



A definition, review, and extension of global ecosystems theory: Trends, architecture and orchestration of global VCs and mechanisms behind unicorns

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ARTICLE INFO

Keywords:

Ecosystem
Venture capital
Orchestration
Hubs
Startups
Scaleup
New ventures

ABSTRACT

The prior Venture Capital research (VC) has examined the micro processes of syndication and alliance formation. However, a macro and more systemic view is lacking, where past research has neglected the global VC-ecosystem. Using a qualitative method and an abductive approach, we combine and integrate two strands of research, on VC and ecosystems, to shed light on the crucial dynamics in the VC industry. We provide a VC-ecosystem definition and portray the ecosystem architecture in a segmentation matrix of investor types and roles, including Active Hubs and Complementors. Moreover, our findings identify and explain central Hub orchestration mechanisms: enablers, governance, partner management, co-specialization, and nurturing. The study concludes with a discussion on the theoretical and managerial implications, and suggestions for future research on a global ecosystem, which operates at a higher level than the traditional firm-level ecosystems on which the previous research generally focuses.

1. Introduction

Ecosystem theory can explain the fundamental forces behind global entrepreneurship and economic development (Schmidt et al., 2020; Stam & Van de Ven, 2021). Ecosystems add value as they allow organizations to coordinate their multilateral dependence through sets of roles that are guided by similar rules, thus obviating the need to enter into customized contractual or non-contractual agreements with each partner (Costanza et al., 2017; Jacobides et al., 2018; Kolagar et al., 2022). Researchers have identified a number of different types of global ecosystems, namely business, innovation, entrepreneurship, and knowledge ecosystems (Cobben et al., 2022). Still, the global Venture Capital (VC) -ecosystem has yet to be explored, despite its role in funding and fostering some of the most successful companies in the world (cf. Mallaby, 2022). The lack of scientific knowledge around the global VC-ecosystem is somewhat surprising (cf. Giaretta and Chesini, 2021).

Ecosystem and VC research have evolved in a similar direction. Both streams stress the need to understand the changes in and consequences

of large-scale collective activities (Jacobides et al., 2018; Cumming et al., 2019; Kenney and Zysman, 2019). For example, Kenney and Zysman (2019) indicate that global venture capitalists (VCs) can formulate ecosystem responses to initiate substantial market changes. Nonetheless, the venture capital (VC) research community has yet to define the concept and mechanisms of the global VC-ecosystem. Meanwhile, the architecture of business ecosystems (BE) has been systematically scrutinized (structures, actors, and roles) (Adner, 2017). In a similar fashion, VC researchers have identified configurations of syndicates (co-investment groups) involving a variety of investor types with different investment strategies (Manjoo, 2011). Ecosystem structures now have a global span, yet the previous research findings capture only a limited scope of the collective complexity in a global VC-ecosystem (Cumming et al., 2019). There is therefore a call for the development of global ecosystem theory, and in the context of VC-ecosystem structures.

The global ecosystem concept is important but underdeveloped. Business ecosystem (BE) researchers highlight the role of a hub in ecosystem orchestration, defined as “a set of deliberate, purposeful

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<https://doi.org/10.1016/j.jbusres.2022.113605>

Received 17 June 2022; Received in revised form 20 December 2022; Accepted 23 December 2022

Available online 5 January 2023

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actions”, to provide the ecosystem with vision and direction (Dhanaraj & Parkhe, 2006, p. 659). The hub is typically a resource-rich global firm. In a similar vein, VC researchers have identified investors taking a lead investor role in syndicates (Wright and Lockett, 2003; Jääskeläinen, 2012). However, these lead roles are only described in relation to single investments, not at the global ecosystem level where large VC players and other associated organizations dominate collective investment activities, through their extensive networks and high investment capabilities. These global leadership roles are crucial to scaling up startups, resulting in the creation of unicorns, defined as fast-growing firms with a value exceeding one billion US dollars (Kenney & Zysman, 2019). We find that VC research lacks understanding on who orchestrates the global VC-ecosystem, and who is being orchestrated.

The main objective of this paper is to advance understanding on the global VC-ecosystem, its architecture, and related orchestration activities. Specifically, we (1) define the VC-ecosystem, (2) identify the global VC-ecosystem architecture, (3) demonstrate how orchestration is performed in the VC-ecosystem, and (4) synthesize the results of our study in a framework model. The proposed framework captures the dynamics and mechanisms of global ecosystems in general, and how VC orchestrators operate in the global ecosystem specifically to create unicorns.

We rely on the following boundary conditions. Herein, VCs refer to actors who i) search for businesses with growth potential, ii) take minority stakes in them, iii) provide the capital on a medium- or long-term basis, and iv) make a profit by selling their shares in the business (Landström, 2017). We draw inferences from data collected in Europe, where large Asian and particularly US VCs have been involved in funding large investment rounds.

2. Theoretical background

Here, we explain the core concepts tying together the VC and ecosystem research. We first describe different types of VCs and their investment logics, thus shedding light on VC-community structures. Then, we depict general VC investment behaviour. Finally, we highlight central tenets of BE-theory and show on the relationship with VC research.

2.1. Types of venture capitalist and their investment logics

The VC-community started its journey from Silicon Valley in the late 1950 s (Kogut et al., 2007; Mallaby, 2022). Since then, it has grown exponentially, adding different types of larger and smaller investors to the community (e.g., Drover et al., 2017b; Block et al., 2018; Cumming et al., 2019). The most prominent of the larger types is the Independent Venture Capital Fund (IVC) (Sahlman, 1990). IVCs professionally manage pools of capital that are invested in growth seeking businesses (Crispin-Little & Breerton, 1989). The funds typically function as limited partnerships (LP). The IVCs serve as general partners, raising capital for the funds from parties such as pension funds, insurance companies, banks, and government institutions (commonly referred to as institutional investors), who function as limited partners (De Clercq et al., 2006; Landström, 2017). The capital is invested in a portfolio of companies. The (LP) funds have a limited lifetime (typically 10 years). Hence, VCs are required to make the investments and close the fund within this predetermined time period. The “closing of a fund” implies that VCs exit the portfolio companies in the fund, and return the invested capital to the fund investors. The exit can, for example, be in the form of an initial public offering (IPO), that is, a VC’s shares are sold on the stock exchange, or via a trade sale where the shares are sold to another company or investor. VCs charge a (fixed) management fee (1–3 % of the fund size) for managing the fund investment activity, plus carried interest on the fund profits (typically 15–20 %) (e.g., Chernenko et al., 2021). Since the IVCs in the ecosystem compete for external capital from institutional investors, they are under great pressure to provide good returns on the invested capital, and their decision-making is driven by

financial motivations. VC funds can be specialists, focusing solely on specific industry-vertical/geographical regions, or generalists, considering investments in many different verticals/areas. They typically add value to investments in the form of strategic advice (through participation on boards of directors), as well as access to additional funding and business and industry networks (e.g., De Clercq et al., 2006).

Another type of large investor is a Government Venture Capital fund (GVC), managed by civil servants responsible for investing taxpayer money (e.g., Maula et al., 2007). Their role in the VC-ecosystem is mainly to provide funding to firms unable to attract private market capital, due to substantial uncertainty associated with their product(s)’ technologies (e.g., biotechnology, 5G). GVCs have a much stronger presence in the European than US VC-ecosystem (Bertoni et al., 2019). A third type of larger player is the Corporate Venture Capital (CVC) fund, which makes investments for large, established firms (e.g., Google, Microsoft, Siemens). CVCs primarily invest to secure strategic benefits for their parent company, typically in ventures whose line of business is closely linked to the parent’s existing business (De Clercq et al., 2006).

Hedge funds constitute another type of big fund. They are so-called open-ended funds with an indeterminate life. Researchers (Aragon et al., 2018; Chernenko et al., 2021) have illustrated that open-ended funds acting in the VC-ecosystem raise and invest institutional and private capital in portfolios including unquoted companies. New capital can be raised and invested continuously by their issuing new shares in the fund. Thus, the portfolio companies can in principle obtain new capital throughout their development.

There are also examples of smaller types of investors, three of which we examine here, namely crowdfunding platforms (CFPs), family offices (FOs), and business angels (BAs). Crowdfunding implies capital raised using social networks on the Internet to connect entrepreneurial ventures in need of capital with a large number of individuals (a “crowd of individuals”), who pool small individual contributions in order to support a particular venture (Landström, 2017). Due to the large numbers making tiny investments in various projects, CFPs have enabled high diversification (e.g., Belleflamme et al., 2014; Mollick, 2014). In equity-based crowdfunding, an entrepreneur can make an open call to sell a specified amount of equity (Block et al., 2018).

