture capital association (2018) as a high-tech company. Patton (1990) indicate that the

information richness of a case is more important than the quantity of the cases under consideration. Thus already a single case study is a valuable contribution. In the case of this research the position as a technology leader in their fields, as well as the prior experience in corporate venturing make the case attractive for research. The information in the case study was gathered from analyzing documents from previous investment cases, interviews with the senior management, and the application to real startup cases.

Pre-tests

The first test conducted targeted the decision making tree identified from the literature. Those consisted of an interview and an open discussion with an experienced CVC. In addition to that, the model got applied to 10 real startup cases, to ensure that the model is applicable and captures all relevant information.

As shown in the previous chapter, the model consists of criteria, attributes, and a global scale with pre-defined ratings. The test was conducted to clarify the wording of the definitions, check the consistency of the model, and to avoid to miss out on relevant criteria or attributes before going to a larger group of CVCs for the following verbal protocol analysis. The researcher saw a need for this pre-test since the theoretical base of the criteria is a merge of 2 articles which do not explicitly address CVCs in high-tech industries with early-stage investments.

The pre-test of the model resulted in the following changes:

- The global scale got improved by defining also the second and fourth scale
- The definitions got partly rewritten to improve their understandability
- Seven attributes got added to the model, wherefore the resulting definitions can be found in the findings

Furthermore, the methodology of verbal protocols and the used startup case got tested in the CVC department. Following the form of a VPA, the initial and the second version of the case got reviewed by two investment experienced employees. The aim was to increase the consistency and exhaustiveness of the case. Conducted changes included:

- Two tables were added, providing an overview of market and financials
- The general level of detail got increased which included for example percentage values for the development to be accomplished

By conducting the pre-tests in the form of a VPA, the time setting, as well as the general setup of the methodology, could be granted.

Main research body

Intro

The main part of this research applies the verbal protocol analysis. Within this methodology, the participant is asked to think aloud his thoughts as they perform a task (Shepherd & Zacharakis, 1999). In this research setting, the participant receives a fictive startup case that is to be evaluated by him. The methodology "has been used successfully to examine the decision-making process of both venture capitalists and business angels" (Smith et al., 2010, p. 11). Wherefore examples can be found in the articles of Hall and Hofer (1993); Mason and Rogers (1996); Mason and Stark (2004); Zacharakis and Meyer (1995). Trickett and Trafton (2009) state that verbal protocols are an appropriate methodology to understand what underlies the performance since it is the strength of VPA to reflect the actual process people use while performing a task.

The process

To analyze the process, the respondent's verbalizations are recorded and afterward transcribed. The content gets analyzed by a coding scheme related to the specific research questions and offers the potential to "provide insights into aspects of performance that might otherwise remain in a black box" (Trickett & Trafton, 2009, p. 345). Frequency counts is a generally applied method to present the results of this analysis (Smith et al., 2010) while the high level of detail captured in the transcripts allow further interpretation of the information on a qualitative manner (Chi, 1997).

Advantages and requirements of VPA

As Shepherd and Zacharakis (1999) notices, the verbal protocol analysis is able to provide a much richer understanding of the topic of interest and is well suited to research "which attributes are extracted from a [business]

plan" (Shepherd & Zacharakis, 1999, p. 206). Since the VPA is a real-time experiment, the CVC is not required to reflect on their thought process and is thus able to overcome many of the potential biases and limitations related to post-hoc methods and retrospective reports (Shepherd & Zacharakis, 1999). It is argued that VPA is a valuable method to analyze decision making, however Ericsson and Simon (1980), Hall and Hofer (1993),and Smith et al. (2010) mention that the success of the methodology depends on several aspects:

- the information reported must be the focus of attention
- the task is not highly routinized by habit
- there must be only a short time between performance and verbalization
- verbalization does not require excessive encoding
- reports are oral
- subjects are free from distraction
- instructions are clear
- completeness in reporting is encouraged

This research meets all the aspects since the investment decision is even for an experienced CVC not a routine task, the research got conducted in separate rooms to limit distraction and let the participant focus on the provided information. Furthermore, the participants got instructed by explanation and a short example of how to verbalize one's thoughts and were asked to report instantly and orally.

Con VPA

A downside of the VPA methodology which gets mentioned multiple times in the literature is the high amount of time, required from the researcher to collect the data and to analyze it afterward (Trickett & Trafton, 2009). Another issue of VPA can occur if the participant is uncomfortable or self-conscious with reading and speaking aloud at the same time since it could vitiate their thinking process (Smith et al., 2010). Furthermore, the researcher is a potential cause of bias since the coding, analyzing, and interpreting the transcripts can be influenced by subjectivity (Smith et al., 2010). Lastly, the frequency count may be impacted by different convincing patterns, where people "repeat something several times if they are unsure but say it once if they are absolutely sure" (Smith et al., 2010, p. 13).

This research tries to overcome the potential biases by first of all explaining the methodology well to the participant. Furthermore, the anonymous participation and the usage of separate rooms, which eliminates external distractions and potential third party listeners were supportive to make the participants more comfortable.

The researcher follows the opinion of Trickett and Trafton (2009) who say that even though the methodology requires high effort from the researcher, "the richness of the data provided by verbal protocols far outweighs the costs" (Trickett & Trafton, 2009, p. 345).

Alternative methods

Further potentially applicable methodology to research the evaluation criteria of corporate venture capitalists includes self & post reflective methods as interviews and surveys. Even though applied multiple times in similar research settings, several weaknesses got recognized over time. Knockaert et al. (2010) summarize that post-hoc, self-reflective methods are problematic since participants might be poor at introspection, could bias the results on purpose, and have only limited knowledge about what has happened. Knockaert et al. (2010) referring to (Shepherd & Zacharakis, 1999). Smith et al. (2010) and Shepherd and Zacharakis (1999) support those claims and found in earlier literature evidence that especially venture capitalists have limited insights into their decision process. Also, current literature concludes "that VCs are not good enough in self-introspection or they are not aware of their own decision-making process" (Sharma, 2015, p. 468). Therefore the validity of research, solely based on self-reported data is questionable (Zacharakis & Meyer, 1998). The consequence is often overstatements on the number of criteria taken into account while underestimating the most important and overestimating the least important criteria (Shepherd & Zacharakis, 1999). An advanced methodology to research the importance of criteria in decision making is the conjoint analysis. While it could properly have answered the second research question, the limitation on the manageable number of criteria (approximately nine), and it's inapplicability for explorative research make it inapplicable in this setting. (Shepherd & Zacharakis, 1999)

Sample

This research focusses on startups in an early stage, that are acquiring a series A funding in high-tech industries. The attention lies on the detailed investigation by the CVC, as explained earlier the last step before potentially investing in the startup.

The information on the startup got provided as suggested by Mason and Stark (2004) in summary form. A three page long fictive case provided information on each attribute, structured in accordance to the in the literature identified criteria. The information provided included:

- a general introduction
- the product and service
- the technology
- the market
- the strategic fit
- the entrepreneur and the team
- the exit attractiveness
- the financials

To be as realistic as possible, the assumptions in the case were inspired by several real business plans. On this way, the current interest of the typical high-tech corporate venture capitalist in 2018 were met. The full case can be found in appendix 4. It dealt with a software startup, seeking for € 1.2m for 18% of their shares. Their aim is to improve the already running software to be able to penetrate the German market. Further expansions are planned for the EU and US and several positive and potentially risky circumstances got explained in the case.

The sample composition

The participants in this research got selected through the nonprobability sampling method purposive sampling (Dooley & Vos, 2008). The main selection criteria applied were:

- the venture capital unit belongs to a corporation
- the CVC unit is experienced in startup evaluation
- the CVC unit is currently active
- the CVC unit focusses on early-stage investments
- the CVC unit focusses on high-tech industries

Hall and Hofer (1993) note that the sample size of VPA typically range from three to 15 participants while Trickett and Trafton (2009) argue that more expert participants will lead to lower variances in the relevant aspects of performance and thus argue for sample sizes of five to ten participants. Based on these recommendations, the minimum number of participants in this study was defined to be eight participants. The previously mentioned selection criteria were supposed to focus the research on the relevant participants. According to the Bundesverband-Deutscher-Kapitalbeteiligungsgesellschaften (2018), Germany's most important investment areas are the south, Bavaria and Baden-Wuerttemberg; the west, North-Rhine-Westphalia; and the east, Berlin. The effort was undertaken to include participants from all areas in the sample. This resulted in 14 number of verbal protocol analyses conducted, summarized in table 4:

Table 4 sample of CVC firms

CVC	Setting	Area	Investment focus	Investment round	Experience	Duration
1	Person	East	High-tech	A	CVC	41 min
2	Person	South	High-tech	A, B	M&A with CVC experience	60 min
3	Person	South	High-tech	A	CVC	31 min
4	Person	South	High-tech	A, B	M&A with CVC experience	32 min
5	Person	West	High-tech & Digitalization	A	CVC	29 min

6	Person	East	High-tech	A	R&D with CVC experience	27 min
7	Person	East	High-tech & Digitalization	A	CVC	19 min
8	Phone	South	High-tech & Digitalization	A	CVC	55 min
9	Person	West	High-tech & Digitalization	Seed, A	CVC	52 min
10	Person	South	High-tech	A	CVC	27 min
11	Phone	South	High-tech	A	CVC	51 min
12	Phone	South	High-tech	A	CVC	17 min
13	Person	East	High-tech	Seed, A	CVC	73 min
14	Phone	South	High-tech	A, B	CVC	

Data collection

The data acquisition phase lasted for 44 days. To reach a higher number of participants, the initial timeframe got extended by 14 days. After that time, in total 14 data acquisitions got conducted, wherefrom ten sessions were in the form of a personal meeting. In the case of four sessions, a personal meeting was not possible which were thus accomplished via telephone conferences. All participants were asked for permission for the recording of their voice and the usage of software-based transcription in a written format as suggested by Trickett and Trafton (2009). In those cases conducted via telephone, the permission was granted verbally. All except of one participant agreed to be voice recorded. The one session that got not voice recorded got excluded from the frequency count and used only to answer the further sub research question. Two session, number 12 and 14 could not be properly conducted due to technical problems. These sessions got excluded from the data acquisition.

Before conducting the verbal protocol analysis, the participants got informed about the purpose and scope of the research, as well about their free will of participation and their right to stop the data acquisition at any time. All information got fully anonymized by excluding brand names from the transcripts. The typical timeframe for the acquisition was 35 minutes, wherefrom 20 were used for VPA and 15 for follow up questions, some sessions got due to intensive discussions extended.

To not interrupt the thought process of the participant, arising questions got asked after the session as suggested by Trickett and Trafton (2009) or at least during breaks, when the participant changed to the next chapter and thus had finished their current thought. Those explanatory parts got excluded from the frequency counts.

Data analysis

As suggested by Smith et al. (2010) the recorded thoughts were transcribed in their full length to be afterward broken down into short phrases, so-called though units "that is, phrases and sentences that are independent thought units" (Smith et al., 2010, p. 15). As suggested by Chi (1997), two grain sizes got applied. Firstly, the text got broken into paragraphs which represent specific topics. Afterward, the paragraphs got broken down into the single thoughts of the participant to furthermore differentiate how intensively he reflected on that topic. The resulting units were then coded into the respective categories, related to the type of attribute they refer to. None of the methods of data reduction which are suggested by Chi (1997) as random sampling; choosing a subset of protocols; or performing only preliminary coding in the whole data set while selecting a subset for exhaustive coding, got applied in this research. Thus the whole sample got transcribed and coded.

The coding scheme is a pre-set code list that includes the 29 attributes grouped to the 7 criteria accordingly. The code list integrated all criteria and attributes identified after the pre-test and can be found in appendix 1. Furthermore, the coding scheme was open for new codes, information which was reflected on by the participants, but not in advance covered by the coding scheme got added to it. To increase the structure and the efficiency of the coding, the software Atlas.ti was used. Furthermore, a database per criteria was created by the software which supports the interpretation of the qualitative data as suggested by Lincoln and Guba (1985).

To research the importance of the criteria, frequency counts as suggested by Smith et al. (2010) and Mason and Stark (2004) got applied. The number of thought units measured are set in correlation to the total number of thoughts, to receive the percentage values of importance.

Follow up interviews

To increase the level of detail further and to answer the third and fourth research question, the participants got asked after the VPA to reflect on the criteria used. To guide the participant, a list with all in the literature identified criteria and the respective attributes got handed to him. While selecting the most important attributes for his decision making, the participant was asked to reflect on why these attributes impact his decision.

In addition to the pure level of importance, the literature review has shown that potentially knock-out attributes are applied by investors. [see Jell et al. (2010) and Franke et al. (2008)]. A bad performance of the startup in this single attribute would directly lead to a refusal of the business proposal. Even though these knock-out attributes are not widely recognized in the literature, their potential existence is the motivation to control for the knock-out attributes of CVCs. Since an integration of multiple low performances attributes in the case study would not be feasible, and it is not yet known which attributes may have such an impact on CVCs, the open form of an interview question got applied.

The questions used in the follow-up interview were:

1. "Which attributes are for you the most important in your decision making?
    a. Why are these attributes important to you?

2. Do you have knock-out attributes, that would with a bad performance of the startup directly lead to a negative investment decision?
    a. Why do these attributes have a knock-out impact?

The follow-up interviews were as the case fully recorded and transcribed. The answers were however not included in the frequency counts and used for qualitative analysis only. Again the software Atlas.ti was used as a supportive tool to code the answers and to create data bases per attribute.

Reliability and validity

Multiple techniques to increase the reliability and validity of this qualitative research are applied, as proposed in the literature review of Riege (2003).

First of all, the external validity got increased by defining the population precisely. Previous research indicated that a broad generalizability is hard to achieve in the context of startup investment decision making, thus a clear definition of the population provides clear boundaries and an application to different fields should be conducted carefully. Furthermore, the conducted pre-test is meant to increase the reliability and accuracy of the findings. The case study made use of multiple sources of evidence, including documents on past cases, interviews, and application of the definitions to increase the construct validity. To Increase construct validity further on, full recording and transcription of the sessions without applying sample decreasing methodologies got applied. The increased workload was seen as less harmful than the potential to miss out on relevant information. Thus the suggestions by Chi (1997) were not followed. With the use of computer-based coding software, databases per criteria and per attribute got created to enable cross participant comparison during the data interpretation which increases the construct validity. (Riege, 2003)

4. Findings

To answer the first sub research question the literature, the single case study at a German corporate venture capital department, used as a pre-test, and the verbal protocol analysis with further German high-tech corporate venture capitalists deliver important insights. The following table 5 summarizes how the attributes defined in the theoretical chapter are used to build the respective global scale. The afterward following paragraph will show the findings from the case study and the VPAs, which resulted in further attributes added.

Research question one

Which criteria play a role for startup evaluation by CVCs?

The first step to gain a profound understanding about how corporate venture capitalists evaluate early-stage startups is the creation of the global scale for those attributes, defined in the previous literature. The chapter "definitions of the attributes" has shown how the literature handles the attributes. In the most cases, those definitions referred to the optimal case, resulting in the definition of the "5" rating. If no further indication could be found in the literature, the scales 3 and 1 got defined by the author. In the resulting scales, these are marked with the […] brackets. The scale 4 and 2 are, as explained in the methodology chapter, defined in an open way to allow the rating of startups, not perfectly foreseen by the model. Attributes that are marked with a "^" are potentially knock-out attributes, according to Franke et al. (2008) and Jell et al. (2010). Whether the same knock-out attributes apply for CVCs will be clarified in the fourth research question. In alliance with Belton and Stewart (2002), the size of the scale was chosen to meet the needs of the investigator. Discussions with the senior management during the case study have shown that a three-point scale would not be capable to capture all varieties while a ten point scale is unnecessarily fine-grained. Thus the five-point scale is chosen.

Table 5 scales of the in the literature identified attributes

Product / service				
Product uniqueness				
5	**4**	**3**	**2**	**1**
The product has outstanding USPs thus the customer has the perception that there are no alternatives *(appearance, style, and aesthetic appeal, ergonomics, convenience) (Knockaert et al., 2010; Mason & Stark, 2004)*	[Better than a three, but not all characteristics of a five are met. Example: The product has outstanding USPs and the customer perceives already some of them.]	[The product has USPs, but it is not ensured that the customer will perceive them.]	[Worse than a three, but above an one. Example: The product differentiates only with few aspects of the substitutes.]	[The product has multiple substitutes and does not differentiate well.]
Acceptance				
5	**4**	**3**	**2**	**1**
First sales have been realized by the company or its competitors to demonstrate market acceptance. (Knockaert et al., 2010; Siegel et al., 1988)	[Better than a three, but not all characteristics of a five are met. Example: A memorandum of understanding, a letter of intent, and a proof concept are available.]	[A market study is available that supports a likely market acceptance.]	[Worse than a three, but above an one. Example: Only weak signals for market acceptance are available, as a low number of interviews.]	[No information on the market acceptance are available.]

