

Integrating sustainability in the strategy and investment process of a corporate venture capital unit

Erik Kurittu

School of Science

Thesis submitted for examination for the degree of Master of
Science in Technology.

Helsinki 29.05.2023

Supervisor

Prof. Markku Maula

Advisor

M.Sc. Erik Kolehmainen



Aalto University
School of Science

Copyright © 2023 Erik Kurittu



Author Erik Kurittu

Title Integrating sustainability in the strategy and investment process of a corporate venture capital unit

Degree programme Industrial Engineering and Management

Major Strategy

Code of major SCI3109

Supervisor Prof. Markku Maula

Advisor M.Sc. Erik Kolehmainen

Date 29.05.2023

Number of pages 94+4

Language English

Abstract

In recent years, the society has become increasingly alert about sustainability, and making the transition to a more sustainable world can be seen as a key priority across the globe. An integral group of actors in achieving this transition are corporations, many of whom have already taken action to start improving the sustainability of their own operations. A measure further supporting this sustainability improvement can be corporate venture capital investments in startups.

This thesis seeks to explain the ways through which sustainability considerations can be integrated into corporate venture capital investments. More specifically, the thesis introduces approaches to how corporate investors should assess the sustainability of the startup opportunities that they are considering, and how they should support their portfolio companies in order to generate sustainability development for the startups and themselves. To define these approaches, the thesis research is conducted as a grounded theory study with the aim to develop a process model containing the stages for sustainability integration. The primary data of the thesis was collected through interviews with 15 corporate investors, 7 venture capital investors, and 2 corporate sustainability experts, which together represented 24 informants from 13 countries. With the interview data and qualitative analysis, the key dimensions for sustainability integration and the connections between these dimensions were defined and presented through an emergent sustainability integration process model.

The main findings of the thesis, presented through the developed model, include three key stages for considering sustainability in CVC investments: identifying strategic preconditions for sustainability, employing balanced sustainability assessment approach, and seeking bidirectional sustainability development. The thesis contributes theoretically to sustainability and corporate venture capital research through specification of the concept of sustainability in business domain and covering the different aspects that arise when sustainability is considered in the CVC investment process. The present research also guides thinking of CVC practitioners by providing steps for formally considering sustainability aspects at each phase of corporate venture capital investment process. Furthermore, multiple suggestions are provided for extending the knowledge in the area through future research.

Keywords Corporate venture capital, Corporate sustainability, Startups, Sustainability assessment, Sustainability development

Tekijä Erik Kurittu

Työn nimi Kestävyyden integrointi yrityksen riskipääomasijoitusyksikön strategiaan ja sijoitusprosessiin

Koulutusohjelma Tuotantotalous

Pääaine Strategia

Pääaineen koodi SCI3109

Työn valvoja Prof. Markku Maula

Työn ohjaaja M.Sc. Erik Kolehmainen

Päivämäärä 29.05.2023

Sivumäärä 94+4

Kieli Englanti

Tiivistelmä

Viime vuosina yhteiskunta on havahtunut entistä enemmän kestävyyteen liittyviin kysymyksiin, ja siirtyminen kestävämpään maailmaan voidaan nähdä tärkeänä tavoitteena maailmanlaajuisesti. Yksi keskeinen ryhmä tämän siirtymän saavuttamisessa ovat yritykset, joista monet ovat jo ryhtyneet toimiin oman toimintansa kestävyyden parantamiseksi. Yksi keino tukea tätä kestävyyden parantamista voi olla suurten yritysten tekemät sijoitukset nuoriin kasvuyrityksiin.

Tämä diplomityö pyrkii selittämään, miten kestävyyden näkökohdat voidaan integroida yritysten tekemiin startup-sijoituksiin. Tarkemmin sanottuna tutkimus esittelee lähestymistapoja siihen, miten yritysinvestoijien tulisi arvioida sijoitettavien startupien kestävyttä ja miten heidän tulisi tukea salkkuyrityksiään kestävyyden kehittämiseksi sekä kasvuyritysten että sijoitusyksikön emoyhtiön näkökulmasta. Näiden lähestymistapojen määrittämiseksi diplomityö toteutettiin grounded theory tutkimusmenetelmällä, jonka tavoitteena oli kehittää prosessimalli, joka sisältää vaiheet kestävyyden integroimiseksi. Työn ensisijainen aineisto kerättiin haastatteluilla 15 yritysijoittajan, 7 riskisijoittajan ja 2 kestävyysasiantuntijan kanssa, jotka edustivat yhdessä 24 haastateltavaa 13 eri maasta. Haastatteluaineiston ja laadullisen analyysin avulla tutkimuksessa määritettiin kestävyyden integroimisen keskeiset ulottuvuudet ja näiden ulottuvuuksien väliset yhteydet, jotka esitettiin kestävyyden integroimiseksi kehitetyn prosessimallin avulla.

Diplomityön tärkeimmät löydökset, jotka esitetään kehitetyn mallin kautta, sisältävät kolme keskeistä vaihetta kestävyyden huomioimiseksi yritysten tekemissä sijoituksissa: kestävyyden strategisten edellytysten tunnistaminen, tasapainoisen kestävyysarviointimenetelmän käyttö sekä kaksisuuntaisen kestävyyden kehittämisen tavoittelu. Tutkimus edistää teoreettisesti kestävyyden ja yritysten riskisijoitusten tutkimusta tarkentamalla kestävyyden käsitettä yritystoimintaan liittyen ja käsittelemällä erilaisia näkökohtia, jotka nousevat esiin, kun kestävyttä tuodaan esille yritysten tekemissä sijoituksissa. Tämä tutkimus ohjaa myös yritysten riskisijoituslähestymistä käytännön tasolla tarjoamalla tapoja kestävyyden huomioimiseksi jokaisessa sijoitusprosessin vaiheessa. Lisäksi työssä esitetään useita ehdotuksia aihealueen tietämyksen laajentamiseksi tulevaisuuden tutkimusten avulla.

Avainsanat Yritysten pääomasijoittaminen, Yritysten kestävyys, Kasvuyritykset, Kestävyyden arviointi, Kestävyyden kehittäminen

Contents

1	Introduction	1
1.1	Background and motivation	1
1.2	Research questions and objectives	2
1.3	Research approach and scope	3
1.4	Structure of the thesis	4
2	Literature review	5
2.1	Corporate venture capital	5
2.1.1	Structure and purpose of CVC	5
2.1.2	CVC investors in the general VC space	6
2.2	Sustainability for companies	8
2.2.1	Triple bottom line of environment, society, and economy	8
2.2.2	Sustainable development goals	11
2.2.3	Environmental, social, and governance factors	12
2.3	Approaches for sustainability assessment	12
2.3.1	Checklists, questionnaires, and scorecards	13
2.3.2	Materiality assessment	15
2.3.3	Life cycle assessment	16
2.3.4	Process-based impact assessments	18
2.4	Elements of startup sustainability assessment	20
2.4.1	Startup sustainability characteristics and challenges	21
2.4.2	Requirements for startup sustainability assessment	22
2.5	Sustainability in corporate venture capital investments	23
2.5.1	Reasoning for implementing sustainability practices	23
2.5.2	Promoting and supporting sustainability development	24
2.6	Literature synthesis	26
3	Research methodology	28
3.1	Research design	28
3.2	Data collection	31
3.3	Data analysis	35
4	Findings	38
4.1	Strategic preconditions for sustainability	38
4.1.1	Sustainability contribution of CVC inside the corporate	38
4.1.2	Requirements set by investment principles	43
4.1.3	Implications from the level of portfolio company integration	46
4.2	Balanced sustainability assessment approach	49
4.2.1	Assessment areas and methodologies	50
4.2.2	Connection of sustainability assessment to other assessments	56
4.2.3	Assessment comprehensiveness	61
4.2.4	Distributing the assessment process	65
4.3	Bidirectional sustainability development	70
4.3.1	Defining development opportunities and tracking performance	70

4.3.2	Supporting portfolio companies	74
4.3.3	Learning for CVC unit and corporate parent	77
5	Discussion	80
5.1	Key considerations for integrating sustainability into CVC investments	80
5.2	Contributions to literature	83
5.3	Practical implications	84
5.4	Limitations and future research	86
	References	88
A	Interview protocols	95
A.1	Protocol for CVC informants	95
A.2	Protocol for VC informants	97

1 Introduction

In the following introductory section, the context of the thesis is introduced and the direction of the present research is set. The research topic is motivated with a look into practical and theoretical needs. Then, the research problem, research questions, and the objectives of the thesis are presented. In addition, the section presents how the research will be carried out and what is the scope. The section is concluded with an outline of the thesis structure.

1.1 Background and motivation

Society and organizations have become increasingly conscious about sustainability, which is reflected in the general increase in corporate sustainability efforts (Hörisch et al., 2020; Ritala et al., 2018). As a result of these internal and external pressures, companies have been pursuing multiple ways to better their sustainability footprint. Concrete actions include most of the world’s largest companies setting sustainability goals and issuing a sustainability report, companies setting science-based carbon targets and pledging to reach net-zero, as well as increasing efforts on diversity and inclusion (Winston, 2021). Moreover, sustainability research has focused on these large companies that have reputation motives and systems in place for sustainability reporting (Bos-Brouwers, 2010; Fichter et al., 2023). However, the improvement of corporate sustainability is not solely dependent on large companies and their internal development efforts.

Startups are active players in the sustainability front, and the interplay between large corporations and startups is a viable option of sustainability development (Hegeman and Sørheim, 2021). One approach for interaction between corporations and startups is investments through corporate venture capital (CVC) programs, i.e., vehicles for minority equity investments to new ventures by corporations (Dushnitsky and Lenox, 2005). CVC investing can be characterized as a strategic action to adapt and prepare for changing environment (Basu et al., 2011), and in case of sustainability motivated investments, preparing for the sustainability transition of the economy (Hegeman and Sørheim, 2021). However, there exists a challenge of assessing sustainability of startups. The low development level of startup sustainability assessments has multisided effects. The inability of investors spotting “green signals” results in them missing out on sustainable opportunities they are looking for, and for new ventures the inability of quantifying and outputting these signals can result in the challenge of showing the quality and value of their offering (Demirel et al., 2019).

Moreover, despite the strategic intentions of CVC, it is not clear how CVC programs and their investments can be tied to the sustainability goals of incumbent companies. Thus, it is also not clear if and how the corporate resources are useful for the sustainability in CVC investments. Consequently, there is a practical need for a framework guiding the investment process from the sustainability standpoint. Corporate parents of CVC investment arms impose sustainability targets for the whole corporate entity, and the investments of the CVC arm must then be aligned with the these targets and help reach them. However, the sustainability metrics

and mechanisms used on the corporate level are usually not directly applicable for startups that are only a fraction of the size of the investing corporate parent (Fichter et al., 2023; Demirel et al., 2019). Thus, there is a need to define guidelines and develop a framework containing the methods through which CVC investors can assess and develop startup sustainability pre- and post-investment.

There is also a need for research in the area from an academic standpoint. Extant research has studied the effects of CVC activities on environmental and social aspects of the corporate parent (Battisti et al., 2022), as well as the relation from sustainable CVC investments to the sustainability innovation of the corporate parent (Bendig et al., 2022). Although the results indicate the potential of CVC improving corporate sustainability, the levers remain uncovered. This calls for research to develop understanding of the underlying methods of how CVC programs can affect sustainability outcomes of incumbents and startups (Battisti et al., 2022; Bendig et al., 2022). Furthermore, there is a need to develop the understanding of sustainability assessment for startups in general. Demirel et al. (2019) call for methodologies and consistency in measures for green entrepreneurship.

This thesis aims to research the subject of integrating sustainability practices into the corporate venture capital strategy and investment process. Furthermore, the aim is extended with a goal of formulating a framework of the sustainability integration for corporate venture capital units.

1.2 Research questions and objectives

Recent research has suggested that CVC investment activities increase company performance in sustainability, particularly on environmental and social factors (Battisti et al., 2022). However, there is a gap in the research and in practitioner knowledge on the mechanisms, which should be applied to have positive sustainability effect from CVC investments. Given the practical and academic interest in finding ways to incorporate sustainability into CVC investing, this thesis aims to find out how to do so. The main research problem can be formulated as a question:

How can sustainability be integrated into the corporate venture capital strategy and investment process?

The CVC investment process and the decisions can be roughly divided into two parts, pre-investment and post-investment. As a result, it is sensible to study the process separately for the two parts. The main research problem is studied through three supporting research questions. Firstly, as a prerequisite, it is necessary to understand the requirements in assessing startup sustainability. Sustainability assessment of startups is present both when doing investment decisions and when tracking the sustainability development post-investment. However, the assessment is not straightforward as there are multiple challenges and resulting assessment requirements due to the characteristics of startups. Thus, the research question to study these elements of startup sustainability assessment is the following:

What requirements are there in making sustainability assessments of startups?

While knowing the requirements of the sustainability assessment is important, it is also relevant to study what the practitioners in the field are doing, given that the subject is new, and much of the knowledge is embedded in the approaches used by practitioners. To research this, the second supporting research question covers the pre-investment part of the CVC process, i.e., the decision criteria when making an investment. The question can be formulated as follows:

What sustainability assessments are corporate investors using as a part of CVC investment decisions?

In addition to the pre-investment assessments, post-investment choices are important in startup investments, given the young maturity and rapid development of these companies. For a CVC investor, this means being able to influence the development of sustainability practices, possibly from scratch, in the portfolio companies. Thus, the third supporting research question is about sustainability related factors during the holding period of the investment. The question is:

What kind of sustainability development support can be provided through the investment cycle?

With these research questions, the objective of this thesis is to uncover the mechanisms that corporate venture capital investors can use to assess the sustainability of startups throughout the investment process, and how they can develop the sustainability of their portfolio companies while also gaining sustainability benefits in the process. The outcome of answering the research questions is to develop a framework with guidelines and an approach for integrating sustainability factors in the CVC investment process.

1.3 Research approach and scope

This thesis consists of a theoretical part and an empirical part. First, in the theoretical part, a view of sustainability in corporate venture capital is developed through a review of literature regarding corporate venture capital, sustainability for companies, approaches for sustainability assessment, elements of startup sustainability assessment, and corporate venture capital as a strategic tool for sustainability development. With the literature review, the aim is to produce an understanding of the underlying concepts and dynamics that affect the corporate venture capital process and how sustainability is seen as a part of it.

Along with the literature review, in the empirical part of the thesis, the understanding of the underlying mechanisms and the process framework are developed through practitioner knowledge in the context of industrial corporate venture capital. The empirical research is carried out with a qualitative and exploratory study with interviews of the stakeholders around CVC investments. The interviews include three groups to get a holistic view of sustainability in CVC investing. The first and main group is CVC investors. The CVC investors in this group are from multiple industrial sectors, namely companies from chemicals, energy, and materials industries,

which can improve the generalizability of the results for other industrial players. Furthermore, the investment profiles of the chosen industries tend to be similar to forest industry, which is a secondary reason for the selection, as the mandator of the thesis is a forest industry company. Other companies in the forest industry are not interviewed for competitive reasons. The second informant group is traditional VC investors. They are included because they are normally present in the investment deals and thus also have a say in the sustainability of the startups. The third group is sustainability experts in the focal corporate parent of the mandating CVC unit, which will provide additional insight and confirm alignment with corporate goals. With these groups, the interviews allow identifying how players in the field assess sustainability of the startups they are investing in, what kind of support do these startups require, and how investors can support their portfolio companies with regard to sustainability improvement for both sides.

The developed guidelines and framework aim to cover the investment process from considerations when making the investment decision and through the holding period of the investment. The framework is specified to industrial corporate venture capital investment arms. This focus and limitation are due to the difference in nature between different sectors, which affects the CVC considerations, e.g., important sustainability factors in the process industry compared to key factors in the software industry.

1.4 Structure of the thesis

The rest of the thesis is organized into four sections. Section 2 contains a literature review, which covers relevant literature on corporate venture capital investing, sustainability from the perspective of companies, sustainability assessments, and specific sustainability elements and requirements in CVC startup investments. Furthermore, Section 2 provides an initial view of sustainability integration in the CVC investment process through a synthesis of the literature. Section 3 presents the research design for the empirical part of the thesis. It describes the reasoning behind the chosen research approach, the methods for the empirical research, how data is collected through interviews, and how the interview results are analyzed. Furthermore, the resulting data structure from the analysis is presented. Then, in Section 4, the findings from the interviews are presented and the underlying elements building the data structure are covered and explained. Section 5 provides discussion of the results from the empirical study, and how they relate to the research questions. The discussion is built around a proposed process framework for sustainability integration in CVC. In addition, the theoretical and practical implications of the key findings are discussed. Finally, the section concludes with the limitations of the research and its findings, as well as possible avenues for future research.

2 Literature review

This section presents relevant previous research and applied literature regarding sustainability factors in corporate venture capital investments. The section begins with a brief overview of corporate venture capital, followed by covering sustainability of companies on the general level. Foundations for sustainability in corporate venture capital investments are built with an examination of sustainability assessment approaches and startup sustainability elements. Then the previous aspects are tied together by covering sustainability in corporate venture capital investments.

2.1 Corporate venture capital

Large corporations have for a long time desired to become more entrepreneurial (Weiblen and Chesbrough, 2015). With the entrepreneurial approach, corporates pursue strategic goals, for example, through realization of external ventures (Ernst et al., 2005). One such approach for having an entrepreneurial approach and being able to develop along with the changing environment is corporate venture capital, which refers to equity investments made by incumbent firms in entrepreneurial ventures, i.e., startups (Dushnitsky and Lenox, 2005). Next, a brief examination is done to understand the structure and purpose of CVC, as well as the positioning of CVC in the general venture capital space.

2.1.1 Structure and purpose of CVC

The most common implementation of corporate venture capital unit is a separate entity that is fully and exclusively funded by the parent corporation (Weiblen and Chesbrough, 2015). The connection to the corporate parent makes the goals of CVC units more complex than independent VC peers because, in addition to financial targets, strategic targets are important for CVC units (Döll et al., 2022; Gompers and Lerner, 2000). This can mean, for example, that the portfolio companies must have a direct link to the strategy and operations of the parent. Naturally, there is a connection between the strategic and financial objectives, since in the long run, the strategic goals need to produce financial outcomes (Ernst et al., 2005). Figure 1 illustrates the goals and connections around one typical structure of a CVC unit.

Corporate venture capital investments in startups allow the parent corporation of a CVC unit to follow interesting technologies and markets for learning, get access to experts of new technologies, influence decisions in the portfolio companies, and potentially gain financial profits from the investments (Weiblen and Chesbrough, 2015; Ernst et al., 2005). With time, there is also possibility for the parent to acquire a potential portfolio company and integrate it to the parent for strategic reasons (Ernst et al., 2005).

The involvement of a large corporation is a two-sided sword, as on one hand the resources and knowledge of the corporation is helpful, but on the other hand the involvement can limit the startup's ability to pivot, and corporate agendas can appear harmful for the startup (Weiblen and Chesbrough, 2015). Thus, CVC investors have

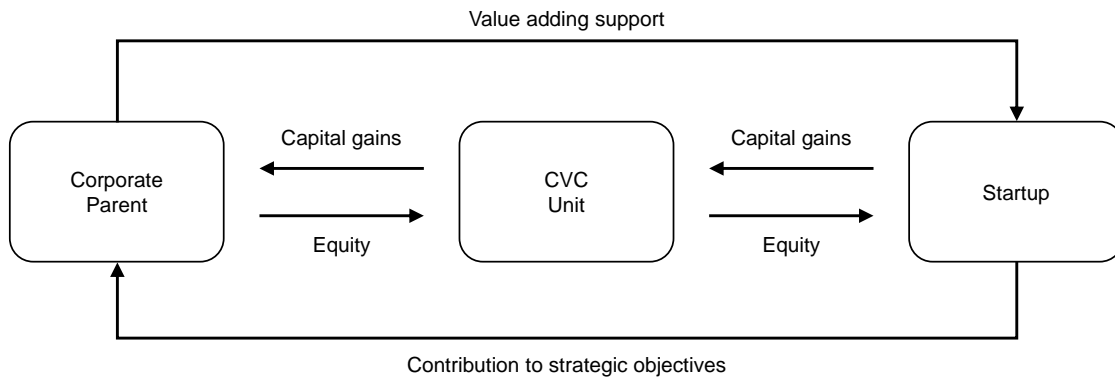


Figure 1: Illustration of typical corporate venture capital structure. Adapted from (Ernst et al., 2005).

to take an open approach in making the investments to alleviate the tensions that startups might have due to the presence of the parent firm. Consequently, there has been movement of CVC funds positioning as independent of the parent (Weiblen and Chesbrough, 2015), which is reflected in the illustrative structure in Figure 1. Weiblen and Chesbrough (2015) note that the tension can also be managed by the corporate investor having a clear value proposition of what they can provide for the startup and what they want out of the startup investment. Having a clear view on these aspects can help the corporate to find the right modes of engagement with startups, which accompany the strategic goals.

The share of corporate venture capital participation in venture capital deals has increased in the past years. Analysis by PitchBook (2023) indicates that in 2022 CVC investors took part already in more than a fifth of European venture capital deals, also showing an increasing trend from the 10% - 15% participation levels in early to mid 2010s. This development puts increased emphasis on the actions of corporate venture capital investors as stakeholders and developers of new ventures.

2.1.2 CVC investors in the general VC space

Although corporate venture capital experiences the tension and strategic requirements of being a part of the corporate parent, CVC also falls under the umbrella concept of venture capital, and given the shared foundations, there are many equal dynamics between the entities that can be considered belonging to the venture capital community. The foundational similarities between the different types of venture capital makes it possible to relate some CVC mechanisms through independent venture capital firms. Furthermore, independent venture capital firms have to be acknowledged when examining corporate venture capital, because CVC investments are often made in a syndicate with independent VC firms taking part (Weiblen and Chesbrough, 2015). Maula et al. (2005) note that support from both corporate venture capital investors and independent venture capital investors are complementary, and the availability of both is beneficial for the portfolio companies and the investors.

For most startups, venture capital investors are not the first source of funding they receive (Marcus et al., 2013), and they often engage after pre-seed and seed stages funded with own capital, funds from family and friends, government grants, or angel investor investments (Bocken, 2015; Hegeman and Sørheim, 2021). Venture capital investors still engage at an early stage, and depending on the focus of the fund, the engagement point can be even in the seed stage. Similar positioning applies to corporate venture capital units, which typically engage little after first VC investors (McNally, 1995), but can also be present even from the initial steps of a new venture, for example, through the funnel from incubator programs. A report by CB Insights (2023) indicates that each year from 2018 to 2022 the share of early-stage deals has been over half of the corporate venture capital deals globally. These ranges of different engagement points can be seen in Figure 2, which presents an illustrative view of the positioning of corporate venture capital and other equity funding providers in relation to the development level of the investment target.

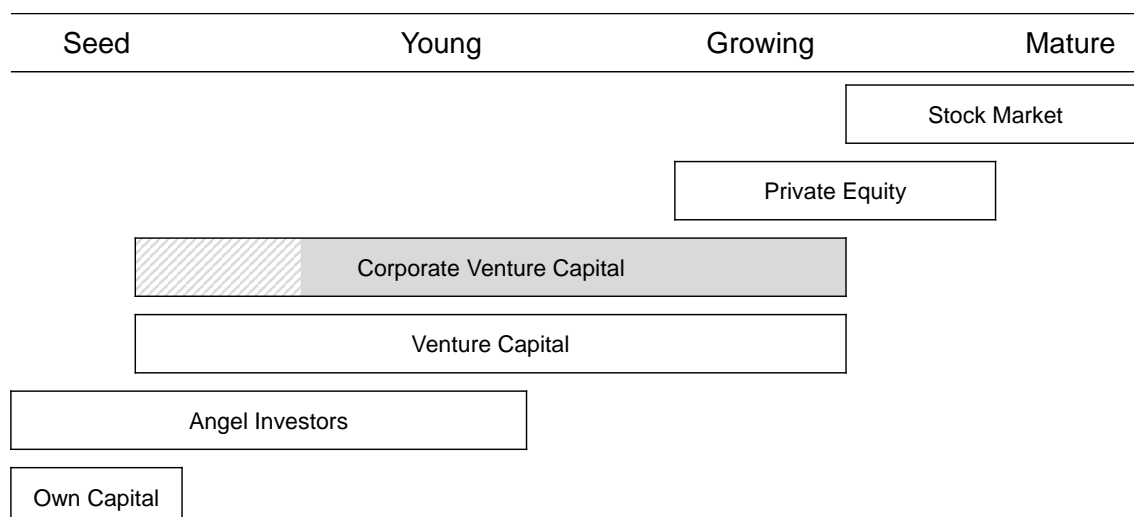


Figure 2: Positioning of CVC in the sources of funding at different growth stages. Adapted from Bocken (2015).

Figure 2 shows that while all venture capital investors might not be funding new ventures from the beginning, they are still engaging relatively early due to their focus and size of individual investments. Although venture capital investors generally have a minority stake in their portfolio companies, it has been found that their influence tends to be disproportionately larger compared to what is indicated by the ownership share (Gilson, 2003). This oversized influence might be even more clearly present for CVC investors, who have a more strategic angle of approach, and who also are often engaging new ventures at the stages of first outside funding.

Actions towards sustainability can be seen from independent VCs. Recently, a number of leading European venture capital firms have developed and adopted a sustainability clause that is included in term sheets and shareholder agreements of the investments, and which will commit the portfolio companies to measure and

actively work on reducing their CO₂ emissions (Engert, 2020; LFCA Foundation, 2020). Although corporate investors are currently not present in these joint initiatives, the movement of independent VCs towards sustainability orientation makes these considerations important for CVCs because independent VCs will invest simultaneously or at later stages to the portfolio companies of the CVC investors, which means that they need to be compliant to the sustainability requirements. Given the increased presence of corporate venture capital investors and their interaction with startups, it is important to gain an understanding of how these investment units should approach sustainability.

2.2 Sustainability for companies

A classic and much used definition for sustainability is the one presented in the Brundtland report (WCED, 1987), “development that meets the needs of the present without compromising the ability of future generations to meet their own needs.” While applicable to business activities, this definition might be considered as ambiguous (Giddings et al., 2002). Furthermore, sustainability assessment requires a clear concept of sustainability (Pope et al., 2004). As a result, it is sensible to examine sustainability further through its key components and how business activities can be related to it.