FOs manage the wealth of business families by investing to sustain and grow their wealth (Block et al., 2018). They diversify through investing in publicly listed stock, bonds, real-estate, and VC funds. They may act as institutional investors, putting money into IVCs, or make direct investments in unlisted businesses (Ford & Nelsen, 2014). As the investors need to consider the wellbeing of the family’s future generations, they have been shown to be more risk-averse than traditional VC investors (Block et al., 2018). Consequently, they prefer to invest in companies that can already demonstrate profitability, as opposed to investments in high-growth companies. They typically take a passive role in the investment once the transaction has been completed (e.g., Block et al., 2018).

In accordance with Mason and Harrison (2008), we define BAs as high net worth individuals who invest their own money in an unlisted business, where there is no family connection, and who, after making the investment, generally become actively involved in the business. BAs typically invest in a company’s early stages of development (the seed phase). BAs have over time, and to an increasing extent, started to co-invest with other BAs in networks and/or groups, which enables them to pool larger amounts of funding and participate in bigger deals (Drover et al., 2017a, b). Business angel networks (BANs) are organisations established to help BAs identify and select investment opportunities, and co-invest with other BAs in so-called investor syndicates. During the past decade, we have witnessed the emergence of a special type of BA – the Super Angel (SA). The term is applied to a particular type of BA that has the capacity to invest large amounts of money in a single project (Kenney & Zysman, 2019). Significant capital gains/profits from their careers as entrepreneurs and/or BAs have enabled them to accumulate large amounts of wealth. These SAs may invest through a limited company

rather than directly, employ personnel to help them with the investment activities, and mimic the behaviour of IVCs (Shane, 2008).

As we demonstrate above, different VC investor types have been described in the VC research. However, a global system perspective is lacking on the relationship between their activities, and in what way they complement each other.

2.2. Venture capital investment stages and behaviour

The VC research typically divides investment stages into seed, startup, initial growth, expansion, and later stages, though VC practitioners typically refer to investment rounds rather than stages. Subsequent to the seed-round, the startup stage is characterised as round A, the initial growth stage as round B, and round C onwards correspond to the expansion stage and later stages, where large amounts of capital are injected by investors to help business scaleup. Typically, GVCs, BAs and CFPs prefer to invest in the seed and startup stages, as they make relatively small investments, CVCs and IVCs in the initial growth, expansion, and later stages, FOs in expansion stages, and hedge funds in later stages.

Investment behaviour can be described as a five-phase process: i) deal sourcing, ii) screening, iii) due diligence, iv) deal structuring, and v) post-involvement activities (e.g., Tyebjee & Bruno, 1984; Van Osnabrugge, 2000; Lahti, 2014). At the deal sourcing stage, investors obtain investment proposals through various channels/sources, and in the screening stage reject those that are weak and/or unsuitable. Next, due diligence implies a comprehensive analysis of the most promising proposals. Deal structuring involves negotiations and contract signing with the entrepreneurs, while post-investment involvement activities encompass, for instance, monitoring and adding value through work on the board of directors. VCs' value-added activities can be divided into financial value-added (FVA) and non-financial value-added (NFVA) (e.g., Maula, 2001; Large & Muegge, 2008). While FVA refers to the financing investors provide, NFVA has been defined "as all non-financial benefits the portfolio companies receive from the investors as a result of the investment relationship" (Maula, 2001, p. 15).

Typically, investments are syndicated, which implies the collaboration of two or more investors. This collaboration may involve sharing due diligence tasks and monitoring, value-adding activities, and may benefit an investment/entrepreneur in terms of adding complementary resources, capabilities, and networks (Wright & Lockett, 2003; Jääskeläinen, 2012). Characteristically, one of the investors will act as the so-called lead investor with primary responsibility for investment management, and provides most value-added. Since deal sizes have increased in recent years, there is a surge in the number of different types of investor involved in syndicates (Kenney & Zysman, 2019).

Although VC research has provided a good understanding of investor behaviour, there is still a need to examine the interplay between different types of investor in complex collaborative settings (Cumming et al., 2019). Moreover, although knowledge on value-added activities has been developed, there is still limited understanding of the VC value-added required for scaling up business activities to result in unicorn emergence.

2.3. Business ecosystems for venture capital

It is generally accepted that the BE concept was introduced by Moore (1993, 76): "In a business ecosystem, companies co-evolve capabilities around a new innovation: they work cooperatively and competitively to support new products, satisfy customer needs, and eventually incorporate the next round of innovations." Acknowledging Moore's (1993) work, we see a BE as a loosely related business community, where a multilateral set of partners aligns and interacts, enabling focal value propositions to materialize (Adner, 2017; Winter et al., 2018). The BE alignment structure is defined as "the extent to which there is mutual agreement among the members regarding positions and flows", and within this structure firms try to secure a competitive position, and their

role in relation to other key players (Adner, 2017, 47).

Ecosystem researchers have, for example, studied industrial ecosystems (Iyer et al., 2006; Burström et al., 2021), the digitalization of ecosystems (Chae, 2019; Senyo et al., 2019; Stahl, 2022), software ecosystems (Burström et al., 2022), and firm-based ecosystems such as iOS and Android (Kapoor & Agarwal, 2017). For an extensive review, see Jacobides et al. (2018). However, there are to date no studies of the global VC-ecosystem. Therefore, in line with the system approach taken in BE studies, we adopt the ecosystem concept in the belief that it will help to explain the behaviour and structure of the global VC-community on a system level.

Advocates of ecosystem studies typically consider the role of big firms as ecosystem shapers (Moore, 1993; Teece, 2007), hubs (Williamson & De Meyer, 2012; Teece, 2016), or keystones (Iansiti & Levien, 2004). In practice, we can see there are big VC firms capable of, for example, contributing to scaling up a business resulting in the creation of a unicorn. However, such knowledge has never been systemized on an ecosystem level, a research gap we aim to fill here.

Ecosystem governance is central to hubs as a way in which to maintain a healthy ecosystem (Jansen, 2020), and can generally be referred to as decision-making in the ecosystem (Tiwana et al., 2010). Ecosystem governance concerns decision rights, formal (e.g., contractual arrangements or standards) and informal (rules of the game) governance mechanisms employed by the hub, and the issue of how ownership is divided (Tiwana et al., 2010). Despite this knowledge, the use of governance mechanisms in various ecosystems should be studied further (Jacobides et al., 2018).

Governance is executed through actions taken by the hub, which undertakes activities that create ecosystem enablers, and enablers satisfy partner goals (van Vulpen et al., 2022, 4). There are different types of ecosystem enablers: mutual trust, knowledge absorption, life-cycle flow, openness to business discussion, orchestrator leadership, and external alignment (van Vulpen et al., 2022). However, researchers (Jacobides et al., 2018; van Vulpen et al., 2022) point out that different ecosystems require different ecosystem enablers, and also that enablers play a role in creating synergies in the ecosystem. There are currently no studies on ecosystem enablers in VC-ecosystems.

Furthermore, orchestration is a topic intimately related to enablers. It is defined as "a set of deliberate, purposeful actions" to provide the ecosystem with vision and direction (Dhanaraj & Parkhe, 2006, p. 659). In addition, Moore (1993) proposes that ecosystem leaders orchestrate ecosystems as a way to enable value co-creation among various stakeholders. Nonetheless, only resourceful firms can act as orchestrators, nurturing the ecosystem by providing a stable set of common assets, enabling connectivity between stakeholders, and encouraging innovation (Iansiti & Levien, 2004; Nambisan & Sawhney, 2011). An outcome of orchestrating activities is that ecosystem leaders can provide institutional stability (Thomas et al., 2014), and reduce uncertainty for all actors involved, which is particularly important in the early stages of venture development (Parida et al., 2019).

Further, if one actor is orchestrating, others are being orchestrated. The stakeholders being orchestrated are in ecosystem theory commonly described as complementors and suppliers (Jacobides et al., 2018). They play distinct roles in the ecosystem (Adner, 2017), where interdependencies tend to be standardized (Helfat & Raubitschek, 2018).

Moreover, links and interdependencies between these actors are typically based on co-specialization (Alexy et al., 2013; Kapoor & Lee, 2013), which creates a web of loosely coupled "alliances" in the ecosystem (Jacobides et al., 2018). Although these stakeholders may act within a stable ecosystem, new actors and technologies might appear and disrupt current structures and roles. Therefore, in order to keep track of complementors and suppliers, and manage disruptions, hubs need to attend to active partner identification (attract, select, engage), and partner management (organize infrastructure, address requests, and provide a consistent interorganizational interface) (van Vulpen et al., 2022). Clearly, change and dynamics are inherent to an ecosystem.

Drawing on Abatecola et al. (2022), we propose that large VCs can play a role as orchestrators, actively imposing change and even disruption, when, for instance, implementing scaleup activities and introducing unicorns to existing ecosystems. Little is known about how such orchestration activities come about in the VC-ecosystem.