Technology				
Protection ^				
5	**4**	**3**	**2**	**1**
Intellectual property rights that are relevant to the core technology are granted. (Baum & Silverman, 2004; Jell et al., 2010; Knockaert et al., 2010; Munari & Toschi, 2015; Siegel et al., 1988)	[Better than a three, but not all characteristics of a five are met. Example: The property rights are under request.]	[Intellectual property rights can be achieved in future]	[Worse than a three, but above an one. Example: It is not clarified yet whether the IP can be protected.]	Intellectual property cannot be protected.
Development still to be accomplished V.1				
5	**4**	**3**	**2**	**1**
A product or a working prototype is available. (Jell et al., 2010; Siegel et al., 1988)	[Better than a three, but not all characteristics of a five are met. Example: The prototype is under development and will be working in near future.]	A proof of concept has successfully be conducted.	[Worse than a three, but above an one. Example: The technology is advanced developed but no proof of concept has been conducted yet.]	[The development is still in a very early stage with high uncertainty.]
Market				
Market understanding of the corporate				
5	**4**	**3**	**2**	**1**
The startup addresses a geographic market in which the venture already operates and has a solid knowledge and experience. (Knockaert et al., 2010)	[Better than a three, but not all characteristics of a five are met. Example: The startup addresses a geographic market in which the venture operates for a short time.]	[The startup addresses a geographic market that is similar to the ones addressed by the corporate *(e.g neighbor countries within the EU)*	[Worse than a three, but above an one. Example: The startup addresses a geographic market in which the corporate exports.]	[The startup addresses a geographic market in which the corporation does not operate till now.]
Size				
5	**4**	**3**	**2**	**1**
The startup addresses a large, mainstream market. (Knockaert et al., 2010)	[Better than a three, but not all characteristics of a five are met. Example: The startup addresses a medium-sized market with the option to address further markets.]	[The startup addresses a medium-sized market.]	[Worse than a three, but above an one. Example: The startup addresses a small market but has the option to enter further markets.]	The startup addresses a small niche market.
Growth				
5	**4**	**3**	**2**	**1**
The target market enjoys a significant growth rate which is stable and high. (Mason & Stark, 2004; Siegel et al., 1988)	[Better than a three, but not all characteristics of a five are met. Example: The market enjoys a stable but medium growth]	[The target market will have a constant but slow growth.]	[Worse than a three, but above an one. Example: The market is mature.]	[The target market is shrinking.]
Knowledge of competitors ^				
5	**4**	**3**	**2**	**1**
The team has a profound knowledge of the competitors in the market, their main features, and their history. (Jell et al., 2010; Siegel et al., 1988)	[Better than a three, but not all characteristics of a five are met. Example: The entrepreneurs have a detailed overview but made an analysis of only some of their competitors.]	[The team has a detailed overview of competitors in the market and has a profound knowledge on some of them.]	[Worse than a three, but above an one. Example: The overview of competitors is incomplete but provides proper knowledge on some of them.]	The team has only superficial knowledge of the competitors and still needs to learn a lot about them.

Competitive advantage				
5	**4**	**3**	**2**	**1**
The competition in the market will be minimal in the next 3 years, due to entry barriers, sustainable competitive advantage, patents, and/or partners. (Mason & Stark, 2004; Siegel et al., 1988)	[Better than a three, but not all characteristics of a five are met. Example: The startup owns sustainable competitive advantages but cannot reduce competition to a minimal level in the next years.]	[The competitive advantage which the startup owns may be lost in the future / next 3 years.]	[Worse than a three, but above an one. Example: No player in the market currently holds competitive advantages.]	[Other players own competitive advantages as patents, and partners, or have built entry barriers.]
Market strategy V.1				
5	**4**	**3**	**2**	**1**
The new venture addresses a new market with a new technology. (Siegel et al., 1988)		The new venture addresses an existing market, with a new technology.		The new venture will improve an existing process with their innovation.
Investor fit				
Support from the corporate				
5	**4**	**3**	**2**	**1**
It is clearly articulated how the corporate can support the startup and it meets the core competencies of the corporate (background, skills, knowledge of the industry, market, technology). (Baum & Silverman, 2004; Mason & Stark, 2004; Siegel et al., 1988)	[Better than a three, but not all characteristics of a five are met. Example: It is clearly articulated how the corporate can support the startup. The corporate can provide some of the support with its core competencies and knows further parties that are willing to help.]	[It is clearly articulated which support is required by the startup while the corporate can provide some of it.]	[Worse than a three, but above an one. Example: It is partly clear which support is required by the startup and the corporation can provide some of it.]	[It is unclear how the corporation is supposed to support the startup or the required support does not meet the corporate's background.]
Strategic fit *(market, product portfolio, technology)*				
5	**4**	**3**	**2**	**1**
The product fits with the corporation's long-term strategy and the venture is in a market or industry which is attractive to the corporate company. In addition, a business group of the corporate has a direct interest in the insights. (Ivanov & Xie, 2010; Mason & Stark, 2004; Siegel et al., 1988)	[Better than a three, but not all characteristics of a five are met. Example: The product fits with the corporation's long-term strategy, and the venture is in a market or industry which is attractive to the corporate company. However, no business group has shown interest, yet.]	[The startup does in certain aspects fit well to the corporate. There is a fit either on the long-term strategy, or on the market or industry, or a business group has a direct interest.]	[Worse than a three, but above an one. Example: The strategic fit to the corporate is vague.]	[The product does not meet the long-term strategy of the corporation and does not address a for the corporate interesting market.]
Entrepreneur / team				
Complementary team				
5	**4**	**3**	**2**	**1**
The team consists of professional technicians and professional economists. (Franke et al., 2008; Kakati, 2003; Knockaert et al., 2010; Miloud et al., 2012; Siegel et al., 1988)	[Better than a three, but not all characteristics of a five are met. Example: The professionals have extensive experience in the other field.]	[The team consists either of professional technicians with economic experience or of professional economists with technical experience.]	[Worse than a three, but above an one. Example: The professionals have only minor experience in the other field.]	Only professional technicians or only professional economists are part of the team.

Business experience ^				
5	**4**	**3**	**2**	**1**
The team has experience with the product, the market, and the team members have for their position in the venture relevant track records. (Franke et al., 2008; Kakati, 2003; Knockaert et al., 2010; Mason & Stark, 2004; Siegel et al., 1988)	*[Better than a three, but not all characteristics of a five are met. Example: Most of the team members have relevant business experience and own relevant track records.]*	Only some team members have relevant experience.	*[Worse than a three, but above an one. Example: Only one team member has relevant business experience.]*	No team member has experience with the market or the product, and the team cannot provide relevant track records.
Leadership capabilities ^				
5	**4**	**3**	**2**	**1**
The team members have demonstrated leadership capabilities in the past and can motivate people. Furthermore, the entrepreneur has articulated well while discussing the venture and is willing to make decisions.(Franke et al., 2008; Kakati, 2003; Knockaert et al., 2010; Siegel et al., 1988)	[Better than a three, but not all characteristics of a five are met. Example: One team member demonstrates leadership, is motivating, has articulated well and is taking decisions.]	At least one member has demonstrated leadership capabilities in the past and can motivate people.	[Worse than a three, but above an one. Example: At least one team member meets at least some of the characteristics.]	No team member can demonstrate leadership capabilities [and they took a passive role during the personal meeting. No team member is willing to take decisions or can motivate other people well.]
Perseverance				
5	**4**	**3**	**2**	**1**
The entrepreneur has proven in the past to sustain his efforts even if things get tough [in business-related situations & multiple times] (Kakati, 2003; Knockaert et al., 2010; Siegel et al., 1988)	[Better than a three, but not all characteristics of a five are met. Example: The entrepreneur has proven to be perseverant in private situations.]	The entrepreneur has proven in the past to sustain his efforts even if things get tough [in one situation]	[Worse than a three, but above an one. Example: There are signals of persistence from the entrepreneur.]	[The entrepreneur cannot prove to be perseverant.]
Contact with the entrepreneur				
5	**4**	**3**	**2**	**1**
The entrepreneur is able to accept criticism and is on the same wavelength with respect to the business idea as you are. (Knockaert et al., 2010; Siegel et al., 1988)	[Better than a three, but not all characteristics of a five are met. Example: The entrepreneur does accept external help but is not always on the same wavelength as you are.]	[The entrepreneur does accept criticism and external help but has a very different personality]	[Worse than a three, but above an one. Example: The entrepreneur tends to be unresponsive towards external help.]	[The entrepreneur has a very different personality compared with mine and is not willing to accept external help.]
Ability to evaluate and react to risk				
5	**4**	**3**	**2**	**1**
The entrepreneur has mentioned multiple thought through scenarios in his business plan and was able to react well to "what if" scenarios during the discussion by providing detailed strategies. (Landström, 2007; Siegel et al., 1988)	Better than a three, but not all characteristics of a five are met. Example: The entrepreneur was able to react well to "what if" scenarios during the discussion and mentioned superficial scenarios in the business plan.	[The entrepreneur has mentioned multiple well-thought through and detailed scenarios in his business plan OR was able to react well to "what if" scenarios during the discussion.]	Worse than a three, but above an one. Example: The entrepreneur mentioned at least one scenarios in his business plan but it needs to be worked out further.	[Neither detailed scenarios were presented nor did the entrepreneur react well to "what if" scenarios during the discussion.]

Exit attractiveness				
Kind of exit				
5	**4**	**3**	**2**	**1**
The exit can be conducted within the corporate. (transfer to a business group - strategic return) (Dushnitsky & Lenox, 2006; Mason & Stark, 2004; Siegel et al., 1988)		The exit can be conducted externally. (IPO or sale - financial return)		Neither internal nor external exit seems plausible.
Finance				
Break-even				
5	**4**	**3**	**2**	**1**
Break even < 1,5 Years (Knockaert et al., 2010)	[1,5 Years]	[2 Years]	[3 Years]	Expected time to break even > 3 Years
ROI				
5	**4**	**3**	**2**	**1**
ROI > 50% (Knockaert et al., 2010)	[ROI 50%]	[ROI = 40%]	[ROI 30%]	ROI < 30%
Amount of funding				
5	**4**	**3**	**2**	**1**
The capital is well planned regarding milestones and timing and does not exceed the available budget or 20% of the fund size. (Mason & Stark, 2004; Siegel et al., 1988)	[Better than a three, but not all characteristics of a five are met. Example: The capital needs are well planned regarding milestones and timing but will exceed the available budget slightly. (handle internally)]	[The capital needs are well planned regarding milestones and timing but will exceed the available budget significantly and will thus require an additional investor.]	[Worse than a three, but above an one. Example: The capital needs are planed vague but will probably not exceed the available budget.]	[Capital needs are vaguely planned and will probably exceed the available budget.]

During the case study, seven new attributes were identified, namely: the ‘unmet need’, ‘after-sales service’, ‘relevant certification’, ‘technological uniqueness’, ‘key opinion leader support’, ‘ market risk’ and ‘attractiveness’ of the exit. In addition to that, the discussions with the further corporate venture capitalists revealed two new attributes, namely ‘go to market strategy’ and ‘assumptions’ which are grouped in the new criteria, called ‘strategy’. The go to market strategy differs significantly from the by Siegel et al. (1988) identified strategic considerations, as explained later. These attributes were not mentioned in the previous literature by Siegel et al. (1988) or Knockaert et al. (2010) and added to the decision-making model. Furthermore, the definition of ‘development still to be accomplished’ got updated since the initial scale did not sufficiently cover the potential cases. Each attribute is explained in more detail in the following paragraphs.

Results from the pretest

Unmet need

In addition to the in the literature mentioned attributes concerning the proposed product and service, the discussion with the manager as well as their prior investment cases have revealed that the addressed need of the potential customer is an essential aspect when evaluation startups. The entrepreneurs are asked to identify this need precisely, which gets assessed on its sustainability and the importance for the customer. If the startup addresses a strong pain which is likely to last, it has a positive impact on the evaluation.

Table 6 scale unmet need

Unmet need				
5	**4**	**3**	**2**	**1**
[The product solves a real, sustainable pain and is needed.]	[Better than a three, but not all characteristics of a five are met. Example: The product solves a sustainable pain, that, however, is not very strong.]	[The problem may just be a short-term trend]	[Worse than a three, but above an one. Example: The solved problem is described well but is short-term and the pain is weak..]	[The solved problem is not well articulated.]

After sales service

Next to the addressed pain, the after-sales service concept is a relevant factor, which has to be addressed by startups. In high-tech industries, occurring problems with a product can easily cause large harms, why a proper service is required to prevent errors or to solve occurring ones quickly. These concepts can cover aspects as hardware as well as software components, the necessity, and availability of service personnel and possibly required partners. Their feasibility strongly depends on the offered product itself and has to be assessed from case to case.

Table 7 scale after sales service

After sales service				
5	**4**	**3**	**2**	**1**
[The startup has a well thought through maintenance and service concept.]	[Better than a three, but not all characteristics of a five are met. Example: The startup knows well which kind of maintenance and service is needed and has a draft concept on it.]	[The startup knows which kind of maintenance and service is needed, but has not worked out a proper concept.]	[Worse than a three, but above an one. Example: The startup knows roughly which kind of after sales service is needed.]	[No after sales strategy is worked out]

Relevant certification

Another attribute added to the proposed product and service criteria are relevant certifications. Taking the medical technology as an example, it is widely known that products have to meet the FDA requirements to enter US markets. Similar certifications can be required in other high-tech industries. In these cases, investors have to know which certificates might apply to a technology and assess in how far the startup’s product already meets those. This step is of importance since the certification process can require additional resources and time.

Table 8 scale relevant certification

Relevant certification				
5	**4**	**3**	**2**	**1**
[The Product has achieved the necessary certifications.]	[Better than a three, but not all characteristics of a five are met. Example: The entrepreneurs are currently working on the necessary certification of their product.]	[The entrepreneurs know which certification are required and have a proper strategy to achieve those.]	[Worse than a three, but above an one. Example: The entrepreneurs know which certificated are required but have no strategy worked out to achieve those.]	[The entrepreneurs do not demonstrate a profound knowledge of the required certificates.]

Technology uniqueness

Knockaert et al. (2010) have mentioned in his article the importance of a unique product. In the case of corporate investors, the technology underlying the product also gets assessed on its uniqueness. The technological expertise and the aim for strategic returns, which differentiate a corporate investor from a typical independent investor might lead to this increased interest in the technology. If the startup is supposed to add to the current technological capabilities of the corporate, it needs to exceed the corporate's status quo. Furthermore, it becomes benchmarked across on the market available technologies to assess its uniqueness.

Table 9 scale technological uniqueness

Technological uniqueness				
5	**4**	**3**	**2**	**1**
[The technology differentiates well, has appealing USPs, and is thus perceived as leading technology.] *(quality, speed, performance)*	[Better than a three, but not all characteristics of a five are met. Example: The technology has appealing USPs, however, it is not seen as the leading technology.]	[The technology has USPs, but they are not highly appealing or seen as the leading technology.]	[Worse than a three, but above an one. Example: The technology can differentiate with a few aspects from the alternatives.]	[Multiple alternatives to the technology are available and the technology cannot differentiate well.]

Key opinion leader support

The case study has revealed that corporate investors assess whether a technology is supported by important players in an industry. These key opinion leaders can be a reputable researcher, key players in the industry, as well as large customers who are likely to be followed by others. The support of researchers or key players is seen as a positive sign for the likelihood of adoption of the new technology and thus positively impacts the valuation of a startup. Furthermore, it is differentiable whether the opinion leader supports the startup of interest directly, which is superior to a more general support of the idea without being in direct contact with the startup.

Table 10 scale key opinion leader support

Key opinion leader support				
5	**4**	**3**	**2**	**1**
[The technology is supported by key opinion leaders that furthermore advise the startup.]	[Better than a three, but not all characteristics of a five are met. Example: The technology is supported by key opinion leaders, but they do not advise this startup.]	[A very similar technology is supported by key opinion leaders.]	[Worse than a three, but above an one. Example: The technology is not supported by key opinion leaders.]	[Key opinion leaders support a different technology.]

Market risks

The case study has revealed that CVCs address the market risks, which the startups face. Jell et al. (2010) indicate that a potential source of risks are new markets. If the market boundaries are unknown and the market may first has to be developed, the risk is higher. These and further risks can increase the uncertainty of the investment if the entrepreneurs are not aware of them or have no strategy to deal with those.