2.2.1 Triple bottom line of environment, society, and economy

A way to get a more approachable definition of sustainability is to break it down to more granular components. Doing so, a common view of sustainability is the triple bottom line perspective, which has dominated in business reporting, and in business engagement with sustainability (Purvis et al., 2019; Milne and Gray, 2013). The triple bottom line perspective takes a view that sustainability consists of an environmental dimension, a social dimension, and an economic dimension (Milne and Gray, 2013). The dimensions of the triple bottom line are also often referred to as the three Ps: planet, people, and profits (Slaper and Hall, 2011). As the three Ps might suggest, employing the triple bottom line perspective extends the view of impact and value created from a basic profit view. Whereas conventional value creation models focus on the economic value and partly on the value of use, sustainable models include the value and impact of environmental and social outcomes in addition to the economic effects (Freudenreich et al., 2020; Sheth et al., 2011). In effect, this means extending the impact consideration from just the focal business, its customers, and its shareholders to a much larger group of stakeholders. This is important because contributions to reduced environmental degradation or improvement of social circumstances do not directly translate to financial return, which is usually used to determine business performance. Savitz (2014) explains the extended view by stating that the triple bottom line “captures the essence of sustainability by measuring the impact of an organization’s activities on the world ... including both its profitability and shareholder value and its economic, environmental, and social capital.” Moreover, classifying sustainability impacts into the three categories makes

analysis more straightforward (Giddings et al., 2002), which can be beneficial for sustainability assessments. To this note, the triple bottom line perspective is often found in sustainability assessment methodologies and sustainability principles. In their analysis of sustainability assessment approaches, Trautwein (2021) found that most of the approaches are based on the triple bottom line perspective.

The environmental dimension of sustainability concerns the environmental impact of companies' activities. Thus, environmental sustainability can be companies' efforts to reduce their environmental footprint (Henderson, 2015). This can be acted through the reduction of negative impacts on the environment, such as reducing greenhouse gas emissions and energy use, conserving natural resources, and reducing waste. Alternatively, environmental sustainability could be seen as companies' efforts to create solutions for the environmental betterment of their value chain or the surrounding society. Albino et al. (2009) propose that strategies for companies' environmental sustainability are process improvement, product and market development, internal transfer of emission reductions, acquisition of emission credits, and supply-chain measures.

Social sustainability refers to a company's efforts to create positive social impacts, with a focus on the well-being of people and communities (Choi and Ng, 2011; Sheth et al., 2011). Ajmal et al. (2018) propose that social sustainability from companies' perspective consists of three areas, which are learning and growth, community development, and safety and security. Learning and growth include factors such as job security, and education and training. Community development includes good governance, cultural considerations, social involvement, human rights, and product responsibility. Safety and security entail labor practices, fair business practices, and health and safety.

Economic sustainability refers to a company's efforts to create long-term economic value. Sheth et al. (2011) articulate the economic dimension to concern conventional financial performance and economic interests of external stakeholders. Thus, the economic dimension can include activities such as making profits, paying taxes, investing in innovation and research and development, and creating jobs.

It is clear that the aforementioned objectives and measures are not exhaustive. The sustainability dimensions can include a multitude of factors and potential measures for them. This has created concerns about complexity and lack of conceptual clarity (Omann and Spangenberg, 2002). A further complication comes from how the overlap and interaction between the dimensions are seen. A view on the connectedness of the dimensions is that focus and compliance on at least two and preferably on all three dimensions is what sets sustainable businesses apart from conventional businesses (Trautwein, 2021). However, the mere presence of these dimensions is not enough for sustainability, but there has to be progress made towards improvement (Milne and Gray, 2013). To this note, a more ambitious interpretation is that triple bottom line sustainability involves progress at least on two of the dimensions while the third remains unaffected (Elkington, 2018). It can be seen that activities can be belonging to more than one of the dimensions. For example, increased resource efficiency can be seen as an effort for environmental sustainability but also for economic sustainability. Similarly, investment in innovation could be seen as belonging to

all three dimensions, environmental sustainability by creating environment-friendly solutions, social sustainability by providing learning and growth for the workforce and society, and economic sustainability by ensuring future cash flows. This interlinkage is illustrated on the left of Figure 3, where the partial overlap of the sustainability dimensions presents the sustainable area.

However, the substitutability of the sustainability dimensions has received critique, with some noting that the environmental dimension should be the restricting boundary (Giddings et al., 2002; Rees, 1995). Giddings et al. (2002) argue that separating the sustainability dimensions risks approaching sustainability in a compartmentalized manner and assuming that trade-offs can be made. Furthermore, it has been argued that sustainability should be seen with a layered view, where the economy is dependent on society and the society is dependent on the environment (Giddings et al., 2002; Wackernagel and Rees, 1996; Rees, 1995). This alternative is illustrated by the nested sustainability model on the right side of Figure 3. Taking this nested view entails that the environment puts boundaries for the other dimensions, and thus also demands an increased focus on environmental sustainability. Furthermore, given that in the nested approach, the economy is seen as a subset of society, the view also drives the focus to the social dimension before the economic dimension when considering the sustainability of the dimensions.

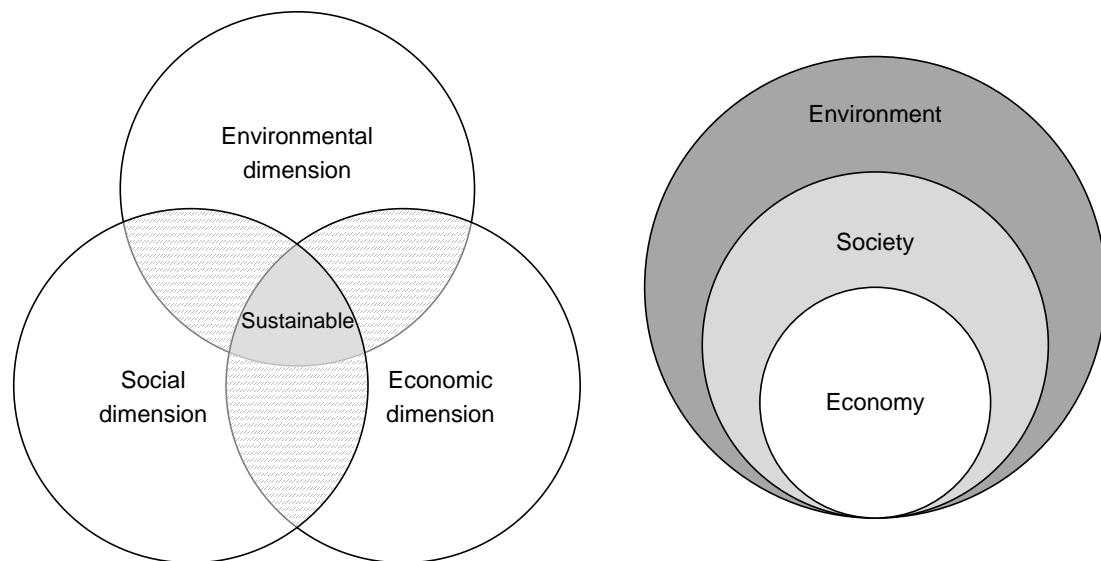


Figure 3: Alternative views of the interaction and relationship between the sustainability dimensions (Purvis et al., 2019; Giddings et al., 2002).

Regardless of the view on the positioning of the dimensions, in the view of corporate sustainability, the triple bottom line perspective can be seen as the integration of environmental, social, and economic aspects into a company's activities, with the goal of creating long-term value for all stakeholders.

2.2.2 Sustainable development goals

In addition to the dimensions in the triple bottom line, a step can be taken to understand more specific sustainability impact areas, in which companies can contribute. A possible group of sustainability impact areas is the United Nations' Sustainable Development Goals (SDGs), comprising 17 goals, 169 targets, and 231 unique indicators aimed at achieving balanced sustainable development in the economic, social, and environmental dimensions (United Nations, 2015; United Nations, 2017). Accordingly, the 17 goals, presented in Figure 4, can be divided into the economic, social, and environmental dimensions of the triple bottom line (Hannan et al., 2021). While the SDGs are macro-level societal goals, companies are playing a central role in achieving them (Delgado-Ceballos et al., 2023; van Zanten and van Tulder, 2021)



Figure 4: The 17 goals for sustainable development (United Nations, 2020).

With the SDGs, companies can have more concrete areas, in which they can assess and communicate their sustainability. The SDGs can also allow companies to identify new ways to make sustainability contributions. According to Pedersen (2018), the SDGs, and their sub-targets, represent a way for companies to “seek long-term guidance for investments and new business opportunities.” Thus, with the sustainable development goals, the sustainability considerations can be taken one step in a more concrete direction from the high-level dimensions of the triple bottom line. This is also noted by Pedersen (2018) with the claim that the SDG agenda is the old sustainability agenda but made easier with more clear priorities. Boffo and Patalano (2020) state that the SDGs can also be seen as aspirational goals to be considered in impact investing. Thus, the SDGs can act as both a way for companies to direct their efforts and a way for investors to assess the sustainability impact of investing in different companies.

2.2.3 Environmental, social, and governance factors

Considering the economic dimension as a part of sustainability can be argued to give it inflated importance, as it is also a driver for evaluating companies on its own. To this note, Giddings et al. (2002) suggest removing the separate economic dimension of sustainability and rather including it in the social dimension. While this merging of dimensions is not necessarily happening, there can be seen as a movement towards assessing sustainability through ESG, with environmental attributes, social attributes, and governance attributes, leaving economic factors to be reported separately from sustainability factors. The three attribute categories allow companies to consider sustainability-related, non-financial factors for potential risks and opportunities in areas such as the business model, corporate structure, and management policies (KFW Capital and BCG, 2021). The ESG representation, similarly to the SDGs, can be seen as a step toward more tangible ways of assessing the sustainability of companies. Supporting this approach, ratings based on ESG have become the currently dominant metrics to measure the sustainability performance of different companies (van Zanten and Huij, 2022). Moreover, Boffo and Patalano (2020) note that ESG investing has seen rapid growth, indicating increasing integration of sustainability factors in investment decisions.

Table 1 lists examples of factors that can be considered in each of the ESG areas. As can be seen from the example factors, ESG considers practical areas related to companies and their operations.

Table 1: Examples of ESG issues (Hayat and Orsagh, 2015).

Environmental	Social	Governance
Climate emissions	Customer satisfaction	Board composition
Air and water pollution	Data protection and privacy	Audit committee
Biodiversity	Diversity and inclusion	Bribery and corruption
Deforestation	Employee engagement	Executive compensation
Energy efficiency	Community relations	Lobbying
Waste management	Human rights	Political contributions
Water scarcity	Labor standards	Whistleblower schemes

According to Dunbar (2022), considering ESG issues when assessing companies can lead to increased alignment between investors and broader objectives of the society. Furthermore, considering ESG aspects can help improve risk management (Boffo and Patalano, 2020). Thus, ESG can also be seen as a way to bring sustainability closer to concrete company-specific factors, which can help integrate sustainability into decisions. To account for the wide adoption and practicality, the ESG representation will also be used when talking about sustainability in the present research.

2.3 Approaches for sustainability assessment

As seen in the coverage of sustainability aspects in Section 2.2, there are multiple areas that can be looked at when assessing sustainability. Thus, it is also important

to understand some of the approaches and methods for the assessments. As a general trend, Caplan et al. (2013) note that sustainable investing is moving its assessment focus from solely negative screening, i.e., exclusion criteria, to emphasizing a more holistic approach, which includes positive engagement with environmental, social, and governance factors. In the domain of corporate venture capital, readily fully suitable sustainability assessments for startups are scarce, but some established sustainability methodologies and tools or variations of them could be applied. The consideration of the more general practices is sensible since the expectation is that with time the startups will mature and move towards the assessments also used by incumbents. Furthermore, even the most radically sustainable “born green” startups often coexist and compete against the more established companies (Demirel et al., 2019), warranting consistency between the possible metrics. Consistency between metrics would also help with aligning the corporate venture capital investments with the sustainability agenda and targets of the corporate parent. Thus, there is an examination of a few existing methodologies for assessing sustainability in general or some dimension of it.

2.3.1 Checklists, questionnaires, and scorecards

To assess the sustainability of target companies, one of the most common approaches by investors is the use of ESG questionnaires or checklists that aim to gather information and evaluate a company’s ESG practices and performance (Zaccone and Pedrini, 2020). These questionnaires and checklists help investors make informed decisions that integrate sustainability considerations into their investment strategies. On the other hand, the same questionnaires can be used by companies internally to think about their sustainability position.

When planning for a sustainability questionnaire, an assessor can refer, for example, to the GRI Standards (GRI, 2022), which contain best practices for reporting on environmental, social, and economic impacts. Other ways of deriving the questions to be used in the questionnaires and criteria for checklists include considering the dimensions of ESG or some specified targets such as UN Sustainable Development Goals (United Nations, 2017) and EU Taxonomy targets (S&P, 2021). Furthermore, there exists multiple generally available checklists and questionnaires for sustainability that have been developed by investment professionals. One of these is the checklist developed by FVCA (2022), which provides over 50 metrics that can be used for assessing ESG performance of targets and portfolio companies. In addition, the surrounding framework provides linkage to calculation guides when applicable, as well as links to regulation, frameworks, and SDGs for each metric. Another similar tool is the ESG questionnaire developed by ESG_VC (2022), which asks early-stage companies to answer to 48 ESG related questions. Furthermore, Trautwein and Fichter (2018) have created a practical tool for startup teams and investors that allow assessment of early-stage companies through different sustainability related questions. Their questionnaire tool differs from the ESG focused tools in a way that, instead of looking just at the ESG dimensions, it covers sustainability in four areas: business context, startup team, business concept, and products and services.

Regardless of the specific focus areas and measure composition, checklists and questionnaires can often be simple and easy to use (ESG_VC, 2022). However, a limitation in them is that they can be subjective and can lack quantifiable information, decreasing comparability. A way to mitigate that is to assign numerical values to the answers, which transforms the questionnaire or checklist into a scorecard, which can be used for comparison of opportunities. Both the tools by ESG_VC (2022) and Trautwein and Fichter (2018) incorporate this scorecard extension. With the scorecard approach, the assessor can add weighting to the different questions or measures, which allows prioritizing the areas that are seen most important. Scorecards can also be extended with an impact compass to visualize the impact and direct the attention of the assessor where the target is performing well and where improvement is needed. To this note, Figure 5 presents an illustration of a possible impact compass that is built on the different question areas of the questionnaire by ESG_VC (2022). The scoring of an assessed company can be added to the compass in each of the focus areas, which then will reveal the overall sustainability positioning and performance.

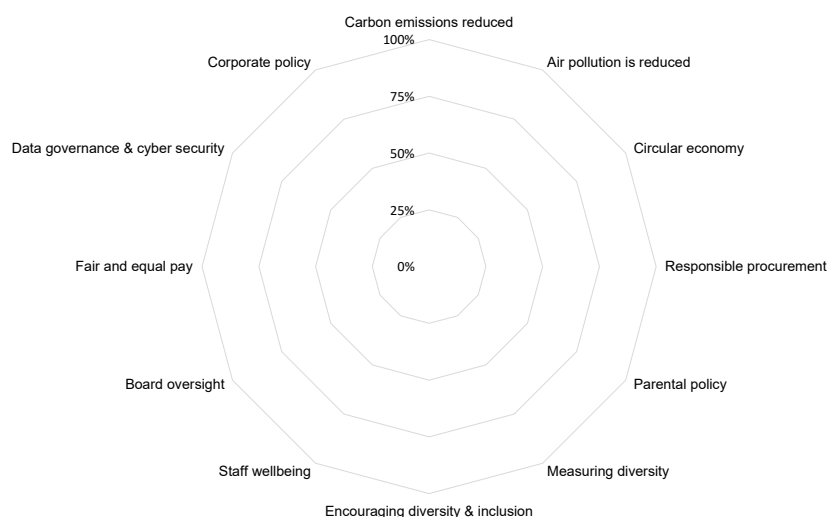


Figure 5: Illustrative example of a scorecard-based impact compass (ESG_VC, 2022).

Although, checklists, questionnaires, and scorecards can generally be thought of as lighter assessment types, it is also possible to make them heavy by making the scope extensive and the answers requiring in-depth analysis. Hansen and Schaltegger (2018) argue that startups with low formalization and high flexibility should not use heavy scorecard assessments, and thus employing such an approach in a radical innovation-seeking corporate venturing unit would be misguided. Therefore, especially for early-stage companies, it is important to think what questions and areas are actually relevant to be assessed.

2.3.2 Materiality assessment

In many cases, especially for startups, the generic sustainability assessment questionnaires and scorecards can contain areas that are not relevant for a specific startup opportunity due to a mismatch in the business context or some other factor. For this reason, materiality assessment is a part that can be seen included in sustainability assessments. To identify the material ESG criteria for individual opportunities KFW Capital and BCG (2021) have developed a tool called ESG Heatmap. With the tool, materiality assessment is made by looking through three different lenses, (1) type of innovation, (2) stage of the start-up, and (3) exit or end-market industry. According to KFW Capital and BCG (2021), the first lens differentiates between tangible products, for which material ESG areas are related to supply chains and resources used in production, and intangible technologies or services, for which material areas are within data security and privacy along with ethical consideration of the use. The second lens puts focus on the development stage. There, for early-stage startups, there are few material ESG areas and the focus should be on creating the minimum viable product, whereas startups in later growth stages should have ESG criteria closer to the established corporations. Finally, the third lens, the exit or end-market industry, leads to determining material ESG areas as the ones that are relevant for the established companies in that industry. Together, the three lenses allow the creation of a matrix that shows ESG criteria that can be material to the startup that is being assessed. Figure 6 presents an illustrative example of performing the materiality assessment for an early-stage startup that provides a car-sharing platform.

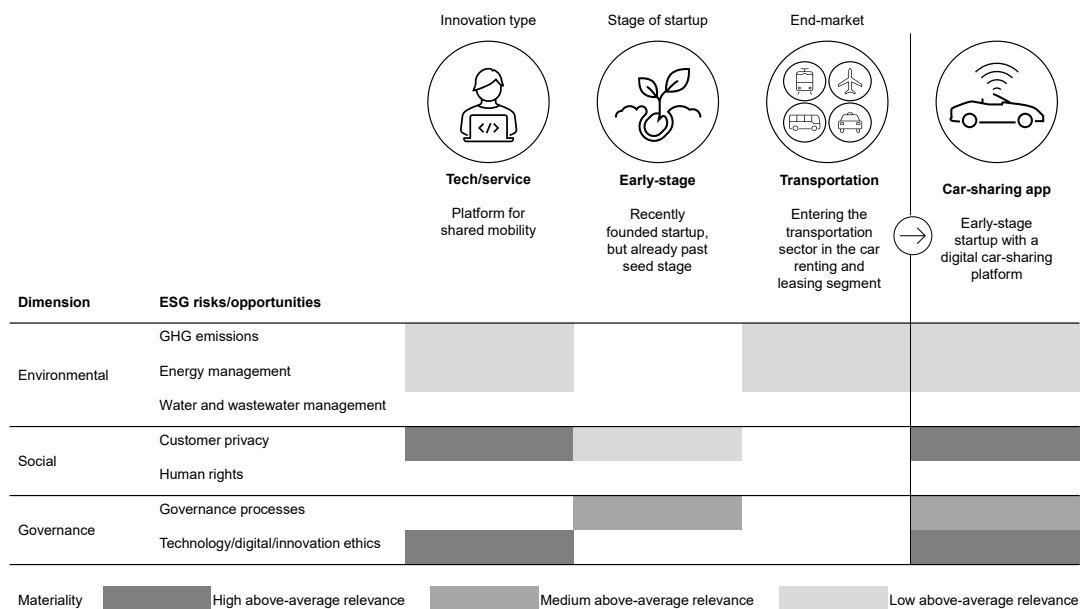


Figure 6: Illustrative example of materiality assessment with the ESG Heatmap. Adapted from KFW Capital and BCG (2021).

As can be seen from the example in Figure 6, different ESG factors can have

different levels of relevance when looking through the lenses of innovation type, stage of the startup, and end-market of the solution. For example, for the car-sharing platform customer privacy is high relevance due to the type of innovation, while wastewater management or human rights are not considered above-average materiality through any of the lenses. That is not to say that human rights would not matter for a car-sharing startup, but rather that it can be reasonably assumed that there are no ESG risks or opportunities present in that area. Thus, materiality assessment allows an entity, such as a corporate venture capital investor, to have an extensive list of sustainability criteria, which can be then narrowed down to the most relevant ones for a specific opportunity.

2.3.3 Life cycle assessment

One of the more analytical sustainability assessments is the life cycle assessment (LCA). Life cycle assessment is an assessment tool for quantifying the impacts and resources used throughout a product's life cycle (Finnveden et al., 2009). As an assessment, LCA is often seen focusing on the environmental dimension of sustainability (Judl et al., 2015). LCA allows identifying environmental hotspots in the life cycle and that way avoids shifting the environmental burden (Ubando et al., 2019), thus helping to avoid the situation where a seemingly sustainable solution actually has a significant negative impact hidden in some other part of the life cycle or value chain. Life cycle assessment typically consists of four stages, (1) goal and scope definition, (2) life cycle inventory analysis, (3) life cycle impact assessment, and (4) result interpretation (Ubando et al., 2019; Muralikrishna and Manickam, 2017; Böckin et al., 2022).

Companies use LCA to map the key drivers of environmental impact for singular products or entire product portfolios (Hellweg and Canals, 2014). Figure 7 presents two views into the scope of life cycle assessment. As can be seen in the figure, LCA can be done on a product level or an organizational level. In the simplest cases, where the organization produces just one type of product, the aggregation from the product level to the organizational level can be easy. However, complexity grows with the number of different products produced and the number of suppliers.

Startups often have just one or a limited number of products and suppliers, which can make the process more straightforward for them compared to larger companies. However, the challenge comes from startups lacking data on the different product life cycle steps and their impacts. Furthermore, since the operating methods can be due for many changes over the development of the startup, the calculations can lack longevity. On the other hand, at the early stages, LCA has high leverage since structures are still fluid and there can be substantial changes made to product and process design (Hellweg and Canals, 2014).

Agarwal et al. (2012) suggest linking the extensiveness of the LCA to the needs of the situation at hand. Depending on sustainability objectives and the use of the LCA results, a lighter version of the assessment might suffice instead of the full standardized version. As the potential LCA versions, Agarwal et al. (2012) propose four variants. The first is LCA lite, which is a qualitative assessment that involves

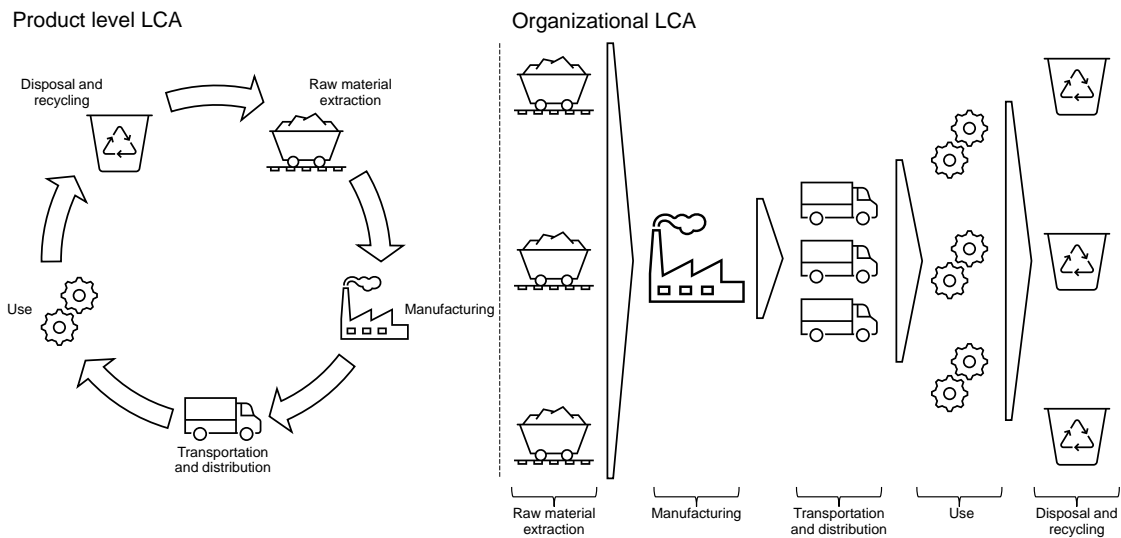


Figure 7: Scope of life cycle assessment. Adapted from Hellweg and Canals (2014).

cross-functional discussions and high-level process mapping. The second is called desktop spreadsheet, which is a high-level, non-ISO, quantitative assessment that uses mostly public industry data. The third is streamlined LCA, which is a quantitative assessment that is roughly based on ISO guidelines and uses a combination of public data and primary company data. The fourth is full standardized LCA, which is a quantitative assessment that fully follows a standardized protocol and is mostly using primary data.

Böckin et al. (2022) argue that mainstream LCAs are largely focused on products, which results in failure to capture the impacts of the business models. They further argue that regardless of how low the environmental footprint of a product is, the overall environmental outcome remains uncertain if mass production and sales are required for economic viability. This consideration is particularly relevant for the assessment of startups, where the business model is still developing and there might be just the initial version of the product. Böckin et al. (2022) have sought to address this by developing a business model life cycle assessment (BM-LCA), in which the business itself becomes the object of analysis. Using a more holistic life cycle assessment such as the BM-LCA can allow for also considering social impacts as a part of the LCA, and thus getting a more comprehensive view of the sustainability of the opportunity at hand.

Overall, in terms of the approaches for trying to systematically assess sustainability, Hansen and Schaltegger (2018) note critically that “measuring actual corporate impacts and outcomes at the level of the society, the economy, or the natural environment is, if possible at all, very complex and resource intense.” A carbon measurement study of 1290 organizations by BCG (2021) found that only 9% of the organizations were able to measure the full scope of their emissions (scope 1, 2, and 3), and moreover the respondents estimated a 30% to 40% average error rate on

their measurements. While these findings call for the development of more integrated and effective measurements, they also support the view of focusing the efforts on understanding the ideas of new innovations and aiming to support their sustainability development instead of being too keen on trying to perfect the assessment methods to the last detail, especially in the case of corporate venturing units seeking for radically innovative startups.

2.3.4 Process-based impact assessments

In addition to the tools and methodologies used for assessing some parts of sustainability, there are approaches for guiding the whole sustainability assessment process. Process-based impact assessments are less prescriptive, and their focus can be seen to be more as a guide for the thinking of the assessor. One such approach is the five-step process for managing impact that was originally launched by the European Venture Philanthropy Association (EVPA) in 2013 (Hehenberger et al., 2015). As is illustrated in Figure 8, the five steps of the process are (1) setting objectives, (2) analyzing stakeholders, (3) measuring and monitoring results, (4) verifying and valuing impact, and (5) reporting.

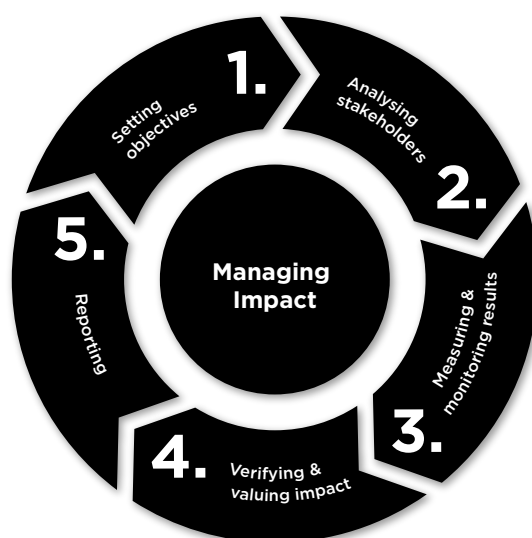


Figure 8: The impact management process by EVPA (Picón Martínez et al., 2021).