Finally, by directing our attention to the VC-ecosystem, we respond to the call of Jacobides et al. (2018, 2267) to “understand “accidental” (or even illicit) ecosystems and the way they evolve...”. We do not propose that the VC-ecosystem is accidental or illicit, but it is an understudied ecosystem, undoubtedly with global impact, within which a special type of player acts. We do, however, propose that the architecture of the VC-ecosystem differs from other types of ecosystem, and that the VC-ecosystem positions itself as a “shadowing” ecosystem in relation to traditional BEs. Here, we recognize there is a difference in characteristics between entrepreneurs/SMEs/Incumbents compared to VCs. The VCs are rarely the carrier of a new idea, in the form of a startup. The VCs connect to the startup once the business idea has been generated. Thus, we assume that the VC-ecosystem will have certain characteristics, making it different from traditional, well-studied BEs.

3. Research methodology

This study contains both exploitative and explorative elements. Research has shown that adopting a transdisciplinary perspective can help advance various fields of research (Lusch et al., 2016). Therefore, as illustrated in the introduction and theory sections of this paper, we rely on tenets from ecosystem theory (architecture, hubs, and orchestration) to guide our analysis and create a global VC-ecosystem framework. We also draw on insights from VC research with respect to investor collaboration. This way of working can be seen as exploitative. However, the global VC-ecosystem is an unexplored phenomenon. Consequently, there was a need to collect complementary emerging insights into the VC-ecosystem (e.g., trends, interplay, selection mechanisms). Thus, the combination of exploitative and explorative elements resulted in a study applying a qualitative method with an abductive approach. We describe the process below.

Our selection approach relied on purposeful sampling, where we aimed to capture opinions and perceptions from all investor types with extensive experience of VC activities (minimum five years). We reasoned that capturing a multitude of perspectives would be necessary to generate an understanding of VC-ecosystem architecture and orchestration activities. More specifically, we conducted extensive interviews with 47 key players in the global VC-ecosystem, including independent, corporate and government venture capitalists, business angels and crowdfunding platform managers, family offices, policy makers, industry experts, and entrepreneurs. These respondents represented 12 different countries to ensure we captured a global preceptive.

We developed a semi-structured interview guide regarding the development of the VC-ecosystem. We further created unique interview guides for investors, experts, and entrepreneurs, in order to collect insights from a variety of perspectives. The guides encompassed three different sections: (1) trends in the VC industry, (2) scaleup funding, and (3) investor behaviour. In total, each guide contained 40 questions, some of which we now highlight: What have been the most influential events impacting the evolution of the VC market within the last 10 years? How has this development impacted your firm/investment activity? Are there new investor types emerging in the market, and, if so, what is their role in the market? How do you identify and select co-investors? How do you manage relationships with co-investors throughout the lifetime of an investment? Is there a chase for unicorns among investors, and, if so, how does it influence investment behaviour?

Our initial five interviews lasted around three hours per interview. We viewed them as pilots, helping us shape the interview guide. On average, the interviews lasted 45 min. In general, as we experienced theoretical saturation, the interviews became shorter, too. We used secondary data as complementary sources, such as newspaper articles,

data from large exits, company financial data from data vendors such as Dealroom, PitchBook, and CB Insights, regional economic data, and data found on VCs' and portfolio companies' web pages. These data helped triangulate our key insights. We were able to study and identify financial trends, syndicate sizes, investment rounds, valuation development, patterns illustrating Unicorn emergence, and exit mechanisms and valuations (trade sales, IPOs). The data enabled us, for example, to validate the presence of big VC firms in unicorn valuation rounds (exceeding \$1 billion) and collaborative configurations.

This research adopted an abductive approach to study the global VC-ecosystem. Therefore, as proposed by Bouncken et al. (2021), we applied a flexible pattern matching analysis (Fig. 1). First, we matched the VC and BE literatures, creating a theoretical framework where previously disconnected parts of the VC literature could be connected. We were able, for example, to connect studies on global macro financial trends with investor firm micro activity studies. Second, we matched the theoretical pattern with our observed empirical pattern. Third, we categorized our data to three main themes, (1) the trends in the ecosystem, (2) the architecture of the ecosystem, and (3) orchestration of the ecosystem. However, at this stage, we also made several iterations in order to ensure the quality of our identified themes. Through this process, we identified patterns that, for instance, reflected structures, roles and behaviour, and interaction in the VC-ecosystem.

In greater detail, the categorization process produced 13 first- and 3 s-order themes. These themes are illustrated in Fig. 2 and displays the way in which the data were ordered and structured into codes, and themes. Thus, Fig. 2 outlines the product of the abductive coding process where data and theory were matched.

4. Findings

In this section we illustrate the trends and characteristics of the global VC-ecosystem, the ecosystem architecture (stakeholders and their roles), and ecosystem orchestration activities (enablers, governance, partner management, nurturing, co-specialization).

4.1. Trends and characteristics of the global VC-ecosystem

The last decade has been decisive for the development of the VC-ecosystem. As can be seen in Figs. 3 and 4 depicting global VC activity, in the period 2015–2021 the number of investments has increased by approximately 67 %, and the volume of activity in terms of deal values by more than 260 %. The surge in activity has been strong in the US (\$88 billion in 2015; \$311 billion in 2021), as well as Europe (\$19 billion in 2015; \$93 billion in 2020) (CB Insights, 2022).

The increasing deal values can also be witnessed in the growing number of so-called mega rounds exceeding \$100 million. As is shown in Fig. 5, both the number and value of mega rounds have increased more than fourfold in the period 2015–2021. These mega rounds have contributed to more companies (848 globally) scaling up and reaching unicorn status (CB Insights, 2021). In 2021, 72 new unicorns appeared in Europe, where there are currently more cities with Unicorns than in any other continent (65 out of 170 cities) (Dealroom, 2021).

Managers of IVCs portrayed a bull market for the last 12 years that had allowed them to cash out funds with a 10 (+2) year life, and enabled them to convince external fund investors (pension funds, insurance companies) that VC is an asset class in which it is worth investing.

Additionally, respondents described how the market has changed to become an entrepreneur's market where investors compete fiercely to invest in the best opportunities, and record high valuations and investment sizes have been observed. Investor rivalry for the best deals is described as so intense that there is no time to perform due diligence.

We don't have time to perform our due diligence.

(an IVC).

The implications of more available capital can also be seen in a rebranding of the rounds. For example, investment sizes in a pre-seed

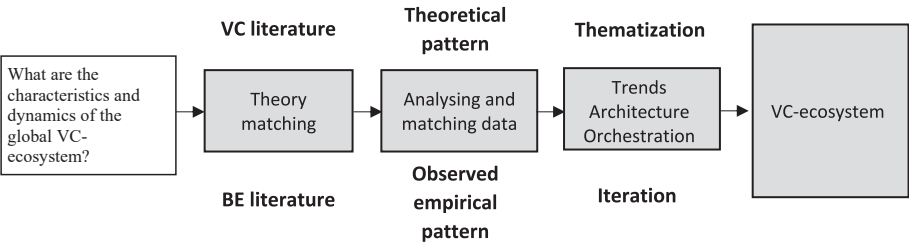


Fig. 1. Pattern matching process.

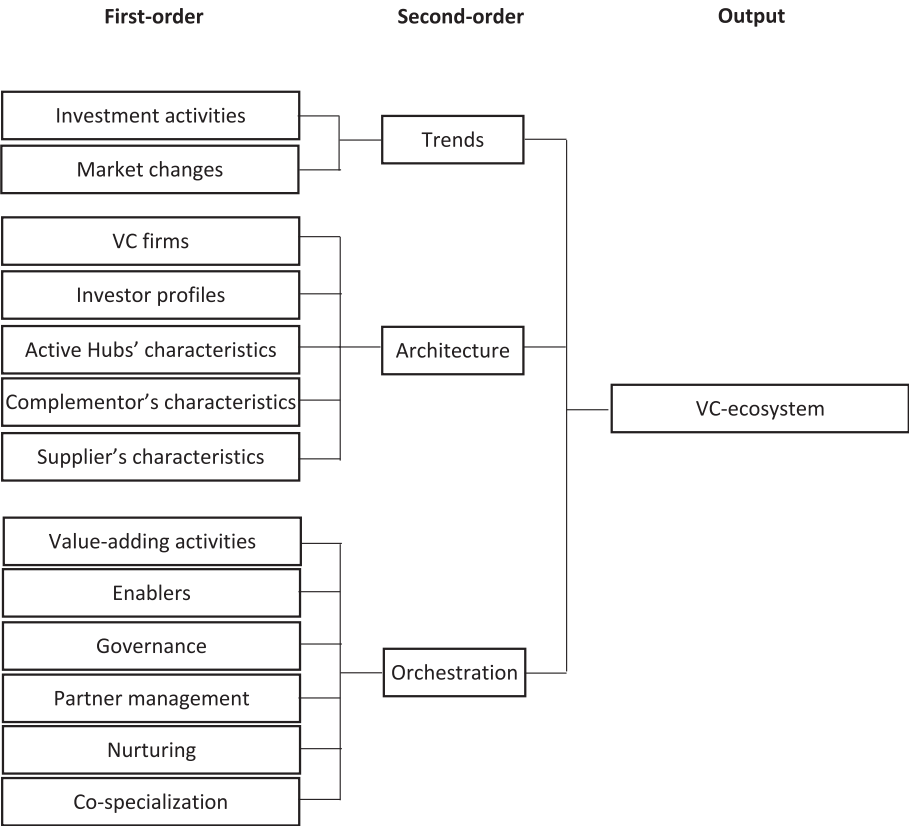


Fig. 2. Analytical process.