Table 11 scale market risks

Market risks				
5	**4**	**3**	**2**	**1**
[The entrepreneurs have comprehensively analyzed the market risks and developed a strategy to deal with them.]	[Better than a three, but not all characteristics of a five are met. Example: The entrepreneurs have analyzed and developed a strategy for all known risks, but their list is incomplete.]	[The entrepreneurs have a profound knowledge of the market risks but not yet developed strategies to deal with them.]	[Worse than a three, but above an one. Example: The entrepreneurs have profound knowledge on some of the market risks, but their list is incomplete and no strategies on how to deal with the risks are developed.]	[The entrepreneur invested only a few efforts to identify and analyze market risks.]

Attractiveness

Being part of the potential exit, the kind of exit is not seen as a sufficient measurement on its own. Next to the internal or external exit option, its attractiveness is addressed by the German high-tech CVC. While the attractiveness of the exit might be a subjective decision, the cases can be differentiated in how well the exit strategy is worked out. A sound planning where important players like certain business groups or companies with a large interest in the solution are already identified is seen as superior.

Table 12 scale attractiveness of the exit

Attractiveness				
5	**4**	**3**	**2**	**1**
[The exit possibilities are clear and attractive and a strategy is worked out on how to capture the opportunities] (e.g. BU participation to absorb knowledge)	[Better than a three, but not all characteristics of a five are met. Example: The exit strategy is clear but it not clear how to absorb the returns.]	[The exit strategy is vague but seems attractive]	[Worse than a three, but above an one. Example: The exit strategy is vague and not attractive]	[There is no potential exit strategy.]

These seven attributes were added to the decision making tree and as a result thereof also part of the coding scheme, used for the VPAs. The analysis of the protocols revealed that there are three major changes in the attributes which CVCs pay remarkable attention to.

Results from the VPA

The verbal protocols of the corporate venture capitalists revealed deep insights into their decision-making process and clarified well which criteria are taken into account. Two attributes which did not get mentioned by Knockaert et al. (2010) or Siegel et al. (1988) and neither identified in the pre-test, were the go-to market strategy of the startup, and an evaluation of the assumptions which the entrepreneurs undertake. During the discussion of the business plan, the corporate venture capitalists, however, spend a remarkable amount of thoughts on those two attributes. Furthermore, the market strategy as is has been defined by Siegel et al. (1988) could not be confirmed.

Strategy

Go to market strategy

All participants in this study took into account how the startup plans to address the market they identified. While Siegel et al. (1988) proposed a differentiation between a new, or existing markets, this decision could not be observed during the VPAs. The market assessment was based on the size and the growth rate of the market, but as long as the market has sufficient future potential, it was not seen as a limiting factor. An example therefor is the additive manufacturing industry. Generally spoken, the industry is present for over a century, however, the processes have large improvement potential and the market has large growth estimations and was seen by several investors as highly attractive.

Instead of assessing whether the startup conducts a blue ocean strategy, the investors reflected on several aspects of the business plan, like the selected revenue model, the chosen pricing points, as well as the strategy for geographic expansion and the resource allocation, to assess how the startup wants to enter the market they identified. It was of importance whether everything fits in the overall picture and provides a solid and well thought through strategy.

> *"The whole setting is typical for a startup. However, the true question is, what are they actively going to do about it. How does their customer retainment strategy look like? How do they take advantage of their key competencies, and what is their strategy to make use of the own advantages?" VPA 8*

An explanation of alternative business models and a discussion of pros and cons is seen as superior because it provides a better line of argumentation and more details on the aspects taken into account. Overall the optimal case has to include a good strategy, which is explained with a great level of detail

Table 13 scale go to market strategy

Go to market strategy				
5	**4**	**3**	**2**	**1**
[The market strategy is well thought through and explained with a great level of detail. The strategy is convincing, feasible, and promising. The entrepreneur provides a solid line of argumentation why the strategy is better than alternatives.]	[The market strategy is well thought through and explained with a great level of detail. However different go to market strategies are not elaborated or could be more promising.]	[A market strategy is worked out well and explained in detail. However, the strategy has clear weaknesses and should be improved.]	[The entrepreneurs have thought about multiple aspects of the go to market strategy, as the pricing, the geographic expansion, and the required staffing. However their picture is still incomplete and/or no sound strategy is formulated, yet.]	[No market strategy is worked out, yet.]

Assumptions

Next to the go to market strategy, all except two CVCs elaborated on the realism and the consistency with which the entrepreneur build their assumptions. The CVCs valued when the assumptions were well explained and for them realistic. Furthermore, the assumptions are tested during discussions with the entrepreneurs.

> *"For me it is important that it is consistent. If they have some super aggressive assumptions below, (…) but then the team is a bunch of dudes who work at the university, that doesn't make sense. It needs to be a consistent picture." VPA 3*

> *"We take a look at their assumptions and discuss those with them. We ask: How do you come to these points? What are your assumptions for the pricing and your pricing strategy? What are your assumptions for certain aspects of the business plan? This will be a discussion, we are not going to tell them: we are right and you are wrong." VPA 5*

The quality of the assumptions and how the entrepreneur come to certain ones as well as whether they can explain them well to the investor is thus an attribute taken into account.

Table 14 scale assumptions

Assumptions				
5	**4**	**3**	**2**	**1**
[The assumptions in the business plan are realistic and consistent. The arguments are based on valid sources and well explained.]	[The assumptions in the business plan are consistent and realistic, however, no sources or line of argumentation is given to validate those.]	[Some of the assumptions in the business plan are questionable, however, the entrepreneur provides good arguments.]	[The assumptions made in the business plan are partly unrealistic, and the line of argumentation has weaknesses.]	[The assumptions made by the entrepreneur are unrealistic. Neither are the reasons to get to those assumptions explained well.]

The two identified attributes made up a remarkable part of the elaboration on the startup and are integrated into the decision making tree under the new criteria strategy.

Further changes

Next to adding new attributes, the VPA also revealed that a product "developed to point of a functioning prototype" (Siegel et al., 1988, p. 237) is in the high-tech sector not sufficient. While the availability of a prototype or even a running product is seen as a clearly positive sign, the CVCs ask for detailed further development plans. In the best case, those include development milestones with an allocated time, manpower, and financial budget. To integrate these insights, the scale of the attribute "development still to be accomplished" got re-defined.

> *"Especially a plan for how I can improve the technology is a key factor. I need the higher reliability of the product and have to know how I achieve it quickly, and what I need to get there." VPA1*

Table 15 scale development still to be accomplished V.2

Development still to be accomplished V.2				
5	**4**	**3**	**2**	**1**
[A product or a working prototype is available and a detailed development plan is developed. The milestones include finance, time, and human resource allocation.]	[Better than a three, but not all characteristics of a five are met. Example: A product or working prototype is available and the entrepreneurs have goals for further developments.]	A product or a working prototype is available but no development plan is available.	[Worse than a three, but above an one. Example: The technology is advanced developed but no proof of concept has been conducted yet.]	[The development is still in a very early stage where the market, the return, and the required time are highly uncertain.]

The research reveals that corporate venture capitalists in high-tech industries include more attributes to evaluate early stage startups than integrated by Knockaert et al. (2010) and Siegel et al. (1988). The new decision-making tree, visualized in figure 11, provides the updated overview of attributes. A more extensive discussion of why those attributes are taken into account can be found in the answers of sub-research question three and four. The following chapter will explain the importance of each attribute.

Research question two

How important are the single criteria for the CVC decision making?

Weights of the attributes

To answer the second sub research question a frequency count, as explained in the methodology got applied to the verbal protocols. The importance of each attribute is visualized in figure 11. The following paragraphs will describe the internal consistency of the weighting for the most important attributes.

First of all, the analysis revealed that three criteria, namely the market, the entrepreneur and his team, and the proposed product or service account for more than 50% of the thoughts when evaluating a startup case. However, none of the investors reduced himself to a limited number of criteria. A different situation occurs with the number of attributes taken into account. The leadership capabilities of the entrepreneurs and the contact with the entrepreneur, as well as the expected return on investment were not taken into account by several investors. This low interest in the attributes is shared along the sample and thus results in the low level of importance in the decision-making model. The perseverance of the entrepreneur and the after-sales service strategy provides a mixed result. While some investors do not take it into account at all, other CVCs spent several thoughts about those attributes and apply a medium level of importance to it.

The market is the most important criteria, where the market risk, the market size, and the corporate understanding of the market are the most impacting attributes. Those attributes enjoy generally a high level of importance in the sample. The entrepreneur and his team are majorly characterized by their complementarity, their business experience, and their ability to evaluate and react to risk. The complementarity and the business experienced are often taken into account by all participants. The ability to evaluate and react well to risk however provides mixed results. The majority of CVCs see it as important and take it several times into account, while it scores surprisingly low in three cases.

When evaluating the product and service, the unmet need, as well as the acceptance are the most important attributes. The unmet need generally receives a high level of focus. Only one participant has shown a low interest during the case study, however, he revealed this impression during the follow-up an interview and thus also supports the general picture. The acceptance achieves a consistently high level of importance.

The next criteria, the technology accounts for 13% of the thought units and is characterized by its development to be accomplished and its uniqueness. As mentioned earlier, the development to be accomplished had to be redefined since CVCs also take the development plan into account and are not satisfied by a working product or prototype. The impact of this attribute on the decision, however, seems to be dependent on the specific person, since few, some, as well as plenty of thought units, were spent on it. The second important attribute, the technological uniqueness is generally seen as important.

The newly created criteria strategy is mainly characterized by the go to market strategy of the startups. All participants spend a high amount of thought units to evaluate whether the strategy of the startup is sound and convincing. The realism and consistency of the assumptions show an interesting pattern and got either strongly or barely taken into account.

The investor fit is equally characterized by the potential support from the venture, as well as the fit to its strategy. Both attributes are seen by multiple CVCs as very important which is reflective of their high weighting.

When considering the exit possibilities of the investment, the attractiveness is majorly taken into account. The strategic or financial return consistently receives a medium amount of thought units from the investors. Similar patterns occur for the amount of funding, which is the main attribute to describe the financial considerations of the CVC.

To sum it up, the corporate venture capitalists agree on the level of importance for several attributes, namely the leadership capabilities of the entrepreneurs, the contact with the entrepreneur, as well as the expected return on investment. Furthermore, the complementarity of the team, and their experience, the unmet need, as well as the acceptance, and technological uniqueness. Possible implications and reasons for why they disagree on others will be explained in the following chapter and elucidated in the discussion. The following figure 11 provides the overview of importance on all attributes. Those marked with a star * are furthermore taken into account as knock-

out attributes while the attributes market with two starts ** are mentioned by at least three investors as knock-out attribute. The boxes indicated newly added attributes.

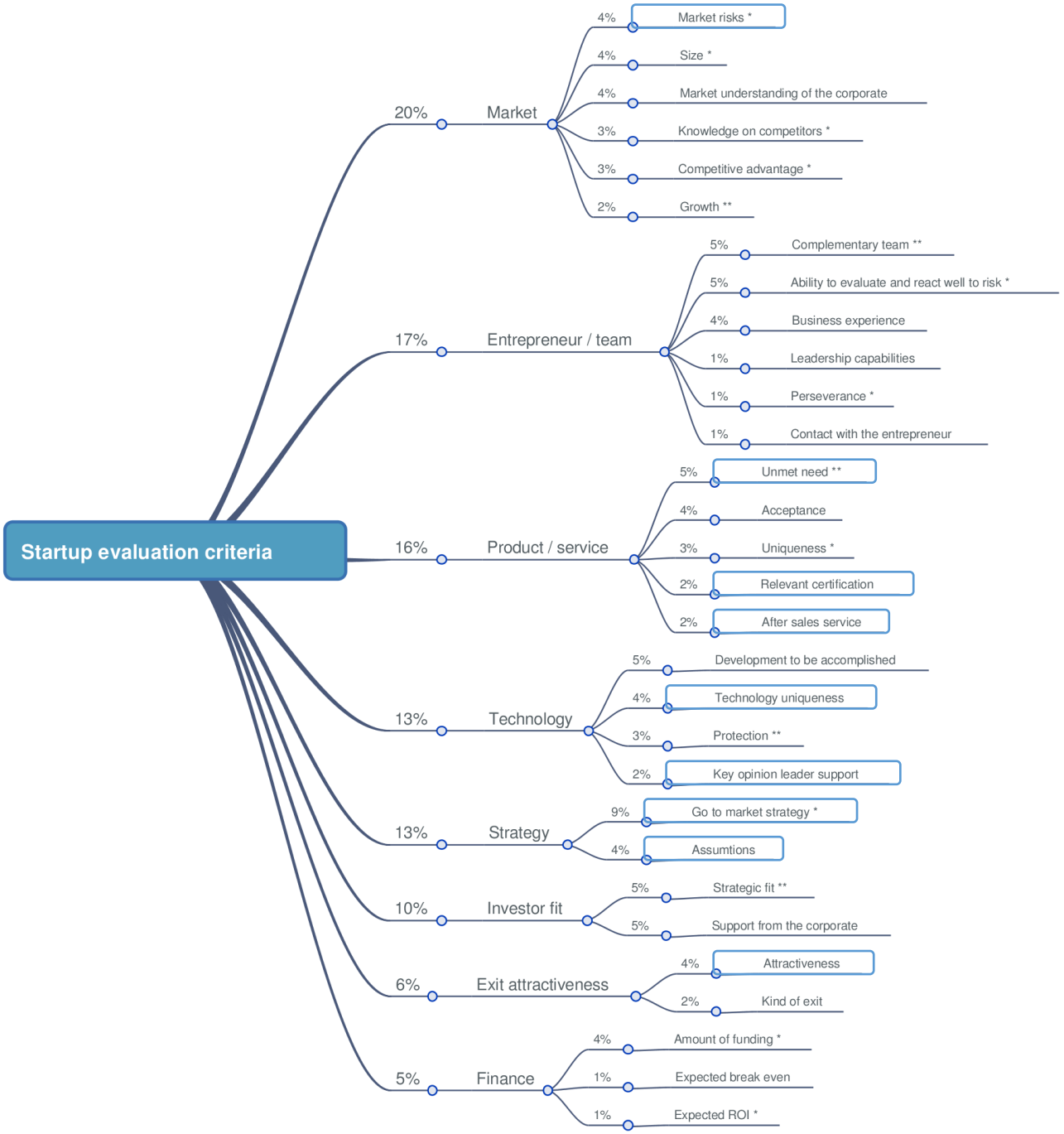


Figure 11 Decision making tree for high-tech corporate venture capitalists in early stage investments, ordered according to their level of importance. A single star indicates knock-out attributes. Two stars indicate that at least three investors classified it as knock-out attribute. A blue frame indicates a new attribute.
Due to rounding, the weightings do not add up to 100%.

Research question three and four

Why are specific criteria more important for CVC decision making?

Which attributes can have a knock-out impact?

The following paragraphs will explain why certain attributes are more important, and which ones can play knock-out roles. As mentioned previously, all potential knock-out attributes are highlighted in figure 11 by a *. In the following, the attributes market understanding of the corporate, complementary team, ability to evaluate and react to risk, development to be accomplished, strategic fit, amount of funding, and expected ROI that were also mentioned in the previous literature are discussed. Furthermore, the attribute market risk, unmet need, technological uniqueness, key opinion leader support, go to market strategy, assumptions, and attractiveness of the exit, from the newly added attributes get discussed, too, as delivering the most interesting insights into corporate venture capitalist's decision making. The later mentioned were not identified by the guiding articles, however several of them take a leading role in the decision making of high-tech CVCs. A complete discussion of all attributes with further quotes providing additional insights can be found in appendix 3. The importance regularly depends on the insights CVCs can extract from the specific attribute related to the expected startup's success and on how far it can support the investment strategy of the corporate.

To begin with, the market analysis provides the investor a high density of information about the success potential of the startup. First of all, the market risks get investigated to enable the CVC to build likely scenarios. The attribute is important, because the investor can with this knowledge estimate whether potentially required adjustments to the startup's development plans and strategies will be manageable, or in which cases they could largely harm the startup.

> *"I would ask an analyst from the business group to clarify the liability question and to show which scenarios are possible. Thus whether it can get to a serious issue or whether everything is adjustable and manageable with minor developments with reasonable costs." VPA 1*

An understanding of how the faced risks can impact the startup and its competition gets integrated into the decision making to foresee potential future competitive disadvantages.

Supportive for the evaluation of market risks is furthermore the market understanding of the corporate. Prior gained knowledge on the market through earlier operations is supportive to evaluate the startup as well as to support it after the investment. The available business network and the understanding of the forces in the market are relevant for this support. A good market understanding can furthermore provide the investor with more security to challenge the startup's proposals and to become generally more comfortable with the investment.