According to Picón Martínez et al. (2021), the more detailed meanings of the five steps are what follows. The first step of the process, setting objectives, is focused on defining impact objectives to be part of the investment strategy. These objectives would then be considered and specified for individual investments during the deal screening, due diligence, and deal structuring phases. The second step, analyzing stakeholders, is about defining relevant stakeholders for the investment through segmentation and analysis. Engagement with the defined stakeholders is expected to continue through the investment period. The third step, measuring

and monitoring results, concerns the definition of outputs, outcomes, impact, and selection of indicators. These actions will happen during due diligence and deal structuring stages, and continue through monitoring after investments to ensure that progress is made in the desired direction. The fourth step, verifying and valuing impact, consists of the in-depth analyses made during the investment holding period and in some cases after exit, to understand the impact that has been created by the investment. Finally, the fifth step, reporting, is about reporting the impacts to the relevant stakeholders and the broader community. As can be seen in Figure 8, the process does not stop on the fifth step, but rather loops over as the different steps feed to each other. This continuity can be reflected as learning that is generated through the investment activities, and the resulting alignment of following actions.

Another process-based impact assessment approach is the plan-do-assess-review process by SIIT (2014) that encompasses seven guidelines for impact assessments. According to SIIT (2014), the process framework is intended for investors to integrate into investment management at the portfolio level and also in the scope of individual deals. As can be seen from Figure 9, the seven guidelines can be grouped under the four different high-level phases of the process: plan, do, assess, and review.

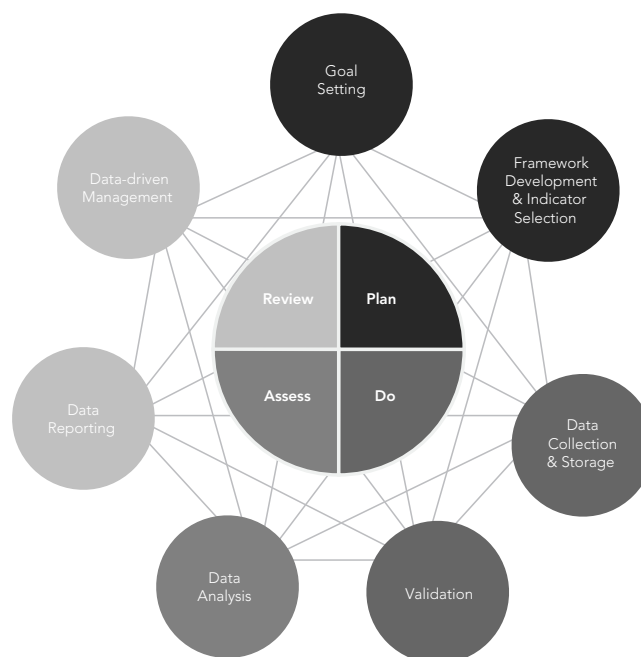


Figure 9: The phases and guidelines for impact measurement (SIIT, 2014).

Starting from the planning phase and following the descriptions by SIIT (2014), the first guideline, goal setting, is about clearly defining the desired impact of investments. Thus, the investor needs to formulate a well-defined investment thesis to guide strategic planning and decision-making, as well as providing a benchmark for evaluating investment performance. Then the second guideline, also related to planning

phase, is framework development and indicator selection. This guideline instructs the investor to select appropriate metrics for evaluating investment performance. Furthermore, the guideline suggests developing a robust impact measurement framework that integrates relevant metrics, and outlines data collection and utilization procedures, ensuring alignment with existing industry standards.

After the planning phase, in the do-phase, the third overall guideline is data collection and storage. This guideline points to timely and systematic collection and storage of data. Thus, the assessor needs to ensure that the necessary technological infrastructure, tools, resources, skilled personnel, and methodologies are in place to effectively gather and track data from investees. Also in the do-phase, the fourth guideline, validation is about verifying the accuracy and reliability of collected data. The investor needs to conduct thorough validation in the relevant areas to ensure completeness and transparency, for example, by cross-referencing calculations and assumptions against reputable data sources when applicable.

Then, in the assess-phase, the fifth guideline, data analysis, directs towards extracting insights from the collected data. More specifically, the investor should review and analyze the data to assess progress towards impact goals and gain a comprehensive understanding of how the investments are performing.

In the final phase of the framework, review, the sixth guideline is data reporting. There it is advised to share impact data with key stakeholders. Distributing impact information in a coherent, credible, and reliable manner enables stakeholders to make more informed decisions. Then the final guideline, data-driven management, guides to identify and implement data-driven mechanisms to enhance the rigor of the investment process. There, the assessor should evaluate stakeholder feedback on reported data and address recommendations to make necessary adjustments to the investment thesis.

The guidance to make adjustments to the investment thesis suggests that the process of the framework has some loop-like characteristics. To this note, SIIT (2014) explain that the guidelines and the actions that are related to them are dynamic. This can also be seen in the connections drawn between the guidelines and the phases in Figure 9. Thus, similar to the impact management process by EVPA, the process in the framework by SIIT needs to be seen as continuous and evolving with time.

2.4 Elements of startup sustainability assessment

To get a better understanding of why some approaches are more and some less applicable for sustainability assessment in startup investments, a closer look must be taken at the elements behind startup sustainability assessment. The assessment of the sustainability of new ventures and startups has been left with relatively little attention from the research point of view (Trautwein, 2021). This can be a result of the challenge of assessing startups with methodologies that look at the current state or past development because the early development stage of startups makes those inapplicable. Some scholars have been researching the suitability of existing approaches that have been developed with a more general focus but could be applicable to startups (e.g., Trautwein, 2021; Recker and Michelfelder, 2017). Also,

some applied literature has begun to emerge, indicating a growing interest in the area (e.g., Trautwein and Fichter, 2018). Given that most interaction between startups and incumbents is with early-stage startups (CB Insights, 2023), it becomes important to acknowledge startup-specific challenges that come to play, especially for smaller and newer startups. In order to determine requirements for suitable sustainability assessment methods, an understanding of the characteristics and challenges related to startup sustainability is required.

2.4.1 Startup sustainability characteristics and challenges

Startups, and more generally, new ventures, can be viewed as an important factor for solving many social and environmental problems (Hall et al., 2010; Pacheco et al., 2010). What makes startups important in accelerating the sustainability transition of industries is that they are key actors in implementing environmental and social innovations (Fichter et al., 2023; Trautwein, 2021). Although the same environmental, social, and economic principles of sustainability apply to companies of all sizes, there are differences in focus points between larger corporations and startups. Incumbents have much more stable operations than startups and a passive approach leading to incremental development (Ritala et al., 2018). As a result, incumbents rather attempt to keep fixed standards than encourage continued innovation (Hockerts and Wüstenhagen, 2010), which however, can be expected to be changing towards more active approaches, given the increased societal sustainability attention. Different from the incremental improvement of incumbents, startups with sustainability orientation focus on creating radically sustainable products and services (Fichter et al., 2023; Hockerts and Wüstenhagen, 2010). Concretely, startups improve sustainable production and consumption through solutions mitigating for example climate change, biodiversity loss, or educational inequalities (Trautwein, 2021).

Companies can convey corporate sustainability in many ways, such as by setting sustainability goals and targets, implementing sustainable business practices, communicating sustainability performance to stakeholders, and engaging with stakeholders to understand their sustainability concerns and expectations. However, startups often lack the means to do these actions. Startups, as smaller organizations, have usually scarce resources, a low degree of formalization, small to no public visibility, and low reporting priorities (Bos-Brouwers, 2010), which are all factors causing challenges in driving formal sustainability, in addition to the lack of historical performance to be measured. An additional challenge that applies also to the general sustainability space is the high involvement and activity from regulators. Government involvement in the forms of policies, including carbon credit markets and different subsidies, have been inconsistent (Bento et al., 2020). This involvement is not only a challenge from the assessment standpoint, but can also affect commercialization (Hegeman and Sørheim, 2021). The regulatory and governmental activity in the sustainability space can be especially challenging for startups since they do not have large administrative departments to follow the developments.

Hockerts and Wüstenhagen (2010) note that incumbent companies tend to focus their sustainability efforts initially on sustainability communication and accounting

systems. Incumbent capabilities and resources with sustainability reporting tools will make it easier for them to develop and display broad sustainability performance than what is the case for startups (Hockerts and Wüstenhagen, 2010). Incumbent sustainability is typically characterized by improvement of the environmental efficiency of the processes and products (Fichter et al., 2023). These improvements are to the existing operations, which largely do not exist for startups that have to develop something new. The difference in meaningful sustainability factors between incumbent companies and startups calls for a closer look into how the sustainability of startups should be assessed.

2.4.2 Requirements for startup sustainability assessment

As the sustainability assessment for startups is still in the early stages, there is constant flux around suitable methodologies and measures. So far, no assessment method has been established as the standard for the startup sustainability and impact assessment (Trautwein, 2021; Bengo et al., 2016). However, researchers have been able to draw up some requirements and guidelines for the assessment based on the common characteristics of startups and new ventures in general.

Startups require a simple assessment approach (Trautwein, 2021). Regarding this requirement, Hansen and Schaltegger (2018) note that the characterization of startups being highly flexible with a low level of formalization results in them not being able to use extensive assessments and controls. The assessments should cover perspectives of relevant stakeholders (Trautwein, 2021). To this matter Costa and Pesci (2016) suggest an approach of using a combination of different measurement methods to conduct the sustainability analysis accordingly to the stakeholder interests.

Fichter et al. (2023) propose four requirements for assessment frameworks of startups and new ventures. The first is that the assessment focuses more on potential sustainability effects rather than current ones, and thus the investigation of startup sustainability should be future-oriented. The second requirement is that the assessment should be flexible enough to remain useful as the business models for new ventures keep evolving. The third requirement states that the assessment should be usable in the dynamic environments of new ventures. Finally, the fourth is that the assessment should acknowledge that sustainability impacts are present across multiple levels and layers of context, which all cannot be optimized for at once.

Taking an assessor's view into the sustainability of startups reveals that there comes requirements also from the perspective of the investors. A survey study by Botsari and Lang (2020) found that the two most common reasons why venture capital investors are not considering ESG information in their investments are that they lack internal resources and expertise on ESG issues and that ESG information is hard to quantify. These challenges experienced by investors support the requirement of sustainability assessment being simple and clear enough to be used with limited resources.

2.5 Sustainability in corporate venture capital investments

Regardless of the sustainability orientation of a startup, a necessary step for most new ventures is funding acquisition (Wöhler and Haase, 2022), which makes collaboration with CVC investors, and more generally VC investors, important. The sustainability considerations in CVC startup investments are not limited only to pre-investment assessment. Another relevant dimension in the process is the post-investment holding period of the investments and the resulting sustainability implications. The post-investment period lifts sustainability development into the spotlight. This then brings the focus to the general relevance of integrating sustainability into corporate venture capital and using CVC investing for sustainability development, which are the two areas covered next.

2.5.1 Reasoning for implementing sustainability practices

Motives for implementing sustainability practices in the corporate venture capital investment process can be found in the general venture capital space. The study and findings by Alakent et al. (2020) indicate that there is a strong correlation between venture capital investor's sustainability practices and the long term sustainability development of the portfolio companies. This relationship was seen as investors that had implemented sustainability practices improving the sustainability of the companies they had invested in, whereas investors not focusing on sustainability issues resulted in the declined sustainability performance of portfolio companies compared to prospects that had not received venture capital funding at all. This might be partly a result of sustainability practices helping to develop the sustainability of the portfolio startups. Another reason can be that investors with sustainability practices are doing negative screening, which leads to a better level in the sustainability of their portfolio companies, as negative screening results in excluding companies that do not fit the investment strategy (FINSIF, 2022), in this case, the sustainability requirements, leaving only the more sustainable companies. In a survey study of European venture capital investors, Botsari and Lang (2020) found that negative screening is the most common motive for considering ESG information in startup investments. As can be seen from Figure 10, negative screening was a motive for half of the respondents. Although negative screening is important, it could be argued to be unambitious. This is because, with negative screening, the investor is staying sustainability compliant but not actively pursuing sustainability progress.

The other motives presented by Botsari and Lang (2020) and their descriptions by FINSIF (2022) are (1) positive screening, which is an approach favoring companies and industries that the investor considers sustainable, (2) impact investing, which is an approach that tracks a change in, for instance, environmental or social aspects in addition to investment returns, (3) active ownership, which refers to an investor using their ownership rights to promote more sustainable business, and (4) full integration into valuation, which adds sustainability criteria alongside financial aspects in investment analysis and decisions.

A fact supporting and further suggesting the adoption of sustainability practices is the finding by Chemmanur et al. (2014) that CVC-backed startups are more

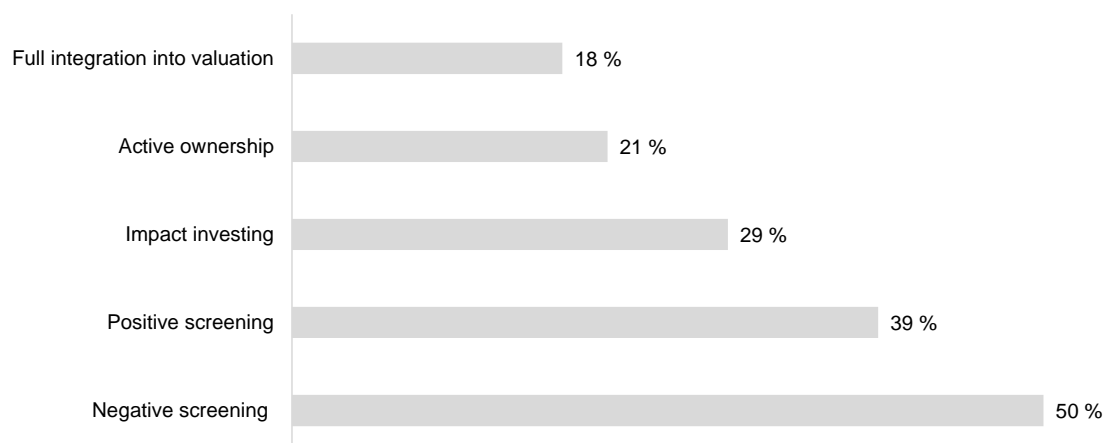


Figure 10: Motives of VC investors for considering ESG information in investment decisions (Botsari and Lang, 2020).

innovative than startups backed by independent venture capital firms. Chemmanur et al. (2014) present two possible causes for this greater level of innovation being the industry expertise of the corporate parent and higher tolerance of failure risk. The combination of industry expertise with the adopted sustainability practices could yield higher sustainability benefits. Although, the higher risk tolerance puts expanded emphasis on the assessment of adversary sustainability effects in case of startup failure.

Hegeman and Sørheim (2021) found that corporate venture capital is used by large companies to promote corporate greening to maintain competitiveness. This shows that the increased sustainability requirements by the investors of large companies funnel down to the corporate investment made by these companies. In this sense, Bansal and Roth (2000) identify three reasons why companies pursue ecological sustainability opportunities, which are competitiveness, legitimation, sense of responsibility. Thus, in addition to the practical motives, we can see firms' motivation for sustainability practices to include ensuring long-term profitability and competitiveness, meeting expectations of stakeholders to maintain legitimacy, and acting out of an ethical inclination (Hegeman and Sørheim, 2021). Regarding legitimacy, the portfolio companies of investors can be seen as an extension of them. It can be argued that investors cannot meet their sustainability targets unless their portfolio companies do (Simpson and Brumme, 2022).

2.5.2 Promoting and supporting sustainability development

As a result of CVC investors being present even from the early stages of startups' lifespan, they have an opportunity to be defining the sustainability practices of the startups. Choices in the early stages can determine an important part of the sustainability impacts of startups (Bocken, 2015). Conversely, the early development stage brings the challenge of assessing the sustainability of these startups when screening and making investment decisions. For early-stage startups, there might

not be any formal sustainability plans or systems in place, leaving the incentive to investors to help the startup to create them.

Trautwein (2021) presents five suggestions on how investors can support the design of sustainability assessment for a startup. First, the focus should be on material factors. As a key stakeholder, the CVC investor should help the startup to define relevant assessment objectives and pursued impacts. Furthermore, the assessment requirements should be made easily understandable, and external expertise should be provided to minimize the resource need from the startup. Second, the defined assessment should ensure transparency so that the stakeholders can recognize and understand the assumptions and adaptations made by the startup. Third, the startup should be advised to involve its stakeholders in the assessment so that the interests of the key external stakeholders are prioritized while being aware of the potential conflicts of interest among these parties. Fourth, the startup should be provided with a digital tool that ensures reliable documentation and communication of the assessment process and results. Fifth, an integrated assessment approach linked to the main organizational activities should be promoted for regularity and resource savings. These five steps help to create a commitment to the assessment and development of sustainability in the startup, which then can result in the efficient and continued improvement of sustainability over time even with the limited resources available.

Support from corporate experts can also be an integral part. In their study of sustainable business model prototyping, Baldassarre et al. (2020) found that novice entrepreneurs required support to fully use a developed sustainability tool, whereas more seasoned employees of a larger company, with more experience in navigating the innovation process, were more independent and efficient with the tool. This indicates that the expertise inside the corporate parent of a CVC unit can be an important resource for the sustainability development of the portfolio companies.

A corporation's strategic goals should guide the engagement employed with startups (Weiblen and Chesbrough, 2015). When relating to sustainability, this implies that the corporation should have clear sustainability targets and have a view of what is wanted to get from the engagement with startups. Schönwälder and Weber (2022) recommend setting sustainability-related targets for the corporate venturing unit. Credibility is a key factor when approaching startups (Weiblen and Chesbrough, 2015), and thus there has to be credibility in a corporation's own sustainability strategy. Simpson and Brumme (2022) suggest identifying a few key ESG dimensions through the purpose of the startup, which essentially is figuring material sustainability factors. Alemany et al. (2022) note that a one-size-fits-all approach cannot be applied and most relevant ESG factors should be defined for each industry, also speaking for materiality. Thus, material factors should be determined both on the corporate side and the startup's side. However, a common critique of corporate sustainability is that it is too focused on measuring and reporting sustainability and less focused on how to actually develop it (Milne and Gray, 2013). Therefore, an essential part of the sustainability development through CVC investments is the actual sustainability actions.

Partnering with a credible CVC can be seen as a stamp of approval for a startup in the eyes of its potential customers. There should also be identified and promoted

collaboration in R&D and operations where this can benefit one or both parties (Weiblen and Chesbrough, 2015). Overall, the combination of a startup's new knowledge, efficiency, and flexibility and the incumbent's financial, production, marketing, and distribution resources can provide synergies contributing to a competitive advantage for both parties (McNally, 1995), also true in the context of sustainability. It can be seen that the sustainability development is not limited to just incumbent guiding the startup, but the learning and development can also go the other way. CVC programs provide incumbents with an opportunity to integrate disruptive sustainability innovations (Hockerts and Wüstenhagen, 2010), and that way boost their sustainability transition over just incremental development.

Schönwälder and Weber (2022) found that the likelihood of working on radical sustainability innovations seems to increase when venture specialists collaborate with sustainability managers. This is supported by the remark by Ferdousi (2012) that innovation development can be enhanced with cross-functional collaboration that leverages the knowledge and skill diversity in the organization. Furthermore, cross-functional collaboration can be a requirement for inspiring innovative solutions to complex sustainability challenges (Bocken and Geradts, 2020). Thus, it would be beneficial to foster dialogue between the corporate venture capital unit and the sustainability function of the corporate parent, while naturally being aware of the confidentiality aspects related to the investments. The collaboration between the corporate venture capital unit and the sustainability function or experts can be justified by the complexity of sustainability-related topics (Schönwälder and Weber, 2022) and their dependency on many stakeholders such as policymakers.

2.6 Literature synthesis

As a synthesis of the literature, it can be seen that corporate venture capital as a strategic investment approach enables companies to adopt an entrepreneurial mindset through startup investments and navigate the evolving business landscape. In today's rapidly changing environment, it has become essential for corporations to embrace innovation and adapt to new market demands. With regard to the evolving landscape, sustainability has emerged as a critical area of disruption, affecting both society and the environment in which companies operate. The concept of sustainability itself has undergone significant changes and development, encompassing various dimensions such as environmental, social, and governance factors and sustainable development goals. Companies are increasingly realizing the importance of integrating sustainable practices into their operations to mitigate risks, enhance brand reputation, and drive long-term value creation. However, while there exists ways to assess the sustainability of companies, assessing sustainability of investments can be complex, especially in corporate venture capital when dealing with startups that possess unique characteristics. Startups often operate in highly dynamic and uncertain environments, making it challenging to evaluate their sustainability performance accurately. Thus, it is crucial to consider these distinctive attributes and tailor the assessment process accordingly to ensure a comprehensive evaluation that fit the needs and resources of both the assessor and the target.

Despite the challenges in assessment, there are numerous motivations for incorporating sustainability practices within the CVC investment process. Firstly, investing in sustainable startups aligns with a corporation's strategic sustainability objectives. Secondly, sustainability-focused investments contribute to a positive societal and environmental impact, promoting corporate responsibility and enhancing brand image. Moreover, integrating sustainability practices can help mitigate regulatory and reputational risks associated with environmental and social issues. When the collaboration between corporates and startups is approached correctly, corporates can become valuable partners for startups in their growth journey. Corporations bring substantial resources, industry expertise, and market access to the table, which can significantly benefit startups. By leveraging these synergies, startups can access capital, scale their operations, and navigate complex business landscapes more effectively, which can then increase the overall sustainability benefits. Overall, given the challenges and possible benefits of sustainability in corporate venture capital investments, it is in particular interest to see how practitioners see the role and execution of sustainability assessment and development in CVC startup investments. This will be examined in the empirical part of the thesis.

3 Research methodology

In this section, the research methodology is presented. The section goes through the design of the empirical research part by part, from the philosophical research stance to concrete techniques and procedures. Furthermore, the research techniques are elaborated more with detailed reviews of data collection and data analysis. Finally, the data structure that follows from the analysis is presented at the end of the section.

3.1 Research design

The aim of the thesis is to create understanding of how CVC investors can assess and develop startup sustainability, and what underlying factors there are to startup sustainability, both largely unstudied areas, which makes the present research qualitative and exploratory in its nature. The choices in research design are interrelated and build on top of each other, affecting the different levels of research, from the philosophical stance all the way to the practical choices. Figure 11 provides an overview of the different design layers and the research related choices, which will guide the empirical part of the thesis. The choices made for the present research, indicated with bolded and underlined text in Figure 11, cover the different levels of design ranging from the philosophical positioning down to the technicalities of the research. Next, detailed reasoning and assumptions behind the design choices are presented.

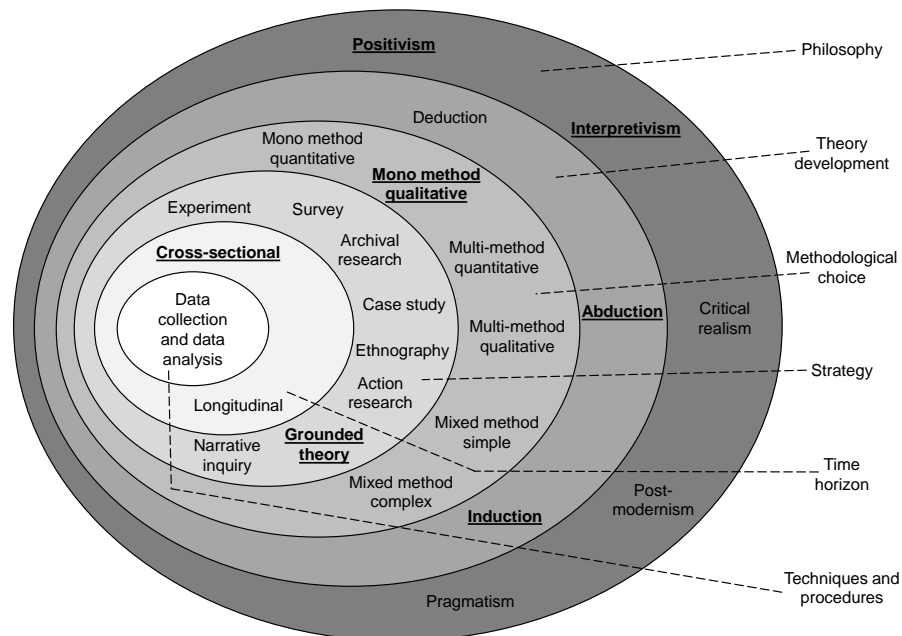


Figure 11: Design choices of the present research from the universe of research choices. Adapted from Saunders et al. (2019, p. 130).

Research philosophy

On the outermost layer of Figure 11, research philosophy grounds the beliefs and assumptions regarding the development of knowledge. Saunders et al. (2019) present that there are five major philosophies in business and management research: positivism, critical realism, interpretivism, postmodernism, and pragmatism. The philosophies differ between each other on their views of nature of reality, acceptable knowledge, and influence of values (Saunders et al., 2019). From these research philosophy stances, interpretivism and positivism are relevant for the present study.

In interpretive research, the assumption is that reality is accessed through social constructs such as consciousness, shared meanings, and instruments (Myers, 2013). Moreover, the interpretivist view considers that observable phenomena have subjective meanings, and the reality is accessed by analyzing these subjective details (Saunders et al., 2019). Interpretivism also sees the researcher's values playing a role in the research process (Myers, 2013; Saunders et al., 2019), which means that the researcher has an effect to the research. This must be taken into account when designing and conducting data collection and analysis to ensure neutral position. Interpretivism is a suitable positioning when researching approaches to assessing and developing startup sustainability, which are realized through the sense-making of actors in the studied institutions.

On the other hand, positivism accesses reality through observable and measurable facts and entails producing law-like generalizations from the observable reality (Saunders et al., 2019). The positivist approach can be seen in the parts of the research where it is studied what approaches are used by practitioners, and which of them are common. As a result, elements from both interpretive and positivist philosophical stances are present in the research, which is highlighted in Figure 11.

Theory development approach

Following the philosophical positioning, the next layer is the approach to theory development. Typically, the choice is between deduction and induction (Bryman and Bell, 2011; Saunders et al., 2019). In a simplified sense, the difference between these two approaches is that the research process goes either from theory to observations and findings, i.e., by deduction, or from observations and findings to theory, i.e., by induction (Bryman and Bell, 2011). More specifically, Saunders et al. (2019) state that deductive approach is used when the research starts with theory and a research strategy is then designed and used to test the theory. Conversely, when the research starts from collecting data of a phenomenon to build theory, inductive approach is being used (Saunders et al., 2019). When comparing the present research to the descriptions of these two theory development approaches, it can be seen that inductive approach is used. It is the suitable choice as the aim is to build a conceptual framework based on empirical observations.

However, there also exist a third approach, abduction, where theory or hypotheses are developed in a way that would best explain observations that have been made (Saunders et al., 2019). There can also be seen abductive elements in the research, as the literature review is partly developed simultaneously with the interviews, and it

explores and elaborates concepts mentioned by the informants. Thus, both inductive and abductive theory development approaches are present in the research, as is indicated by the second outermost layer of Figure 11.