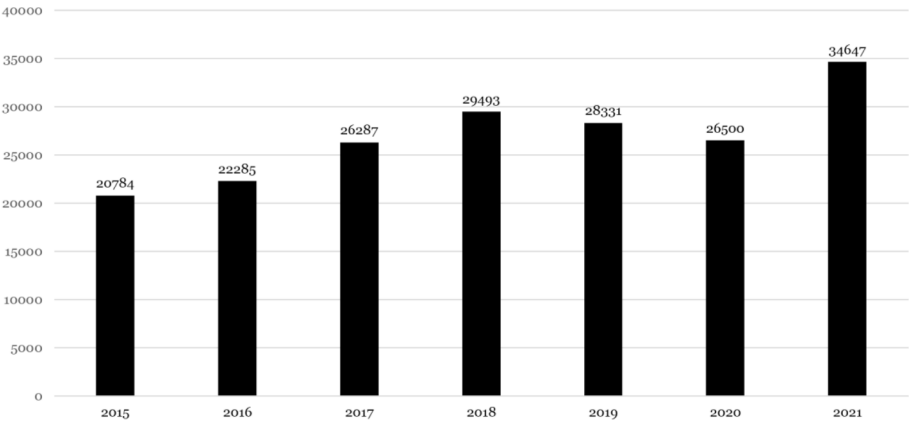


Fig. 3. Global VC activity by number of investments (source: CB Insights, 2022).

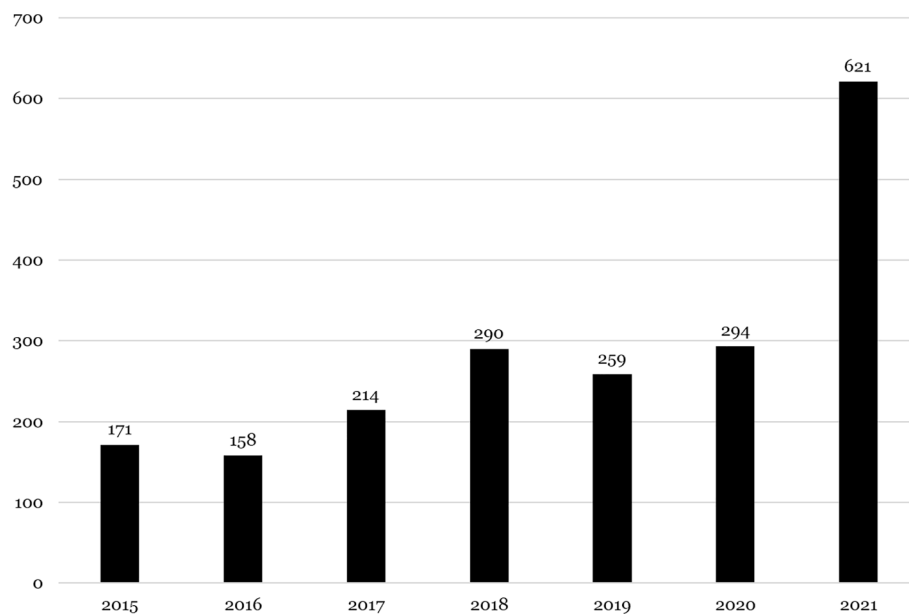


Fig. 4. Global VC activity by value of deals (\$ bill.) ().

Source: CB-Insights, 2022

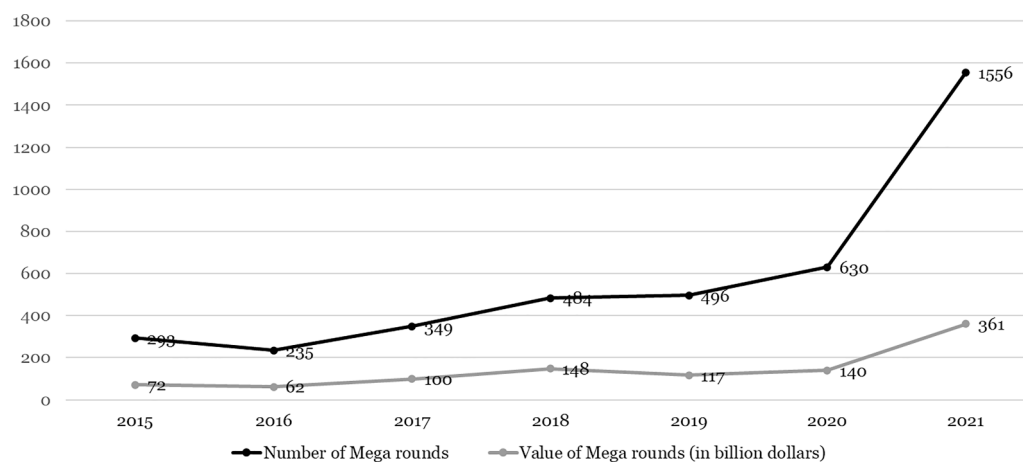


Fig. 5. Number and value of mega rounds (>100 \$ mill.) (Source: CB Insights, 2022).

round correspond with what was previously considered a seed round. The increasing number of rounds implies that the timescale has grown longer before companies are exited by investors. To date, relatively mature companies can even access capital in a J-round (e.g., Swiggy raised \$5.5 billion).

Although the strongest growth in the recent number of new Unicorns is materializing in Europe (e.g., Dealroom, 2021; PitchBook, 2021a), the European VC market lacks so-called VC mega funds that can invest €100–250 million to support entrepreneurs' scaleup funding needs (World Economic Forum, 2020). These funds tend to be located in Asia, and, in particular, the US (PitchBook, 2021b). European investors that like their portfolio firms to become Unicorn companies must therefore typically learn to collaborate with their overseas counterparts. As a consequence, syndication configurations have grown larger due to the greater amount of capital injected into potential Unicorn firms.

Asian and US streams of VC have multiplied, which has markedly increased European access to funding. In particular, they exert a strong presence in the mega rounds, where large amounts of capital are needed. Data on VC investments in the European markets in the first half of 2021 demonstrated that in investment rounds exceeding \$50 million, US and

Asian investors account for more than 50 percent of the invested capital (Dealroom.co, 2021; European Commission, 2022). The larger the investment round, the higher the overseas involvement in the deals. In the mega rounds, US VC investors account for by far the highest share of investments (European Commission, 2022).

Finally, the regional presence of large US VC-funds in the global ecosystem is important for scaling up businesses, materializing in the development of future markets and technologies. For example, during the last 15 years, international VC activities have contributed significantly to market disruptions. Through the support of international VC funding, unicorn firms such as Bolt have disrupted the taxi industry, Spotify the music industry, and Skype the telecommunications industry. Such disruptions have been made possible by the ongoing reconfiguration of the VC-ecosystem architecture, and its related orchestration activities.

4.2. Ecosystem architecture

In general, our respondents described a situation where there is global interplay between various types of VC stakeholder playing

different roles. Some VC firms have grown to become leading, powerful *Active Hubs* that have a central influence on global VC activities. Meanwhile, others were described as playing complementary roles in the VC-ecosystem. Their respective investment profiles are illustrated in Fig. 6.

Two types of VC firm have positioned themselves as industrial and stage generalists (*Active Hubs* & *Passive Giants*). That is, they invest in several industries and across several investment stages. In contrast, most other investor types are positioned as industrial generalists and experts. That is, investing in several industries but specific investment stages. Here, Later stage funds (LSFs) stand out from the crowd in how they are positioned as niche and stage experts. We now describe the characteristics of these stakeholders in detail (see Table 1).

The VC-ecosystem has evolved into a system with global coverage and large key actors (*Active Hubs*) shaping the technologies, industries and markets of the future. *Active Hubs* are typically described as big, resource rich, and with vast experience in the VC industry (e.g., Sequoia Capital, Accel, Andreessen Horowitz, Index Ventures). Their role may be compared to that of Microsoft, Apple, Google, and Android in the telecom ecosystem. These *Active Hubs* usually take a lead role, with active involvement, and directly related to the creation of a high number of Unicorn firms, not only in the US, but also in European countries. As demonstrated by 2021 data on the European market (Dealroom.co, 2021; European Commission, 2022), for example, Accel ranks top with 17 unicorns in 2020–2021, Index Ventures second with 11, closely followed with 7 by Sequoia Capital.