> *"From an investor's point of view I like to know the market, it would give me some more security. Probably I will be a bit more biased thus the team needs to prove themselves more to convince me." VPA 11*

The current research supports once more the importance of the entrepreneur and the team for startup evaluation. CVCs focus their interest on the complementarity, their ability to evaluate and react to risk, and the entrepreneur's business experience. Overall these attributes are seen as determining whether the team will be able to build the company and deliver the in the business plan promised results. A complementary team and the right personnel is seen as key factor to be strongly enough equipped to solve the challenges which will be faced by the startup. The team thus does not only need to be complete, but also suit to the circumstances of the startup.

> *"The topic is furthermore, does one think the team is capable to address the existing risks of the market and to finish the development or are those topics where one directly thinks they are only capable of this to a certain extent. If so, one has to take into consideration that potentially support is required." VPA 10*

If this is not the case, investors either step back from the investment and use the team complementarity as knock-out attribute or place hiring conditions on the investment.

Next to the complementarity, their ability to evaluate and react to risks significantly impacts the CVC investment decision because it is seen as an important indicator of the overall capabilities of the team. It even is mentioned by one CVC as knock-out attribute. The investors reflect on this ability to get a better picture of the entrepreneurs and to assess whether they will be agile enough to react to the ever-changing risks, faced by a startup. The entrepreneurs are required to place enough emphasis on the analysis of the environment and a detailed evaluation in one topic,

as the technology development, cannot outweigh a lack in other fields as the legal risks. A thorough picture is seen as important by CVCs.

In difference to the entrepreneur and team, where no attribute got added to, the product or service provided gets investigated by three additional attributes. Next to the acceptance, and uniqueness of the product, the unmet need, relevant certifications, and the after sales service characterize this criterion. The attributes largely play a role to be able to evaluate how well the offering fits the market.

A clear unmet need is seen as a necessity for a successful market entry and signals the investor how well the entrepreneurs know their customers. The unmet need should be clear, sustainable, and backed by market feedback to allow the entrepreneurs to formulate more focused strategies and increase their likelihood of success. A well-identified unmet need can even be used as a market barrier, however, in high-tech industries, a lack of customer understanding and thus a missing need is a common problem.

> *"In many cases, startups which are very technology driven have a good solution and afterward run around to find out that either no one really faces the problem, or they do not understand why their solution is not good." VPA 8*

The importance for the product's success, as well as the often faced negligence by high-tech entrepreneurs of this attribute make the attribute of importance for CVCs who characterize it as a knock-out factor.

The technology is as the product relatively important for the corporate venture capital decision making. It gives an understanding of how well the startup is prepared to face future challenges, and whether their advantage will be sustainable, as well as whether the startup can add to the corporation's internal capabilities.

As shown previously, the scale of the development to be accomplished got extended by adding the development milestones presented by the entrepreneurs. The availability of a working product or prototype is clearly a positive signal, however in high-tech industries not seen as sufficient since the technology is the backbone of a product in this field. The CVCs assess the development plan to ensure comprehensiveness and achievability of the set milestones and commonly receive support from experts to do so.

> *"They state to require € 500k to achieve a 90% reliable software. That makes a good impression, however, I would talk to our own technician and discuss also the roadmap to identify potential gaps, required to achieve the higher software reliability. Furthermore, I would not only talk to the team, but also to experts from the field who have the experience to create comparisons." VPA 11*

> *"Usually it takes much longer because especially in startups people underestimate how long it takes until it is a real product, and the product is reliably running. Just because something can perform some simple features, it is not a serviceable product." VPA 3*

Overall, the CVCs integrate the development to be accomplished considerably in their decision making because it can strongly impact the success of the whole startup and its ability to add strategic value to the corporates portfolio.

Whether the technology can add value to the corporates current portfolio also depends on its uniqueness. A unique technology is valued by CVCs since it can be the source of protection mechanisms and a base for product uniqueness. The startup's solution gets compared to own, and on the market, available technologies to highlight advantages and disadvantages of the technologies. The sustainable uniqueness of the technology has to be ensured which most likely happens through ongoing development. A unique technology is seen as superior, as long as it adds value to the product and does not make it unnecessarily complex. CVCs thus assess the technological uniqueness to better understand the competitiveness of the startup, its ability to add value to the current portfolio and knowledge of the corporate, and to ensure that the technology serves the unmet need.

The second attribute added to the technology criteria is a support from key opinion leaders. The feedback from professionals can verify the technology, as well as market access points, and thus the external validation is able to decrease the uncertainty for the investor.

> *"The value of the startup goes up if the market and product fit some validation since the risk goes down. Thus that would be a question I would raise here." VPA 3*

On the one hand, contact with leading technicians can improve the development and quality of the startup's product. While on the other hand, experienced business players, who might have conducted previous investments in the

industry or run businesses in the field themselves can drastically improve the market understanding and network of the startup. Finally, a support from large customers can be valuable by providing feedback, as well as being a role model for other customers. In that way, they support the technology to become dominant. To sum it up, CVCs take the opinion of key externals into account to decrease the uncertainty of the entrepreneur's and their own assessments. It provides a certain level of security and is thus appreciated by the investors, belongs however to the less important attributes

The newly added criteria strategy is strongly taken into account when CVCs place investment decisions because it is seen as majorly impacting the potential success of the startup. In addition, their planning skills and assumptions provide valuable insights into the capabilities of the team.

If the entrepreneurs have not worked out a sound go to market strategy, it can knock-out the investment. A good combination of the market knowledge with the own capabilities and strengths is key for receiving an investment.

> *"An aspect often lacking with high-tech startups. But if it is not clear to me, I won't invest. They need to know how to get on the market." VPA 1*

The strategy proposed by the startup gets challenged and improved. Experience from previous investment and the own business understanding are often the benchmarks and can be inspiring for changes, but also making the investor reductant towards strategies which in the past have proven to be difficult. Thus it also depends on the respective investor, whether a market strategy can convince him, or not

> *"I have a startup who are currently growing because one can apply several business models on the hardware they have. However they had a hard start caused by the add-on hardware, so this would be a red flag for me." VPA 9*

The entrepreneur's ability to build a good strategy is complemented by the realism and the consistency they build their assumptions with. CVCs will challenge several parts of a business while evaluating it. Since a business plan includes multiple projections for future scenarios, good arguments should be provided.

> *"So you fundamentally want to understand how they base their decisions. All the base assumptions on the market, on the price, on the customer, on basically everything." VPA 13*

> *"We have our own people who take another look. The things said or provided by the startup is used to get a feeling for how realistic they are." VPA 5*

If the assumptions are not properly explained or unrealistic, it negatively impacts the impression on the entrepreneur's capabilities. Since CVCs want to clarify these points beforehand, it can drastically delay the investment process. The realism of the assumptions plays an important role in the investment decision of the CVC because it indicates the overall trustworthiness of the business plan and again gives indications on the capabilities of the entrepreneurial team.

When the market, the team, the product, as well as the technology is understood, the CVC is able to clearly evaluate the startup's strategic fit, and the support the corporate can offer. Both belong to the more important attributes during the decision making. The strategic fit is furthermore a commonly mentioned knock-out attribute.

During the VPAs the impact of the strategic direction got visible when one participant clearly denied the case, while it was seen as an interesting opportunity by several others. The one investor denied because the technology, as well as the market, did not meet the strategic direction of their corporation, an impactful factor which is recognized by multiple participants.

> *"Even though there are several interesting details, I still need to understand how the startup will fit in the strategic thoughts of the corporate. However those thoughts of the corporate look like technology and market wise. Which role is the startup supposed to play in our product portfolio, or how should it extent the portfolio of the corporate?" VPA 10*

> *"My corporate has some no-go areas. Let's say the startup targets defense, those are typical things we would not do since they are really not in line with the standards of the corporate and the corporate is also not directly active in these fields. If this is something out of the clear investment strategy, you first have to adopt the strategy and then go systematically afterward, but you don't sort of pick and choose just based on nothing." VPA 3*

The startup is required to meet the current or future interests of the core company. A startup which does not fit in there will most likely not receive an investment. Corporate venture capitalists are dependent on their mother company, which sets a certain strategic direction to place investments. The brand identity and values of the corporation can be limiting factors for investment opportunities. No go markets as well as quality expectations of the corporate can get transferred on the startup. Overall the strategic fit is included in the decision making of CVCs to enable them to fulfill their investments goals and thus align the portfolio with the interests of the corporate.

Next to those limiting implications, the corporate strategy can have, it can also be supportive for the startup. One investor indicated a willingness to accept a not that high performance in different fields like the attractiveness of the standalone business if the match with the corporate is very high. This situation is caused by the better support the corporate can provide in such a situation. The experience in the market, their knowledge of the customers, as well as about the production, or the legal frames are a strategic support which is seen as more important than the financial support provided and can especially address the weak points of the startup. The non-financial support however also creates costs for the corporate, which investors take into account before deciding on a startup. It is generally seen as supportive if a business unit will get involved in the investment, but not in all cases seen as a necessity.

Next to providing support, a CVC has interests in the returns of the investment. Beside financial returns, the investment can be strategically attractive. Being an attractive opportunity has, however, to be complemented by the ability to hold the returns in the long term in the corporation. The company needs to be prepared to absorb the knowledge that is required for a strategic return somehow. Thus the attribute is taken into account already before the investment, to ensure a feasible strategy to capture returns. This can include the integration of a business group in the investment.

The financial criterion is overall less taken into account. Corporate venture capitalists place low trust in the financial forecasts provided by the startup and thus make their decision less dependent on the expected return on investment and the expected break even. However, if a return on investment does not occur by the CVC self-conducted forecasts, it can have a knock-out impact. An excellent knowledge about the market and the startup is however required to conduct these forecasts. From the three attributes defining this criterion, the amount of funding is the most important one. It is taken into account to ensure that the investment size and the resulting influence on the startup meet the investment strategy of the CVC and that the spend capital fits in the budget of the corporate. Investments of high relevance should typically result in a board seat or other opportunities to impact the further development. Next to the pure size of the investment, CVCs show an interest in a precise use of capital plan, which is next to being used for the startup evaluation also relevant to convince further players as the investment boards in the corporate. Thus the low importance of ROI and break even should not motivate the entrepreneurs to put less effort into these fields. Even though the CVCs do not trust the numbers provided, they use it to get a better understanding about the planning capabilities of the startup, about the assumptions the startup places, and about the level of detail they work with.

Overall there are multiple reasons why corporate venture capitalists take attributes into account. Their impact on the startup's performance and success are often determining factors. The in this chapter excluded attributes and further details and quotations for all attributes can be found in appendix 3. The following chapter will show how the created insights can get applied in praxis by explaining the computer-based evaluation model, which got developed with this research. Afterward, the final chapter will provide a detailed interpretation of the results.

The computer-based model

The detailed understanding about corporate venture capitalists created by this study is used to build a computer-based evaluation model and is successfully applied at a German high-tech corporate venture department. The following paragraphs will explain how the model is to be used in a circular approach, and how it can enhance the understanding of the startup, the comparability between investment opportunities, and be a platform for discussion in the team. As the whole research focusses on the detailed investigation of series A startups, the model supports this specific evaluation phase and is not meant for the initial screening, nor tested to be applicable for later stage investments.

Fill the model

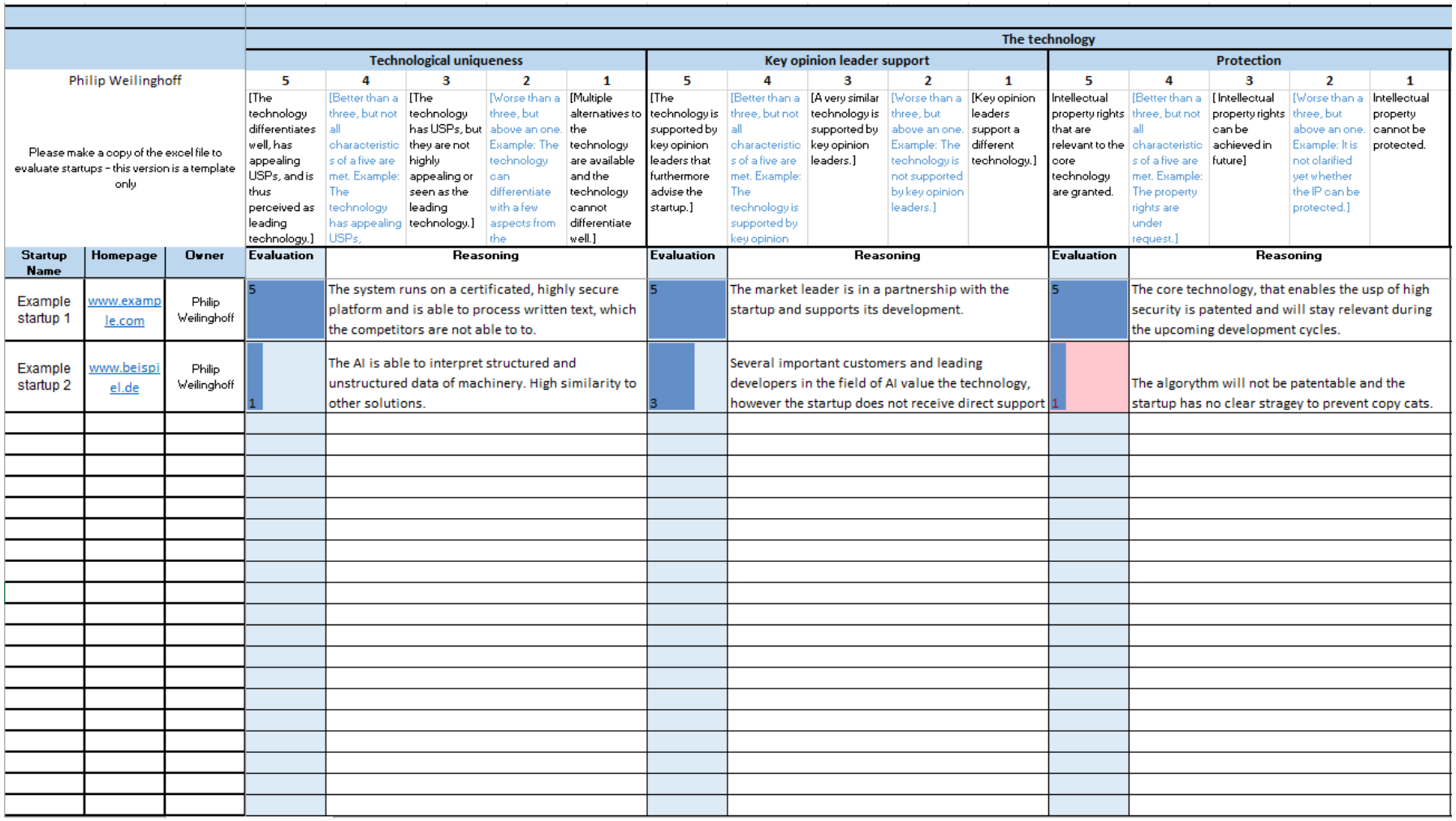
To begin with, figure 12 shows an extract of the model. The previously developed 30 scales are integrated into the model and thus can be applied to evaluate each startup consistently. Information concerning the performance of startup per attribute is collected and summarized in the therefor intended "reasoning" column. The information thus gets conserved and can easily be forwarded to, and discussed with team members. By comparing the startup's performance with the global scale, the one to five score can consistently be applied to the startup. In this way, the investigated startups become comparable, which is supported by the visualizations in the "evaluation" column. Knock-out attributes are highlighted by a red color if the startup is rated a one and thus performs badly in this attribute. The model is built to handle a high amount of information, which can best be collected in a circular approach, as explained in the following paragraph.

Evaluation circles

After the initial industry screening (see chapter one), the number of startups to be further analyzed decreases. The application in praxis has shown that the model can realistically be applied at a time for samples smaller than 50 startups. Theoretically, no limitations on the number of startups to be evaluated apply, however, for practical reasons it is not suggested. The size of the first evaluation round should be first of all dependent on the number of promising candidates available and secondly, depending on the time and human capital available to analyze the startups. During the first evaluation round, publicly available information should be used to get a first impression on the startups. The web presence, databases, and third-party information are valuable sources. The current score indicates which startups are of higher interest. It has, however, to be taken into account that blank cells will create a bias. The as more interesting identified startups have to be contacted, to receive detailed information about them. The business plan, the investor deck, as well as further documents, are valuable sources for the second evaluation round. The application has shown that five to ten startups are a well manageable amount for this round. The investor should be with this information able to evaluate the startup on most of the attributes. Next to indicating the high performing startups, the model also indicates where information is missing and which attributes are not yet fully understood by the corporate venture capitalist. The current "final scores" as shown in figure 13 provide a good overview of the remaining investment opportunities. The highest scoring ones should be selected for the third, and final evaluation round, which includes personal discussions to clarify the remaining questions. Additional support from experts as technicians or legal advisors from the corporate can be valuable in this step. Having accomplished this round, the model will be completely filled and provide valuable information to the investor.