Methodological choice

After the approach for theory development, the following step is making the methodological choice, i.e., choosing between qualitative and quantitative research, and the number of research methods. In the research of this thesis, a single data collection approach is used, which is semi-structured interviews along with the corresponding qualitative analysis, making the methodological choice mono method qualitative. The interconnectedness of the design layers is visible here, as there is often an association between qualitative research and interpretive philosophy, resulting from qualitative researchers having to study the researched phenomenon through subjective and socially constructed expressions (Denzin and Lincoln, 2017; Saunders et al., 2019). The research also leverages secondary data sources, such as informant company websites, to triangulate the results. However, the role of secondary data sources is small, and thus the mono method is indicated in Figure 11, instead of a multi-method choice. The focus on the empirical interviews is also reflected on the literature review. The approach taken in conducting the literature review focuses on building a path from general corporate venture capital and sustainability considerations in the literature to the more specific sustainability aspects in startup investments made by corporate investors, instead of trying to cover exhaustively all possible details related to the research topic. This approach to the literature review is in line with the note by (Gioia et al., 2013) that in this type of research the literature reviews will not be extensive or exhaustive, given the presumption of semi-ignorance of prior work.

Research strategy

After the choice of theory development approach comes choosing suitable research strategy or strategies. Research strategy acts as the link between the research philosophy and the chosen methods for data collection and data analysis (Denzin and Lincoln, 2017). Strategies often associated with qualitative research are: action research, case study research, ethnography, grounded theory, and narrative inquiry (Saunders et al., 2019). For the research of the thesis, grounded theory is chosen. It is suitable since the aim is to build concepts from multiple accounts. Grounded theory is not designed for hypothesis testing, but rather the concepts and theory should emerge from the data (Myers, 2013). The grounded theory strategy entails that the theoretical views from the literature review are not extensively carried over to the empirical research (Gioia et al., 2013). Instead, in grounded theory research, the voices of the informants play a large role. As a result, the literature review is conducted along the empirical study, and it is partly used to elaborate concepts mentioned by informants.

Time horizon

Another important design choice is the time horizon of the conducted research. From the two possible choices presented in Figure 11, cross-sectional research entails collection of data at a single point of time (Bryman and Bell, 2011). Longitudinal studies entail studying a phenomenon over time, often focusing on change and development (Saunders et al., 2019). In the present study, the aim is to study the approaches for sustainability assessment and development by different players in the investment domain. Thus, the suitable approach is cross-sectional study.

Techniques and procedures

Finally, the most practical layer of the research design includes the technical and procedural choices. The data collection and analysis are following largely approaches of the Gioia methodology (Gioia et al., 2013), which is an adaptation of the grounded theory strategy. These aspects are covered in the following two subsections, which depict first data collection and then data analysis, covering the innermost circle in Figure 11.

3.2 Data collection

The chosen method for data collection is semi-structured interviews, which is the recommended approach by Gioia et al. (2013), as it allows obtaining retrospective and current accounts of the phenomenon of interest straight from the people involved. The semi-structured interview builds around an interview guide with prepared questions related to the themes of the research questions, complemented with probes eliciting more elaborate responses when needed (Qu and Dumay, 2011). Gioia et al. (2013) suggest a similar approach that the interview protocol should be focused around the research questions, and they also add that there should not be questions that are leading the interviewee. The aim of the interview structure is to keep the interview within the thematic frame, but also allow for flexibility and emergence of new ideas. As a grounding assumption for the data collection, the stance is that people in organizations, when constructing their organizational realities, know what they are doing and can explain their thoughts, intentions, and actions (Gioia et al., 2013; Gehman et al., 2018). This stance is supported with the notion that the organizational practitioners are the most knowledgeable agents in the present field, where academic research is limited.

To get a holistic view of sustainability in CVC investments, data is collected from the different parties in investment syndicates of startup investments. As noted in the literature review, CVC units often coinvest with VCs. Due to this reason, independent VC investors are included in the interviews along with CVC investors. This is compliant to the suggestion by Eisenhardt and Graebner (2007) that knowledgeable informants, who view the phenomena from diverse perspectives, should be used to limit interview bias. Separate and focused interview protocols were created for both of these stakeholder groups to guide the interviews without too many restrictions. The protocols were used to cover the areas around the research

questions, but also depending on the discussions and informant answers, some other questions were asked. Moreover, the protocols were iterated few times during the first interviews to include additional questions that were brought up and remove ones that were found unsuited, which follows the suggestion from Gioia et al. (2013) that the interview questions should be changing with the progression of the research. The final interview protocols can be reviewed in Appendix A.

The interview protocol for CVC investors consists of five sections. The first section includes questions on the general level about the approach to startup investments. The questions in the second section cover aspects around sustainability motivated investments. The third section focuses on sustainability assessments. The fourth section contains questions about sustainability development from the relationship between a startup and a corporate investor. Finally, the fifth section contains some concluding general questions as well as questions about possible new informants and relevant materials.

The protocol for VC informants has 4 sections. The first three sections cover sustainability investments, sustainability assessment, and sustainability development, largely in a similar way as is done in the protocol for CVC informants. The fourth section focuses more on how VC investors see CVC investors compared to themselves and what role differences there might be. In addition to the aforementioned protocol sections, in the beginning of the interviews the informants were asked to provide a brief introduction of the company or the fund and their role in it.

The data collection is done following the principles set by grounded theory strategy. The data for the research is collected with purposeful sampling, also known as purposive or theoretical sampling, which is a typically used approach in qualitative research (Patton, 1990). Purposeful sampling is the opposite to probability sampling, the usual method in quantitative research, by the fact that the sampling is made by the judgement of the researchers, thus making the process non-random (Patton, 1990). The goal of the sampling method is to reach theoretical saturation instead of population representativeness (Gioia et al., 2013; Patton, 1990; Saunders et al., 2019). Thus, interviews were had with new informants until new interviews did not reveal information that had not been discussed in the previous interviews. When choosing the entities to be interviewed, the aim was to pick informants from multiple industrial fields, where the sectors and more specifically investment approaches were alike. This was done in order to get results that could be generalized. Furthermore, the practical interest of the mandator of the thesis was also considered by checking that the sample was constructed from CVC investors that were related to the mandator's field, forest industry, by the industry type and in terms of investment style. However, other forest industry companies were explicitly excluded for competitive reasons. Also, VC investors were chosen through a requirement that they were active in similar investments as the chosen CVCs. Sampling was done by creating predetermined criteria and then identifying and selecting informants that met the requirements. For corporate venture capital units, the criteria was:

- The parent company of the CVC unit is operating in an industry that is related to the forest industry by industry characteristics and capabilities of the

companies.

- Similar investment approach in terms of pursuing strategically motivated targets, such as new process technologies, energy types, or materials innovations.

Similarly to corporate venture capital investors, criteria was defined for venture capital investors to find suitable candidate funds. For independent venture capital funds, the criteria was:

- Investments in the same areas as the chosen corporate investors.
- Communicating sustainability focus in investments.
- Has done investments with corporate investors.

Then, informants who were involved with investment activities were identified in the potential companies and funds. Interview requests were sent for potential informants meeting these criteria until theoretical saturation was reached, which resulted in contacting 21 CVC informants out of which 15 agreed to an interview, and contacting 8 VC informants out of which 7 participated. Each informant was from a different company or fund. In addition to the interviews with the CVC and VC informants, two expert interviews were held before interviews with the other informants. The summarizing list of informants is presented in Table 2.

The resulting list of 15 CVC informants is presented in the first group of Table 2. By industry, the CVC investor informants are from chemicals, materials, and energy industries. The distribution of informants in these industries is presented in Table 3. As stated before, other forest industry companies were not included in the study for competitive reasons. The geographical distribution for CVC investors, based on the parent company headquarters location, includes companies from Europe, Middle East, Americas, and Asia, with most of the respondents based in Europe. Based on this classification, the corporate informants represented 10 different countries. The size of the informant companies, measured by 2022 revenue in euros, is 3 companies with revenue less than 10 billion, 7 companies in the 10 to 50 billion range, and 5 companies in the 50 to 100 billion range. Given the size of the chosen companies, they have operations in multiple countries with some having global presence, and thus for most informants the geographical investment scope included several nations or was global.

The list of VC informants is presented as the second group in Table 2. All the chosen VC funds are based in Europe, representing 6 distinct countries, and thus most of the VC informants were looking at opportunities in Europe, but several were also following other geographical areas. All the interviewed VC funds and informants had some level of sustainability focus, with most being especially focused on environmental sustainability aspects.

Finally, the expert informants are in the third group of Table 2. The experts interviewed were high level sustainability focused employees in the mandator company, one being Vice President of Climate and Circular Economy and the other Vice President of Sustainability Management. Unlike the interviews with CVC and VC

Table 2: List of interviewed informants.

Group	Label	Informant Role
CVCs	CVC 1	Technology Scouting Manager
	CVC 2	Investment Manager
	CVC 3	Venture Director
	CVC 4	Venture Partner
	CVC 5	Investment Manager
	CVC 6	Investment Director
	CVC 7	Senior Investment Manager
	CVC 8	VP of Ventures
	CVC 9	Senior Investment Manager
	CVC 10	Investment Advisor
	CVC 11	Senior Investment Associate
	CVC 12	Investment Associate
	CVC 13	Senior Investment Associate
	CVC 14	General Manager
	CVC 15	External Ventures Manager
VCs	VC 1	Senior Investment Lead
	VC 2	Investment Manager
	VC 3	Partner
	VC 4	Investment Manager
	VC 5	General Partner
	VC 6	Partner
	VC 7	Investment Manager
Experts	Expert 1	VP of Climate and Circular Economy
	Expert 2	VP of Sustainability Management

Table 3: Distribution of CVC informants in the chosen industries.

Industry	Count	Informants
Chemicals	7	CVC 1, 3-7, 11
Materials	4	CVC 8, 10, 14, 15
Energy	4	CVC 2, 9, 12, 13

informants, the expert interviews were unstructured discussions about sustainability in the corporate context and in corporate venture capital investments. This approach allowed the expert informants to provide a range of open-ended ideas that could be then reflected against answers from CVC and VC informants.

The semi-structured interviews were held between February and April 2023. The language of the interviews was either English or Finnish, with the majority being in English. Possible quotes from the Finnish interviews were translated directly to English. The interviews were conducted as video calls using the business communication platform Microsoft Teams, which allowed recording and transcribing the interviews with permission from the informants. One informant requested for

the interview not to be recorded and transcribed, in which case written notes were made during the interview. The length of individual interviews ranged between 30 and 60 minutes. The two unstructured expert interviews were both 60 minutes in length and were not recorded or transcribed. However, for both, written notes were made during the interviews.

In addition to the data through interviews, secondary sources were used to gather data for triangulation. The secondary data was mainly collected from the websites of the institution of the informants and in some cases from the documents provided by the informants. Collected secondary data includes descriptions of investment approaches, other background information that did not come up during the interviews, and sustainability assessment or measurement templates.

Table 4: Types of examined secondary data.

Type	Informants
Website	CVC 1-15, VC 1-7
Sustainability assessment templates	CVC 11-12, VC 5
Other assessment materials	CVC 2, VC 1
Sustainability disclosures	VC 3-5

The collected secondary data was then used to triangulate the data obtained through the interviews and thus increase the credibility of the results. Eisenhardt (1989) note that triangulation through multiple data collection methods strengthens the substantiation of developed constructs.

3.3 Data analysis

When it came to analyzing the empirical data, the Gioia data structure was applied as the chosen method of analysis and also as an approach for adding rigor and transparency (Gioia et al., 2013). Following the practices for the data structure in the Gioia methodology, the analysis starts with 1st-order analysis, where the interviews are categorized with initial coding that tries to follow the terms of the informants. Familiarization with the data and initial analysis started already after the first interviews while writing up the discussions using the recordings and transcripts. In the first phase, the number of codes can rise quite high, which is expected and acceptable (Gioia et al., 2013). This was observed in the research as the number of codes rose initially to around 500 codes when sticking to the informant terms. Following the approach by Gioia et al. (2013), equivalent codes were then combined into first-order concepts, which resulted in a much more manageable number of 34 concepts. Then as the research progresses, there starts to emerge similarities and differences also between the concepts. Using these connections, a more abstract, 2nd-order theoretical level of themes is derived. Finally, the second-order themes are classified under aggregate dimensions, completing the data structure. Furthermore, the data structure, along with the analysis of findings, should be translated into a grounded theory model that shows the connections between the emergent concepts, themes, and dimensions, which cover the researched phenomena (Gioia et al., 2013).

The developed model and data structure are complemented with written analysis and informant quotes to emphasize crucial parts of the interview findings.

Gioia et al. (2013) argue for semi-ignorance of the literature until after the data gathering and initial stages of analysis in order to decrease the potential for confirmation bias and avoid influencing the informants during the interviews. Thus, the results from the literature are considered at the stage of discussing the implications of the results. The research follows the suggestion for a literature review from the Gioia methodology, which suggests for relatively light review. However, the literature is nevertheless considered at the stage of discussing theoretical contribution, which provides a rich representation of views given that the interview and analysis process was not guided by the literature. The results of the analysis are structured and presented using a Gioia data structure, which can be seen in Figure 12, and which will be covered in more detail in Section 4. Then, the resulting grounded theory model is presented in Section 5 along with discussion of the results.

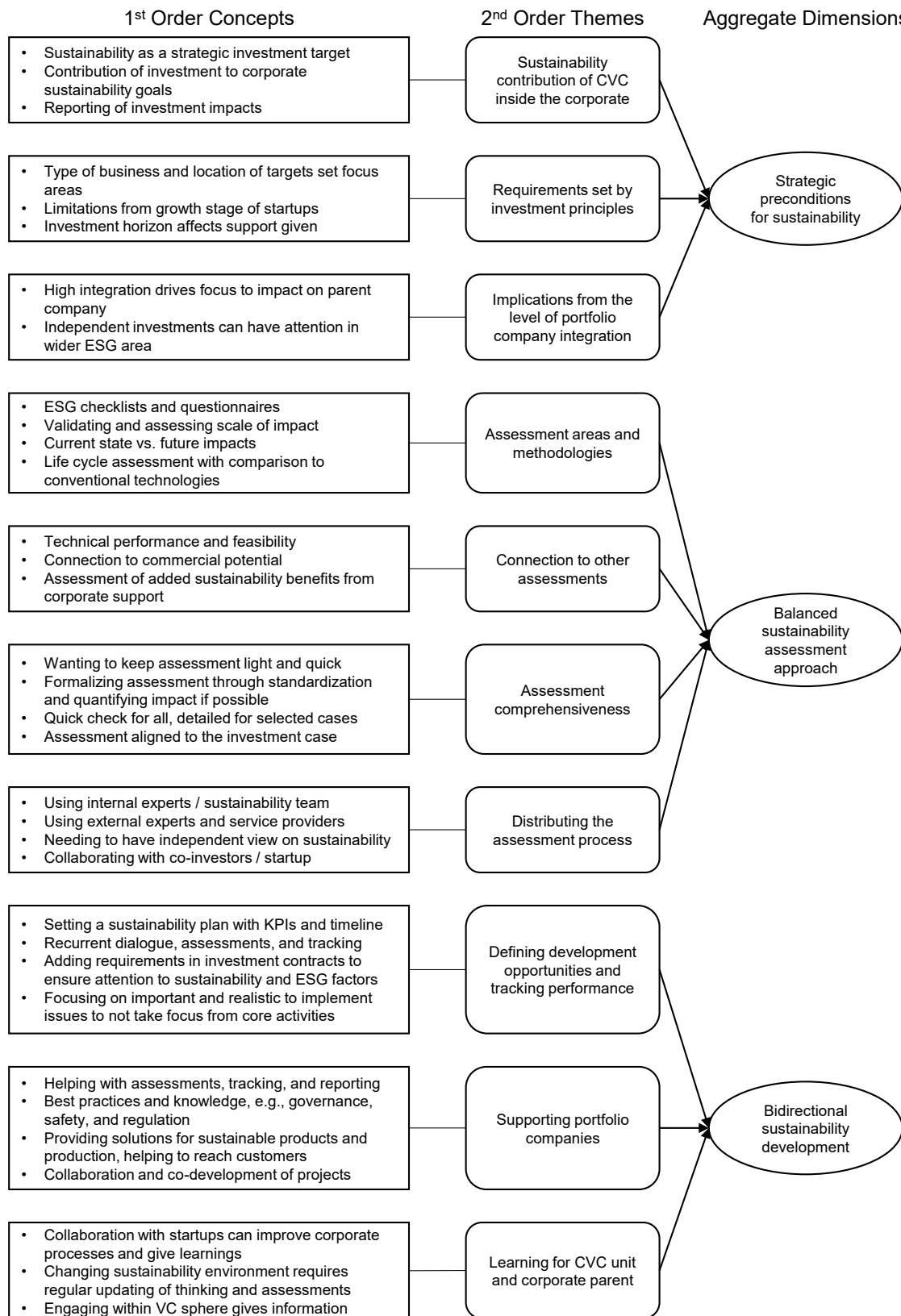


Figure 12: Data structure of central dimensions, themes, and concepts.

4 Findings

In this section, the findings of the empirical study are presented. Analyzing the interview data led to identification of three aggregate dimensions, shown in Figure 12, which make up the considerations on how to approach sustainability in the domain of corporate venture capital. The identified dimensions include strategic preconditions for sustainability, balanced sustainability assessment approach, and bidirectional sustainability development. Furthermore, the dimensions show a progression from a chosen investment approach, to assessing possible startup targets, and finally to supporting portfolio startups.

4.1 Strategic preconditions for sustainability

CVC investors have a strategic role inside the parent company, and usually several strategic goals in their venture investments in addition to the financial goal that is shared with the independent VC investors. These strategic elements also affect the way sustainability is managed in the investments. Approaching sustainability in corporate venture capital investments begins by determining the underlying strategical elements of why sustainability is an area of interest for the corporate venture capital unit and its corporate parent. Analysis of the interviews led to identification of three main themes that can be considered integral for driving how potential targets are searched, assessed, and supported in terms of sustainability. As can be seen from the data structure in Figure 12, these thematic areas are the desired sustainability contribution of CVC inside the corporate, requirements set by investment principles, and implications from the level of portfolio company integration. Next, these themes are covered in more detail.

4.1.1 Sustainability contribution of CVC inside the corporate

The interview discussions indicated that the first theme that corporate investors should think about when considering sustainability in CVC investments is the role of the CVC unit in supporting the sustainability of the parent company. With this in mind, most of the corporate informants stated sustainability as one of the strategic goals for their investments. Observing sustainability as a strategic goal reveals several possible submotives. First, sustainable CVC investments can act as one of the enablers for the parent company and industry sustainability transition.

We are currently focusing our investment scope, and it will become more and more about accelerating green transition [around the parent company core business areas].

- Venture Partner, CVC 4

We invest in disruptive technologies and new business models that could enable or help or support us in order to achieve the commitment that we want to be a zero emission company in our daily operations.

- Senior Investment Associate, CVC 13

Expert 2 echoed on these transition motives by stating that investments in sustainable new ventures help in making the parent company future-proof and ready for future operations. In addition to solely supporting the sustainability transition, the investments can be motivated by an aspiration of creating new business around sustainability.

It is really about trying to gain access to new differentiated technologies that help us accelerate our business, particularly in the areas of sustainability.

- Senior Investment Manager, CVC 7

Continuing the business perspective, another reason for sustainable investments can be also creating new markets for the offering of the parent company through sustainable startups. With investments to sustainability startups, the CVC unit and the corporate parent can support emerging solutions to replace, for instance, incumbent materials with more sustainable materials, especially when the corporate can supply these materials to the startups.

Fiber is an outstanding material to replace plastic in any sort of fossil based products. So we got such nice opportunities and also a very positive market fundamental. [Our industries] really need to have the fresh voice and the fresh technology and fresh ideas from the external, especially the younger companies.

- General Manager, CVC 14

Thus, by investing and supporting new ventures close to their offering, a corporate can try to favorably influence the market view on what will become the sustainable alternative for current incumbent solutions that are seen unsustainable. Some corporate investors are also looking to make bets into the future in sustainable technologies that might become important, even if they currently seem distant.

In an energy company like us, probably our impact is quite small in comparison with others business units, but it helps. Especially when we are dealing with technologies that maybe nowadays don't make sense, or they are not quite profitable, but who knows, maybe with our support there will be some technology that they will help us in the next coming 5 to 10 years.

- Senior Investment Associate, CVC 13

However, not all strategic investments have necessarily sustainability angle. A big challenge around sustainability is greenwashing, and thus sustainability angle should not be forced to all startups. For some strategic startup investments, it might be hard to explain what is their sustainability angle, and for these, there should not be added some insignificant sustainability impact claims to say that they are sustainability driven. Thus, for investments it has to be thought what is the key impact and if it is sustainability related or something else.

We invested in a company, they have artificial tissue model and measurement methods for artificial tissue. Of course, you can argue that this is also sustainable because you don't need animal testing anymore. On the other hand, they do not play in the field of CO₂ reduction, or waste reduction, or circularity, or whatever. So this is just a testing method for personal care products. This is also important for us and we invest in them as well and there of course we don't have these strict rules regarding our sustainability codes. [...] Avoiding animal testing is kind of aspect, maybe in the social area, but I think it would be only a small factor. I think it's really more important what is the uniqueness of your method to make these kinds of measurements and the company is unique.

- Investment Director, CVC 6

Even if an investment does not have a sustainability angle or significant sustainability impact, it should be compliant with the overall sustainability agenda and do no harm.

We believe that all products and services that our company is delivering are about sustainability, and that's why when we say strategic fit [to the parent company] in a nutshell means to what extent the certain technology or certain company might fit into the overall sustainability agenda.

- Senior Investment Manager, CVC 9

Informants also pointed out that although sustainability plays a part in the investments, the strategic role of most CVCs is not being impact investor. Thus, while CVCs follow different sustainability aspects, they do not need the same level of rigor as impact investors.

There are investors that say we are impact investors, we are only looking at sustainability aspects and so forth. They will apply a much more rigorous checklist, because it's in the core business. If you make the statement, I'm an impact investor specifically looking at sustainability, then the sustainability articulation of their investment deal needs to be fairly well stated and fairly strong. So I'd say that's a choice. And so do we have a very rigorous way of doing the initial analysis. I would say no. Do we keep track of it as we're looking at the information, then the answer is yes.

- Technology Scouting Manager, CVC 1

Investment manager of VC 4 notes that although it is possible for corporates to invest in sustainable technologies and solutions for just the sake of being more sustainable, there are often other business motivations such as cost savings from increased efficiency or increased sales through meeting customer requirements and marketing.

I see corporates only engaging in new technologies if there is a clear benefit for them. And often not just sustainability benefits, and this can be, for example, energy reduction in their chemical plants. So this is from a cost savings perspective and so really financial driver. You also see corporates who invest, for example, in sustainability and sustainable chemicals or sustainable materials because they think that we can make some good business with this because there is a customer requirement. So is this really from belief that they should do something good for the environment, I'm not sure. This is more from a marketing perspective and from the current trend and the request from their customers. But you also have corporates who just invest to make the transition and do that for their own sustainability goals and reporting.

- Investment Manager, VC 4

Given that there are secondary opportunities when making sustainability investments, such as marketing, it is sensible to think about the aspects of communicating and reporting the sustainability aspects of the CVC investments. The movement of independent VCs towards sustainability practices in their investments have largely been motivated by the requirements of their limited partners (LPs), and by sustainability reporting regulations in the financial services sector. However, although the parent companies can be seen as the LPs imposing requirements for CVC investors, CVCs do not have reporting duties regarding sustainability in the same level that VCs have.

We don't need to report on ESG topics. If you're a fund that operates under article 9, then you have to do ESG reporting. I've seen those funds active and the questions that they ask are much more in depth than what we currently do. It's something we could adapt in our due diligence, for sure, but I don't see us being an Article 9 fund.

- Investment Manager, CVC 5

Thus, the informants view that CVC investors do not have a strategic requirement for as detailed sustainability assessment for startups as sustainability focused venture capitalists have. However, CVC investors should think who are the relevant stakeholders for them. CVCs should think about whom they report to and who is interested in the sustainability of the investments. The corporate often has to report to shareholders, and investment impacts could be shared in the corporate sustainability report. This stakeholder consideration was also suggested by Expert 2, who mentioned doing stakeholder analysis to understand the strategic requirements and resulting focus areas for sustainability. However, there are limitations to the sustainability considerations in areas that can be interesting to many stakeholders, as defining concrete numerical impacts that could be claimed by the investor are often hard to define. This challenge is noted by VCs, who have been reporting different sustainability impacts of their investments already for a longer time.

We do make an assessment up front before making an investment of what could be the impact of the company if it makes its business plan. Then every year we make an estimation of what has been realized, and we report on that to our shareholders, and they like to see those numbers, but I don't think they really do a lot with those numbers. Some investor asked us one time, can we get credits out of this if we are a minority shareholder in the fund and you realize 1 million tons CO₂ reduction. I don't think it's that easy at this point in time.

- General Partner, VC 5

Moreover, even if some impact can be defined, it is usually small in the scale of the corporate parent and its operations.

It is our intention to report also the ESG development of our portfolio companies as a part of the wider ESG reporting of the parent company. [...] in the scale of the parent company, the ESG effect from these small startups is quite small, and it will not show much in the numbers, so it would be more on the qualitative side that how the parent company invests in these [sustainable] companies and how it accelerates green transition.

- Investment Associate, CVC 12

The difficulties in quantifying impacts and being able to claim them results in more qualitative reporting. The more qualitative reporting of investments in sustainable startups can be raising public awareness and promoting the actions of the parent company.

I feel that in terms of measurable [sustainability] results, most of the work is being done in the business units. [...] Then we [CVC unit] are a significant actor in PR sense, as we display the commitment of the parent company to accelerate the transition and that we are helping in many fronts.

- Venture Partner, CVC 4

As we report case studies on sustainability, we would like to start reporting more case studies on the startups we invest in [...] and see how some of these startups have helped, are well aligned with our goals with sustainability, and what's their track progress on this on these. [...] We would definitely have to talk, bring in our sustainability team and ask them what they want to see and what they want to report and track.

- VP of Ventures, CVC 8

Naturally, when aiming to report sustainability effects or case studies from CVC investments, collaboration with corporate sustainability department is needed to get alignment with corporate sustainability goals and to track right metrics. This again highlights the stakeholder perspective for defining strategic preconditions for sustainability.

Altogether, CVC investors need to think what is their reasoning behind strategic sustainability investments. In addition, they have to be thinking about how the investments are contributing to the corporate sustainability goals, as well as how the impact from the investments are to be reported. Thus, first corporate needs to determine what is the role of sustainable CVC investments, is it to report cases in the sustainability report, or is it to make long term plays in potentially disrupting innovations, or to replace incumbent solutions with more sustainable ones. These considerations will then drive the choice of what sustainability dimensions and metrics are assessed and in what detail.