Unlike any other investor type, *Active Hubs* have different complementary funds focused on particular stages of development (seed, early-stage, growth, later-stage), along with a high number of complementary, knowledgeable teams in their organizations.

We are working with multiple teams, who provide a 360 degree review during analysis and later phases.

(an *Active Hub*).

Due the combined effect of their resources, they also have a unique capability to disrupt. Moreover, as illustrated in Fig. 6, they invest across various industries (industrial generalists) and investment stages (stage generalists). Their deep connection to the US exit market is typically described as a central competitive advantage.

4.2.1. Complementors

Our respondents also described other VC firms playing complementary roles. *Passive Giants* (e.g., Softbank, Tiger Global, BlackRock, Tencent) are resource rich, relatively new to the VC-ecosystem, and play a different role to the *Active Hubs*. Some of the *Passive Giants* were formerly defined as hedge funds and/or private equity funds (that typically invest in management buy-outs and delisting of public firms). Therefore, they have enormous amounts of capital under their management. Nonetheless, compared to ecosystem leading *Active Hubs*, these firms work with passive involvement, typically piggy-backing on other investors and avoiding active management.

We are usually hands-off.

(a *Passive Giant*).

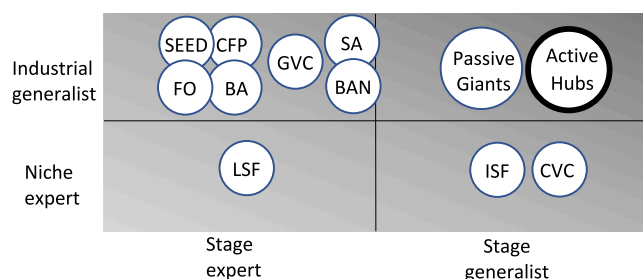


Fig. 6. VC-ecosystem investment profiles.

Albeit to a lesser extent than *Active Hubs*, *Passive Giants* are also involved in creating unicorns. As illustrated in Fig. 6, they typically invest across industries (industrial generalists), and focus on later-stage investments, but have recently started to invest in early-stage deals, too (mainly stage generalists). Their main competitive advantages relate to the speed with which they make investment decisions, as well as the ability to pay a premium price, though that may be viewed in a negative light by other investors.

They push out every-one else and inflate everything.

(a *FO*).

The respondents also described smaller complementary investor types in the VC-ecosystem (CVCs, CFPs, FOs, BAs, SAs, BANs, LSFs, Seed and Early-stage funds (SEED), Industry specialized funds (ISFs), and GVCs). Here, we observed there can be local variants of complementing VC firms. However, it is not possible to illustrate all of these variants. We discuss typical roles and features and illustrate them in Table 1.

First, Corporate Venture Capitalists (CVC) are subsidiaries of a large corporation (e.g., Google, Microsoft, Volvo). Therefore, they are relatively large in size (several teams), and have a high capacity to invest. They are active in their investments and typically want to take a lead role. However, when possible, they step back and hand over leadership to IVCs.

We prefer to have a VC as a lead.

(a CVC investor).

CVCs prefer to invest in certain industries (niched expertise) but can do so across investment stages (stage generalists). Their industrial expertise constitutes their competitive advantage.

Features of other investor types are illustrated in Table 1. The table shows how investors complement each other in terms of organizational size/actor size (small organizations have few teams), investment capacity (BAs have a low capacity vs GVCs who have a high capacity), typical lead and follow behaviour (some are typically followers, while others demonstrate more dynamic behaviour), industry generalists or experts (most are generalists), stage generalists or experts (super angels and BANs are changing behaviour), and their respective competitive advantage (what makes them special and needed in the VC-ecosystem). Table 1 shows that in order to understand complementor positions and behaviour in the VC-ecosystem, it is necessary to understand several features of each investor type.

However, some investor types change position and behaviour faster than others, giving them new roles in the VC-ecosystem. In Europe, there is a trend of more Unicorn exits, producing individual wealth that can be re-invested in the ecosystem. Thus, the number of SAs increases and their impact on the VC-ecosystem grows. SAs are of great importance to the VC-ecosystem, since they can bring entrepreneurial knowledge and re-invest in various startup ecosystems. The impact of such players has been observed especially in Estonia, where their re-investments have during the last decade supported business scaleup and a significant increase in the number of Unicorn firms.

4.2.2. Suppliers

Finally, respondents described the increasing presence of a new type of player in the VC-ecosystem, where some firms have started to act as suppliers of advanced investor data. First, some offer data-as-a-service (DaaS) about investment deals. For example, CB Insights, Crunchbase, and PitchBook (all with a US focus), and Dealroom (European focus) provide data on deal rounds, deal sizes, and valuation trends. These databases are widely used by investors on a global scale.

Second, other firms offer corporate-venture-capital-as-a-service (CVCaaS). For instance, screening deals based on big data for large European CVCs, and providing AI-capabilities. Artificial intelligence (AI) can enable cost savings and speed up investment decisions for investors. Machine learning algorithms can be used to automate central parts of the investment process, “sniffing and crawling” the Internet to

Table 1
Complementors.

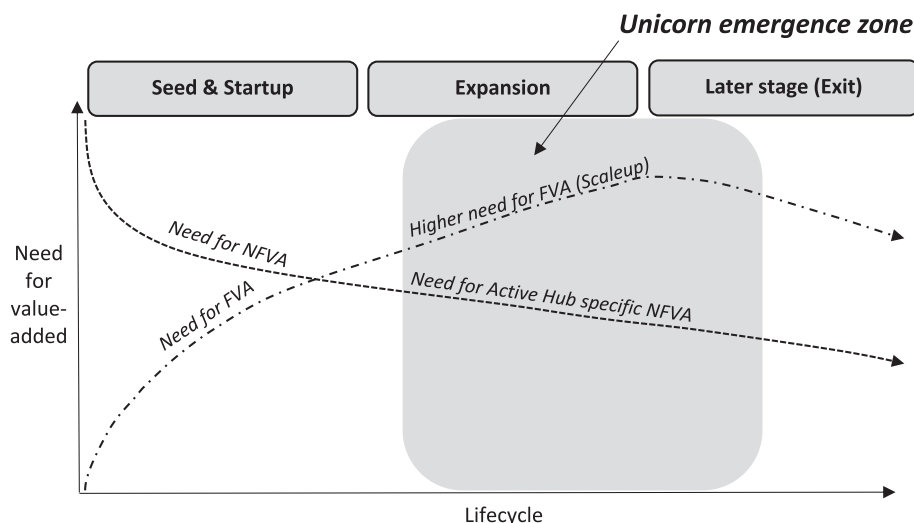
Types/Features	Example	Organizational/ Actor size	Investment capacity	Typical Lead/ Follow	Industry generalist/ expert	Stage generalist/ expert	Competitive advantage
Passive Giants	Softbank, Tiger Global Management, Tencent	Relatively large	Very high	Typically follows	Industrial generalist	Stage generalist	Size of funds
Corporate Venture Capitalists	Google, Microsoft, Volvo	Relatively large	High	Can lead but prefer IVC to lead	Niched expert	Stage generalist	Industrial knowledge
Crowdfunding Platforms	Indiegogo, Mightycause, GoFundMe	Medium	Low to medium	Follower	Generalists	Early-stage expert	Network size
Business Angels	Thomas Hessler, Thomas Berglund, Mikko Silventola	Very small (Individuals)	Very low	Early lead, follower in later stages	Typically generalist but with exceptions	Early-stage expert	Local market knowledge
Super Angels	Jeff Bezos, Richard Branson, Taavet Hinrikus	Small to medium	Low to high	Early lead, follower in later stages	Mostly generalists	Early-stage experts with a tendency to extend to later rounds	Entrepreneurial insights
Business Angel Networks & Groups	Band of Angels, Ohio TechAngels Funds, LINC Scotland	Medium	Low to medium	Early lead, follower in later stages	Typically generalists	Typically early-stage expert, but tendency to extend	Local market knowledge
Later-stage Funds	DST Global, Meritech	Medium	Relatively high	Follower	Niched expert	Later-stage expert	Growth acceleration
Seed & Early-stage Funds	Lifeline Ventures, Ribbit IA Ventures	Small to medium	Low to medium	Follower	Generalists	Early-stage expert	Network relationships with large IVCs
Funds with Industry Specialization	AltEnergy, Arborview Capital, Voima Ventures	Small to medium	Low to medium	Early lead, follower in later stages	Niched expertise	Stage generalist	Industrial expertise
Government Venture Capitalists	GVC, TESI, European Investment Fund	Medium to large	High	Follows	Generalists	Across stages, but primarily early-stage expert	Capitalization of VC funds & soft capital
Family Offices	Kanopé, Umana	Small to medium	Low to medium	Follows	Generalist	Later-stage expert	Local market knowledge

identify investment opportunities, classifying them, and generating reports as a basis for strategic decision-making. In industry verticals where data is available, AI can play a vital role in forecasting potential investment objects, in single firms, clusters of firms, and industry development. Thus, DaaS, CVaaS, and AI capability providers can act as suppliers in the VC-ecosystem, providing stakeholders with critical investor data and thereby increasing their competitiveness.