Interpreting the results

The preliminary scores which are the results of the first and second evaluation circle already indicate with which startup the investor should proceed. The final scores per criteria, as shown in figure 13 enable the corporate venture capitalist to compare the strength and weaknesses of the remaining startups well with each other. The "comment" column is meant to collect the most important information and interpretations. For example, a weak performance in the team might be caused by missing human capital in one field of expertise. The investor can with this information place the condition to hire an experienced manager if the startup should receive an investment. The profound understanding of each criterion which is a result from the structured evaluation according to the model enables the investor to interpret the final scores and use it as a foundation for the investment decision and the post-investment strategy, as for how to support, or how to integrate the startup in the upcoming years.



			The technology														
			Technological uniqueness					Key opinion leader support					Protection				
Philip Weilinghoff			5	4	3	2	1	5	4	3	2	1	5	4	3	2	1
Please make a copy of the excel file to evaluate startups – this version is a template only			[The technology differentiates well, has appealing USPs, and is thus perceived as leading technology.]	[Better than a three, but not all characteristics of a five are met. Example: The technology has appealing USPs,	[The technology has USPs, but they are not highly appealing or seen as the leading technology.]	[Worse than a three, but above an one. Example: The technology can differentiate with a few aspects from the	[Multiple alternatives to the technology are available and the technology cannot differentiate well.]	[The technology is supported by key opinion leaders that furthermore advise the startup.]	[Better than a three, but not all characteristics of a five are met. Example: The technology is supported by key opinion	[A very similar technology is supported by key opinion leaders.]	[Worse than a three, but above an one. Example: The technology is not supported by key opinion leaders.]	[Key opinion leaders support a different technology.]	Intellectual property rights that are relevant to the core technology are granted.	[Better than a three, but not all characteristics of a five are met. Example: The property rights are under request.]	[Intellectual property rights can be achieved in future]	[Worse than a three, but above an one. Example: It is not clarified yet whether the IP can be protected.]	Intellectual property cannot be protected.
Startup Name	**Homepage**	**Owner**	**Evaluation**	**Reasoning**				**Evaluation**	**Reasoning**				**Evaluation**	**Reasoning**			
Example startup 1	www.example.com	Philip Weilinghoff	5	The system runs on a certificated, highly secure platform and is able to process written text, which the competitors are not able to to.				5	The market leader is in a partnership with the startup and supports its development.				5	The core technology, that enables the usp of high security is patented and will stay relevant during the upcoming development cycles.			
Example startup 2	www.beispiel.de	Philip Weilinghoff	1	The AI is able to interpret structured and unstructured data of machinery. High similarity to other solutions.				3	Several important customers and leading developers in the field of AI value the technology, however the startup does not receive direct support				1	The algorythm will not be patentable and the startup has no clear stragey to prevent copy cats.			

Figure 12 Abstract of the computer based evaluation model

			Final Score									
Philip Weilinghoff												
Please make a copy of the excel file to evaluate startups - this version is a template only			Total		Product / Service		Technology		Market			
Startup Name	Homepage	Owner	Score	Comment	Score	Comment	Score	Comment	Score	Comment		
Example startup 1	www.example.com	Philip Weilinghoff	3.5		3.9		4.6	Technology is of high relevance for the own 5 year plan	3.6			
Example startup 2	www.beispiel.de	Philip Weilinghoff	2.9		3.0		2.4		1.7			
			3.5		4.3		4.1		4.1			
			2.5		3.9		2.9		2.8			
			3.6		4.1		3.5		3.9			
			4.5	Conduct a workshop with BG before the investment.	4.7		3.9		4.5			
			2.8		4.2		2.7		3.3			

Strategy		Investor fit		Entrepreneur / Team		Exit attractiveness		Finance	
Score	Comment	Score	Comment	Score	Comment	Score	Comment	Score	Comment
2.3	Strong support required to develop market strategy.	3.5		2.5	Condition: Hire experienced economist	4.4		3.9	
3.6		3.0		3.6		3.0		3.4	
1.4		4.5		2.7		4.6		1.0	
2.1		3.0		2.2		0.0		0.0	Startup is not willing to share financial data
2.6		4.0		3.8		4.4		1.3	
4.7		5.0		4.9	Mr. ---- is advisor and investor (+)	4.4		2.9	
1.3	Entrepreneurs miss market understanding	3.0		2.9		3.0		0.0	

Figure 13 Final scores view with example comments, due to space limitations split into two

5. Discussion and conclusion

This study conducted 14 verbal protocol analysis with German corporate venture capitalists who are active in high-tech industries, to investigate how the detailed evaluation of startups takes place. By following the methodological suggestions by Mason and Stark (2004), Smith et al. (2010) and Chi (1997), the high level of detailed provided by VPAs got used, to understand better which attributes are used, how important they are, as well as why they are of importance, and whether they can have knock-out impacts. The following will critically reflect on the findings, compare them to earlier research, and show opportunities for further research.

First of all, the research is in line with previous articles as Jell et al. (2010), Knockaert et al. (2010), Siegel et al. (1988) and several more, that startups are evaluated by investors through applying multiple criteria. The reflection on multiple attributes allows the investor to gain a complete picture on the startup. While doing so, strengths and weaknesses are identified and highlighted for discussion in the team and with the startup. The information received in this way impact the investment decision, as well as the post-investment strategy. To react to weaknesses directly, these can be transformed to conditions to be fulfilled by the startup to receive the investment.

For an increased consistency, a global five-point scale has proven to be a well applicable tool during the evaluation process. The usage of this scale improves furthermore the comparability between the startups and through requiring explanations for each evaluation, the personal bias gets reduced and the knowledge transfer within the team gets increased.

The generally in venture capital literature mentioned criteria of the product, the market, the startup team, and the financial returns (Franke et al., 2008), could only be partly confirmed with this research to also apply to CVCs. While the market, the team, and the product are the most important criteria also for high-tech CVCs and thus show parallels to independent VCs, the financial returns are seen as remarkably low in the importance. As the literature review explained, CVCs are expected to value strategic returns higher than financials, caused by their interest in the technology, the markets, and the business opportunity. This hypothesis is in alliance with the current findings and can explain the low relevance of the financial attributes. In addition to that, the low reliability of the provided financial forecasts demotivates CVCs further to base their decision on that information. A detailed financial forecast should anyhow not be neglected by entrepreneurs since CVCs assess the entrepreneur's capabilities and the realism of their assumptions based on the provided information. This aspect is remarkable since it shows that CVCs extract information about several attributes from a single source.

Overall, a general trend can be observed when reflecting on the importance of the single attributes. The attributes which have a higher impact on the startup's success, seem to be more important during the decision making of the investor. A good market strategy, a sustainable unmet need, and a complementary team will have a higher impact on a successful startup, than a well-defined exit strategy or a fast break even and high ROI. This impression is in line with the findings of Kakati (2003) who identifies the same aspects as more relevant for startup success. The focus on those attributes might be caused by the situation that CVCs are to a large extent driven by strategic interests and therefore require a company with ongoing development and growing business, instead of focusing on quick financial success.

The findings of this study agree with Knockaert et al. (2010) and Siegel et al. (1988), even though their work got extended by eight attributes taken into account. While Knockaert et al. (2010) may have decreased the number of attributes taken into consideration due to methodological constraints, the differences to Siegel et al. (1988) can currently only be explained by the focus on high-tech industries, which is not followed by Siegel et al. (1988). The added attributes mainly concerned the product and the technology, which could relate to the more complex industries, high-tech companies operate in. Their focus on complex ecosystems, as high-tech industries are, makes the search for external validation through key opinion leaders a feasible opportunity to decrease the investment risk. The technological focus of the startup furthermore requires a sound after-sales service strategy, since customers will in many cases not be able to maintain the product themselves. Certifications are regularly required if the technology works either in safety-relevant fields or requires access points to further machinery which are overall typical circumstances for the high-tech sector. Interestingly, this study did not add any attributes to the entrepreneur and his team and followed the suggestions by Knockaert et al. (2010) and Siegel et al. (1988) for this criteria fully. The attributes applied to evaluate a team seem to be the same between VCs and CVCs and furthermore, do not have changed during the past years.

Furthermore, this research supports the idea of knock-out attributes as indicated by Franke et al. (2008) as well as Jell et al. (2010). According to the findings of this research, corporate venture capitalists have attributes where

startups have to perform on a certain level to proceed. Overall the investors differed in the kind of attribute as well as in the number of attributes which play a knock-out role, which makes generalizable conclusions difficult. Five attributes were mentioned however more often, namely the unmet need of the product, the protection of the technology, the growth of the market, the strategic fit of the investment, and the complementarity of the team. Thus this research can prove that knock-out attributes are applied by corporate venture capitalists and should be taken into account by future research. A larger scaled study could clarify further which of the identified knock-out attributes are generalizable for CVCs and at which level of performance they are applied. Whether an attribute becomes a knock-out attribute depends on the willingness of the CVC to develop the startup further. While one investor only required a well-defined unmet need and was willing to invest in the technological as well as human capital development, others were less open therefor. Even though a correlation between the amount of knock-out attributes and startup development stage seems plausible, since a later stage startup is expected to be further developed, this sample, which includes minor differences in the investment focus (focus on Seed & A: or A & B) does not support this hypothesis. Follow up studies should compare the knock-out attributes in different investment stages of a startup.

The changing level of importance assigned to some of the attributes between the participants can motivate further research to search for new correlations with the investor's characteristics. As explained in the findings, the investors partly differed in the importance assigned to single attributes. The investors agree on the low importance of the leadership capabilities of the entrepreneurs, the contact with the entrepreneur, as well as the expected return on investment. This low importance is reasonable since leadership problems can be solved by additional hires, a capable entrepreneur is more important than being in good contact with him, and the expected return on investment forecasts are barely accurate. Furthermore, the investors agree on the high importance of the complementarity of the team, their experience, the unmet need, as well as the acceptance, and technological uniqueness. The study has shown that investors expect of these attributes to have a high impact on the startup's success potential, where a CVC ultimately has a large interest in. In contrast to that, the realism and consistency, the development to be accomplished, and the ability to evaluate and react to risk provide mixed results. Especially the realism is interesting since it is either taken strongly or weakly into account. The focus of this study on high-tech industries and early-stage investments does not seem to be sufficient to cancel this variation out. Previous research has shown that experience has an impact on the attributes taken into account by venture capitalist and business angles (Franke et al., 2008; Smith et al., 2010) which was taken into account by this research by selecting only participants who have experience in startup evaluation. Further factors which could have an impact and be tested in future are the background of the investors. Corporate venture capitalists can come from various areas and range from finance experts, over natural science experts, to people with a legal background, and economists. The different kind of education could make people more sensitive to information from their area of expertise, and thus shift the allocated importance. Furthermore, negative experiences could have an increased impact on the evaluation. An investor indicated the rejection of a business model, caused by negative previous experience. In addition to that another participant indicated the protection as knock-out attribute since previously, one entrepreneur left the startup and took the IP with him. Potentially positive and negative experience have different learning effects and thus influence the following investment decisions differently. Negative experiences seem to turn into knock-out attributes more easily.

Attributes that require further investigation

This research came for few attributes to conflicting results. One is the importance of the growth factor, which needs further investigation. While the VPA indicated a low importance, the follow-up interviews indicate a very high importance. This mismatch is interesting since even though the investors report growth as an important factor, they do not spend thoughts whether different market strategies could increase the overall market growth, for example by changing the focus or application. This situation could be caused by the low impact an investor has on the market growth or by the high required effort to identify a new use case and thus a new market. A possible explanation is thus that the market growth is an attribute seen as either sufficient or not. This elaboration would require a few thoughts but still have potentially a high impact on the decision. Which would be in line with its characteristic of being a knock-out attribute.

The second attribute which did not deliver clear results is the scale for an internal or external exit. Since the investors had different opinions on whether an internal or an external exit is seen as more attractive, a global and generalizable scale does not seem to be applicable to this attribute. This situation implies in praxis that the scale needs to be adjusted to the strategic objectives of the corporate. For theory, it is worth to recognize that the

differences in the strategic objectives of CVCs might be a possibility for further classification. Knockaert et al. (2010) find that VCs in high-tech industries can be classified further on their focus and differentiates between financial, people, and technology investors caused by their interest, as well as the public or private nature of the fund. Since none of the CVCs under investigation had the possibility to use public money and none followed public interests as the 'technology investors' identified by Knockaert et al. (2010), this classification cannot be transferred to CVCs. A larger scale study could search for further differentiation between CVCs in the high-tech industries.

As a finishing note on further research, the order of the criteria taken into account can potentially have an impact on the decision. Emden et al. (2006) have found out that successful collaboration decisions follow a common order of investigation, which was followed by this research without controlling for its effect. One participant mentioned a small bias in his decision when he receives information about the pre-money evaluation at an early stage during the investigation. While researching an impact of the order of information provided and decisions taken was not in the focus of this paper, the exploratory nature motivates to report these impressions as well.

Limitations

The author is aware of the fact that qualitative research is limited in its ability to generate generalizable results. Through the focus on a specific group of CVCs, the kind of criteria taken into account and the reasons of importance are expected to be generalizable in the population of high-tech, early-stage corporate venture capital investors. Applying frequency counts is a good methodology to make full use of the level of detail from VPAs and provides valuable insights into the importance of the attributes. However, future research should apply quantitative research methods on larger samples to control the resulting ratings.

One methodology to increase the robustness of qualitative research could not be applied in this paper. The coding by multiple researchers could have been supportive for this research (Smith et al., 2010), however, the frame of a master thesis did not allow for co-researchers. To use not involved researches for additional coding was not seen as supportive by the researcher caused by their missing understanding of the corporate venture capital topic. However, the researcher is aware of this potential source of bias.

Conclusion

The correct evaluation of startups is a complex task which requires high efforts and time to acquire a comprehensive picture. This research explains how this process is conducted by corporate venture capitalists in high-tech industries, which focus on early-stage investments. By capturing the process and building a decision-making model of it, the research provides a guideline to structure future decision making processes better. This will help investors to come to a better thought through opinion about the startups. In addition to this paper, a computer-based model was developed to be applied in praxis. In this way, a platform for discussions in CVC teams is created. First real case tests have revealed the supportive function of the model where the main advantages in praxis are a better overview and an increased comparability of the investments opportunities, a knowledge conservation, and a well-defined guideline for consistent evaluation across team members which is helpful to prevent personal biases.

For the scientific literature, this research provides deep insights into the work of CVCs. By analyzing the verbal protocols of corporate venture capitalists, their decision making and the motivations for their decisions got tangible. This detailed understanding is supportive to begin closing the literature gap on high-tech CVCs. Having several parallels to previous research the findings can be well connected to other theories, while at the same time highlighting several uncertain points which are opportunities for further research. The explanation of why differences between investor groups, as well as single investors occur, the generalizability of the findings, and the further understanding of how CVCs work and by which factors they are impacted will stay an interesting field of research.