4.1.2 Requirements set by investment principles

In addition to the desired sustainability contribution of the CVC investments, the sustainability assessments and collaboration with startups are affected by the investment principles of the CVC unit. Often CVC investors can have determined several guidelines for their investments such as industry, type of technology, growth stage of targets, geographical location, and holding period for the investments. All these factors then affect what are material areas in sustainability assessments and support that is provided for the portfolio companies.

Arising from the geographical location and type of business of a startup, different factors related to environmental, social, and political aspects can have an effect on the sustainability assessments, especially in terms of what is seen as material assessment areas for environmental and social sustainability.

So it depends on the nature of technology and where they are because for instance, if you have a startup which is developing certain things and based somewhere in the Nordics then probably we will focus more on the environment and maybe governance. For a similar startup based in a developing country, probably in addition to those, you also want to look into social effects, right. For instance, child labor usage, forced labor, all of that. You have reasons to believe that child labor should not be a massive issue in the Nordics, probably there are enough empirical evidence to not go into there too much, but if you go and work with the startup in some developing country, there are probably reasons to believe that this should be very much carefully looked upon. So that's what very much depends on the type of the business we are looking at and specific location.

- Senior Investment Manager, CVC 9

Many of the sustainable innovations are more long term plays and might need some regulatory support and push, and this regulatory environment is different between countries, which also affects the way sustainability and feasibility of sustainable solutions are assessed.

You need to have some push from regulation because in terms of economical viability, it's not always the case. So usually it's more long term vision, and you need to have some pressure from the government to have traction

about some solutions. So in some countries this is not the priority.

- External Ventures Manager, CVC 15

Also, depending on the location of the startup, different resources can have different sustainability profiles. For instance, the solution of a startup can be electrification of processes or replacement of fossil fuels with alternatives produced with electricity, but then you have to consider the electricity mix available in that country.

We find that many times when it comes to production, we are going over to electrification and when you start with electricity as the power source, you can always use the electricity mix or the CO₂ mix in the country or the different countries that are going to be the markets for the company.

- Investment Manager, VC 7

For electricity, there are also different CO₂ rates that you have to put into your estimation. So if you're in Norway, it's different than in Germany, for example, with the green energy that is available, so this we take into account as well.

- Investment Director, CVC 6

Similarly, the usage of different resources such as water have different significance and implications in different geographical areas.

If you have a startup with a high water consumption in Finland, it's not so difficult as in Spain. So it always depends on which region you are and how far certain raw materials have to be transported to get there. This is part of the due diligence to see what is the environment around the company.

- Investment Director, CVC 6

As a result, investors need to think about the effects from the geographical location as a strategic precondition, because often they have defined some geographical limitations or focus areas to their investments. On the other hand, the location assessment could be seen as one of the normal due diligence items too.

Investors should also think about aligning their approach to the maturity of the startups they are investing in.

The different parts [of possible sustainability assessments] are differently important to each company depending on if it's an early stage research based company without production or if it's a later stage growth case.

- Investment Manager, VC 7

Investment Manager of CVC 2 stresses this point that sustainability assessments will have to follow a similar cycle tied to the growth stage of targets as other assessments in terms of detail and validation possibilities.

In my opinion, it [sustainability assessment] is linked to the maturity level. If you're looking at early stage startup, the whole company is still a question mark, so you cannot assume that the ESG maturity and assessment readiness is on high level if the financial model is some back-of-the-envelope Excel calculation. [...] In ESG aspects, you have to take into account that you can validate them at the same level as other aspects such as financials, tech readiness, and team. [...] You need to acknowledge that you cannot assess everything at this stage.

- Investment Manager, CVC 2

It can be seen that sustainability assessments get more formal and cover a larger number of subjects with later stage startups.

The significance [of sustainability assessments] grows as the company grows. So in late stage funding rounds, the ESG due diligence by late stage investors is much more extensive.

- Investment Associate, CVC 12

Given that there are several possible growth stages for startups and also for the technologies they are developing, there are large differences between the impact possibilities. For some, the technology might be still far away from commercial deployment and the development is more for future effects, while with other companies the technology might be ready to be deployed in existing value chains. Informants see that actions are needed at the current moment, and thus new solutions that can be readily implemented and integrated to better corporate footprints are important.

To be to truly sustainable, I think everybody can do it, it's just a matter of time and cost, but we are in the middle of urgency to solve all these sustainability related problems like environmental problems. So, we cannot wait forever to have this real solution.

- General Manager, CVC 14

However, there is need for both type of investing. Radical innovations that are 5 or 10 years away from realizing can be really impactful down the line. These are also investments where informants see corporates having a chance to be more supportive than independent VCs, given the possibility for a longer investment horizon.

We are an evergreen fund, so we are able to support the company on the longer term, when most of the [VC] funds, they have an 8-10 years lifespan and so after a certain period they won't even invest.

- Senior Investment Associate, CVC 11

Our focus is not like a short time return, but our basic policy is to grow the company together until they are really considered well established, and they are recognized in the marketplace as one of the major solution providers or one of the major suppliers of the materials.

- General Manager, CVC 14

We don't want to exit [the portfolio companies]. The idea is really to create a partnership for a long time to create value together. So we are not looking for return on investments. The idea is really to help provide new solutions on the markets, and the only times when we have exited are when there was an IPO or something like that. Otherwise, we just want to keep the relation as long as possible.

- *External Ventures Manager, CVC 15*

Where there is misalignment [in investment approaches], maybe, is the overall goals like timeline to exiting the company, corporate can wait, we can't afford to wait.

- *Partner, VC 3*

Still, long investment horizon is not a constant in CVC investments and investors can enter into startups with an intention to exit the investment in a few years as the company grows, due to, for example, the next investment round being out of the investment scope for the corporate investor who is just interested in early stage startups.

In some instances, we exit the company before it actually reached certain maturity that would allow making those [sustainability impact] calculations. And so you can't really see the [sustainability] benefit of the investment, if it will be there. [...] the company is still like 10 years away from actually having a product on the market [...] and when we invest now, it's really not, let's say, relevant to see what will be the benefit in two years.

- *Senior Investment Associate, CVC 11*

Taken together, with the variety of different industries and types of startups, it is harder to have standard assessment if investments are made to all kinds of companies. If the CVC investor is investing in startups in some limited and preselected geographical area, and the business types of the startups are alike, the sustainability assessment framework can be standardized much further, of course noting the limitations arising from the growth stage of the targets and the planned holding period. Thus, CVC investors need to think through the investment principles they have in place and aim to understand what requirements those set for sustainability considerations.

4.1.3 Implications from the level of portfolio company integration

Another theme affecting the sustainability considerations is how integrated the investments are to the corporate parent. The desired contribution of the investments, the investment principles, and also the way corporate investment is structured inside the parent company have an effect on how integrated the relation to the portfolio companies is. This then has an effect on what sustainability factors are considered and where there can possibly be a more flexible approach to sustainability.

I have corporates which invest from a corporate venture arm, but you also have corporates which invest from the balance sheet. So that's already a difference and then if you look at the corporate venture departments, you have corporates who have a very independent venture departments, but you also have corporates who have a venture department which can only invest if the business unit aligns. So this already makes a lot of differences in how corporate VC or corporate investment occurs and how they think and how they will report in the end.

- Investment Manager, VC 4

In terms of portfolio company integration, the corporate investors, who invest from the balance sheet, often require high level of integration and collaboration. This is followed by venture units who need business unit alignment in their investments. On the other hand, the more independent CVC units are able to do more independent investments, where there is less integration to the corporate parent and smaller amount of collaboration. Many of the corporate informants described how they seek to have collaboration and projects within the parent company to improve the sustainability profile of the corporate, while also bringing other benefits to both sides.

What we are really focusing on is trying to help our portfolio companies collaborate and create value with the group, and when I say create value it has to be both in terms of revenues but also taking the group closer to the sustainability goals that we have, like carbon reduction.

- Senior Investment Associate, CVC 11

This linkage to the parent company operations and processes then drives the sustainability assessment towards the possible impact that the startup can have in relation to the parent company.

What we try to look at in our assessment is what could be the potential impact of that technology upon the existing processes [of the parent company].

- Senior Investment Manager, CVC 7

Furthermore, the strategic and collaborative requirements limit the number of possible startups, so corporate investors cannot be as extensive and exhaustive in the other ESG assessments if they want to have a sufficient number of possible investment targets.

We are CVC, so all innovations we are looking have to be linked to our businesses. So it's not like we have a lot of choice. [...] We don't have a lot of startups we can assess, so at the end, of course it [ESG] is really important for us, but it will be more about the technology. I think for VCs, [ESG assessments] make more sense. For CVC, as we don't have a lot of choices, we will have less opportunity to do these assessments.

- External Ventures Manager, CVC 15

General Partner of VC 5 also notes this difference, that the alignment required by corporates with more integrated investments results in the need for more flexible sustainability assessment.

We like to invest in companies that can become business units of big corporates. I think CVCs are not necessarily doing that. They can do that as well, but they can also invest in companies that have technology that is very relevant for existing business units, and then you probably don't want to have those strict parameters with respect to ESG, so I think they should be more flexible.

- General Partner, VC 5

The informants note that although there can be many benefits in close collaboration and integration of the portfolio companies, corporate investors need to consider leaving enough independence for the startups to not make them harmfully dependent and limiting their innovation potential, which can be a risk especially within the sustainability dimensions where a startup might be seeking for radical sustainability innovations while corporates focus more on improvement of incumbent solutions.

We are not taking more than 25% of the startup's shares, and we want them to be independent. [...] For us, the idea is to really push their ideas, and we have an example in the past where corporate tried to be too much [involved] in a startup. It never worked because like they are too small and with all the process of the big companies, it just kills them. So, we like them to be independent, and we don't want to have too much power on them.

- External Ventures Manager, CVC 15

CVC has another long term goal than normal VC because, they don't only see the maximum return on the investment as such, they see the maximum return of the investment for the corporate. So the problem there is with the corporate that the corporate may stray constraints on the portfolio companies, that is not perhaps the best deal for the portfolio companies. So I think along the way as when the portfolio companies grow bigger, they can have a lot more out of the investment from the corporate because at that point they perhaps need the network, the expertise, and they're able to grow faster. But you need to have a corporate that can see the big picture.

- Investment Manager, VC 7

The possible dependence on a corporate investor and its parent company can also be a concern for co-investors. Investment Manager of VC 4 gives an example on ensuring that the startup does not get too integrated to incumbent processes in order to also keep focus on the long term sustainability aspects.

For this company, within the ESG strategy, when we came in as an investor, we made sure that there was this dual R&D strategy. And that's due to the interest of current petrochemical industry so that it would not drive the time spent by the team to only the petrochemical applications, but there was still enough people working on the sustainable [applications] and the more long term sustainable aspects as well.

- Investment Manager, VC 4

As a result, it can be enticing for CVCs to invest to integrate startups and there the sustainability effects are often larger and easier to see for the corporate, given that attachment to corporate processes can give scale. Moreover, when the technology is used in the incumbent processes, the impact can be attributed to the corporate. Corporate investors with this integration aim should be most concerned with the specific sustainability impact they are trying to get from the integration if that is the purpose, but then be more flexible in the general ESG aspects, due to the very limited number of startups meeting the requirements for integration and other strategic needs. However, the basic negative screening and do no significant harm criteria should be applied also in these cases.

For other CVCs who invest with intention to learn and explore, there might not be as quantifiable effects quickly, given that often the impact is quite small compared to the corporate when the investment targets are at startup level. There the matter of attributing the impact comes also into question, as what was the contribution of the investor when the level of collaboration is lower. With these types of investment cases, corporate investors can also use more extensive ESG assessments, given that there are fewer requirements limiting the number of startups beforehand. However, the more independent investments do not have to be limited to just looking at the general ESG aspects, but there can also be some specific sustainability impact that is preferred and thus assessed.

Often the level of integration can be in between these two ends. In these cases, the corporate must be careful to not tie the startup too much into itself, as that can limit the startup's potential. It has to be thought, is the corporate collaboration somehow limiting the startup from potentially achieving even larger impact in the value chain. Furthermore, the difference between investing to integrate the technology versus investing to support the development of a separate company has implications for the sustainability factors related to the startup as a company, such as how important is to drive diversity in the startup.

4.2 Balanced sustainability assessment approach

After determining the strategic factors affecting sustainability approach, the following focus area is how a corporate venture capital unit can conduct balanced sustainability assessment of its investment targets. The interviews suggested that this aggregate dimension of balanced sustainability assessment approach contains four important themes, as seen in Figure 12. These themes are assessment areas and methodologies, connection of sustainability assessment to other assessments, factors behind

assessment comprehensiveness, and distributing the assessment process between stakeholders. Next, each of these thematic areas will be covered individually.

4.2.1 Assessment areas and methodologies

An important factor for the sustainability assessments is the actual assessment areas and methodologies used for the assessments. The interviews indicate that CVC investors are using both qualitative and quantitative assessments, and that there are many similarities to assessment styles of independent venture capital funds. Furthermore, there can be seen two sides to sustainability assessment, sustainability effects from how a company produces its product or solution, and sustainability impacts to the external environment from that product or solution. Partner of VC 6 puts it as:

So sustainability, in our approach, you need to differentiate between ESG and impact. And so we have a lot of ESG due diligence prior to making an investment because the ESG is to a large extent related to risk management. So, to what extent do they have their environmental, social, and governance elements in order. Impact, it's much more what are they doing. So that's much more looking at the products and looking at the applications.

- Partner, VC 6

Thus, on one hand, the investor needs to look how the startup brings its solution to the market, how they produce, and therefore how the different ESG aspects are complied with. Then another element is the actual invention of the startup, what are they bringing to the market, and what is the sustainability impact of that.

Starting with checking the compliance to the different aspects, CVCs are using different ESG checklists and questionnaires, which are sent to startups to be filled or used as a base for discussions.

We do have a sort of standard, let's say, [ESG] questionnaire that we send out to all startups when we first engage with them. So more classical due diligence questionnaire and that's something we are updating regularly.

- Senior Investment Manager, CVC 7

We have the startups fill up this shortish questionnaire, which has different questions about the 3 letters ESG, so there are both qualitative and quantitative questions. [...] There are pretty evenly questions from all areas.

- Investment Associate, CVC 12

Few CVC and VC informants showed in the interviews their ESG questionnaires and checklists, and those were similar to and in one case even based on some generally available frameworks that have been created by different venture capital associations and initiatives. In some, the dimensions followed the triple bottom line categorization,

being profit, people, and planet, instead of ESG categories, but the principle and questions were largely the same. Namely, two mentioned questionnaire frameworks that had been used as a base were ones by ESG_VC initiative (ESG_VC, 2022) and Finnish Venture Capital Association (FVCA, 2022), which are also covered in literature review, in Section 2.3.

From the perspective of a corporate looking for new technologies, internal R&D projects can be considered similarly as investments to external startups. Thus, there is a possibility to have an overlapping sustainability assessment approach for the two ways of bringing innovation to the corporate parent.

We have really a questionnaire that we also use internally for our R&D projects where they have to think about what are the feedstocks that get into the process, what is the energy they're currently consuming.

- Investment Director, CVC 6

Some investors did not have an explicit ESG questionnaire or checklist, but the areas were covered in other assessments of the due diligence process. For instance, environmental factors were covered as part of the impact assessment or technical assessment, social factors were part of safety assessments, and governance factors were covered in legal due diligence. There was also mentions of applicability issues of the more detailed ESG questionnaires, as sometimes the startups, especially the early ones, are not able to answer the questions. However, as noted by Investment Manager of VC 2, that also reveals information itself.

I've liked to discuss the ESG factors through with the startup using some questionnaire and asked them to just fill something and emphasized that don't make up the answers and rather if they feel that they don't know something then write that. Then we get to know what is the starting level.

- Investment Manager, VC 2

With these ESG questionnaires and checklists, investors can determine if there are any red flags regarding sustainability. According to the informants, the ESG side can be seen as a measure for risk management and also a way to do negative screening of targets. However, the questionnaires and checklists can be also used for identifying improvement areas, as mentioned by Investment Associate of CVC 12.

It [ESG questionnaire] is mostly for negative screening that if there comes up something unwanted, then we can drop the case at that point. On the other hand, if something comes up, and it is not a red flag but a yellow flag, then the deal does not fail on that, but it will be something that the startup needs to develop on and that can be monitored.

- Investment Associate, CVC 12

Another way some CVC investors are assessing sustainability is by consideration of EU Taxonomy contribution and the do no significant harm principle. These assessments were mentioned to be more qualitative and heuristic, rather than focusing on precise quantification.

We have that DNSH, do no significant harm examination, so those 6 questions there, we check that they are complied with, but we do not use any precise quantitative metrics for it yet. With some companies we have had some calculations, but it is not systematic.

- Investment Associate, CVC 12

Expert 1 adds to the use of the DNSH principle by stating that all startup investments should be compliant to the principle, but they should also have ambitions to be best in class on some dimension or on some specific sustainability goal. Furthermore, EU Taxonomy alignment and DNSH are also used by VC investors. In the discussions, it was mentioned that there is some level of subjectivity in the DNSH criteria, since they have room for different interpretations. The same subjectivity and ambiguity can be seen when assessing sustainability using the UN SDGs. There is the risk that different parties interpret the startup contributing to different SDGs. Furthermore, the SDGs contain a multitude of sustainability goals, and considering all of them might not be relevant for corporate investors who also have strategic focus areas outside sustainability. This is where the focus areas set by the strategic preconditions come into play for choosing the areas to follow. Based on the informant answers, for most of the industrial CVCs, it is easier to have a strategic link and focus on environmental opportunities than other sustainability areas such as social innovations. As a result, environmental impact gets most attention from CVC investors in the assessment process.

So we thought about it [looking other than environmental sustainability], but it was too difficult really to act as a strategic investor in the other fields. So we are really focusing on the environment.

- Investment Director, CVC 6

The focus on the environmental sustainability dimension and impacts was also seen among the VC investors.

The single most important element that we apply for impact is avoided emissions related to the product or the application, technology that they develop.

- Partner, VC 6

As noted by Partner of VC 6, avoided emissions was an important or the most important sustainability impact for all the interviewed CVC and VC investors. Furthermore, there was a clear focus on the environmental impacts, whereas social impacts were not usually considered in the same extent. Some have chosen a few key impact areas, from which they are defining innovation areas, where they are looking for startup opportunities and in some cases setting minimum requirements for the impacts.

We have our three 3 pillars, CO₂ reduction, waste reduction, and water reduction, and for the beginning, we set certain hurdle rates, which I

don't mention to the outside, but we have these hurdle rates internally. Otherwise, they [startups] will always calculate that they will reach these hurdle rates. So we don't want this. So we have these internal hurdle rates where we say, OK, at least within a certain time frame a startup should have a significant reduction in one of these fields.

- Investment Director, CVC 6

Typically, we're asking them to provide us, so depends on the opportunity, but carbon dioxide, there goes an example, how much CO₂ they can capture, and what is the quality of the SCM [supplementary cementing materials] they can produce, at what rate this SCM can replace the cement and with that we can calculate how much CO₂ we can reduce from our production.

- VP of Ventures, CVC 8

Some opportunities can also be applicable for multiple purposes and act as an enabler for other solutions. In these cases, it can be hard to quantify the impact, and it might be better to treat them as enabling solutions without calculating a specific quantified impact.

In the chemical sector, a lot of chemicals that you produce are just an in between step and from this chemical you have a diversity of applications and this can be in plastic, this can be in food, this can be in automotive sector. The critical thing is if you report on ESG and on impact or on sustainability in general, I think you really need to focus on what is the company itself solving. And it can be that the end product that they produce enable a lot of other industries, for example, that they enable better food and in the meantime they enable lightweight materials for the automotive industry. But if you start to claim CO₂ reductions by having a lightweight material in the automotive industry, then you can claim everything, and I think that's not the way how to do that. I think you really need to focus on what is the company solving with the technology and what is the boundary of the technology.

- Investment Manager, VC 4

Even as in some cases it might be easier to take a heuristic based approach for the sustainability assessment, given the quantification challenges and other limitations, some investors have sought to create tools for helping the assessment. Senior Investment Associate of CVC 11 explains the idea of a tool that allows ranking opportunities based on their sustainability impact factors.

We have this program within the group [...] to rank the projects on sustainability. On the x-axis, basically you try to assess whether the project is part of the problem or part of the solution, or if it's neutral. [...] Sometimes it's easy to see, but sometimes you really have to go deeper into the subsequent actions and consequences of the product you are going

to make. On the y-axis, you are trying to see for 1 euro of EBITDA, what is the environmental footprint you need. Basically the higher you rank, the less costly it is for the planet, the environment, the society. You really want all the project to be on the farthest spots of the graph.

- Senior Investment Associate, CVC 11

Even with availability of some assessment tools and focus on the environmental area, a challenge that remains for the impact assessment is the comparison and ranking of different impacts.

Currently, it's not clear, how to weigh the three different dimensions that we have against each other. I don't want to end up with 15 companies in the space of CO₂ reduction and none in the water, and none in waste, but I'm not sure how to really compare this. If you do everything on CO₂, you can compare the companies, but if I have a company in CO₂, another one on waste, maybe with waste I can recalculate the CO₂ impact, which is reduced by the waste, maybe that's possible, but when it comes to reduction of water consumption, how much CO₂ does that save, there's no direct link between these two aspects.

- Investment Director, CVC 6

New solutions can have positive impact in some area compared to incumbent solutions and worse impact in some other area, and then the problem is which impact is more important. Of course, using the do no significant harm principle, it could be said to invest in companies that are contributing to some impact areas while not doing harm to the others. However, there are restrictions such as available capital, which means that the projects have to be ranked. If social impacts are added, the problem gets even more complex. The interviews did not provide clear answers to this problem, but it could be deduced that investors need to choose the impacts that matter to them and use judgement in weighing different impacts.

Although a new technology might seem to have only positive sustainability impacts, there can be unexpected effects in the whole life cycle if the connections are not thought carefully. This consideration is important both in terms of the movement through the value chain and in terms of comparison between the current stage of a startup and a future stage where it has potentially scaled up.

We could have a technology that could minimize the amount of CO₂, but it could actually increase the level of microplastics, for example.

- Technology Scouting Manager, CVC 1

The importance of taking a holistic approach covering multiple sustainability areas through the life cycle is indicated by several investors who mentioned their use and focus on life cycle assessment as a method for sustainability assessment of new ventures. The life cycle analysis contributes both to understanding the positive sustainability impact but also possible negative effects.

I mean, most general [assessment] probably is that our best practice is we have a peer reviewed LCA that follows ISO standards. That's kind of how we typically operate, to ensure that we have a solid baseline to fall back on when we talk about sustainability around the product.

- Venture Director, CVC 3

They [assessment team] look at the multitude of things going from the assurance of the feedstock, that it's not competing with other markets, for instance, if you would look at fermentation, that the feed stock is not being used into food segments. We will look at the CO₂ impact, we will look at can things be recycled, what's the impact on nature in general, do we make the problem worse.

- Technology Scouting Manager, CVC 1

Often the idea of the startup can be good and sustainable from a local standpoint, but the problems might arise when trying to scale the business sustainably due to different factors in the value chain, which highlights the need to understand the feasibility of going from the current impact to the possible future impact.

You know, even if their mission is quite interesting and this mission can contribute to environmental good, they cannot ignore all the other aspects you know in back of their project. And talking back to this agri-waste business, if they take a number of trucks needed to harvest these residues, the CO₂ emission is considerable. And then so we always need this lifetime assessment from the broader point of view.

- General Manager, CVC 14

The life cycle assessment also extends the view from the focal startup to its suppliers to see if they are compliant with the different ESG requirements. However, this brings into play the resource restrictions that startups have in making and taking part in these more extensive assessments. As there are a countless number of dependencies and limited resources, it becomes again important to consider the key sustainability areas, when assessing life cycle effects.

We are focusing on these 3 topics [CO₂ reduction, waste reduction, and water reduction]. So of course if you make a full life cycle analysis, then you also look into other aspects. Which we also do, but sometimes it's very, very difficult for startups to deliver all the data that are necessary for full LCA. And we agreed with our sustainability department that we focus on these three topics that can be delivered by the startups, where we don't have to spend 2 months of work to really get into that.

- Investment Director, CVC 6

The life cycle assessment can be connected to benchmarking against incumbent technologies and alternative solutions.

We also look what is the best alternative, because this is how we calculate really the mitigation they can achieve. This is sometimes a little bit difficult if you're in a new product space where we normally are with startups because maybe there is no alternative already in the market, or you don't know them because it's also developing currently. But we spend some time with the startups during the due diligence to have a deeper understanding on that.

- Investment Director, CVC 6

This is an area also seen important by the VC investors and an approach that many of the VC informants were taking.

Basically whatever technologies and innovations that they [startup] bring, we compare it to conventional technology, and they have to be more sustainable than the existing technology.

- Partner, VC 3

You have to also consider that the competing products are getting better. So you have to beat the best available technology. And we only can calculate the difference between the best competition and not the worst competition. That's a very common error that they [startups] make.

- Investment Manager, VC 7

As seen in this section, there are many alternatives for the possible assessment areas and methodologies with each having some benefits and challenges, and no clear best-in-class approach. This puts increased emphasis on taking into account the strategic preconditions and using them to define material sustainability assessment areas, and then making the assessments accordingly. In addition, available assessment capabilities have to be considered when choosing between the more flexible and quick assessments that rely on heuristics and simple frameworks or the more rigorous questionnaires and life cycle calculations that can require specific expertise.

4.2.2 Connection of sustainability assessment to other assessments

Sustainability factors of startups do not exist in a vacuum, and thus their assessment should also not be separated from other areas that are looked at when assessing investment opportunities. In many startups with sustainability angle, it is important to understand if the solution is technically sound and feasible. With that in mind, the technology assessment is often tied to sustainability assessment if there is a sustainability focus in the solution of the startup.

For the due diligence on the technology, we have experts in the group that are helping us qualify the technology, the maturity of the technology, the market sizing, the segmentation, the different applications, et cetera, and this is really how we try to get a grasp on what's the benefit of the technology in terms of environment and sustainability.

- Senior Investment Associate, CVC 11

Multiple corporate investors and the sustainability focused VCs mentioned that as in their investments sustainability is embedded in the business idea of the startups, it makes sustainability assessment easier to consider and more practical as the main impacts are looked at together with the technical details and commercial potential.

The thing is that in most of our startup companies, the sustainability is embedded in why they were incorporated in the first place. So when your startup is about recyclability, then there is no tradeoff, it's either you perform technically speaking and so you are closer to your sustainability goals, or you just die. [...] All of our startup companies, the goal on the sustainability front is really the same as all the others, on the technology, the financials, the commercial traction, it's all linked to sustainability.

- Senior Investment Associate, CVC 11

However, the link between technology and sustainability assessments is seen more on the impact side, whereas the ESG checks are seen as additional assessment.

We always look at technology first and that is always the case because we have enough means and weight that if we really want to progress with this company, we will do all the ESG checks [and correct shortcomings]. A company with an extraordinarily good ESG profile, with a medium to bad technology, will not make it. A company with a very good technology, where we see room for ESG improvement, that's something we can work on with them.

- Technology Scouting Manager, CVC 1

Informants point out the importance to think about the sustainability impacts in relation to the probability of scaling the business. This means that even if a startup could calculate it having theoretically a significant sustainability impact, it cannot be achieved unless the offering is technically feasible and close enough for commercial production.