4.3. Active Hub's orchestration activities

In the subsections above, we have described the VC-ecosystem architecture, and that Active Hubs hold a unique position in the VC-ecosystem. Here, we will discuss the relationship between venture needs and Active Hub capabilities, and show why the Active Hub can act as an orchestrator in the VC-ecosystem.

In general, venture teams are inexperienced in the early funding stages (Seed & Startup). They therefore have a clear need for support from investors, through both non-financial value-adding (NFVA)

**Fig. 7.** Unicorn development and Active Hub value-added.

activities and financial value-adding (FVA) activities. Thus, at these early stages, several investor types can bring value-added to the venture (Fig. 7). NFVA concerns, for example, customer connections, collaboration partners, supplier connections, innovation partners, market analysis, strategic advice, operational advice, and technological insights. However, Active Hubs also add specific ecosystem-related activities, such as incubator programs, accelerator programs, scouting models, and deal sourcing from regional VC funds. The breadth and depth of an Active Hub NFVA activities therefore outperform other VC types' NFVA activities even at the early stages of investment.

Moreover, typically, the magnitude of FVA matters. Since the Active Hub is resource rich and financially stronger than most other investors, it can choose to make substantial investments in both the early and later stages of involvement. Hence, the Active Hub has a wider investment spectrum than most other investors (only Passive Giants have the same FVA capability). Here, the inclusion of other investors depends on the Active Hub's goodwill and needs. An Active Hub could, for example, choose to include industrial specialist investors (CVCs, ISFs, LSFs) in order to complement a need for NFVA or FVA.

Additionally, when the venture transitions to the expansion stage, the need for more qualified NFVA changes, and that for FVA increases (Fig. 7). Thus, fewer investors can provide the required value-added. Typically, early-stage specialized investors (BAs, CFPs, BANs, SEEDs, GVCs) find it difficult to add value at this stage. They lack either the capital and/or knowledge resources. In contrast, as the only stakeholder, due to the variety of funds directed towards different development stages, the Active Hub can bring both FVA and NFVA throughout the venture lifecycle. Here, the most important Active Hub contribution is to ensure funding for scalability (FVA), as it is at the expansion stage that valuations typically exceed \$1 billion. That is, ventures enter the Unicorn emergence zone (Fig. 7). Here, unique Active Hub related NFVA is central, involving for example new definitions of rules of the game through co-investor governance, complementor selection, and partner management.

In the later stage, the venture has matured, since uncertainty regarding market acceptance has been reduced and the venture may be profitable. Thus, FVA continues to be important, but to a lesser extent than in the expansion stage. Still, Active Hub NFVA capabilities are central. Here, specific Active Hub related NFVA in particular involves creating relationships with the exit market and realizing the exit process.

On an aggregated level, large IVCs (Active Hubs) have started to orchestrate the global VC-ecosystem. Below we go more in detail and discuss enablers for ecosystem orchestration, partner management, co-value creation, and co-specialization.

4.3.1. Enablers for ecosystem orchestration

The interviews allowed us to identify ecosystem enablers that explain why partners have an incentive to join an ecosystem orchestrated by an Active Hub, and be tied to it; namely, goal alignment, certification, mutual trust, and complementarity (Table 2). Some of the benefits materialize through scaling up businesses leading to Unicorn

emergence and exits generating extraordinary returns on invested capital.

4.3.2. Governance

Active Hubs use two different modes for *ecosystem governance*, namely formal and informal. Respondents illustrated that Active Hub formal governance is partly dependent on control through ownership. In early-stage investments, Active Hubs strive for sufficient ownership so that ownership stakes are not substantially diluted in later-stage investment rounds. It also follows that investors with the highest ownership stake will typically take the most active role and govern the relationship with the other investors involved, as the ownership stake influences control rights and the share of the rewards when a successful exit takes place. Thus, through their large company resources and ability to scale firms up, Active Hubs can follow on from seed to later-stage rounds, and fulfil the lead investor role in several investment rounds.

The Active Hub lead role is significant in active governance. A GVC actor, with substantial field experience, pointed out that the absence of a lead investor in big money deals results in very passive, hands-off involvement on the part of all VC investors, as no one player is sufficiently incentivized and motivated to lead the collaboration.

The structure starts to resemble that of a publicly listed company where you have dispersed ownership and a lot of passive shareholders. (a GVC).

Respondents also described how, in the absence of Active Hub governance, a situation might emerge featuring competition in term sheets proposed by different investor syndicates. The position of lead investor may then switch in every investment round, which becomes very complicated as the lead investor exerts control over the company via a seat on the board of directors. Thus, board rights may have to be reallocated in different investment rounds. Moreover, if the syndicates are overly complex with too many investors it may become difficult to reach agreement.

It's very difficult getting backed on anything, too many people, too many opinions, too many different situations and too many interests. (an IVC).

VC investors also recounted the need to understand the formal/informal interface. For example, there is typically no separate formal agreement or contract between co-investors determining roles and responsibilities. The rights are stipulated in the shareholder agreement, but roles and responsibilities are generally negotiated. Therefore, the agreement between investors on who does what, in terms of governance and value-adding, is *informal*.

Further, respondents described the importance of informal governance. It is necessary to create a form of social glue among investors. The Active Hub's governance of collaborating partners therefore includes informal interaction involving a combination of e-mailing, virtual meetings, face-to-face meetings, and phone calls.

Table 2
Enablers.

Enabler	Description
i) Goal alignment	All investors benefit from the value appreciation of a firm in their investment portfolio. It represents a mutual goal. For instance, Unicorn firms typically represent home runs where the money can be returned at a 10x multiple.
ii) Certification	For investors, regardless of type, participation in successful firms confers high status and reputation. For instance, they can use the logos of companies achieving unicorn status on their homepages and in their pitch deck. Such certification, signalling investor capability, helps IVCs raise even larger funds in the future.
iii) Mutual trust	Mutual trust is a key enabler in the global VC-ecosystem, and for Active Hub orchestration to produce successful outcomes materializing in new Unicorns. One of the Active Hubs explained that “partners that start out as acquaintances have first to become cousins, and thereafter brothers and sisters”. It is an important glue factor in the ecosystem between an Active Hub and its partners.
iv) Complementarity	Active Hubs' ideal partners should have complementary knowledge and capabilities. This may imply specialized knowledge about a local market, industry vertical and/or stage of development, and contacts related to these. The knowledge complementarities generate interdependencies and facilitate learning from each other. Complementarity may also involve sharing risks with Active Hubs, on the part of, for instance, Passive Giants, through their participation in mega rounds requiring sizeable capital infusions.

You need to get to know your partners.
(an Active Hub).

Due to the importance of getting to know your partners, Active Hubs have established headquarters in European cities, particularly London. This business expansion facilitates geographical proximity to European partners. Active Hubs need their employees in Europe to see them the same way the US team does.

We started European operations and I want to make sure we have the glue.
(an Active Hub).

Also, the combined effect of Covid and digitalization has increased the appeal of investing overseas, since a lot of VC investors have adapted to distance work and nowadays actively use virtual platforms for interaction. Our interviews revealed that typically the lead investor (Active Hub) is responsible for maintaining investor contact, keeping the ecosystem partners informed about what is going on and getting their consent on key decisions. Thus, digital platforms have become an important coordination mechanism for Active Hubs in governing and managing relationships with entrepreneurs and co-investors.

4.3.3. Partner management

Partner identification and selection plays a central role in Active Hub orchestration activities. Due to their long history in the VC-ecosystem, Active Hubs have a rich network, which nevertheless needs ongoing renewal. Active Hubs describe a situation where they are commonly contacted by a large web of potential new partners. Only a few are selected. Yet, several of the respondents acknowledged that big entrepreneurship conferences such as Web Summit in Lisbon, Slush in Helsinki, and VivaTech in Paris play an important role in partner identification, where VC investors typically establish the first contact with their counterparts overseas. Thus, conferences not only connect investors and entrepreneurs, but also investors with similar interests that benefit from collaboration. Hence, in conferences, Active Hubs start a screening process evaluating other IVCs, BAs, GVCs, CVCs, FOs and Hedge funds/Passive Giants.