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Appendix

- **Decision making tree after the pre-test; the coding scheme**
- **Knock-out attributes**
- **Additional findings and explanations per attribute**
- **The fictive startup case of imaginary one**

1) Decision making tree after the pre-test; the coding scheme

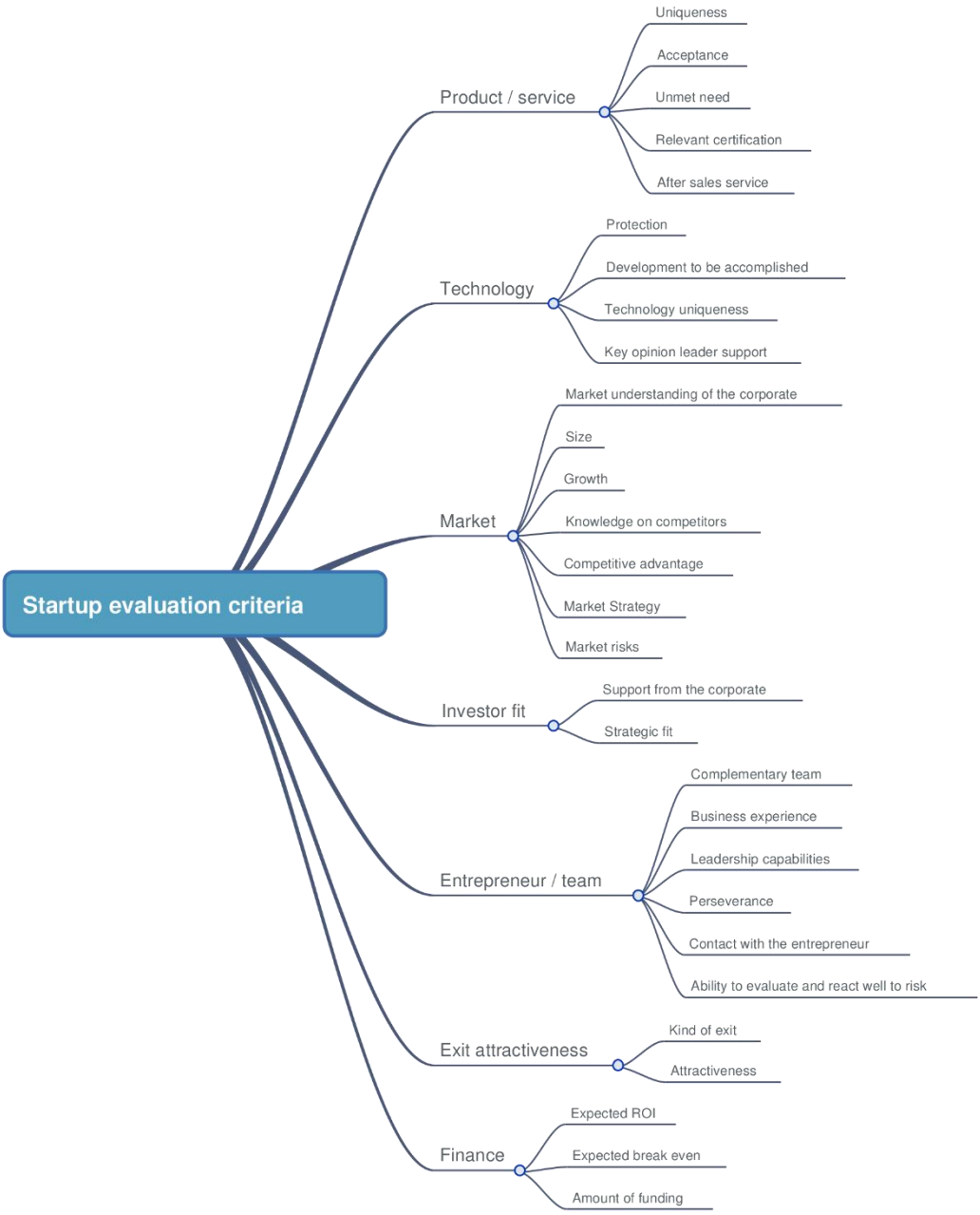

Figure 14 The decision making tree after the pre-test. The identified attributes furthermore represent the coding scheme.

2) Knock-out attributes

Table 16 knock-out attributes of CVCs in high-tech industries. n=12

Criteria	Attribute	Times mentioned as knock-out
Market	Growth	3
	Size	1
	Knowledge on competitors	1
	Competitive advantage	1
	Market risk	1
Entrepreneur / Team	Complementary team	3
	Ability to evaluate and react to risk	2
	Perseverance	1
	(general team appearance and interaction)	2
Product / service	Unmet need	4
	Product uniqueness	1
Technology	Protection	4
Strategy	Go to market strategy	1
Investor fit	Strategic fit	3
Finance	Amount of funding	1
	Expected ROI	1

Comment: The table shows the attributes mentioned as having a knock-out impact on the investment decision. Two investors mentioned the general team appearance and their 'feeling about the team' as an additional knock-out attribute, which is not part of the current evaluation.

3) Additional findings and explanations per attribute

Market

To start with the most important criteria for CVC decision making, the attribute concerning the market are explained in the following. Overall, the market analysis provides a high density of information to assess the startup's future potential.

Market Risk

The market risks are to be understood to enable the investor to estimate the potential development of the startup as well as the steps required to react to several scenarios. Investors want to understand how changes in the environment will impact the startup as well as the other players on the market to foresee potential competitive disadvantages.

> *"Ok, the legal framework is for sure a risk, however, the question is whether it will apply to all competitors or whether someone has a different technology which might be better protected and thus less impacted." VPA 8*

Their experience in the industry is helpful to understand those correlations, however, investors tend to receive help from colleagues with a higher expertise in the field of interest, like the legal department or the business group.

> *"I would ask an analyst from the business group to clarify the liability question and to show which scenarios are possible. Thus whether it can get to a serious issue or whether everything is adjustable and manageable with minor developments with reasonable costs." VPA 1*

> *"For the foreign markets, one would have to assess the risk. Will there be minor things that have to be adjusted or could it become a deal breaker needs to be analyzed in more detail." VPA 11*

The market risks are thus taken into account to estimate whether potentially required adjustments are manageable or could largely harm the startup.

Size

The market size is taken into consideration to estimate the potential which the startup has. A large market is required to prevent a limitation of the scalability. Very small addressed markets can be a knock-out criterion for investors.

Two questions are taken into account when talking about the market size, first of all, how large is the addressable market, and how much market share can be gained by the startup.

> *"The problem is the following. Their addressed market is not incredibly large. The resulting question is how much market share are they able to gain." VPA 1*

If the achievable market share is large, investors are willing to enter smaller markets than they typically would. In the high-tech sector, billion dollar market are seen as an attractive size. The geographic expansion strategy of the startup should ensure to address the largest markets, otherwise investors tend to disagree with the plan. During the VPA multiple participants questioned the expansion to the US and suggested an Asian focus instead since the software market is likely to be larger there.

> *"We try to invest in growing companies and look at billion dollar markets. Two to four hundred million is normally a bit too small for us." VPA 9*

> *"Exactly, the addressable market is important for us. How large is the addressable market at all, and is that interesting for us?" "So it should in the best case be a billion dollar market." VPA 5*

> *"However, in some cases, it might also be some special applications. In those cases, a two to three hundred million market is fine if we are likely to gain a large market share." VPA 5*

The market size is important because it is an enabling factor for the startup to grow, and to become a valuable company since in a small market even the biggest player can be unattractive. However, to estimate this, the market growth is of importance, too.

Growth

A growing market is seen as more likely to be of high importance in the future and thus positively impacts the investment decision. Furthermore, market growth is an enabler to create market share, instead of taking it from established players, which is seen as an easier solution. Three investors indicate the market growth as a knock-out criteria, which is surprising since typically few thoughts are spent on it during the case.

> *"Regarding the target market, growth is of high importance for us. We do not want to invest in decreasing markets and participate in a market consolidation. We want to shape the future and focus on new fields which we can shape. And for example, due to financial reasons do not focus on consolidation aspects." VPA 4*

> *"Fighting for my share and replacing existing solutions is always harder than addressing a new problem with new technology or even addressing a new market." VPA 3*

> *"We would also invest in startups which currently have no or a very small market when we are convinced the market will become of major importance in the future." VPA 9*

Next to the simplified market access for the startup, the innovative focus of CVC units and their often reported task to find future technologies and markets are reasons to take the market growth into consideration during the evaluation.

Market understanding of the corporate

A good market understanding can provide the investor with more security to challenge the startup's proposals and to become comfortable with the investment and is thus positive for the investment decision.

Prior knowledge, as well as during the evaluation gained insights, and contacts are sources for the understanding. The better understanding can lead to a better risk assessment, as well as improve the ability to provide support to the startup.

> *"We also conduct customer calls to talk to the potential users and get a true feeling on whether the information is only the estimations of the startup or whether it is truly what the market thinks." VPA 5*

The assumptions of the entrepreneurs are compared to the market understanding of the CVC. The good understanding of the market helps the CVC to evaluate the startup and to challenge their assumptions, their strategy, and their claims.

> *"If I know the industry very well I would go through it and see whether the margins are ok. Are there reasonable scale up assumptions? That also tells me a little bit about the management team how prepared VPA 3*

> *"What I think is strong is that they claim to have a problem they are solving. I need to understand that better because I want to question their market strategy. So I need to know which markets they are going next and why they're going to different markets." VPA 13*

> *"From an investor's point of view I like to know the market, it would give me some more security. Probably I will be a bit more biased thus the team needs to prove themselves more to convince me." VPA 11*

Overall a good market understanding of the corporate thus enables the investor to place more trust in his decisions and enables the corporation to provide better support and thus impacts the investment decision. Furthermore, it assists the investor to evaluate on the realism of the entrepreneur.

Knowledge of competition

A proper knowledge on competitors is important to estimate risks, to benchmark the own product against substitutes, to receive inspiration for e.g. the pricing strategy, and to identify the own advantage against the other players. A missing of this knowledge can be a knock-out attribute for CVCs.

A weak knowledge about the competition increases the risk of the investment. By not being aware of the other players, several things may happen. An unforeseen competitor could enter and occupy the market, or companies could block the startup's invention by creating market barriers as patents.

> *"You are monitoring the market in Germany and the European Union but how can we ensure that there are no competitors in the silicon valley who have a better technology?" VPA 4*

To prevent those surprises, CVCs even conduct own market analyses and compare the results. A focus here is on the differences between the technologies and the strategies to prepare for market risks. Competitor benchmarking can furthermore validate assumptions like price points, and clarify how one is superior to the competitors.

> *"The competitors are very important. We would have to take another look at them. What we are doing is furthermore an own analysis." VPA 5*

> *"Which risks the others have with their technology and how they are prepared for example to react on the legal issues belongs to the competitor awareness." "One has to make sure that the own applied technology is better, and one has to know where the own advantages are and why our technology is better." VPA 8*

A good competitors knowledge of the entrepreneurs is thus seen by the CVCs as important to be able to build proper strategies and to be aware of the risks, why it is taken into account during the decision making.

Competitive advantage

A proper competitive advantage is needed to scale the business without investing tremendous amounts of capital in it. The limited resources a startup has make this differentiation even more important to ensure long-term survival.

It is important to know whether the own competitive advantage, as well as the ones others hold, is sustainable and how it can be affected by environmental changes.

> *"The question concerning the legal risk is whether it addresses all competitors. If one has a technology which is protected and thus not affected by those changes, they would have an advantage afterward." VPA 8*

Corporate venture capitalists use their market understanding and a competitor benchmarking to assess the advantages held by the startup under investigation.

> *"Here I would take a look at why the competitors use a different technology, how it will evolve and where the advantages and disadvantages are." VPA 11*

Investors generally see a sustainable competitive advantage as a necessity for a successful business.

Entrepreneur / Team

Following the market, the entrepreneur and his team are of high importance when evaluating a startup. As visible in figure 11, the complementarity, their ability to react to risk and their experience are determining factors. Overall t CVCs try to estimate whether the entrepreneurs will be capable of delivering what they promise in the business plan.

Complementarity

A complementary team is important to have all required capabilities to build and run a startup in-house and if not sufficiently provided, it was mentioned several times as having a knock-out impact.

Being strongly enough equipped with the right personnel to solve the challenges which will be faced by the startup is a key factor. Therefore it is important that the team suits the circumstances of the startup and should for example in a software-heavy industry employ a sufficient number of developers.

> *"If the team would be slightly larger it could be a good team, but one has to ask how they want to finish the product. The product is software focused but they have only one developer." VPA8*

The entrepreneurs are required to have clear roles, to avoid overlaps and have clear responsibilities. If advisors support the team, it is relevant how deeply they are integrated into the everyday job. If certain capabilities are not available in the team, new hires are a common condition for an investment.

> *"We have a startup in our portfolio with a genius sales guy and a very good technician. However, the whole operations and legal issues get neglected. We will intervene there to add a proper CEO to the company. At the latest when one reaches a certain size, and nobody takes care of it, it will become a problem and critical. Thus a balanced team is of importance." VPA 9*

> *"The topic is furthermore, does one think the team is capable to address the existing risks of the market and to finish the development or are those topics where one directly thinks they are only capable of this to a certain extent. If so, one has to take into consideration that potentially support is required." VPA 10*

Overall it is important to assess the team complementarity to estimate whether they will be able to develop the product, to run the company, as well as to get it on the market. Furthermore to identify potential blank spots which have to be filled.

Ability to evaluate and react to risk

The identified risks and the proposed solutions on how to deal with them have to convince the CVC to be thorough and fitting for the situation. If the entrepreneur is not capable to convince in his business plan and during the meetings in this attribute, it can have a knock-out effect.

Investors take a look at this attribute to assess the entrepreneur's capabilities to plan current and future situations. The longer the planning horizon, the less detailed needs the plan on how to react to the risk to be.

> *"I don't want them to have an answer for the second step. I want to see whether they thought about the second step and say, we've thought about it, but we're going to focus on this first, this is great, that's the perfect answer. Because in order to succeed they need a focus now, but they know that there's potential for something else and think about where they would go." VPA 13*

> *"I see that they are more focusing on the current situation and dealing with it. Which is, of course, important, however, they also need to plan further ahead." VPA 11*

The investors reflect on this ability to get a better picture of the entrepreneurs and to assess whether they will be agile enough to drive a startup and whether they place enough emphasis on the environment. A detailed evaluation in one topic, as the technology development, cannot outweigh a lack in other fields as the legal risks.

> *"I would expect from them to improve this and would look at how long they need. Afterward we are able to see how realistic they see the business and whether they can build a proper plan out of it. If they are totally lifted it will become complicated." VPA 8*

> *"Dependency on market risks is always a bit tricky, but that is no showstopper as long as they are able to find workarounds, and they describe it here." VPA 11*

> *"I need all those things to be able to react to problems. If I know where which costs occur and how the market looks like and where the risks actually are, I need all of that." VPA 1*

During the investigation, the entrepreneur's ability to evaluate and react to risk is thus seen as an important indication for the overall capabilities of the team and positive if they take a large variety of risk into account with a proper level of detail.

Business experience

Several reasons exist, why business experience is seen as a relatively important attribute by CVCs. On the one hand experience provides entrepreneurs with a better market understanding, and on the other hand better capabilities to build the company.

Business experience in the industry and in large corporations is valued positively by CVCs since it is a sign for better market understanding if the experience was built in a relevant field. The owned network can be of advantage during later stages

"In the optimal case, there is someone in the team who is coming from that market. Who has market experience and knows the processes to be able to talk on a par with the customer." VPA 8

"To be honest, straight from university team has maybe skilled but not experienced, they need to have an advisory board and maybe get two or three more people having done them scale and sell" VPA 7

"Regarding the team, I like the educational and technical background of your team. But I am missing people with professional experience because the development of the product is the one side but on the other hand, the marketing and the distribution is also important for the success of the company." VPA 4

On the other hand, founding experience, whether successful or not is appreciated by CVCs since the entrepreneur will better know the mistakes which are to be avoided.

"One of them, one or two, should at least already have made the mistakes. That's a point we take a look at." VPA 5

Overall, a mix of startup and industry experience mixed with experience from academia is of value to convince an investor about the team's capabilities.

The further three attributes, leadership capabilities, perseverance, and the contact with the entrepreneur are way less often taken into account during the startup evaluation. Anyhow, the attributes are not neglected.

Leadership capabilities

A good leader in the team should, on the one hand, be able to take hard decisions, and on the other hand be willing to empower his people. For example, the CEO should make use of the expertise of his developer and let him answer the technical questions during the discussion. While it is hard to assess how decisions are taken in the startup, the ownership structure can be an indicator. It can be of advantage and fasten decision making if one entrepreneur is the leader and owns the majority of the company.

"I want to see their rules and if they take ownership, I want to know who's making decisions about products and how they're making decisions and who's making decisions about features and other organizations on there." VPA 13

The leadership capabilities are thus taken into account by CVCs to ensure that the startup will make progress after the investment.

Perseverance

The perseverance of the team is regularly taken for granted. A team who came together to build a startup should have the mindset to go on if it is getting tough. However if there is an indication that this is not the case, it can knock-out the investment opportunity.

"They are all motivated, well they are young and it would be very tragic if they would throw the towel that early." VPA 5

The entrepreneur's motivation to be in the startup is a key determining factor to assess whether he is likely to keep his drive. If he joined out of free will and because he believes in the thing, it is rated positively.

[In a startup will be] "Frustration and perseverance, ability to tolerate enormous amounts of ambiguity and Chaos. I want to look for somebody that always forwards with a path and if just a friend talked them in the project I will always be a little hesitant and careful." VPA 3

CVCs know that the circumstance of building a startup will require persistent people but seem to be easily pleased as long as no negative indicator occurs.

Contact with the entrepreneur

A good contact with the entrepreneur has only a small impact on the CVC's decision. The attribute correlates with the entrepreneur's willingness to receive external help.

"Great, it's good that they have external advisors because then they seek input." VPA 13

"You need a team which is open and willing to watch out to their left and to their right and to accepts the help which gets offered." VPA 11

Aspects which go beyond this openness are positive, but not a necessity. At the end, it is more important for the entrepreneur to build the company than to interact with the CVC.

„One needs certain trust in the guy. Even if he is sitting next to you and is an extremely arrogant guy, but he is able to get the things done which he tells you. I prefer those doubts against someone where I know from the beginning on that he is incapable." VPA 9

The attribute is thus less important for CVCs since they admit that the startup can become a success even if one does not get along well with the entrepreneur.

Product/service

The third most important criteria is the product or service offered, which becomes evaluated to gain a good understanding of how well the product fits the market and thus CVCs estimates the likelihood of success for the startup.