So when we say sustainability, at the same time we evaluate also the scalability or probability and also how distant they are, or the technology is you know from the reality, which means the current position.

- General Manager, CVC 14

In addition to the readiness of the technology, the offering of the startup needs to have commercial potential to get customer adoption and that way achieve the sustainability impact.

If you can get a sustainable technology to get that market share, then the theory is that you have the maximum impact possible. Even though, social investing and impact investing for the sake of doing it because it's good, it's also a valid way of investing, but we believe that in order for truly something to get integrated and utilized by the maximum consumers as possible, it also has to have a successful business edge.

- Partner, VC 3

Thus, it needs to be assessed that the startup has a credible view of who benefits from the sustainability effects, and who is willing to pay for it. For a corporate investor, this can also mean thinking if other investors value the same sustainability effects. For instance, if a corporate has invested in a startup that has a strategic sustainability impact of using the waste streams of the corporate parent, other investors might not value this impact as much if the solution cannot provide value for a larger group of possible customers.

I think because if you are in the climate impact area, you need to grow fast, and you need to be in many markets in order to make great impact and the same goes for if you want to grow fast, you need to be able to attract money from investors and investors look for return. So everything goes in hand. I mean, if you cannot grow fast, and if your product is not competitive, you will not make any impact. So it's what you as an investor have to look at not only that you have a potential, but also that that potential is real, that's to say you can have an advantage over your competition in terms of cost for the customer.

- Investment Manager, VC 7

The technological and commercial linkage can be seen also important to determine if the startup can stay sustainable when scaling up. Expert 1 points out that startups should have confirmed that they will be technically and financially able to use the sustainable methods and resources even after growing, and not having to revert to, for example, fossil based materials. Being able to use sustainable approaches and staying commercially feasible at the same time is an important combination because prioritizing either aspect can be challenging. In the general venture capital space, as sustainability performance is incentivized by the limited partners, there has risen some concerns about how to balance sustainability to the need of financial success.

One tricky thing is that if you have in your portfolio one or two companies that are greatly supporting your CO₂ impact goals, but they are financially struggling, then you come to a difficult decision because you have to decide whether you want to put more money in such a company to keep them going, so to say, while maybe other companies that have less impact do have much more financial return opportunities.

- General Partner, VC 5

For corporate investors, the need for monetary gains is often smaller as the strategic goals drive the investments, but nevertheless the financial aspects need to be considered.

As a guy with a corporate venture capital background, I've been always saying that losing money is not really a strategic choice or a good choice. There are way cheaper ways to get those [sustainability] insights than pushing millions into deals which did not even have a chance to make it.

- Investment Manager, VC 2

On the venturing side, it's about growth, which means also making money. It's making money, not at the cost of sustainability, it's making money with sustainable technologies, but it's still about making money.

- *Technology Scouting Manager, CVC 1*

The importance of financial success even when considering sustainability aspects relates to the triple bottom line view of sustainability, where economic dimension also plays a role in sustainability considerations. Expert 1 explains the economic connection as a resource to being able to develop the other sustainability dimensions.

A company that is not successful in financial terms cannot invest in new and more sustainable technology, which is why economic factors are also important in addition to environmental and social factors.

- *VP of Climate and Circular Economy, Expert 1*

An often mentioned approach was to link the sustainability impact to the commercial potential and forecasts. With this approach, the sustainability impact is assessed as a byproduct of sales estimates, which allows for making predictions about the future impact.

Also, how we calculate avoided emissions, we want to link it to the number of products or the number of units sold. And because that's the impact that you have, so and when you have the outlook about how much they expect to sell this year and next year and the year after, we have some idea about what will be the impact over the next years.

- *Partner, VC 6*

Then when the goal for a corporate investor is to, for example, support reduction of emissions, a way to assess and compare investment opportunities is to tie the sustainability impact potential to the size of the investment, which is an approach used by some of the informants.

We also calculate something like if we invest 2 million in the company, what is the CO₂ return or reduction we get per euro, and then we can also compare and say OK this company is better, this one is not so good.

- *Investment Director, CVC 6*

The sustainability angle that is present in many investment opportunities of corporate investors as well as the integration of sustainability to the core activities of the startup is beneficial. This is because there will not be conflict between the sustainability aspects and the other metrics of success.

For instance, food delivery, you have the success of the company and the sustainability of the company. You can be successful without being sustainable. Well, you have to pay good wage to all the delivery guys, so you have to make sure that the value is properly shared with everybody.

If possible, they have to ride a bicycle or an electric scooter. You can do all of that, or you can just say I'm just going to be all about costs, and they are going to ride combustion engine scooters, and I'm going to pay them very little, and I'm going to have only guys. So in this case, we can really separate sustainability from success, but in our cases you can't.

- Senior Investment Associate, CVC 11

Furthermore, startups for which sustainability is at core are welcoming to sustainability assessments and reporting given its connection to the other areas, whereas ones where there is no integration can find sustainability as an additional burden. The informants from VC 5 and VC 3 elaborate this dynamic that is present in the portfolio companies for both VCs and CVCs. However, the pushback can be sometimes less profound for corporate investors who only look at opportunities with sustainability angle, different from VCs who might look at all kinds of startups.

I see earlier stage companies that think oh my God, I'm doing so many things, do I need to do this also, I don't have time for it. I see more mature companies that realize very well that if they can report on this nicely with nice numbers it is going to help them in everything, in fundraising, and making a better profile in the market. So they're happy to do that, and some of these companies are even further in their thinking than we are. We have one carbon capture company and then of course it's their core business. So they're very much on top of how to do this. But we also have a company where I remember that the CEO told me 2 times, please, I'm so busy, don't do this to me.

- General Partner, VC 5

Some companies in our portfolio, they're much more concentrated on operational things that bring immediate effect, and they might not necessarily, it's not like they don't care, it's just they don't prioritize it [sustainability] as high as we would like, in which case we run after them and say, look can we help you. This needs to be filled. On the other hand, you have companies that really put a lot of focus on this because they realize that it helps them tremendously on their long term as well.

- Partner, VC 3

Corporates also tend to assess the support that they can possibly provide. This support is often related and best suited to environmental aspects, which can also explain partly the focus on startups with environmental impacts.

When we invest, we plan how to generate value to the startup using [parent company] resources, colleagues, and those kinds of stuff or just information or customer access. So we think of this before an investment with the goal of generating value at the startup.

- Investment Manager, CVC 5

As a whole, connecting sustainability and sustainability assessments to the other areas have benefits of reducing the number of distinct assessment needed in the investment process and increasing the buy-in from stakeholders as sustainability is not just seen as an additional burden. Furthermore, thinking about sustainability aspects in connection with the technical and commercial aspects can give the assessor a deeper understanding of the feasibility and possible impact of the venture. Corporate investors should aim for making the sustainability assessments in connection to the other assessments to get the aforementioned benefits, but also get a more holistic view of the effects on sustainability development from the different support actions they can provide.

4.2.3 Assessment comprehensiveness

The comprehensiveness of sustainability assessments had clear differences between informants. Some informants preferred a more flexible and informal style of assessing sustainability factors, while others had a very formalized process. The approach by some informants was heuristically thinking if a startup has positive enough sustainability impact for them and then explaining why, as opposed to having a list of metrics and assessments that are gone through to form a view of the sustainability of targets. Informants from CVC 4 and CVC 2 explain that they have a flexible way of looking at sustainability that is not tied to specific measurements. The approach can provide speed and ease for the assessment process, as often it does not take the investor much time to make the high level judgement whether the sustainability profile of the target is sufficient.

We don't have precise metrics of what the sustainability assessment should include, but still for every case we go through if the solution has enough benefit in terms of green transition. [...] We haven't wanted to tie our hands with some measurement or tracking criteria, other than do we think that it [startup target] is sustainable and if yes, then why.

- Venture Partner, CVC 4

We don't have any like explicit sustainability tick in our investment assessment, but it is built in the requirement for strategic alignment. [...] We check and require that startups comply with our code of conduct, which covers some of these [ESG] areas. [...] The operations of targets are often still quite small, so we cannot audit them much.

- Investment Manager, CVC 2

The flexible approach to the assessment is explained by the early growth stage of the targets, which makes it hard to audit them extensively. This highlights the role of chosen maturity level of startups, which was identified as one of the strategic preconditions for sustainability approach. These comments from informants show the focus on the sustainability or other strategic impacts of the startups while putting less focus on the company specific ESG aspects.

I would say that it would feel weird to enforce any assessment parameters and tracking for a really early stage startup. Like, why add complexity and slowness to the process when the only goal is to be agile and test market traction with different business models.

- Venture Partner, CVC 4

It can be seen that also VC investors are looking for some level of flexibility and are reluctant of tying the assessments too much to specific target numbers.

We ask ourselves immediately before deciding what to answer to a startup, which we just met, that does this have a significant greenhouse gas reduction potential. We deliberately say significant and not x megatons of potential. [...] If you chose wrong cutoff for the potential, and it is also hard to sometimes estimate, then you can miss financially good deals with significant [sustainability] potential.

- Investment Manager, VC 2

We're going to formulate a policy that fulfills the requirements of SFDR, but we're not going to bind ourselves too much to very hard numbers if not necessary, because I'm afraid it could turn against us if we do that. It's an inconvenience, the complication. [...] We're figuring out what's the best way to do it and keep it also a bit light. [...] On the other hand, you don't want to make an investment that you think is very green, but actually it's not so green. So it's finding the balance between rigor and speed.

- General Partner, VC 5

On the other hand, some CVC informants are aiming to get more detailed sustainability information with standardized sustainability assessments and quantifying impacts.

We're trying to develop a standardized approach. Otherwise, you reinvent your questions and your requirements for each deal. We're trying to at least become systematic in our approach and have a sort of standardized question list and requirements for any investment that we're looking at.

- Senior Investment Manager, CVC 7

Quantifying the sustainability areas shows signs of the strategic precondition of wanting to report sustainability contribution from the investments on the parent company level.

Because you can say what you want, but unless you can measure it, you don't know whether the company is actually able to achieve these goals. So we're trying to translate the [corporate] sustainability goals into things that can be measured and can be implemented in the startup.

- Senior Investment Manager, CVC 7

An important consideration is that although having an extensive standard sustainability model to be sent for each startup can ease the workload for the investor, it might not give a good picture of the investor to the startup. As a result, it can be beneficial to have a more in-depth assessment of the company specific sustainability aspects for individual opportunities.

It [the assessment] is case by case. We can invest in so many subject areas that it seems impossible for me to push it to one format. [...] Early stage investing is a delicate activity in a sense that we need to be somewhat critical of what we believe and also demand enough background information and calculations. At the same time, in good deals it's me who is selling myself to the startup, not the other way around, as good startups can choose their investors. Then if I would be a startup facing a CVC unit that would send me some enormous assessment template, I would freeze and think that if the corporatization starts already before the investment, then what would the life be after.

- Investment Manager, VC 2

One approach to managing the assessment comprehensiveness while using some assessment template is choosing the material and relevant assessment areas case by case. In this case, there can be a standard base for the assessment questionnaire or checklist, which is then modified by only including the areas relevant for the assessed opportunity at hand.

The base for the assessment questionnaire is standard. There are some questions, for example, about production, which are relevant for companies with production facilities, but we also do quite many software investments, so then in these cases that kind of questions will be dropped, but 70-80 percent it's same for everyone.

- Investment Associate, CVC 12

The informants note that there are challenges for implementing really formal and standardized process for sustainability assessment. This also points to the investment principles part of strategic preconditions, as the formalization of assessments depends on the number of different target profiles that the investor has.

Now, what we're trying to be very mindful of is that how do you find the right balance. Because, some of the requirements, if you really go for the whole ESG agreement, it would be quite onerous on startups, and they might not have the ability and resources for basically fulfilling these criteria.

- Senior Investment Manager, CVC 7

I do not see a completely standard [sustainability assessment] template being advisable unless you have just one type of projects. [...] In a way,

each type of investment project needs their own assessments. Of course, with repetition, like 5 similar investments, they start to be alike, and then it could be effective to have a ready-made template.

- Senior Investment Lead, VC 1

Compromise between workload and detail of assessments could be two-phase assessment, with a light potential focused assessment for all opportunities and more detailed one for opportunities closer to investment. Investment Manager of CVC 9 explains that in the first phase they form a view of the sustainability angle is enough on the high level. In this phase, the deduction is done by asking the startup about some supporting data and samples of their solution without going more in the company specific details. Then, if the opportunity is deemed good, a more in-depth assessment is done.

We try to look in two phases. So first we do so-called light due diligence where we don't go too much into all details, and do a bit of quick sprint to see whether it's worth going and then if we confirm, then we go into more detailed due diligence. [...] specifically for sustainability part in this light due diligence stage, we just need to understand high level, of course we ask for some supporting data. So for certain sustainability claims, for instance, they say, we are saving, 10 percent of GHG when using our technology, or we can recycle these types of different waste and produce these this type of product. So, we can say, can we see data, can we see samples. And if possible, we do maybe a quick view on their lab, if they have a lab, is there data, protocols. So we need to understand that and if we decide to do this bigger due diligence with more detailed ones [assessments] and of course there we can go much deeper.

- Senior Investment Manager, CVC 9

Investment process of CVC 11 also contains a lighter initial assessment in which investment opportunities are ranked on a high level impact basis without going into the specifics.

The requirements to rank a startup are not as stringent and as detailed as for a few 100 million CapEx, for instance. So we call it a quick scan, and so they won't go into the details of how much emissions they are going to produce, et cetera. It's way much simpler.

- Senior Investment Associate, CVC 11

Having a light and flexible first assessment for sustainability gives the benefits of being able to move fast, and then being able to focus on the individual case level for the opportunities that pass the initial assessment. Flexibility can be seen an important in factor, as it is one of the things, along with ease of collaboration, which is promoted in the websites of the venturing units of the informants. Furthermore, this approach can communicate a higher level of investor understanding and commitment

to the startup than just sending a large sustainability assessment template. Even the VC investors with larger reporting needs find it important to align the assessment to the specific investment case, even if it leaves some information out for some companies.

What we want to avoid is to annoy the startup with a huge impact reporting with a lot of criteria that they have no clue about, they don't know what it means. They're not measuring it because of our impact reporting, so we want to support the startup as much as possible. [...] We're not going to ask our water companies to say how much plastic did you avoid getting to landfill because they are just getting annoyed. You have to do the due diligence but not annoy them too much with all kinds of strange reporting that they do not understand and which is remote from the core business.

- Partner, VC 6

As a result, corporate venture capital investors need to consider what level of detail they need in their sustainability assessments, to avoid putting unnecessary burden on startups while still being able to form a credible view of the sustainability profiles of targets. A promising approach for handling the balance between rigor and assessment lightness is the two phase approach, where more detailed assessment is done only for opportunities that have passed other assessments and deemed interesting for a more detailed sustainability assessment. Comment by Technology Scouting Manager of CVC 1 explains well the rationale behind this type of approach where the more extensive sustainability assessment is left to the end.

The intellectual property needs to be right, the technology needs to be right, the financial structure needs to be right, the market expression and potential entry models need to be right. Well, that's already a large set of criteria. While sustainability is just one more and so in the end, they all need to kind of come together. [...] I always start with the one that I think is most prone to being flawed, where I will find the flaws so that we do not have to continue, and that is in 90% of the cases is the technology. So obviously I will go technology first. If it makes sense, I'll look at the intellectual property position. If that makes sense, I'll move to the financial position. If that makes sense, I'll move forward. The starting order is depending on the situation, but you know, you have to kind of feel a little where the weak point of the deal maybe is and that's where you focus on first. So we pride ourselves in what we are calling killed fast. Yeah, I could spend days looking at the sustainability profile and still not know whether the technology works or not.

- Technology Scouting Manager, CVC 1

4.2.4 Distributing the assessment process

A relevant question in the assessment process is who should do the sustainability assessments. Often the corporate venturing teams are quite small, and some sustainability assessments require specific knowledge, making it hard for the assessment

being done solely by the venture team. This resource restriction is noted by informants, and a suggestion is given to use colleagues from the parent company who have the knowledge that the assessments require.

When you have a venture capital team of two, can they do the full financial assessment? No, they might want to bring in financial specialists. Can they do the full technology assessment? No way they can, they will need the business people and the R&D people from the business units to assess. Will they be able to do the full sustainability, ESG assessment? Most likely also not, but I'm sure they have colleagues that can support them there.

- Partner, VC 6

These colleagues can be technical experts, who can help with making the life cycle assessments and give general opinions whether some startups' technology and idea make sense and are feasible from sustainability perspective. The vast knowledge available in many corporates can provide a corporate investor flexibility advantage compared to independent VCs who use external experts, as the threshold to talk with corporate colleagues can be smaller than going to an external expert.

To be fair, we don't look at the opportunity cost of these people, they're on [the parent company] payroll. So we can just call on them as we see fit. I think if you're an institutional VC investor, yes, you'll leverage experts, third party experts and these people are also good, but of course, every time they need to call these people, they typically need to pay them whatever the hourly tariff is. So, I think we have the ability to call on this internal expertise more often to address questions as they come up, as opposed to having to wait until there is a serious question or collecting several questions together before you engage with an external expert.

- Senior Investment Manager, CVC 7

Furthermore, collaboration with corporate sustainability experts and teams are encouraged as they can promote the alignment to corporate sustainability goals, while giving general expertise about different sustainability factors.

Our investments need to be aligned with the wider sustainability goals of the corporate parent, and often we have someone from the corporate sustainability department with us doing the assessments and ensuring the alignment.

- Investment Associate, CVC 12

Corporate sustainability people can also be present when defining the sustainability assessments, such as creating a sustainability questionnaire to be used for the assessment. Their sustainability knowledge can be valuable in defining the most material areas for the assessments.

Our sustainability guidance, which is part of our investment policy, is from the corporate sustainability department and when we were building our assessment questionnaire, we collaborated with the sustainability team to determine what were the relevant questions for us.

- Investment Associate, CVC 12

However, if there is a limitation in internal experts, or they are occupied with their primary tasks, it can be difficult for a CVC investor to leverage the inside expertise.

We have to go to the internal experts, which are busy with decarbonizing the chemical industry. Do they have time to help us do LCA analysis with the startup? On their radar, it's kind of small. There are bigger problems to deal with, and that's transforming the parent company, transforming the chemical industry, making us carbon-neutral.

- Investment Manager, CVC 5

Some informants have ensured the availability of expertise through having specialized sustainability teams that are doing assessment to both internal and external projects.

There is a special team that we have, we have an entire big team or function called sustainability who are doing like full-fledged sustainability assessments.

- Senior Investment Manager, CVC 9

The problem is we look at so many types of technologies that there's not one single rule of things that we can follow and that's why we have all these specialists sitting in our environmental tech center, they are specialized in it, and then they actually come back with their analysis that's not something we do ourselves.

- Technology Scouting Manager, CVC 1

In areas where the corporate might not have that much expertise, it is also possible to use external sustainability experts, similarly as for example outsourcing legal due diligence. Some mentioned also using external experts to audit the initial checklists or questionnaires they use as part of the assessments. Using the experts or the sustainability assessments teams results in the added benefit of an additional independent view on the investment opportunity. This can be a safeguard against making seemingly sustainable investments that then turn out to be less sustainable than thought.

In some instances in the past we found some very interesting technologies like for oil and gas, for instance new technologies for drilling. It would be a huge deal for us because it would have meant us supplying a lot of

materials to those startups and lots of additional sales to the oil and gas industry. [...] but the sustainability team was like, no guys, that's really not going to be a good investment from a sustainability profile. So you see you really need to have some independent safeguards, I would say, in the way we make investments.

- Senior Investment Associate, CVC 11

Also, startups cannot be facing with too many different and extensive assessment processes. It will be too hard for the startups to prepare and understand. Thus, either all investors should have similar process or in the specific investment cases the investor and startup have to collaborate to define the material and most important sustainability factors for the business to be assessed and tracked. The same ideology can be seen to be also true for the CVC unit, they have to define the material ways they want to contribute to sustainability through the investments. Thus, it could be defined for example how much a specific portfolio company contributes to decreasing waste of the parent company.

Several of the informants mentioned that when there are VC funds in the investment syndicate, it is possible for the CVC investors to rely on the sustainability assessments made by the VCs, especially when the VC is sustainability orientated.

As a corporate venture [unit], we never invest alone. We always co-invest with other venture capital funds, and so we try to rely as much as possible on those funds who were there like for decades and really had the time to improve their processes. [...] So like most of the time if the lead investor has made a really detailed due diligence on the company, we would send a reliance letter, and we would get like the due diligence report from them. So yeah, we try to share as much as we can.

- Senior Investment Associate, CVC 11

Typically, it's the VCs that they lead on that, not the corporates. And the reason for that is they have a lot of LPs usually that they report to that they want to see these ESG metrics. [...] And the reason why some of these VCs also lead the charge on that is because typically you would have one lead VC for example who would have like maybe a board seat, and they would start pushing towards this stuff.

- VP of Ventures, CVC 8

Letting one of the investors in the syndicate take the sustainability assessment as their responsibility has the benefit of reducing the workload for the startup and letting them focus on their operations instead of filling multiple assessment forms. The investors can then coordinate on what should be included in the assessment, so a corporate investor can also voice their opinion if they have some specific sustainability factor that they want to be assessed.

In reality, the investors [in a syndicate] should not all send their own Excel to be filled out. Instead, they should agree that, hey, I'll handle the

ESG side, here is my model, do you want to add something to it, and then they work it out. [...] I know that the life [after investment] will be horrible if each investor just sticks strictly to their own position instead of putting the interest of the startup first.

- Investment Manager, VC 2

When there are impact investors, for example, an Article 9 fund in the syndicate, their ESG assessment is usually at a very stringent level, which should meet the requirements of other investors such as corporates venture capital investors.

I think by the fact that we're in Article 9 fund, we probably have the most stringent reporting and information gathering obligations. [...] When we're in a syndicate, we also try to be as pragmatic as possible, and we try to align the processes, and often we lead the process because we say, guys, we're the most stringent, here's what we asked for, does it fit your reporting obligations and usually the answer is yes. So let's just use one form and one process, and then every party derives the information that they want out of it from there.

- Partner, VC 3

This collaboration in assessments is important as it builds the foundation for the holding period of the investment. By doing this, the investors can have an aligned view on the startup and avoid discrepancies between how the startup is seen. With all investors doing their own assessment, there is the risk that two investors report the sustainability impacts of the same startup differently.

What you now start to see is that you invest from a consortium and as I mentioned, the sustainability reporting is a requirement for VCs in the market, so each VC within the company will need to report on sustainability. But what you start to see is that different VCs start to report differently on the same startup. For example, we are invested in a plant based foods startup. So if you just look on very high level at the UN SDGs, we see a better process, we see reductions of CO₂ and so on. But what we do not claim is zero hunger because the products of this company are not going to lands who struggle with poverty and hunger. No, they are here in the supermarkets. One of our co-investors claims this. So you see already the difference and the different perspectives that you can take there. [...] I think on the next board meeting, we should bring this up. We should say, hey look, we see different reporting styles, and we see different UN SDGs and claims of these SDGs, we need to align this as an investor consortium.

- Investment Manager, VC 4

Moreover, if the investors are not aligned in their sustainability assessments, it will cause problems also for the startups as they cannot be prepared to what will be asked from them and cannot form a uniform view of where the investors want them to go in terms of sustainability development.

It [lack of assessment alignment] will drive the startups nuts because they don't know what to expect.

- Partner, VC 6

Thus, there should be collaboration between the investors with regard to the sustainability aspects and ESG factors to not overburden the startup and overcomplicate things.

We definitely want to avoid that when there is fundraising and five corporates are interested that five due diligence teams are visiting the startup because that will kill them.

- Partner, VC 6

Overall, distributing the sustainability process between different stakeholders can be seen as a beneficial action in the CVC investment process. Involving the stakeholders can result in increased expertise to do the assessments, act as an independent safeguard, increasing alignment in the investment syndicate, and make the process more flexible.

4.3 Bidirectional sustainability development

In several interviews the informants mentioned that most of the startups have some imperfections or limitations on some ESG aspects and that is natural with early stage companies. Investors, and especially corporate investors with limited investment opportunities, need to be tolerant of these aspects and ready to work with startups to develop their sustainability profiles. As General Partner of VC 5 puts it, opportunities can rise from anywhere, which means many possible development levels in terms of sustainability factors.

[...] good ideas and good companies can emerge from anywhere, with any random collection of people.

- General Partner, VC 5

Thus, there is a need for development of sustainability supported by the corporate investor and the parent company. The interview data suggests that there are three themes around the sustainability development dimension. The first is evaluation of the portfolio companies to define development opportunities and tracking the performance. The second is the support provided to the portfolio companies. Finally, the third theme is the learning from the investment activities for the CVC investor and the parent company.

4.3.1 Defining development opportunities and tracking performance

After an investor has done the sustainability assessments part of the due diligence process and invested in a startup, focus on the sustainability aspects should not stop there. The sustainability assessments should continue in the holding period of the investment.

I think that the sustainability and impact that the company creates, it's not just a one time photograph of the company. It's not just a one time evaluation. You need to do this on a recurrent basis, and you need to evaluate the impact and how the company is performing from time to time to steer the company towards certain impact.

- Investment Manager, VC 4

Senior Investment Manager of CVC 7 notes that although a startup could pass all ESG checks during the due diligence phase and have a suitable sustainability profile, they will continue monitoring that after the investment.

If we invest and the company fulfills our requirements as part of our questions for sustainability and ESG reporting, we will monitor that in the board. So yeah, we will take board positions, we will monitor the company's performance along different metrics going forward in the board.

- Senior Investment Manager, CVC 7

In many cases, startups can have some yellow flags raised regarding ESG in the pre-investment assessments, given their early development stage. This is something that most investors accept, but then it is important to put focus on these areas that are lacking in the post-investment phase. Partner of VC 6 suggests defining a road map and action plan for improving the identified areas.

Sometimes they do not have everything in order yet. But then you define a road map and action plan how we believe they should improve this.

- Partner, VC 6

Helping startups to create a sustainability roadmap is an action that was also suggested by Expert 1 to provide sustainability support for portfolio companies. The roadmap can also be structured to contain and put on a timeline the different possible sustainability support actions provided by the corporate investor. Similarly, CVC 7 mentions defining clear objectives and deliverables for the portfolio companies, and that they are looking to include sustainability in those.

Typically, what we would do very clearly for all startups today is before we invest, we define very clear objectives, very clear deliverables and I think what we are doing more and more as we go forwards is we will be building criteria around sustainability and issue reports of those deliverables. So I think we will measure when we do our portfolio review, how is the startup performing against those milestones that we set at the beginning of the investing, are they on track, are they falling behind relative to what we were hoping to achieve.

- Senior Investment Manager, CVC 7

These milestones and tracking can be especially important for investors who have strategic collaboration projects with the portfolio startups. This is to stay aware of are the projects producing expected outcomes or should more support or resources be provided. Then also decisions can be made in timely manner if fundamental issues come up.