Moreover, stemming from the realization that firms with scaleup potential (as Unicorns) can be found anywhere, Active Hubs have over time increased their presence overseas, and in particular in the European markets. To accomplish this, they have selected complementary partners that can help them tap into new deal flow. Active Hubs have, for instance, started to rely on seed funds in different European countries for deal sourcing purposes.

We are a real source for those guys.
(a European seed-stage fund).

European seed funds have an incentive to provide Active Hubs with new deals, as they do not have the capacity to consider larger investments themselves. Thus, European seed funds can learn to play a key role in Active Hub networks.

Every-one wants to be our friend because we never go to round A.
(a European seed-stage fund).

These seed funds willingly offer the lead role, involving chief responsibility for the investment, to an Active Hub when a portfolio company's development matures beyond the seed stage. This is a reciprocal relationship. The Active Hub benefits from a European seed fund's knowledge and access to contacts in the local market, and the seed fund from an Active Hub's ability to help a portfolio company expand into the US market and potentially achieve an exit there.

Similarly, respondents demonstrated that BAs are selected as partners if they can refer interesting investment opportunities. To facilitate this and formalize collaboration with BAs, some Active Hubs have developed a so-called scout model. Simply put, an Active Hub's scout fund invests in the opportunity recommended by a BA. In turn, the BA is

rewarded with a success fee for referring the deal. The fee is typically a fraction of carried interest in the fund or money to invest in the project, if the referred deal results in an investment by the Active Hub. This reciprocity-based model enables Active Hubs to find BA partners, get involved and initiate collaboration in seed and startup stages. This partner selection model has proven successful; for instance, where the ride sharing Unicorn company Uber was identified by an Active Hub via a BA's recommendation.

Our interviews also revealed that Active Hubs select passive investors such as CFPs, Passive Giants and FOs as partners, when money is needed to fill the capital requirements of investment rounds. These actors are attracted by the possibility to collaborate with Active Hubs, as they have vast experience in the VC industry and a strong reputation.

Popularity is a factor for choosing investor firms.
(a FO).

Finally, the other side of selection and inclusion concerns de-selection and exclusion. Respondents emphasized that VC-investing is a people business, where reputation matters, and ethical behaviour is a key concern. They illustrated consequences of inappropriate behaviour towards entrepreneurs, co-investors, and, in particular, Active Hubs. For example, if an Active Hub (or other player) perceives that a co-investor has acted in a self-interest seeking manner (e.g., proposing harsh liquidation terms/rights, not delivering on promised value-added), they can exclude that party from future collaboration. A bad reputation has long-term consequences, and is costly for a VC investor since it reduces the potential to get involved in deals and raise capital.

There are different characteristics, different egos, and there's certainly this kind of, you know, "I'll never work with that guy again" phenomenon in the background.
(an IVC).

4.3.4. Nurturing

Active Hubs are engaged in two types of nurturing process that encourage co-value creation enabling business scaleup. One micro nurturing process relates to entrepreneurial firms, where the Active Hub most often takes on the role of lead investor, acting to fulfil contractual agreements and expectations. The other type of nurturing process is conducted at a more general ecosystem macro level, is based on non-contractual agreements, and contributes to ecosystem wellbeing. We discuss these processes below.

In general, our respondents described a situation where it becomes more difficult to nurture entrepreneurs the more the firm has matured. At this micro level, we found that Active Hubs involve themselves at an early stage and stay involved until the IPO or trade sale. However, they also nurture firms in later stages of development. Active Hubs have funds covering different stages of development, including seed, growth, and later stages. They have typically involved themselves in Unicorns when the firms were very small and resource-constrained. The respondents also acknowledged that company building expends a great deal of time, and saw their involvement as a long-term partnership.

We want to be there from year one to year 21.
(an Active Hub).

Active Hubs also found that the seed fund (stage) is very important, since that is when the relationship with the entrepreneur and other investors is built.

Seed investing is the most strategic part of the business. It's when you build the early connections. Where you build trust. You help shape the company.
(an Active Hub).

Nurturing activities may include helping founders find customers, suppliers, industry professionals, and executives, serving as a sounding board for the founders, providing follow-up funding, professionalizing

activities through board work, and in rare cases improve operations. Thus, they can help their portfolio companies overcome uncertainties, and strongly influence value creation in the business. They acknowledge that the importance of a VC's strategic value-added decreases when a company's development matures.

Active Hubs' involvement in early investment rounds provides them with the moral authority to participate in later stages on appropriate terms. Results suggest that not only Active Hubs but also their ecosystem partners benefit from early involvement in syndicates. Active Hubs have the capacity to participate in bigger follow-on rounds through their access to a large pool of resources. So, key terms for follow-on rounds can be determined early on to benefit all actors involved. This reduces future uncertainty and the need to renegotiate agreements with new investors on joining and gaining control of the company at later stages.

To ensure they can nurture and support a portfolio firm's development over a long period of time, some Active Hubs have disrupted the market using an open-ended fund structure with no fixed term. This allows them to remain in long-term investments and hold shares in firms post IPO, thereby relieving the pressure to make an exit. Thus, Active Hubs' assortment of funds includes a combination of open- and closed-ended, enabling a long-term commitment to their most enduring companies.

At the ecosystem level, Active Hubs' most significant nurturing activity concerns knowledge sharing. For instance, some use newsletters to share knowledge on novel developments in technology with members of the global VC-ecosystem. Moreover, as described earlier, some have developed a scouting system to draw smaller players into the Active Hub ecosystem. Active Hubs also create open or closed knowledge-sharing events. The open events may concern special investor meetings or general entrepreneurial summits. Closed events are offered to partners that have achieved a special relationship status or are knowledgeable in certain industry areas. For example, in 2022, one of the Active Hubs created a novel type of startup program for 15 selected European startups. The program will offer business opportunities for both entrepreneurs and co-investors.

4.3.5. Co-specialization

Several of the investors we interviewed explained there is strong competition to invest in the best deals, and that smaller IVCs must differentiate themselves in the market by adopting a specialization strategy. It increases their chances of qualifying as partners for the Active Hubs in deals that may result in scaling businesses, Unicorn company emergence, and successful exits. Partners from Active Hubs and specialized IVCs suggested that Active Hubs have a competitive advantage in providing strategic value, involving consultancy, recruitment and strategic advice, due to their large organizational size and extant resources.

We can help an entrepreneurial company from a 360 view because we have people with all sorts of different work experience and backgrounds.
(an Active Hub).

In seeking companies with the potential to become market leaders, Active Hubs consider investment opportunities on a broad basis, and some may not fit their prior industry knowledge. Thus, IVCs that specialize in specific industry verticals can bring a lot of additional value to an investment, and help Active Hubs in investment evaluation. It was suggested that these IVCs know the ins and outs of the industry, and can therefore play an extended role.

When an investor has a background in the specific business sector where the startup operates, they can for instance even join business negotiations with customers and partners.
(an industry specialist IVC).

This specialist role may be utilized not only by an industry expert IVC, but also by CVCs. They have industry-specific knowledge and contacts related to their parent company's sector.

With our help in the energy industry, startup solutions can be rolled out across Europe once the solution is in place.
(a CVC).

However, some Active Hubs consider that a substantial number of VC investors do not have adequate competences and skills to deliver value-added. This reflects a top VC's perspective:

Only a third of venture capital investors are knowledgeable.
(an Active Hub).

Furthermore, smaller VC investors can through specialization create a unique niche and a competitive advantage that is hard for other actors to replicate. This was highlighted by a VC investor selected to collaborate with Active Hubs on deals involving the creation of a Unicorn company. Through their collaboration with big Japanese corporates, they provide additional resources, involving connections, and potential synergies.

We are so unique that we can provide a unique package. In order to co-invest with the global top investors, you need to have some special competences. We have the Japanese twist.
(IVC collaborating with corporates).

The results indicate Active Hubs typically seek to collaborate with specialized investors that have complementary resources or strategies, and that such co-specialization takes place in repeated, long-term collaboration in the global VC-ecosystem.

In this section, we have illustrated the trends and characteristics of the global VC-ecosystem (significant trends), the ecosystem architecture (the stakeholders and their roles), and ecosystem orchestration activities (enablers, governance, partner management, nurturing, co-specialization). Next, we present a definition of the global VC-ecosystem and a framework.

5. Global VC-ecosystem definition and framework

This study is motivated by the lack of prior VC-ecosystem studies. While earlier VC researchers have indicated the existence of a VC-ecosystem (Cumming, et al., 2019; Kenney & Zysman, 2019), there have to date been no systematic studies thereon. We now present the first definition of the VC-ecosystem as: "A dynamic, loosely coupled, competing and collaborating global community of VC investors (Active Hubs and Complementors) actively investing in startups with growth potential." Additionally, we have identified other VC-ecosystem actors. These include suppliers, who contribute data-related services, crucial AI-capabilities, and software infrastructure. They play a critical role in enabling VC firms to further develop their business models.