Unmet need

The unmet need is the most important in this criteria and mentioned by four investors as a knock-out attribute. A clear unmet need is seen as a necessity to bring the product on the market and furthermore a sign for the market understanding of the entrepreneurs.

The unmet need should be clear, sustainable, and backed up by market feedback. An understanding of what the customer actually requires provides more focus to formulate strategies and can even be used as a market barrier. Furthermore, it will support the startup to get a track of the market and create acceptance for their product.

"If I have a very good idea about what the customer wants and what the use case is, I can make a detailed plan on how to implement." VPA 8

"What I think is important is that they go to the customer and ask them face-to-face instead of developing it back-end." VPA 13

"IP protection for software is problematic, to be honest, I think a fast adoption to the customer needs is more important in this segment." VPA 1

Once the market is entered with the first addressed need, an ongoing growing customer understanding can highlight further needs which can lead to additional revenue stream.

"In future, there are potentially additional revenue streams of additional features. But you can only go into this if you know what the first use case was." VPA 13

In high-tech industries, a lack of customer understanding and thus a lack of identified unmet needs is a common problem. Due to this the investors might place an increased attention on this attribute and came to harsh opinions concerning the unmet need.

"In many cases, startups which are very technology driven have a good solution and afterward run around to find out that either no one really faces the problem, or they do not understand why their solution is not good." VPA 8

"The unmet need is a clear knock-out attribute if nobody requires the topic, the startup is not needed either. " VPA 11

Overall a well-formulated unmet need is investigated by CVCs to estimate whether the product will be able to enter the market, and in addition to that, whether the team has a good understanding of its customers.

Acceptance

As mentioned before, a good unmet need will most likely result in an acceptance of the product on the market. If at the point of investigation the startup is already able to convince market representative customers to pay for their product, it is highly appreciated by the investors.

> *"First sales are a good indicator." VPA 10*
>
> *"What is done well is that they can show to be able to convince customers" VPA 13*
>
> *"The follow-up question is whether those are actually paying customers, or whether those are trial versions with reduced costs." VPA 11*
>
> *"My next question would be who are these customers? Are they relevant?" VPA 1*

However, the first sales only have a value to the investor if they meet several conditions. First of all the customer needs to be representative for the market, it have to be realistic cases which excludes proof of concepts and trial versions, and the customer contact person needs to be a relevant employee at the customer side.

> *"Three customers running, ok. I would immediately ask the question how it is integrated. Is it in innovation management and just a pilot version to play around with, or is it in any sort of business-critical area." VPA 3*
>
> *"It is important who got convinced at the customers. Is it only somebody responsible for example for digitalization, or is it somebody responsible for the production. Somebody who has to install the product, uses it, and integrated it into the daily business. The last would be definitely better." VPA 8*
>
> *"My condition for first sales is that they are not only PoCs but that the product got properly sold." VPA 1*
>
> *"A critical aspect is who got convinced at the customer side. Is it only the head of something who likes the idea, and how does the acceptance looks like when they talk to the developers." VPA 1*

If those conditions are met, a CVC takes indicators for market acceptance into account in his decision making since they are a positive signal for future sales and customer understanding.

Uniqueness

For product uniqueness, it is of importance that unique features directly address the customers and are appreciated by him. A simple installation, as well as an easy to use customer interface, can be valuable and easily communicated to the customer. The absence of product USPs can be a knock-out attribute.

The direct visibility to the customer differentiates this attribute from the technology uniqueness, addressed later. Aspects of the product which simplify the life of the customer in a better way than the substitutes are appreciated by investors.

> *"Short installation time is for sure a good customer USP, the small investment costs, too. As a customer, I simply do not want to be bothered. Thus this is good." VPA 1*
>
> *"Product uniqueness is important for me. First I need to fulfill a need from the customer, which however can be solved in different ways. If I can manage it to create a uniqueness which is visible to the customer it would be important to me." VPA 11*
>
> *"The question is, is it a simple product design, is it a simple architecture of the product and will it help to reach the customer. It should not be overly complicated and not overly packed, so it should not overwhelm with features. Next to that, I always check the underlying technology and whether they have fundamental obstacles." VPA 3*

The product uniqueness has an impact on the investment decision since it will enable sales of the product and thus support the startup's success. The condition for the USP is, however, to be sustainable.

Relevant certification

To meet relevant certifications has only a minor impact on the investment decision of CVCs. Since the certificate applies to all players in the industry, meeting those is not seen as an unique selling point, but more as a minimal viable condition.

> *"Even if we only invest a minority, the startup needs to have a certain legal security with what they are doing." VPA 5*

> *"I would simply assume they meet the legal frames. Otherwise, it would simply be a deal breaker." VPA 8*

> *"It is good if the hardware needs no further certifications." VPA 11*

The attribute seems to become only problematic if certain certifications are not met, however, no investor sees a knock-out effect in this attribute.

After sales service

The after sales service is part of every running business and should also be taken into consideration by startups. Questions to be answered are who provides the service, how will it be financed, and which impact changes on the product will have.

The opinions on an appreciated level of outsourcing differ. While on the one hand CVCs appreciate a focus and agree to outsource cost-intensive services as hardware, the dependency on the third party and their impact on the own brand is critically recognized.

> *"It sounds good that they took a look at the whole life cycle of their product and have some thoughts about how to deal with it. Already during the development one has to ask certain questions. What happens during updates? Will the API keep on working? I often experienced that entrepreneurs don't think about it. Responses like 'we will solve it when the problem occurs' are rather difficult." VPA 9*

Even though the after-sales service concept is not highly important for the decision, it is taken into account by CVCs to estimate future costs and potential revenues of the business. Furthermore, it provides drawbacks on the team capabilities by highlighting how well the entrepreneurs consider the whole picture of the business.

Technology

The technology is as the product relatively important for the corporate venture capital decision making. It gives an understanding of how well the startup is prepared to face future challenges, and whether their advantage will be sustainable, as well as whether the startup can add to the corporation's internal capabilities.

Development to be accomplished

The availability of a working product or prototype and a detailed development plan are an important attribute for CVCs in the high-tech sector.

While a working product is a good starting point, the development plan gets reviewed by the investors who are likely to receive support from further experts to ensure the comprehensiveness and achievability of the development plan.

> *"They state to require € 500k to achieve a 90% reliable software. That makes a good impression, however, I would talk to our own technician and discuss also the roadmap to identify potential gaps, required to achieve the higher software reliability. Furthermore, I would not only talk to the team, but also to experts from the field who have the experience to create comparisons." VPA 11*

> *"Usually it takes much longer because especially in startups people underestimate how long it takes until it is a real product, and the product is reliably running. Just because something can perform some simple features, it is not a serviceable product." VPA 3*

The roadmap should furthermore integrate details on financial and timing factors since they will have an impact on the go to market strategy and on the occurring revenues.

> *"Ok, now the software achieves 70% reliability. (...) But how can you make sure that you will reach this development goal with further investments?" VPA 4*

"For us, it is always important that the development funding buffer is large enough." VPA 6

"The technological development plan would need to be more detailed. Especially for the technology development one has to know how to keep the USP. Therefore I need to know how to develop it further. If I don't, I might be dead after half a year. This has to be reflected in the financials, too. What will I need to achieve the goals? Which costs will occur with it?" VPA 1

Overall, the development to be accomplished is important since it is the backbone of a high-tech product. It can strongly impact the success of the whole startup why CVCs integrate it considerably in their investment decision.

Technology uniqueness

The following attribute is the technological uniqueness. It can be the source of product uniqueness and be the base for protection mechanisms as well as market acceptance.

CVCs tend to compare the proposed technology to their own as well as to other on the market available solutions to highlight the advantages and disadvantages of the technologies.

"We will take an own look at the market and see whether comparable technologies are available." VPA 5

"Faster and cheaper implementation is fine, but which different technology are they using?" VPA 7

"The USP is important, but one has to be able to assess how other technologies look like." VPA 5

A unique technology is seen as superior, as long as it adds value to the product and does not make it unnecessarily complex. An internal assessment by experts is furthermore common.

"To deal with innovations we have our own technicians. They would have to take a look at it and assess what has been done inside the product." VPA9

"In this situation, I would also question why the competitors use a different technology. This would raise my interest and it would make me a bit skeptical." VPA 11

A confirmed technology uniqueness is valuable to protect the business in the long run but as mentioned before, the technology development plan has to ensure its sustainability.

"Ok But you definitely have a sweet spot so to say. The technology will become unique, that is what we are looking for to defend our market position." VPA 4

"Technology uniqueness means for me that it is not that easily to be copied. As I already said, it does not necessarily belong to patents, but more about the agility of the team and whether they have identified a gap or a need and whether they can supply it with this technology." VPA 9

CVCs thus assess the technological uniqueness and include it in their decision making to better understand the competitive advantage the startup owns, and whether it can add value to the internal technological capabilities and serve the identified unmet need.

Protection

Protection is important, but the classical patent becomes less and less interesting, especially for software-based startups. Other strategies as speed to market or agility towards customer needs can be more promising mechanisms.

"If you secure your IP by patents, it is a risk to get very costly due to the innovation cycle. If after 2 years you developed a new technology which makes your patents obsolete, the patent process is very costly and leads to nothing." VPA 4

The lower interest in patents, however, does not mean that a protection strategy gets unimportant. Proper mechanisms against competitors, as well as against knowledge outflow are in the eyes of CVCs relevant to receive funding.

"Patents is not everything, however, I think it is difficult if one team member should leave and take all the knowledge with him. There needs to be some security mechanism." VPA 11

"IP is important for us. If we invest in the startup two important aspects are the team and the IP and that they have the right protection. We would analyze further during the due diligence what they are doing in this field, to feel secure ourselves." VPA 5

"Especially in the software business, there are other solutions. From my point of view, it is complicated to secure the own product properly and thus it better to be fast than to concentrate on the patents." VPA 9

Next to the investors who are used to deal with startups and their IP strategies, other parties from the corporation as lawyers often have a saying on the investment, too. Also these parties need to be convinced about the protection mechanisms why they should be well explained by the entrepreneur.

"However the startup also get assessed by our corporate law department. They will have a different opinion on this and have their tasks to do. Thus I could not check off the protection right now." VPA 9

Protection mechanisms thus play a role in the decision making of CVCs to ensure the long-term stability of the startup and to decrease the risk of their investment.

Key opinion leader support

The last attribute used to assess the technology is the support of key opinion leaders. The feedback from professionals can verify the technology, as well as the market access points.

An external validation is seen as positive since it can decrease the uncertainty for the investor. Furthermore, it is likely to improve the team knowledge as well as the technology itself.

"The value of the startup goes up if the market and product fit some validation since the risk goes down. Thus that would be a question I would raise here." VPA 3

"This is a point which brings a lot of uncertainty since the entrepreneurs have not been able to talk to other developers." VPA 6

"I do not understand that you are not in contact with other developers. That would make sense to me. On the one hand to assess your software and your specific case, and on the other hand to learn from the others and to benchmark your efforts." VPA 4

Next to outstanding developers who can grant the technology, also customers can be important indicators. Especially large players can be role models and opinion leaders by impacting other players in the market and by providing feedback.

"A certain narcissism in startups is fine because it leads them to give everything one's got for the product. However, it is important to look to your left and to your right and to receive a neutral market opinion or a neutral opinion from an expert." VPA 11

CVCs take the opinion of key externals into account to decrease the uncertainty of the entrepreneur's and their own assessments. It provides a certain level of security and is thus appreciated by the investors, belongs however to the less important attributes.

Strategy

The strategy of the startup is deeply analyzed by investors because it is seen as majorly impacting the potential success of the startup. In addition, their planning skills and assumptions provide valuable insights into the capabilities of the team.

Go to market strategy

As mentioned earlier, CVCs investigate deeply how the startup tries to address the market they have identified. How the entrepreneurs combine their knowledge of the market and the strength and weaknesses of their situation to a strategy impacts the investment decision. If the entrepreneurs have not worked out a sound go to market strategy, it can knock-out the investment.

"I want to understand their business model, so what do they actually sell? Is it a license, which may include maintenance and a hardware support, or is it a project based sale with implementation, or is it software as a service where everything is in the cloud?" VPA 8

"So I want to see and talk about the revenue model and see whether they have thought about going above the flat license model. So they could be charging for utility because it is partly also bought. But how will they get the customers, in the beginning, to put trust in them? For example, if you say to only charge them when it works, it is easier to convince them." VPA 13

"An aspect often lacking with high-tech startups. But if it is not clear to me, I won't invest. They need to know how to get on the market." VPA 1

The strategy proposed by the startup gets challenged and improved. Experience from previous investment and the own business understanding are often the benchmarks. Thus it also depends on the respective investor, whether a market strategy can convince him, or not. If the investor disagrees with the proposed strategy it can have a negative effect.

"So I see here a kind of subscription model with reoccurring revenue. That is something we like." VPA 5

"Their strategy has a problem which we have faced several times. If you need to go from the customer to the customer to generate sales, the customer acquisition costs can become problematic." VPA 1

"I have a startup who are currently growing because one can apply several business models on the hardware they have. However they had a hard start caused by the add-on hardware, so this would be a red flag for me." VPA 9

Overall the go to market strategy is an important attribute in the startup evaluation by CVCs because they see in it a major impact on the success of the startup. Whether entrepreneurs come in the eyes of the investor to the right conclusions and can explain their strategies well thus impacts the investment decision.

Assumptions

The second attribute belonging to the strategy is whether their assumptions are realistic and consistent. CVCs challenge aspects of the business plan which are not convincing for them.

The entrepreneurs are asked to provide solid arguments for their ideas to make them comprehensible. Sources as market studies or interactions with experts of the field can verify assumptions. While CVCs conduct own research to get a better picture of the situation.

We see whether the margins are ok, are there reasonable scale up assumptions? That also tells me little bit about the management team and how prepared they are." VPA 3

"I can see the proposed market share for the different countries, but how well are these estimations? How do you derive at them for the single countries? I cannot see that." VPA 4

"We have our own people who take another look. The things said or provided by the startup is used to get a feeling for how realistic they are." VPA 5

If assumptions are not properly explained, several CVCs first would clarify and discuss all open points, before placing an investment, which can drastically delay the process. To gain a solid understanding of the business plan can require these clarifications.

"I think that the numbers are a bit high. This is quite a lot and in doubts, I would go for a conversation with them. I would tell them that I am not sure about it and that we might need to agree on a milestone planning." VPA 8

"So you fundamentally want to understand how they base their decisions. All the base assumptions on the market, on the price, on the customer, on basically everything." VPA 13

The realism of the assumptions plays an important role in the investment decision of the CVC because it indicates the overall trustworthiness of the business plan and again gives indications on the capabilities of the entrepreneurial team.

Next to investigating how well the entrepreneurs build their business strategy, the following criteria taken into account is how well the startup fits the corporation as an investor.

Investor fit

The investors fit is characterized by the strategic fit and the support the corporation can provide. The fit of a venture in the strategy of the corporation is an important aspect during the evaluation and has the potential to knock an investment proposal out. Typically the CVC identifies the weaknesses of the startup during the evaluation. By comparing those to the core capabilities of the corporation, the investor knows how to provide potentially valuable support.

Strategic fit

During the VPAs the impact of the strategic direction got visible when one participant clearly denied the case, while it was seen as an interesting opportunity by several others. The one investor denied because the technology, as well as the market, did not meet the strategic direction of their corporation, an impactful factor which is recognized by multiple participants.

> *"Whether it is relevant is depending on the strategy of the corporate venture capital. It is something different when the strategy say we want to focus on these three markets, or when we want to diversify the portfolio." VPA 13*

The investors have their strategy in their mind and reflect on how the startup's product and technology, as well as their addressed market, can fit into their portfolio.

> *"Even though there are several interesting details, I still need to understand how the startup will fit in the strategic thoughts of the corporate. However those thoughts of the corporate look like technology and market wise. Which role is the startup supposed to play in our product portfolio, or how should it extent the portfolio of the corporate?" VPA 10*

> *"A direct question coming up in my mind is, what will be the impact on the current portfolio of the corporate. It doesn't need to meet the current portfolio directly, but the question is about our strategy. Will it be strategically meaningful for me and will we develop in that direction during the next years, thus will a business unit have interest in the software during the upcoming years." VPA11*

It is not required that the startup is similar to the current investments or the current offering of the core company, but it has to meet its future goals. A startup which does not fit in there will most likely not receive an investment since corporate investors typically agreed with the board of the sponsoring company on a strategy, which cannot be easily changed. The brand identity of the corporate further limits the potential investments. It leads to no go markets as well as to certain standards which can get transferred to the startup. If a corporation is the technology leader in their field and put a high focus on quality, the technology of the startup could be under pressure to fulfill these expectations, too.