Several VC informants mentioned that they were adding sustainability requirements and targets in the investment contracts, for example, in term sheet or shareholder agreement. CVCs appeared to choose this approach less. One of the CVC investors mentioned adding their code of conduct, which contains some sustainability guidelines, to shareholder agreements, but no strict requirements were added to the contracts. Another CVC mentioned adding requirements for reducing emissions and penalties if that does not happen. However, investors need to be careful about setting strict target requirements for impacts of the startup because they can limit the startup's ability to pivot. This can mean a startup needing to stay in a course of trying to push their solution to a commercially infeasible area instead of pivoting it to a better suited niche area. Investment Manager of VC 4 elaborates this concern:

If we set certain CO₂ targets, for example, thresholds that the company should meet at certain moments. This can also inhibit the success of the company. For example, if a company starts a process to produce fuel from plastic waste, it seems that with these fuels we have an extremely big CO₂ impact. But if the startup sees that the fuel cost and process is too costly to get the fuels in the market, you will probably pivot towards other products, maybe a more valuable chemical. But this more valuable chemical will probably have a much smaller application, and so the target market is much smaller. So the impact that you will calculate is much smaller compared to the initial impact that you had with renewable fuels. So, I think your sustainability goals for a certain startup should allow for some pivoting of the startup as well. If you put these hard requirements and thresholds as an investor, you might lose the interest to further support the company and to further do some follow-on investments in the company to do the pivot towards another application.

- Investment Manager, VC 4

Investment Director of CVC 6 shares this concern about including impact requirements in term sheets and shareholder agreements:

What will be the consequence if you include this [sustainability impact target] in the term sheet and then the company did not reach it, then you will have void contracts. What will happen, you will say OK I will leave the contract? [...] I also cannot believe that someone will put it in as a hard fact.

- Investment Director, CVC 6

A more flexible way of adding sustainability requirements to the investment contracts is including requirements for board level attention to sustainability and creation of sustainability strategy and roadmap for the company.

If we invest, in our term sheet that we use to the startups, it's already included that one of the board members should be responsible for the ESG topics and that these ESG topics should be discussed at board level at least once a year, and so that there is also a kind of ESG strategy for the next few years.

- Investment Manager, VC 4

In addition to defining development areas and following their development, another area that the investors can track is sustainability impacts from each investment and also on the aggregated portfolio level. Majority of informants who said that they were tracking the companies after the investments mentioned CO₂ impact being a measure that they follow, and for some it was the only sustainability KPI that they were following. However, not all sustainability impacts are emissions related. The informants see difficulties in portfolio level impact tracking and reporting when there are startups with different sustainability impacts.

There are already quite good tools to manage the portfolio in financial sense like how much money you have invested to the portfolio companies, how their revenues have grown, head count, how much money they have left, runway, and so I think that it would be natural to add there, for example, what is the portfolio level CO₂ reduction so far. However, what if you have a company that focuses on cleaning water, how would you add that there?

- Investment Manager, VC 2

So we developed already a portfolio tool [for tracking sustainability impacts], but with only one bubble [CO₂ impact] it does not give so much answers there.

- Investment Director, CVC 6

Overall, the development areas and tracking should be focused on the most meaningful areas and also be aligned with the resources available at the startup.

We're not going to push the startup that they put solar panels on the roof. That's nice, but the startup should be focusing bringing the innovation to the market and not immediately worrying whether they have solar panels on the roof or not.

- Partner, VC 6

In the end, we aren't going to save the world with reporting, but actually doing things. [...] Startups have small teams, you cannot throw there too much reporting burden because then the idea will die.

- Investment Manager, CVC 2

CEOs of these companies, they usually have too much work in the current developing day by day business to be involved or to be interested in order to develop such [ESG] policies at the company. For sure, they will do it, but it is not in the priorities right now.

- Senior Investment Associate, CVC 13

4.3.2 Supporting portfolio companies

Given the view that good startups can have many investor candidates to choose from, it becomes important for a corporate investor to have defined the support that they can provide to their portfolio companies. In the area of sustainability, corporate investors can provide support in a few subareas, including bringing focus to sustainability in the startups as well as executing and getting towards the sustainability goals.

First, corporate investors can help startups with sustainability assessments, tracking sustainability factors, and reporting them to different stakeholders. In other words, this is helping startups to legitimize their sustainability claims and drive focus to ESG compliance. Formalizing the sustainability profile and reporting readiness helps to prepare the startup for later investment rounds, where more stringent sustainability assessments are made by investors.

The next round will be even more brutal in terms of [sustainability] questions. So they need to be ready. As a board member, I will make sure that's on the priority list. So when I did my due diligence, that was one of the items that I identified as a to-do items post investment on how to generate value. [...] You need to be ready for those questions and that's where I will use my contacts in the industry and those funds to help the startup to get ready.

- Investment Manager, CVC 5

In this area, the informants mention that they have connected their portfolio companies with the sustainability experts of the parent company, who then bring knowledge of different sustainability metrics and what others are tracking. Furthermore, the informants were giving early stage startups information about what the requirements and assessments models of later stage impact investors are going to be. Then another way of supporting is to actually share methods how startups could, for example, calculate their key impacts. These are often related to environmental impacts, such as carbon emissions.

For carbon footprint assessment, we have given some methods of how they should approach it and calculate it.

- Investment Associate, CVC 12

For example, LCA, we can bring good methods and databases with information on how to do the calculations that the startup needs. As a startup, would you want to use 50k for buying such database or would you use that 50k for hiring new salesperson, at least I would hire the salesperson, so

having a corporation with these resources available can help the startup really much.

- Investment Manager, CVC 2

Corporate can also bring best practices to the portfolio startups, for instance, in the areas of safety, governance, and regulatory aspects. In regulatory aspects, the experts from large companies can provide knowledge how sustainability regulation will develop.

Big factors are deep understanding of regulation and validation [of being compliant], maybe also what is happening in the markets. Startups don't have an army of lobbyists in Brussels, but we do, so we know well through our public affairs what, for example, is being planned on EU level in the sustainability front.

- Investment Manager, CVC 2

A key support factor regarding sustainability for corporate investors is the help they can provide for actually realizing the solution that the startup is developing. This was also the area where many of the CVC investors saw themselves differentiating from the support that other VCs can provide.

Will they [VCs] be able to help them actually reaching the goals, if it's a product or a process, probably not. That's where we come in, so we probably will be able to help them do more heavy lifting kind of stuff. [...] We can use those good [parent company] resources to help the startup, and we come in, and we help the startup actually do it. Build a process, reduce the CO₂ footprint of their process or whatever they're making.

- Investment Manager, CVC 5

Thus, the corporate investors see that an important part for their help is having the startups interact with engineers, chemists, or other experts inside the parent company. Often the parent companies of CVCs have also made internal development for sustainable solutions, and these solutions and the knowledge behind them can be valuable for startups developing new technologies.

We can support them by really bringing knowledge to them and maybe also help with a sustainable solution that we have developed already within the parent company.

- Investment Director, CVC 6

We can develop the environmental aspects, for example, help startups to find ways to develop the innovation in even more sustainable direction and taking into account what additional aspects are needed. [...] We support the technological development by giving our understanding.

- Investment Manager, CVC 2

Many times the technical support is not directly related to the sustainability aspects because the sustainability thinking of the startup is further than the incumbent, but in these cases the startup might need help in, for example, performance related aspects. Support on these other technical factors is also important because it helps the sustainable product to perform against incumbent alternatives.

I would say from my experience, most of the cases, those companies [with sustainability angle], what they need is like support on applications or maybe some bits of the technology. [...] We have expertise really on materials innovation. So in some instances the startup companies they will need our materials to make their product better. But that's not always linked to the sustainability profile. So if they need the materials to make their product lighter, for instance, we would be glad to help them on that path.

- Senior Investment Associate, CVC 11

The value of the deep technical expertise and solutions inside large companies are also recognized by others in the venture capital space, and some independent VCs are trying to leverage that through corporates who are investing also in VC funds.

They [VCs] try, and this is what they're doing with us, try to select their LPs wisely so that the LPs of the fund can also support the portfolio companies of the fund. So this is what we're also doing, investing into a fund. We also offer them to be a partner there for the portfolio companies.

- Investment Director, CVC 6

In addition to support for developing sustainable products and enabling sustainable production, corporate investors can help with the commercial aspects, which are also essential in order for startups to reach scale and create the largest impact possible. A normal way that a CVC can help startups is by giving them customer network access. In the case of sustainability, corporate can help startup finding the group that is benefiting from the sustainability impact of the startup and willing to pay for it. Marketing resources and channels can help raise awareness of the solution that the startup is developing.

With these early stage companies, it [support] is usually validating and developing the business model, finding the right market, and building traction.

- Venture Partner, CVC 4

A type of support comprising several of the aforementioned support types and a key factor how several CVC investors saw themselves providing sustainability related support to their portfolio companies is providing collaboration projects, in which the startups can validate their solution. Co-development and piloting with the startup can be a way for corporate to help and save the limited resources of the startups. Corporate can also have pilot or demo facilities for the startup to use, which lessens the need from building these from scratch. The CVC informants see these projects as a win-win relationship, where both parties could learn and develop.

I think what we are providing them is obviously the money, but we are providing them projects as well. So this is something that the pure venture capital cannot offer because of their nature. [...] At the end of the day, it's a win-win relationship, as they need to validate their solution and make significant progress. We also need to develop projects because we are committed to do that in order to fulfill the net-zero goal as well.

- Investment Advisor, CVC 10

Overall, the informants agree that the support given can be very case specific, and corporate also needs to acknowledge the differences between corporate world and startup world. This makes it important for a corporate investor to having mapped out the ways they can provide support and then aligning the support actions together with each individual startup case.

There are differences between companies [on the support given]. Startups are different, but also the corporate mindset versus startup mindset are very different.

- Investment Manager, CVC 2

4.3.3 Learning for CVC unit and corporate parent

Finally, one of the main reasons why corporates invest in startups is to get learnings from them, thus making the sustainability development work both ways. Sustainability development happening towards the corporate investor and its parent company is an important consideration because that allows for accumulating learnings that can be then used to provide relevant and timely sustainability support for portfolio companies as the time passes. Of course, there is also the benefit of getting the new technologies and solutions in the vicinity of the corporate parent for the corporate sustainability development.

Hopefully we will have some learnings from the startups. This is what we always expect, you know, so the startup will learn something from us, and we hopefully will learn something from them [...] and bring the technologies the startups developed also into the parent company, that's part of being a strategic investor.

- Investment Director, CVC 6

The direct sustainability learnings from the startup investments are often related to making some processes or products more sustainable.

I think they [startups] know pretty well what they are doing, but we might in our end need their help to make our own processes more sustainable or to have like a green feedstock stream.

- Senior Investment Associate, CVC 11

In addition to the explicit sustainability gains from the projects with portfolio startups, there are also implicit sustainability learnings to be had for the CVC investors and their parent companies. First, there is a need for continuous learning and development of sustainability thinking as the sustainability space is under constant change. This means that investors need to be developing their assessments to account for the expanding sustainability knowledge and possible new ESG risks that might emerge.

You should keep on developing it [assessments] because also the environment is continuously changing, and what we considered no risk a couple of years ago seems to become a risk today. Regions, geopolitical tensions, whatever. So we have to update that, and that's what we do. So this is a living document, it's not changed every week. But when we see there's enough reasons to update some questions or eliminate some questions, that's what we do.

- Partner, VC 6

Sustainability and ESG assessments should be a joint effort from the investor community. There are initiatives and discussions going on about how to manage sustainability aspects in venture capital investments.

We believe the ESG scene is not competitive, it shouldn't be competitive. [...] We had an open debate about ESG, and we also launched an initiative with VCs willing to team up with us on how to further improve the ESG assessments. This is not something we want to keep for ourselves. This is something which is good for the industry, which is good for everybody. [...] We're willing to share what is our experience, but we're also willing to listen from others, and there are also some common initiatives, VentureESG, I believe it's called.

- Partner, VC 6

Currently, these common initiatives are mostly driven by independent venture capitalists, but they are something that corporate venture capital investors should also consider. Some CVCs have already taken the initiative to create or join these investor networks.

We are also in charge of developing a network of other investors or corporations or other potential people that could be interested in earlier-stage companies.

- Investment Advisor, CVC 10

Engaging in the venture capital sphere is a useful action as it can provide new sustainable investment opportunities, but also allow the corporate investor to stay on top of how the different sustainability dimensions and factors are seen in the venture capital community. It is especially useful for a corporate investor to follow what the

impact focused VCs are doing and what the communities are developing, as that can help to ensure that the sustainability assessments are aligned with common practices. Furthermore, the engagement with other investors can lead to possible ideas emerging on how to use corporate resources even better to support sustainability of portfolio companies.

5 Discussion

This section presents the resulting grounded theory model that has been derived from the data structure shown in Figure 12 and the consequent findings in Section 4. The main findings are summarized in the process model that shows the relationships and positioning between the identified themes and dimensions. The model works to answer the research questions presented in Section 1.2 and through them the main research problem, “*How can sustainability be integrated into the corporate venture capital strategy and investment process?*” The section also covers the contributions to literature, practical implications of the main findings, limitations of the present research, and the resulting avenues for future research.

5.1 Key considerations for integrating sustainability into CVC investments

The main considerations and factors covered in the study are summarized in the emergent model shown in Figure 13. The model is structured on two dimensions, in which the identified aggregate dimensions of Figure 12 are considered. The horizontal dimension covers the phases in the corporate venture capital investment process, starting from a planning phase, moving to the pre-investment phase, and then continuing to the post-investment phase. Then, on the vertical dimension, the model covers actions from a more strategic level to a more operationalized level and moves from planning desired outcomes from the investment activities to evaluating opportunities to find suitable targets, and then to concrete execution of collaborative and supportive actions as well as observing the resulting development.

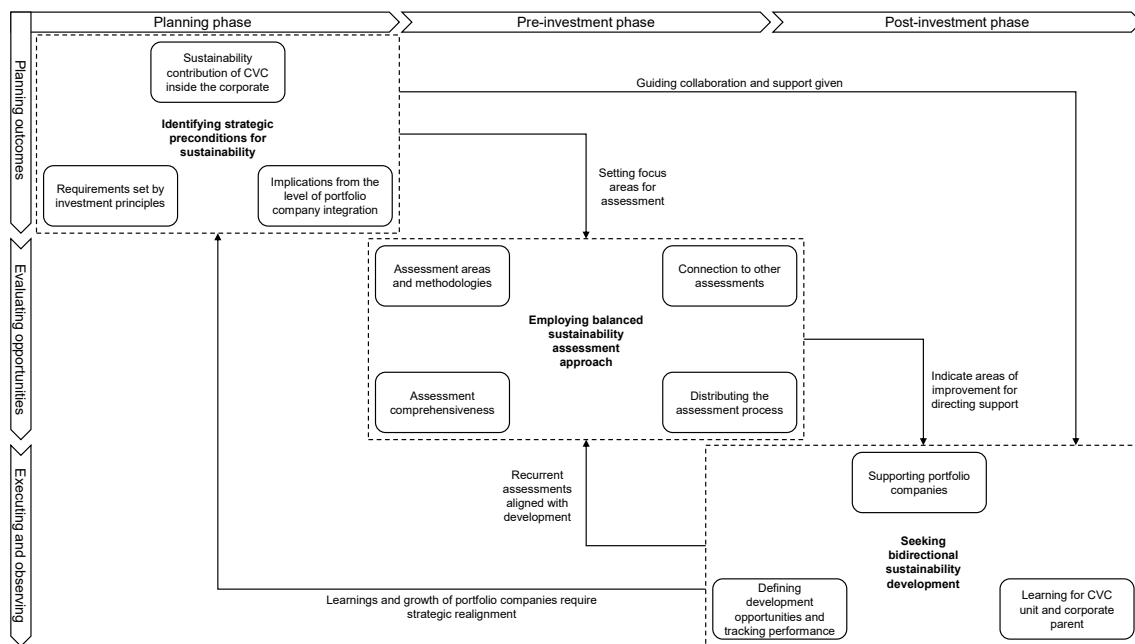


Figure 13: Proposed model for sustainability integration in CVC investments.

In the full view, the model presents the stages to be considered when integrating sustainability to corporate venture capital investments, along with their interrelationships. Taking a closer look at the model reveals three distinct process stages, which are based on the identified aggregate dimensions and the underlying themes. The first stage that corporate venture capital investors should consider regarding sustainability in their investments is to identify the strategic preconditions for sustainability. As shown in Figure 13 and explained more in depth in Section 4.1, corporate investors can identify the strategic preconditions for sustainability through consideration of the following three thematic areas. First, it should be recognized what is the desired sustainability contribution of the CVC unit and their investments in the domain of the corporate parent. This theme builds from the considerations of the CVC unit's role inside the corporate. Second, corporate investors should understand the requirements for sustainability actions that are being set by their investment principles, such as defined target industries, geographical investment scope, and pursued growth stage of targets. Third, corporate investors need to understand the implications from the desired level of portfolio integration to sustainability assessments and sustainability support given. As a whole, the stage sits on the planning area, both in terms of the investment phases and the type of actions. The first stage answers on a strategic level to the first research question of "*What requirements are there in making sustainability assessments of startups?*" by setting the focus areas for sustainability assessments, which also creates a connection to the following dimension related to the assessment approach. In addition, the strategic preconditions also drive the sustainability development dimension by guiding the collaboration between the corporate and the startup as well as the support actions provided for sustainability development.

The second stage for integrating sustainability in corporate investments is employing a balanced sustainability assessment approach. Within this aggregate dimension, there are four thematic areas to be considered, following the second-order themes presented in Section 4.2. The first thematic consideration is the concrete assessment areas and methodologies used for the sustainability assessments. Here, corporate investors need to choose material areas to be assessed and methods that are suitable for the types of targets considered by the CVC unit. The choices inside this thematic area are connected to the strategic preconditions, but there can also be a need for the alignment of assessment areas and methodologies for individual investments. The second thematic consideration is about connecting the sustainability assessments to the other assessment areas such as technical and financial assessments, which results in a higher level of integration and buy-in for making the assessments while decreasing the perception of sustainability as an additional burden. The third consideration in this dimension is the comprehensiveness of chosen sustainability assessments. Within this theme, decisions are to be made about positioning between assessment speed and rigor, as well as the level of quantification compared to more heuristic-based approaches. Finally, the fourth thematic area inside the sustainability assessment approach dimension is how the sustainability assessment is distributed to different stakeholders that are connected to the CVC unit. Considering the four thematic areas together allow for having a balanced sustainability assessment approach that complies with the requirements and focus areas from the strategic preconditions

dimension. This second stage of the model lies mostly in the pre-investment phase of the horizontal dimension, but also extends partly to the planning and post-investment phases. On the vertical dimension, this stage is related to evaluating opportunities. In terms of the research questions, the present stage adds to the answer for the first research question by indicating the requirements to sustainability assessment on operationalized level. Furthermore, the stage answers to the second research question of “*What sustainability assessments are corporate investors using as a part of CVC investment decisions?*” by covering concrete assessment areas, methodologies, and the way they can be used in the investment process. This stage also provides input to the following sustainability development stage by indicating areas of improvement that can then be used for aligning the sustainability support provided.

The third stage of the sustainability integration process is about seeking bidirectional sustainability development between a startup target and the corporate entity. Following the findings of Section 4.3, this stage has three thematic areas. First, the initial theme of the sustainability development stage is defining development opportunities for sustainability and tracking the performance. This theme links to the assessment stage of the model, as defining development opportunities and tracking require assessing the portfolio companies at regular intervals, while at the same time being conscious of not adding too much assessment related workload for the investors and for the portfolio companies. The second theme covers the actions to support the portfolio companies to improve their sustainability and reach sustainability goals. This support can be provided on the process level regarding sustainability assessments, but also on the execution level of developing sustainable solutions, which brings importance to the corporate investor having a clear view of what kind of support it aims to provide for the portfolio companies. Then, the third theme concerns the learnings and resulting sustainability development that comes to the CVC unit and its corporate parent from making the investments and working with the portfolio companies. These learnings are crucial to improve the sustainability of the corporate, but also to have an up-to-date approach to sustainability in the investments. As can be seen from Figure 13, this stage is mostly located in the post-investment phase of the horizontal dimension of the model, but also has some overlap with the balanced sustainability approach stage in the pre-investment stage. On the vertical dimension, this stage sits within the executing and observing area. Together, the themes inside this stage of the model form an answer to the third research question of “*What kind of sustainability development support can be provided through the investment cycle?*” by discussing the different types of sustainability support provided by corporate investors and also the aspects of structuring and developing the support itself. Furthermore, the theme also extends this sustainability development consideration to include the concurrent sustainability development to the corporate entity.

There is a seeming continuum from strategic preconditions to sustainability assessments to developing and supporting. However, as new investments are done continuously, the process can be considered partly also as a loop, especially as the sustainability space is also continuously transforming, requiring periodical realignment of approaches. This can be seen in Figure 13, where there is a connection

from the sustainability development stage back to the sustainability assessment stage, warranting recurrent assessments that are also aligned with changes in the sustainability environment and in the startup being assessed. Furthermore, there is also a connection from the sustainability development stage back to the strategic preconditions stage, as the learnings from the investment activities and the growth of portfolio companies can demand strategic realignment. In addition, the partial overlap on the horizontal axis emphasizes that the stages should not be considered fully consecutive, but rather as having fluid transitions and partially being simultaneous.

5.2 Contributions to literature

The findings of the present research make contributions to the literature on multiple levels, ranging from general business sustainability considerations to the specific sustainability aspects and requirements in startup investments. The theory related findings of the thesis mostly support the concepts and proposals presented in the prior literature.

Firstly, the research contributes to the sustainability literature by clarifying the concept of sustainability and its components. By distinguishing between environmental, social, and economic dimensions, the thesis emphasizes the importance of considering economic success as a resource for sustainability development and success in the other two dimensions. Furthermore, the thesis provides a view of sustainability where ESG is used for considering company specific sustainability risks and sustainability impact is used for the sustainability effects that a company produces through its inventions, products, and services for the surrounding environment and society. These clarifications and distinctions of the present research contribute to alleviate the concern of complexity and lack of conceptual clarity of sustainability raised by Omann and Spangenberg (2002).

Furthermore, the research sheds light on the use of different sustainability assessment methods in the context of CVC investments. It reveals the high adoption level of checklists, questionnaires, scorecards, and life cycle assessment (LCA) in assessing sustainability aspects of startup investments. This finding of the popularity of the aforementioned methods challenges suggestions in prior literature (e.g., Hansen and Schaltegger, 2018) of these methods being inapplicable for startups. The thesis suggests that dynamism that is called for in prior research (e.g., Fichter et al., 2023) can be incorporated at a higher level, allowing for flexibility in choosing assessment methods based on the specific situation and capabilities of the assessor. This insight contributes to the ongoing discussion on effective sustainability assessment practices. The thesis also supports the notion by Fichter et al. (2023) that assessments should be forward-looking and focused on determining key impacts rather than attempting to optimize all aspects. Simplicity is also identified as an important consideration in assessing startups, aligning with prior findings (e.g., Trautwein, 2021).

Moreover, the research supports the process-based impact models presented in prior literature (e.g., Picón Martínez et al., 2021; SIIT, 2014). The emerging model in this study highlights the importance of defining objectives, involving stakeholders, conducting recurring alignments, and maintaining a continuance of the process.

These findings corroborate earlier suggestions and thus contribute to the body of knowledge on effective sustainability impact management on the holistic level.

In terms of investment motivations, the research extends existing knowledge by demonstrating that sustainability is not merely a negative screening factor for many corporate investors. Instead, sustainability is seen as an integrated part of their investments by a high share of the informants in the study. This finding supports the trend discussed by Caplan et al. (2013), that sustainability considerations are moving towards emphasizing a more holistic approach.

Furthermore, within the domain of corporate venture capital, the study confirms the general view highlighted by Weiblen and Chesbrough (2015) that the presence of a corporate investor and its parent company can create tensions among startups and other stakeholders. These tensions also manifest in the realm of sustainability, as informants mentioned the need in some cases to put on safeguards for the sustainability effects resulting from the interests of large corporates. The present research highlights the importance of having clearly defined goals and approaches to investments, which can be articulated to other stakeholders to alleviate tensions and promote alignment. The findings also highlight the need for cross-functional collaboration in managing sustainability-related aspects, which is in line with the suggestion from Bocken and Geradts (2020).

These contributions enhance the understanding of sustainability and aspects of its integration into corporate venture capital investments, providing valuable insights for reflecting prior work around the subject area.

5.3 Practical implications

As the present research focuses on the actions and viewpoints of practitioners, most contents of the thesis are relevant from the practical standpoint, especially the coverage of findings in Section 4 and discussion of key considerations in Section 5.1. However, a few key practical implications can be lifted to summarize these sections from a practitioner perspective.

The findings of this study highlight the need for corporate venture capital units to incorporate sustainability goals into their investment strategies. By aligning their sustainability contributions with the parent company's sustainability goals, CVC units can ensure a cohesive and integrated approach to sustainability throughout the organization. With these desired sustainability goals, along with the general investment principles and the pursued level of portfolio company integration, CVC units can establish guidelines towards achieving the wanted sustainability outcomes.

With the defined guidelines, corporate investors can choose the most material assessment methods and measures to focus their sustainability assessment, instead of trying to exhaustively cover all possible aspects related to sustainability. Initially, CVC units can make use of generally available environmental, social, and governance checklists, as well as other available approaches, which are covered in Sections 2.3 and 4.2.1. However, to focus assessments on the most critical sustainability areas from the defined guidelines, a materiality assessment should be conducted. This assessment can be conducted, for example, with the materiality heatmap approach,

also presented in Section 2.3. It enables CVC investors to prioritize sustainability areas based on the strategic preconditions and the aspects related to the specific target startups. This materiality focused approach can help make the sustainability considerations lighter and more flexible than what extensive approaches would allow for, which has importance for CVC investors, who have already limited number of targets to consider due to the other strategic requirements. This consideration is also supported by the fact that unlike traditional venture capitalists who evaluate various opportunities, industrial CVCs often can deal exclusively with sustainability-focused opportunities. This prebuilt sustainability focus reduces the need for extensive ESG checklists from a risk perspective, allowing CVCs to concentrate on validating the key sustainability claims of potential investments.

Another practical suggestion that stems from the research is the importance of CVC investors collaborating and engaging with relevant stakeholders when considering sustainability. CVCs should leverage the knowledge and capabilities of other stakeholders within the organization, including corporate experts and corporate sustainability personnel, as well as stakeholders outside the corporate parent, such as co-investors and the startups themselves. This collaborative approach ensures that sustainability views are aligned among relevant parties, which can help to reduce possible tensions that can be present in the investment process and in the following holding period. Furthermore, collaboration with assessments reduces the overall workload required. By tapping into the expertise of these stakeholders, CVCs can enhance their understanding of sustainability and strengthen their decision-making processes.

In terms of development, CVCs should have a clear vision of the support they can provide and the sustainability development they expect from their investments. This clarity will guide their collaboration with portfolio companies, enabling them to foster sustainability-driven growth and impact. Furthermore, CVC investors should track the development of their portfolio companies also after the investment to see if the startups are on the right path and if more support is needed. Additionally, corporate investors should actively engage with other players in the venture capital space to stay updated on evolving sustainability methods. Following this engagement, they should be open to revising their assessments and approaches as new knowledge and practices emerge.

In conclusion, by following the framework defined in the thesis (see Figure 13), corporate investment managers can guide their thinking and investment approach in a way that integrates sustainability aspects to all phases in the investment process. The actions then contribute to the broader sustainability agenda of both the CVC unit and the parent company, while promoting responsible and impactful investment practices in the venture capital landscape. Furthermore, having determined the strategic preconditions for sustainability and the assessment methodologies allow the CVC unit to promote its approach and positioning, which can raise its profile positively and attract the types of startups that are wanted for investment.

5.4 Limitations and future research

The present research comes with a few limitations, which on the other hand also provide interesting avenues for future research. These limitations arise from the scope of the research, the qualitative nature of the study, and the cross-sectional research approach.

Firstly, the research focused specifically on industrial sectors. This leads to the results being generalizable to industrial sectors, which have similar dynamics and investment profiles as the ones covered in the present research. This scope covers already numerous corporate venture capital players, but also leaves out actors from some more distant industrial sectors and more notably non-industrial sectors, which limits the generalizability of the results. Therefore, future research could explore how sustainability assessments and development are handled in companies where the investment focus is, for instance, in software startups or services. This would provide valuable insights into the unique challenges and approaches in different sectors, and contribute to a more comprehensive understanding of sustainability practices in CVC investments and sustainability considerations for startups in general. Furthermore, the other sectors could also provide more in-depth look into social sustainability aspects, which were overshadowed in the present research by the environmental factors.

Secondly, the qualitative nature of the study limits the ability to determine the most effective assessment approaches and types of sustainability support that yield the best sustainability results for the different stakeholders. Future research could employ a quantitative study design to test and compare different assessment approaches as well as the different types of sustainability support and measure their impact on sustainability outcomes. Such research could provide empirical evidence on the effectiveness of various strategies and create quantifiable support for integrating sustainability practices into CVC investments. A quantitative study could also help provide insights on the ranking of different sustainability impacts, an area that was found challenging in the present study. In that area, a quantitative study could try to find equivalence points between different types of impacts, and also try to determine how to balance investor portfolios to not only include climate gas related impacts, but to increasingly consider other sustainability areas as well. Additionally, another avenue for future quantitative research could be examination of sustainability effects resulting from startup failures, which are common in the venture capital space, and thus an important topic to consider. Often the effects are not only limited to economic dimension as a loss of invested capital but also include environmental and social effects such as unnecessary property, plants, and equipment left behind. Understanding the types and scale of adversary effects from startup failures could help to provide support for mitigating those effects of failure. This is a relevant topic especially from the view of CVC units and their corporate parents as they can provide resources such as production facilities for startups, which would lessen the adverse sustainability effect in case of startup failure, since the facilities do not become obsolete. Thus, also investigating how corporate investors' resources and support mitigate the adverse effects of obsolescence in the event of startup failure

would be particularly valuable.

Furthermore, the cross-sectional research approach in the present study provides only a snapshot of the researched entities at a specific point in time. Conducting a longitudinal study would allow for a comprehensive examination of sustainability development in portfolio startups, CVC investors, and parent companies over time. This longitudinal perspective would shed light on the effects of different actions and initiatives on sustainability outcomes and provide insights into the evolution of sustainability practices within the venture capital ecosystem. Furthermore, a longitudinal study would allow for examining the usability of startup sustainability assessments over different startup development stages, and give a better view of what sustainability support actions are needed at the different development stages.

Taken together, the limitations identified in this study offer intriguing avenues for future research in the field of startup sustainability, CVC sustainability assessments, and development through the support from CVC investors and their parent companies. By expanding the scope to different sectors, conducting quantitative studies, and adopting a longitudinal approach, researchers can address these limitations and further enhance the understanding of sustainability in the business world.

References

- Agarwal, S., Tanger, K., Linich, D., Madsen, J., Nicholson, A., and Martin, L. (2012). Enhancing the value of life cycle assessment. Deloitte.
- Ajmal, M. M., Khan, M., Hussain, M., and Helo, P. (2018). Conceptualizing and incorporating social sustainability in the business world. *International Journal of Sustainable Development & World Ecology* 25(4), 327–339.
- Alakent, E., Goktan, M. S., and Khoury, T. A. (2020). Is venture capital socially responsible? Exploring the imprinting effect of VC funding on CSR practices. *Journal of Business Venturing* 35(3), 106005.
- Albino, V., Balice, A., and Dangelico, R. M. (2009). Environmental strategies and green product development: an overview on sustainability-driven companies. *Business strategy and the environment* 18(2), 83–96.
- Aleman, L., Ioannou, I., and Kacperczyk, O. (2022). How VCs Can Help Startups Set (and Meet) ESG Goals. <https://hbr.org/2022/01/how-vcs-can-help-startups-set-and-meet-esg-goals>. Harvard Business Review Digital Article. Accessed: 06.02.2023.
- Baldassarre, B., Konietzko, J., Brown, P., Calabretta, G., Bocken, N., Karpen, I. O., and Hultink, E. J. (2020). Addressing the design-implementation gap of sustainable business models by prototyping: A tool for planning and executing small-scale pilots. *Journal of Cleaner Production* 255, 120295.
- Bansal, P. and Roth, K. (2000). Why Companies Go Green: A Model of Ecological Responsiveness. *Academy of Management Journal* 43(4), 717–736.
- Basu, S., Phelps, C., and Kotha, S. (2011). Towards understanding who makes corporate venture capital investments and why. *Journal of Business Venturing* 26(2), 153–171.
- Battisti, E., Nirino, N., Leonidou, E., and Thrassou, A. (2022). Corporate venture capital and CSR performance: An extended resource based view's perspective. *Journal of Business Research* 139, 1058–1066.
- BCG (2021). Carbon Measurement Survey Report 2021: Use AI to Measure Emissions Exhaustively, Accurately, and Frequently. <https://www.bcg.com/publications/2021/measuring-emissions-accurately>. Accessed: 02.02.2023.
- Bendig, D., Kleine-Stegemann, L., Schulz, C., and Eckardt, D. (2022). The effect of green startup investments on incumbents' green innovation output. *Journal of Cleaner Production* 376, 134316.
- Bengo, I., Arena, M., Azzone, G., and Calderini, M. (2016). Indicators and metrics for social business: a review of current approaches. *Journal of Social Entrepreneurship* 7(1), 1–24.
- Bento, N., Borello, M., and Gianfrate, G. (2020). Market-pull policies to promote renewable energy: A quantitative assessment of tendering implementation. *Journal of Cleaner Production* 248, 119209.
- Bocken, N. M. P. (2015). Sustainable venture capital – catalyst for sustainable start-up success? *Journal of Cleaner Production* 108, 647–658.

- Bocken, N. M. P. and Geradts, T. H. J. (2020). Barriers and drivers to sustainable business model innovation: Organization design and dynamic capabilities. *Long Range Planning* 53(4), 101950.
- Böckin, D., Goffetti, G., Baumann, H., Tillman, A.-M., and Zobel, T. (2022). Business model life cycle assessment: A method for analysing the environmental performance of business. *Sustainable Production and Consumption* 32, 112–124.
- Boffo, R. and Patalano, R. (2020). ESG Investing: Practices, Progress and Challenges. OECD Paris.
- Bos-Brouwers, H. E. J. (2010). Corporate sustainability and innovation in SMEs: Evidence of themes and activities in practice. *Business Strategy and the Environment* 19(7), 417–435.
- Botsari, A. and Lang, F. (2020). ESG considerations in Venture Capital and Business Angel investment decisions: Evidence from two pan-European surveys. EIF Working Paper 63. Luxembourg: European Investment Fund.
- Bryman, A. and Bell, E. (2011). Business Research Methods. Third edition. New York: Oxford University Press.
- Caplan, L., Griswold, J. S., and Jarvis, W. F. (2013). From SRI to ESG: The Changing World of Responsible Investing. Wilton, CT: Commonfund Institute.
- CB Insights (2023). State of CVC 2022 Report. https://www.cbinsights.com/reports/CB-Insights_CVC-Report-2022.pdf. Accessed: 30.01.2023.
- Chemmanur, T. J., Loutskina, E., and Tian, X. (May 2014). Corporate Venture Capital, Value Creation, and Innovation. *The Review of Financial Studies* 27(8), 2434–2473.
- Choi, S. and Ng, A. (2011). Environmental and economic dimensions of sustainability and price effects on consumer responses. *Journal of business ethics* 104, 269–282.
- Costa, E. and Pesci, C. (2016). Social impact measurement: why do stakeholders matter? *Sustainability Accounting, Management and Policy Journal* 7(1), 99–124.
- Delgado-Ceballos, J., Ortiz-De-Mandojana, N., Antolín-López, R., and Montiel, I. (2023). Connecting the Sustainable Development Goals to firm-level sustainability and ESG factors: The need for double materiality. *BRQ Business Research Quarterly* 26(1), 2–10.
- Demirel, P., Li, Q. C., Rentocchini, F., and Tamvada, J. P. (2019). Born to be green: new insights into the economics and management of green entrepreneurship. *Small Business Economics* 52, 759–771.
- Denzin, N. K. and Lincoln, Y. S. (2017). The Sage Handbook of Qualitative Research. Fifth edition. Los Angeles: Sage Publications.
- Döll, L. M., Ulloa, M. I. C., Zammar, A., do Prado, G. F., and Piekarski, C. M. (2022). Corporate Venture Capital and Sustainability. *Journal of Open Innovation: Technology, Market, and Complexity* 8(3).
- Dunbar, P. (2022). Starting Up - Responsible Investment in Venture Capital. UN PRI.
- Dushnitsky, G. and Lenox, M. J. (2005). When do incumbents learn from entrepreneurial ventures?: Corporate venture capital and investing firm innovation rates. *Research Policy* 34(5), 615–639.

- Eisenhardt, K. M. (1989). Building Theories from Case Study Research. *The Academy of Management Review* 14(4), 532–550.
- Eisenhardt, K. M. and Graebner, M. E. (2007). Theory Building From Cases: Opportunities And Challenges. *Academy of Management Journal* 50(1), 25–32.
- Elkington, J. (2018). 25 years ago I coined the phrase “triple bottom line.” Here’s why it’s time to rethink it. *Harvard Business Review* 25, 2–5.
- Engert, B. (2020). Leaders for Climate Action (LFCA): German Venture Capital Firms Introduce Sustainability Clause. <https://actoncapital.com/leaders-for-climate-action-german-venture-capital-firms-introduce-sustainability-clause/>. Accessed: 16.01.2023.
- Ernst, H., Witt, P., and Brachtendorf, G. (2005). Corporate venture capital as a strategy for external innovation: an exploratory empirical study. *R&D Management* 35(3), 233–242.
- ESG_VC (2022). The ESG_VC Measurement Framework. <https://www.esgvc.co.uk/>. Accessed: 11.04.2023.
- Ferdousi, S. (2012). Cross-Functional Teams for Corporate Entrepreneurship Practices. *ISM Journal of International Business* 1(4), 1–25.
- Fichter, K., Lüdeke-Freund, F., Schaltegger, S., and Schillebeeckx, S. J. (2023). Sustainability impact assessment of new ventures: An emerging field of research. *Journal of Cleaner Production* 384, 135452.
- Finnveden, G., Hauschild, M. Z., Ekvall, T., Guinée, J., Heijungs, R., Hellweg, S., Koehler, A., Pennington, D., and Suh, S. (2009). Recent developments in Life Cycle Assessment. *Journal of Environmental Management* 91(1), 1–21.
- FINSIF (2022). Responsible Investment Guide. Finland’s Sustainable Investment Forum.
- Freudenreich, B., Lüdeke-Freund, F., and Schaltegger, S. (2020). A Stakeholder Theory Perspective on Business Models: Value Creation for Sustainability. *Journal of Business Ethics* 166, 3–18.
- FVCA (2022). ESG Toolbox to Help With Corporate Responsibility Work. <https://paaomasijoittajat.fi/en/esg-toolbox-to-help-with-corporate-responsibility-work/>. Accessed: 11.04.2023.
- Gehman, J., Glaser, V. L., Eisenhardt, K. M., Gioia, D., Langley, A., and Corley, K. G. (2018). Finding Theory–Method Fit: A Comparison of Three Qualitative Approaches to Theory Building. *Journal of Management Inquiry* 27(3), 284–300.
- Giddings, B., Hopwood, B., and O’Brien, G. (2002). Environment, economy and society: fitting them together into sustainable development. *Sustainable Development* 10(4), 187–196.
- Gilson, R. J. (2003). Engineering a venture capital market: Lessons from the American experience. *Stanford Law Review* 55, 1067–1103.
- Gioia, D. A., Corley, K. G., and Hamilton, A. L. (2013). Seeking Qualitative Rigor in Inductive Research: Notes on the Gioia Methodology. *Organizational Research Methods* 16(1), 15–31.
- Gompers, P. and Lerner, J. (2000). The Determinants of Corporate Venture Capital Success: Organizational Structure, Incentives, and Complementarities. Morck, R. K. *Concentrated Corporate Ownership*. University of Chicago Press, 17–54.

- GRI (2022). Consolidated Set of the GRI Standards. Global Reporting Initiative.
- Hall, J. K., Daneke, G. A., and Lenox, M. J. (2010). Sustainable development and entrepreneurship: Past contributions and future directions. *Journal of Business Venturing* 25(5). Sustainable Development and Entrepreneurship, 439–448.
- Hannan, M., Al-Shetwi, A. Q., Ker, P. J., Begum, R., Mansor, M., Rahman, S., Dong, Z., Tiong, S., Mahlia, T. I., and Muttaqi, K. (2021). Impact of renewable energy utilization and artificial intelligence in achieving sustainable development goals. *Energy Reports* 7, 5359–5373.
- Hansen, E. G. and Schaltegger, S. (2018). Sustainability Balanced Scorecards and their Architectures: Irrelevant or Misunderstood? *Journal of Business Ethics* 150, 937–952.
- Hayat, U. and Orsagh, M. (2015). Environmental, Social, and Governance Issues in Investing – A Guide for Investment Professionals. CFA Institute.
- Hegeman, P. D. and Sørheim, R. (2021). Why do they do it? Corporate venture capital investments in cleantech startups. *Journal of Cleaner Production* 294, 126315.
- Hehenberger, L., Harling, A.-M., and Scholten, P. (2015). A Practical Guide to Measuring and Managing Impact. EVPA.
- Hellweg, S. and Canals, L. M. i (2014). Emerging approaches, challenges and opportunities in life cycle assessment. *Science* 344(6188), 1109–1113.
- Henderson, R. M. (2015). Making the business case for environmental sustainability. *Harvard Business School working paper No. 15-068*.
- Hockerts, K. and Wüstenhagen, R. (2010). Greening Goliaths versus emerging Davids — Theorizing about the role of incumbents and new entrants in sustainable entrepreneurship. *Journal of Business Venturing* 25(5). Sustainable Development and Entrepreneurship, 481–492.
- Hörisch, J., Wulfsberg, I., and Schaltegger, S. (2020). The influence of feedback and awareness of consequences on the development of corporate sustainability action over time. *Business Strategy and the Environment* 29(2), 638–650.
- Judl, J., Mattila, T., Manninen, K., and Antikainen, R. (2015). Life cycle assessment and ecodesign in a day - Lessons learned from a series of LCA clinics for start-ups and small and medium enterprises (SMEs). Reports of the Finnish Environment Institute 18. Helsinki: Finnish Environment Institute.
- KFW Capital and BCG (2021). Growing the Seeds of ESG: Venture Capital, Start-Ups and the Need for Sustainability.
- LFCA Foundation (2020). VC Sustainability Clause. <https://lfca.earth/sustainability-clause/>. Accessed: 16.01.2023.
- Marcus, A., Malen, J., and Ellis, S. (2013). The Promise and Pitfalls of Venture Capital as an Asset Class for Clean Energy Investment: Research Questions for Organization and Natural Environment Scholars. *Organization & Environment* 26(1), 31–60.
- Maula, M., Autio, E., and Murray, G. (2005). Corporate Venture Capitalists and Independent Venture Capitalists: What do they know, Who do They Know and Should Entrepreneurs Care? *Venture Capital* 7(1), 3–21.

- McNally, K. (1995). Corporate venture capital: the financing of technology businesses. *International journal of entrepreneurial behavior & research* 1(3), 9–43.
- Milne, M. J. and Gray, R. (2013). W(h)ither ecology? The triple bottom line, the global reporting initiative, and corporate sustainability reporting. *Journal of business ethics* 118, 13–29.
- Muralikrishna, I. V. and Manickam, V. (2017). Chapter Five - Life Cycle Assessment. *Environmental Management*. Oxford: Butterworth-Heinemann, 57–75.
- Myers, M. D. (2013). *Qualitative research in business and management*. Second edition. Thousand Oaks: Sage Publications.
- Omann, I. and Spangenberg, J. H. (2002). Assessing social sustainability. *Biennial conference of the international society for ecological economics*. Vol. 7, 304.
- Pacheco, D. F., Dean, T. J., and Payne, D. S. (2010). Escaping the green prison: Entrepreneurship and the creation of opportunities for sustainable development. *Journal of Business Venturing* 25(5). Sustainable Development and Entrepreneurship, 464–480.
- Patton, M. Q. (1990). *Qualitative research and evaluation methods*. Third edition. Thousand Oaks: Sage Publications.
- Pedersen, C. S. (2018). The UN sustainable development goals (SDGs) are a great gift to business! *Procedia Cirp* 69, 21–24.
- Picón Martínez, A., Gaggiotti, G., and Gianoncelli, A. (2021). Navigating impact measurement and management – How to integrate impact throughout the investment journey. EVPA.
- PitchBook (2023). CVCs take part in more than a fifth of European VC deals. <https://pitchbook.com/news/articles/cvc-participation-european-vc-deals>. Accessed: 30.01.2023.
- Pope, J., Annandale, D., and Morrison-Saunders, A. (2004). Conceptualising sustainability assessment. *Environmental impact assessment review* 24(6), 595–616.
- Purvis, B., Mao, Y., and Robinson, D. (2019). Three pillars of sustainability: in search of conceptual origins. *Sustainability Science* 14, 681–695.
- Qu, S. Q. and Dumay, J. (2011). The qualitative research interview. *Qualitative Research in Accounting & Management* 8(3), 238–264.
- Recker, M. and Michelfelder, I. (2017). Sustainability entrepreneurship: how to measure future sustainability impact for early stage new ventures. *Innovation management, entrepreneurship and sustainability: Proceedings of the 5th international conference* (Prague), 821–835.
- Rees, W. E. (1995). Achieving sustainability: reform or transformation? *Journal of planning literature* 9(4), 343–361.
- Ritala, P., Huotari, P., Bocken, N. M. P., Albareda, L., and Puumalainen, K. (2018). Sustainable business model adoption among S&P 500 firms: A longitudinal content analysis study. *Journal of Cleaner Production* 170, 216–226.
- S&P (2021). A Short Guide to the EU's Taxonomy Regulation. <https://www.spglobal.com/esg/insights/a-short-guide-to-the-eu-s-taxonomy-regulation>. Accessed: 25.05.2023.

- Saunders, M., Lewis, P., and Thornhill, A. (2019). *Research Methods for Business Students*. Eighth edition. New York: Pearson.
- Savitz, A. W. (2014). *The triple bottom line: how today's best-run companies are achieving economic, social, and environmental success—and how you can too*. Second edition. San Francisco, CA: Jossey-Bass.
- Schönwälder, J. and Weber, A. (2022). Maturity levels of sustainable corporate entrepreneurship: The role of collaboration between a firm's corporate venture and corporate sustainability departments. *Business Strategy and the Environment*, 1–15.
- Sheth, J. N., Sethia, N. K., and Srinivas, S. (2011). Mindful consumption: A customer-centric approach to sustainability. *Journal of the academy of marketing science* 39, 21–39.
- SIIT (2014). *Measuring Impact*. Subject paper of the Impact Measurement Working Group. Social Impact Investment Taskforce.
- Simpson, B. and Brumme, C. (2022). Startups Need an ESG Strategy. <https://hbr.org/2022/11/startups-need-an-esg-strategy>. Harvard Business Review Digital Article. Accessed: 06.02.2023.
- Slaper, T. F. and Hall, T. J. (2011). The triple bottom line: What is it and how does it work. *Indiana Business Review* 86(1), 4–8.
- Trautwein, C. and Fichter, K. (2018). *Manual for the sustainability assessment of start-ups: A practical tool for start-up teams, investors and funding organizations*. Berlin: Borderstep Institute for Innovation and Sustainability.
- Trautwein, C. (2021). Sustainability impact assessment of start-ups – Key insights on relevant assessment challenges and approaches based on an inclusive, systematic literature review. *Journal of Cleaner Production* 281, 125330.
- Ubando, A. T., Rivera, D. R. T., Chen, W.-H., and Culaba, A. B. (2019). A comprehensive review of life cycle assessment (LCA) of microalgal and lignocellulosic bioenergy products from thermochemical processes. *Bioresource technology* 291, 121837.
- United Nations (2015). *Transforming our world: the 2030 Agenda for Sustainable Development*. <https://sdgs.un.org/2030agenda>. Accessed: 04.05.2023.
- United Nations (2017). *Global indicator framework for the Sustainable Development Goals and targets of the 2030 Agenda for Sustainable Development*. <https://unstats.un.org/sdgs/indicators/indicators-list/>. Accessed: 04.05.2023.
- United Nations (2020). *Sustainable Development Goals – Guidelines for the use of the SDG logo*. <https://www.un.org/sustainabledevelopment/news/communications-material/>. Accessed: 29.04.2023.
- van Zanten, J. A. and Huij, J. (2022). ESG to SDG: Do Sustainable Investing Ratings Align with the Sustainability Preferences of Investors, Regulators, and Scientists? *SSRN*.
- van Zanten, J. A. and van Tulder, R. (2021). Improving companies' impacts on sustainable development: A nexus approach to the SDGS. *Business strategy and the environment* 30(8), 3703–3720.
- Wackernagel, M. and Rees, W. (1996). *Our ecological footprint: reducing human impact on the earth*. Gabriola Island, Canada: New Society.

- WCED (1987). Our Common Future (The Brundtland Report). Oxford: Oxford University Press.
- Weiblen, T. and Chesbrough, H. W. (2015). Engaging with Startups to Enhance Corporate Innovation. *California Management Review* 57(2), 66–90.
- Winston, A. (2021). Sustainable Business Went Mainstream in 2021. <https://hbr.org/2021/12/sustainable-business-went-mainstream-in-2021>. Harvard Business Review Digital Article. Accessed: 30.12.2022.
- Wöhler, J. and Haase, E. (2022). Exploring investment processes between traditional venture capital investors and sustainable start-ups. *Journal of Cleaner Production* 377, 134318.
- Zaccone, M. C. and Pedrini, M. (2020). ESG factor integration into private equity. *Sustainability* 12(14), 5725.

A Interview protocols

A.1 Protocol for CVC informants

General questions about startup investments

- What are your goals in the startup investments?
- In which stages do you invest?
- Do the investments have a strategic link to the parent company?
- What kind of investment process do you have for startup investments?

Sustainability investments

- What role does the CVC unit play in the sustainability development of the parent company?
- Do you have a focus on investing in sustainable startups, why?
- Do you prioritize startups already performing well across sustainability dimensions versus startups with sustainability issues that will be addressed as part of the investment strategy?
- Have you implemented / are you going to implement any sustainability clauses (in term sheets or shareholder agreements)?

Sustainability assessment

- What kind of sustainability assessments do you have in place?
- What methods or tools do you utilize for assessing the sustainability of startup investments?
- How is the sustainability impact measured, numerical or qualitative measures?
- Are the assessments based on some general guidelines / dimensions, e.g., SDGs or UN PRI?
- How have you developed your methodology for assessing the sustainability of startups?
- Is the methodology developed internally or by an external party, and is it inspired by some other CVC/VC investor?
- How are the different aspects of ESG (Environment, Social, Governance) reflected in the sustainability assessment for the investment decision?
- How are your corporate sustainability goals reflected in the sustainability assessment?

- What information would you require for your sustainability analysis that the startups typically are not able to provide?
- What do you see as the general approach for startup sustainability assessment, what is most important?
- How do startups feel about the assessments and reporting?

Sustainability development

- What kind of actions are there to improve the sustainability of a startup from an investor perspective?
- What sustainability related resources are you providing for startups, where can you best provide support?
- What type of sustainability issues do the startups require most help with?
- How are the different aspects of ESG (Environment, Social, Governance) reflected in the sustainability development during the post-investment period?
- Do you think that startups should be concerned with sustainability and have systems or plans in place for sustainability tracking and reporting?
- Do you or your portfolio companies utilize a framework to measure and track their material sustainability factors?
- Do you think that startup interaction can also provide sustainability development for the incumbent corporation?

Further information

- What do you see as the biggest challenges for making sustainable startup investments?
- Do you see that CVC investors can provide additional sustainability support compared to independent VC investors? If yes, how?
- Do you collaborate internally with your corporate sustainability team or sustainability experts?
- Are there CVC or VC investors that you can name, that you consider to be knowledgeable regarding sustainability assessment or development of startups?
- Do you have any documentation or examples of the investment process regarding sustainability that you can provide?

A.2 Protocol for VC informants

Sustainability investments

- How have you defined your sustainability targets?
- How do the sustainability targets compare with financial targets?
- Have you implemented / are you going to implement any sustainability clauses (in term sheets and shareholder agreements)?

Sustainability assessment

- What kind of sustainability assessments do you have in place?
- Do you use some standard template that startups fill to give you sustainability information?
- What methods or tools do you utilize for assessing the sustainability of startup investments?
- How is the impact measured, numerical or qualitative measures?
- Are the assessments based on some general guidelines / dimensions, e.g., SDGs or UN PRI?
- How have you developed your methodology for assessing the sustainability of startups?
- Is the methodology developed internally or by an external party, and is it inspired by some other CVC/VC investor?
- How are the different aspects of ESG (Environment, Social, Governance) reflected in the sustainability assessment for the investment decision?
- What information would you require for your sustainability analysis that the startups typically are not able to provide?
- What do you see as the general approach for startup sustainability assessment, what is most important?
- How do startups feel about the assessments and reporting?

Sustainability development

- What kind of actions are there to improve the sustainability of a startup from an investor perspective?
- What sustainability related resources are you providing for startups?
- What sustainability things do you see startups requiring most help with?

- Do you think that startups should be concerned with sustainability and have systems or plans in place for sustainability tracking and reporting?
- Do you or your portfolio companies utilize a framework to measure and track their material sustainability factors?

Role difference between VCs and CVCs

- What difference in roles do you see for CVC investors compared to independent VCs?
- Do you see that CVC investors can provide additional sustainability support compared to independent VC investors? If yes, how?
- Are there tensions in syndicates between investors with different mindsets?
- What are your biggest challenges for sustainable investing as an independent VC?