> *"My corporate has some no-go areas. Let's say the startup targets defense, those are typical things we would not do since they are really not in line with the standards of the corporate and the corporate is also not directly active in these fields. If this is something out of the clear investment strategy, you first have to adopt the strategy and then go systematically afterward, but you don't sort of pick and choose just based on nothing." VPA 3*

> *"We will brand the product and the technology with our own brand which stands for the highest standards, so we would not accept any exception regarding the products and technology." VPA4*

Support from the corporate

Next to those limiting implications, the corporate strategy can have, it can also be supportive for the startup. One investor indicated a willingness to accept a not that high performance in different fields like the attractiveness of the standalone business if the match with the corporate is very high. This situation is caused by the better support the corporate can provide in such a situation. The experience in the market, their knowledge of the customers, as well as about the production, or the legal frames are a strategic support which is seen as more important than the financial support provided and can especially address the weak points of the startup.

"We are able to help them, so we can offer a value as a CVC, what is important." VPA 13

"In those situations, we can typically provide support at the development of the product, during the production, as well provide market knowledge which will help during the production, sales, and market entry." VPA 8

The non-financial support however also creates costs for the corporate, which investors take into account before deciding on a startup. It is generally seen as supportive if a business unit will get involved in the investment. However, their capabilities and especially their willingness to provide support get controlled by integrating them already during the evaluation.

"For sure it is a large advantage if a business unit is convinced of the product and sees a need. Their willingness to participate in the investment to provide support is extremely good." VPA 9

Whether a business unit support is seen as a necessity or not, however, depends on the specific CVC. Some investors see it as an important factor to achieve an investor fit, while others do not see it as a show stopper when a business unit has no interest or spare capacity to support the startup.

Overall, the investor fit is integrated into the startup evaluation to ensure an alignment between the mother company's interests and the investment, as well as an alignment between the capabilities the corporation can provide as support and the needs a startup will have.

Exit attractiveness

The exit is less taken into account by CVCs. However, the outcomes of these attributes impact the investor's own strategy on how to capture the potential returns and to estimate whether the startup is a good candidate for a venture capital unit of the corporate.

Attractiveness

An attractive exit opportunity is self-explaining an appreciated circumstance. While financial returns are relatively simple to be captured, especially strategic returns depend on several aspects which are taken into account before the investment.

Since a CVC is typically an investor and does not acquire the startup, the technology and IP transfer has its limitations. Therefore a clear strategy should be worked out on how a strategic return can be accomplished and which parties in the corporation need to collaborate therefor.

"Transferring the IP will be hard when looking at investing, and not acquiring. Maybe we can make a knowledge exchange so that the startup teaches our team for the development." VPA 13

"It seems like something but this is not so super clear formulated yet. So I would make a question mark and see how strong the business group is trying to follow up." VPA 3

"For the exit attractiveness, if there is no clear exit strategy it could become a little bit difficult." VPA 6

"As I said, when we invest we want to transfer knowledge to our business group. We are not a financial investor, so we want to have a critical influence on the future development of the technology, according to our interests." VPA 4

The strategic attractiveness for the corporation depends on the ability to hold the knowledge in the long term in the corporation. If the startup should not be integrated, the corporate needs to be prepared to absorb the knowledge somehow. The right people, often from the business groups, need to be available to be work with the entrepreneurs or to receive training.

"Specifically in the field of corporate venture capital, one tries to integrate the technology in a long perspective. If it is only about a short-time thing, one would try to sell it quickly. However, the technology should have a long-term use-case, from the perspective of a CVC." VPA 11

"Valuable learning effects for the business groups sounds good. I would integrate the business group in the evaluation and would expect them to provide feedback to me, in how far they see further applications, and

how they can use the technology in future. I would not solely base this on my own assessment but include the business group here." VPA 11

To sum it up, this attribute is of importance for CVCs to not only evaluate potential returns but also to find strategies to capture those.

Internal or external exit

Whether the exit will be internal or external is taken into consideration since it has an impact on the investment strategy. A solely internal exit strategy is seen as critical by CVCs, who would in those cases evaluate whether an investment by the business group or by the M&A department would be a better choice. An early statement concerning an acquisition is furthermore critical since it could hinder further investors from participation and negatively impact the motivation of the entrepreneurs.

"I would be careful with announcing internal exits. On the one hand, one becomes dependent on the startup and they become dependent on the corporate investor. In further rounds, probably no further investors will be found. That makes it difficult. In the best case, I would even be careful with first refusal and similar things, to make sure that the business stays attractive to other investors. VPA 5

"If the business group has such an interest, I ask myself why should they not conduct the investment themselves?" VPA 1

"If I consider this as a venture, and not as a simple portfolio extension, I want to know how the external market looks like." VPA 1

"If an internal exit is the only channel, I would reconsider the investment strategy and probably not buy it directly, but take a larger share to smoothen the later acquisition." VPA 11

The attribute is thus taken into account because it will impact the investment strategy and the evaluation of further attributes.

Finance

The last criteria influences the CVC's decision by estimating whether the project fits within the investment orientation of the corporate. The size of the investment and whether the startup will need additional investment rounds will impact the influence which the CVC can have on the startup. The provided financial data are however generally handled with caution and thus have a lower impact on the CVC's decision, or motivate him to conduct own forecasts.

Amount of funding

During financial considerations, the amount of funding is the most important because it ensures that the corporate is capable to deliver the financing and the startup will take a decent share of the portfolio.

The number of received shares should be large enough to have an impact on the startup's future development, while in several cases it should stay below 25% to stay a minority investor. This, however, depends on the CVCs strategy. The general circumstances of a CVC also have an impact on the preferred amount invested. Caused by their connectedness to the corporate as well as due to the additional support they provide, an investment creates further costs.

"We typically do not invest less than € 500k, otherwise the effort is not worth the investment. We have way more costs than a typical VC. For our investment, additional costs for the legal and the accounting, as well as for the support we provide have to be taken into account." VPA 9

The investment is furthermore always linked to the strategy followed by the CVC. The strategic focus and the backup by a large corporation can make the available budget more flexible. If the startup convinces the CVC with the technology and a very good fit, additional budget could be requested, especially if an internal exit is likely. However, a detailed planning for spending the money is regularly a requirement.

"Ok, I have a € 30 million budget and am allowed to invest up to six million per startup. That means I have a budget for five startups for my strategy. I have to have my strategy in mind to be able to decide on an investment." VPA 11

"Finance, for example, we could invest with additional resources if we are convinced of the technology." VPA 4

"€ 1.2 million is fine, even if they will require additional € 800k it is in principal legit. However, I need to know their planning." VPA 1

"For the investment, we need a precise use of capital plan. It needs to be clear wherefore they need the cash, how long it will last and what their burning rate is expected to be. Then we know when the next funding round will be and whether the money is actually sufficient." VPA 5

Overall the amount of funding is an important attribute because it has to fit with the corporates investment strategy and needs to be reasonably explained to the fund providing company.

Expected break even and ROI

The expected break even and the expected return on investment, however, are seen as less important by a corporate venture capitalist. The financial forecasts provided by the startup are treated with caution. In high-tech industries, the forecasts often either support the proposed DCF valuation or are realistic plans, which then do not fulfill the expectations.

"Generally we make our own financial planning. The revenues and the break-even will probably be shifted to a later point in time." VPA 5

"The expected return on investment is 40%, ok how would somebody know?" VPA 11

Even though handled with caution, the business needs to turn profitable at some point in time. One investigated CVC conducts an own financial planning and controls with standardized discount rates whether there will be a financial return. If not, the investment can be knocked-out.

"When we take a look at the projections and see a great strategic fit, but it is not worth the investment it would be a knockout. The whole investment has to give a return. We use certain discount rates and if the results are not proper, we have to quit the investment relatively quickly." VPA 5

Overall, the ROI and the break-even of the startup are not generally unimportant, since even a CVC has limitations in the available resources. However, the attributes take a smaller role in the investment decision since several investors do not put their trust in the delivered projections.

4) The fictive startup case of imaginary one

All provided information is fictive. Similarities with people, companies or technologies are purely coincidental.

The startup case imaginary one

Your team has identified and evaluated during the last weeks a startup that seems to be an interesting candidate for your venture portfolio. The startup is called Imaginary One. Your team has analyzed the business plan, had a three-hour personal discussion with the entrepreneurs and used further internal and external information to present to you the following report. Now it is your task to decide on whether or not to invest in Imaginary One.

Please read the case and speak your thoughts out aloud.

Imaginary One offers an image analysis software and has identified a use-case where the software can be integrated into already existing environments. The integration requires only minor hardware adjustments to often already at the customer installed systems. You have the authority to invest up to 6 million Euro per startup and have a yearly budget of 30 million Euro for your portfolio. The entrepreneurs ask for 1.2 million Euro for 18% of the company shares.

The product and service

The startup identified a well-defined use case for their image analysis software and was able to generate the first sales. Their beta version is currently running at 3 customers that are representative of the addressed market. Further companies have signed a letter of intent to get into discussions with the startup, once the technology is developed further concerning the reliability of the software. The largest potential customer indicated a need for 95% reliability while other customers indicated a willingness to accept a reliability of 85% onwards. The startup is able to differentiate its product from the competition by having a very short installation time and low investment needs to integrate the software into running systems. Imaginary One's solution is faster and cheaper since the competition uses a different kind of technology. Imaginary One's software is working fast enough to not become a bottleneck in the customer's process. The startup also offers the necessary hardware, if a customer should require a new system. The startup knows and communicates the problem they address well and provide a market overview as well as interviews with some potential customers to define the met need clearly. Even though your colleague is not sure about the long-term (+5Years) feasibility he is convinced that the need is strong enough to create further revenues in the next years, before the software can be transferred to other application fields. In the current version, the technology meets all legal frames to be implemented in Germany and the EU. The US market can only be addressed if the product gets adjusted to several legal requirements. Since the hardware is widely standardized, no further certificates are required to extract the data from the system. Next, to the product, the entrepreneurs have also thought about their after sales tasks including the maintenance and service and propose to take care of the software themselves while using sub-contractors if hardware problems occur.

The technology

This service concept is feasible since the hardware is widely known. The software, however, is the core technology and will only be known by the entrepreneurs themselves and their investors. The entrepreneurs are currently trying to build additional IP protections but have not yet claimed patents. As mentioned beforehand, the product is in a working (beta) status. The next development steps will improve the quality of the output and the reliability of the algorithm. Currently, the software achieves a 70% reliability. In the development plan, the entrepreneurs claim they need half a year and 200k to 500k Euro to improve the software to 90% reliability. The further development required to be able to enter the US market is forecasted by your colleague to 900k Euro including costs for legal advice and the resulting development work. At the moment the technology differentiates from the substitutes by working faster and having the lowest costs of implementation. This is appreciated by the customer. However, the interview with potential customers indicates that the technology will only become unique if the reliability will be increased in the next versions. In general, the largest potential customers support the technology. The entrepreneurs, however, have not yet talked to leading developers or other opinion leaders in their field to let them assess their software.

The market in k €

Market forecast				
	2018	**2019**	**2020**	**2021**
Total Market	**1440000**	**1451000**	**1462000**	**1473000**
Germany	170000	170000	170000	170000
EU	630000	636000	642000	648000
US	640000	645000	650000	655000
Total Addressable market	**357000**	**359700**	**362400**	**365100**
Germany	39000	39000	39000	39000
EU	126000	127200	128400	129600
US	192000	193500	195000	196500
Targeted market share				
Germany	1%	4%	8%	15%

Imaginary One offers a new product to a stable and mature but therefore large market. Imaginary One claims that 23% of the German, 20% of the EU and 30% of the US market are addressable with their technology.

Since the first country to be addressed is Germany, your corporate knows the general market well. You know the main players and the largest potential customers as well as the culture and bureaucratic system of the market. The entrepreneurs have a clear understanding of the market which they want to enter and define well the need that they are solving. Every customer faces the same pain and the most customer own a similar hardware system, where the Imaginary One's product can be added to. However, the entrepreneurs will still need to convince every single customer to buy their product and are unlikely to generate large sales volumes with a single contract (max 6 licenses) what increases the costs of revenue, even though the product can be easily added to a running system. The customer will conduct a single payment of 1500 Euro if the installation of the hardware is necessary and buy a 1000 Euro annually per license for the software. The Entrepreneurs have not yet developed a strategy to enter the EU or US market.

In their strategy, the entrepreneurs refer to some risk and boundaries in the market as the legal frame in which their product operates. They have taken German and European laws into account and adjusted their current product to fit the requirements. For some features that will be added in the next years, the current legal framework is not very clear. The government will publish new laws in the next 2 years that will address this problem. Most likely, the government will publish laws that easily can be fulfilled by Imaginary One. In the worst case, one feature that increases 5% reliability of Imaginary One's product will need to be deleted. The liability framework in which Imaginary One's product operates is well understood by the corporate and acceptable. The business plan does address the risks associated with the US market only superficially.

The entrepreneurs know the competition they face and have taken a brief look at their technology. Two established companies and one other young venture work on substitutes for the product. The entrepreneurs did not analyze the competition's developments and history in great detail but your colleague found that the competitors use different technologies. As mentioned before, Imaginary One's product is cheaper and faster to be implemented in the market. However, they are only able to build a sustainable competitive advantage if they successfully increase the reliability of their product. If the startup would lose one of the large potential customers to the competition, it would limit the growth potential.

The strategic fit

The market that Imaginary One plans to address does not meet the current portfolio of your corporate, however, it would be feasible and manageable to enter and thus to profit from the identified use case. Your corporate has a good understanding of the hardware and the general market. The software developed by the startup builds the core technology. This software is interesting for your company because it can be transferred to other development projects and provides valuable learning effects for one of your business groups. The corporate can support the startup well with the further development

and future production of the hardware component since your current product portfolio already offers the right hardware solutions. Furthermore, the professional image of the corporate is valuable for the startup to convince future customers. The corporates knowledge of the software is rather limited, but you can support the entrepreneurs with important data that is needed to develop the reliability of the software further.

The entrepreneur and the team

The team consists of 4 people. Two of them, John and Sebastian have a university degree in economics, Martin is a professional software engineer and the fourth team member, Jessica has a natural science Ph.D. John, one of the economists has prior working experience in a large corporation while Sebastian, Martin, and Jessica come directly from the university. The team gets supported by a financial and a sales advisor who both have several years of working experience in corporations. John, the CEO has strong leadership capabilities and has proven to be able to motivate his team. Furthermore, he was guiding a research project during his time at the university and is active on the board of his private sports association. John gives the impression that he can keep his drive and stay motivated during hard times. Jessica has faced several challenges during her Ph.D. that got extended due to unpredictable problems. However she staid motivated and kept on working on it until she finished successfully. Personally, your colleagues came along well with the entrepreneurs. John and Jessica seem to be on the same wavelength as your team and all of the entrepreneurs are open to receive your help.

During the meeting with the entrepreneurs, they were keen to convince your team about their technology and presented their ideas well. They discussed the product from different perspectives but when they were asked how they plan to enter foreign markets they had no proper strategy on how to react to occurring problems. Also, the in the business plan worked out scenarios are lacking some details on expectable costs and strategies how to face risks. Overall the level of detail varies across the business plan sections. While the use case and possible customers are described well, the financial planning and the future technology development are less detailed described.

The exit attractiveness

One of your business groups has indicated an interest in the software and the developing skills of the entrepreneurs and suggest a corporate internal transfer. The potential for an external exit is unclear. Till now no company with an interest has been identified. Your colleagues worked on a clear strategy for the next years, in which the startup will stay 4 Years within the venture program of your corporate to develop the product and software further. Once it is finished you will transfer the startup to the business group. This exit is attractive for you because you can keep the knowledge in the corporate and gain strategic advantages while your corporate venture department receives a financial compensation from the other business group.

The financials

A financial evaluation of Imaginary One predicts a break even in the third year after the investment. Anticipating what the startup will be worth in 4 years, your colleague expects an overall 40% return on investment. The 1.2 million Euro capital the startup asks for is in the budget of your fund, which allows for 6 million Euro per startup. Your colleague has reviewed the milestones in the business plan and came to the conclusion that they miss some details, where additional costs of 800k Euro will occur, not including the 900k Euro required to adjust the product for the US market.

Forecast Germany in k Euro				
	2018	**2019**	**2020**	**2021**
Total Market	170000	170000	170000	170000
Addressable market	39000	39000	39000	39000
Market share	1%	4%	8%	15%
Revenues	**390**	**1560**	**3000**	**5800**
Cost of Revenues (Marketing, Salespeople, Hardware)	156	936	1200	2320
Gross Margin	**234**	**624**	**1800**	**3480**
Operating Expenses	672	878	838	890
Personal costs	270	460	460	520
Number of personal	4	8	8	9
Development costs	140	140	100	50
Non personal costs	262	278	278	320
EBIT	-438	-254	962	2590