While previous researchers have provided an understanding of, for example, the software sector ecosystem (Iyer et al., 2006), and firm-based ecosystems (Kapoor & Agarwal, 2017), we have instead identified an evolving VC-ecosystem. Based on the findings of the present study, we can now demonstrate a general process model of the global VC-ecosystem (Fig. 8). Active Hubs are characterized as *industrial and stage generalists*. Resource rich in terms of knowledgeable *teams* and *funding*, they traditionally take a *leading role*. As ecosystem leaders, they aim to orchestrate the VC-ecosystem. Orchestration is defined by Dhanaraj and Parkhe (2006, 659) as "a set of deliberate, purposeful actions" to provide the ecosystem with vision and direction (Dhanaraj & Parkhe, 2006, 659).

In our study, Active Hubs' orchestration activities involve *governance* (Tiwana et al., 2010), *partner management* (van Vulpen et al., 2022), *nurturing* (Parida et al., 2019), and *co-specialization* (Jacobides et al., 2018). However, as part of the orchestration strategy, Active Hubs must also work actively in enabling orchestration (cf. van Vulpen et al., 2022). Here, four enabling mechanisms, namely *goal alignment*, *certification*, *mutual trust*, and *complementarity* come into play (grey circle in Fig. 8). These mechanisms function as a filter between the Active Hubs and

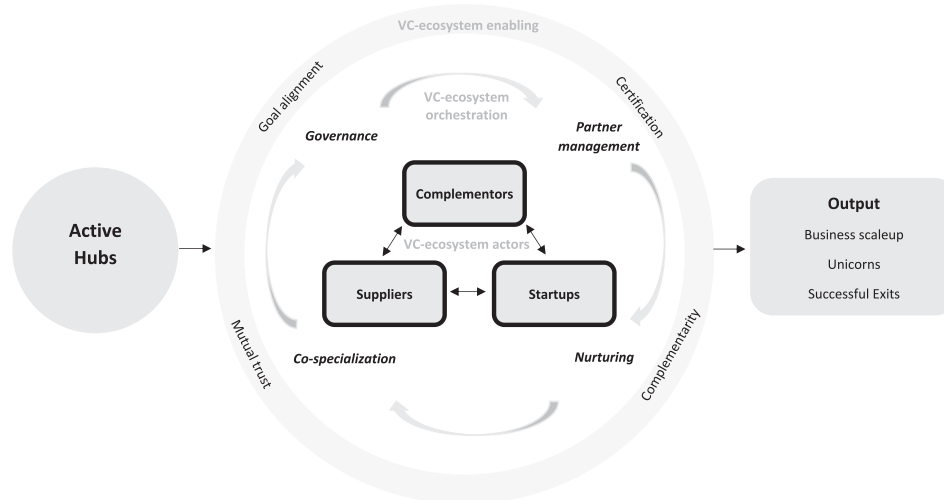


Fig. 8. Dynamics in the global VC-ecosystem.

other stakeholders. For example, a failure to establish trust between a certain set of stakeholders (complementors, startups, suppliers) as part of an investment round will most certainly lead to negative tensions, conflicts, and possibly failure.

Moreover, for the Active Hub, the global startup community is the centre of attention. The work of scanning the market for plausible investment opportunities is prioritized. Nonetheless, complementors can work to identify potential high-performing startups and thereby provide investment leads for the Active Hub. Thus, it is of central importance for Active Hubs to view any relationship as reciprocal and dynamic. Here, suppliers also play an important role, since they can provide the VC-community with central market knowledge which could otherwise be difficult to gather. Yet, complementors may also engage in different syndicates where the Active Hub is not involved. In such cases, complementors need to self-orchestrate their activities.

In an ideal world, the shared effort from stakeholders in the VC-ecosystem leads to businesses *scaleup* resulting in outputs of Unicorn firms and successful exits. However, the long road of investment will of course produce other outcomes, and even failures.

6. Conclusions

While prior studies have provided an understanding of, for example, the software sector ecosystem (Iyer et al., 2006), and firm-based ecosystems (Kapoor & Agarwal, 2017), we have instead identified a dynamic, global VC-ecosystem, its architecture, orchestration activities, and outputs (scaleups, unicorns, exits). Adopting a system level approach, we find differences and similarities with other ecosystems (Jacobides et al., 2018). We coin the term Active Hubs to describe the biggest players in the global VC-ecosystem. They have the power and capacity to deliver unique NFVA and FVA for startups reaching the expansion stage, and to disrupt industrial ecosystems through their investment activities. Unlike stakeholders described in BEs, players in this ecosystem act “behind the scenes”, and the global VC-ecosystem can therefore be positioned as a “shadowing” ecosystem.

6.1. Theoretical contributions

Previous VC research has examined syndication and alliance formation (e.g., Wright & Lockett, 2003; Jääskeläinen, 2012). We extended this research by adopting a system level approach to studying the global VC-ecosystem. We make several theoretical contributions. First, we created an intersection between two strands of research, that is, VC research and ecosystem research, and shed light on how tenets from ecosystem theory can help in understanding dynamics in the VC

industry.

Second, we provided a segmentation matrix, shining a light on the roles of various investor types in the ecosystem, and portraying the global VC-ecosystem architecture. We have explained the roles of VC investors and their degree of specialization, with regard to development stage and industrial expertise (Fig. 6 and Table 1). While previous VC studies have commonly compared specialist with generalist strategies of separate investor types (De Clercq et al., 2006), we instead demonstrate that different types of VC investor can fulfil complementary specialist roles. These findings provide a more complete picture of VC firm roles in the ecosystem.

Third, in line with the prior research, we demonstrate the existence and importance of hubs (Williamson & De Meyer, 2012; Teece, 2016). We introduce the label Active Hubs for those in the global VC-ecosystem. We find that they play a central role in the VC-ecosystem, and are essential for scaleup activities materializing unicorn development (see Fig. 7). Active Hubs have vast resources and experience in the VC industry. We find that their capabilities to deliver NFVA and FVA are crucial to playing an orchestrating role in the VC-ecosystem. Here, NFVA is considered a knowledge/network capability and FVA a funding capability (Maula, 2001; Large & Muegge, 2008). We propose that the capacity to combine these capabilities enables Active Hubs to meet venture needs in a dynamic fashion.

Fourth, it has been found in ecosystem research that enablers play an important role in tying partners to the ecosystem, and creating and reaching shared goals (Jacobides et al., 2018; van Velpen et al., 2022). In a similar vein, we have identified four central ecosystem enablers: goal alignment, certification, mutual trust, and complementarity (Table 2). These enablers create endurance during global VC-ecosystem collaboration and development. We propose that they positively affect both horizontal and vertical collaboration; vertically between Active Hubs and smaller players, horizontally between financially strong generalists such as Active Hubs and Passive Giants, and in-between smaller VC firms. The understanding of such enablers is lacking in previous VC research.

Fifth, in this paper, we reason that orchestration comprises a wide variety of actions, ranging from strategic ecosystem governance to interfirm operational activities. Ecosystem research shows that ecosystem governance is based on formal and informal governance mechanisms (Tiwana et al., 2010). Our study reveals that Active Hubs in the VC-ecosystem also employ both formal and informal governance mechanisms, such as control through ownership, follow-on capacity in several investment rounds with a lead role, information gathering on partners through informal interaction, and enhanced geographical proximity involving expansion decisions into Europe. Thus, although VC

investing is known to include, for instance, comprehensive shareholder agreements (e.g., Kaplan & Strömberg, 2003), formal governance mechanisms are not employed to ascertain co-investor value-added in syndicates. These findings respond to Cumming and Groh's (2018) call for more research on governance where multiple investor types are involved.

Sixth, just as in other types of ecosystem, we find that Active Hubs in the VC-ecosystem orchestrate other players in an effort to create synergies (Jacobides et al., 2018; van Vulpén et al., 2022). Here, co-specialization plays an important role. Specialized firms such as CVCs, IVCs, FOs, and SAs contribute with complementary and often localized knowledge.

Ecosystem research further describes that the interplay between co-specialized firms demands a certain type of orchestration activity, namely partner management (Alexy et al., 2013; Kapoor & Lee, 2013; van Vulpén et al., 2022). In our study, we also find that Active Hubs in the VC-ecosystem actively identify, select and manage partnerships with various investor types. These findings add to VC research, showing that specialized complementors can be a valuable source of, for example, deal flow for IVCs (e.g., Harrison & Mason, 2000; Drover et al., 2017a, b). However, there is also a risk of deselection and exclusion for partners that exhibit inappropriate behaviour towards the Active Hub or other actors.

Finally, ecosystem research describes how Active Hubs can nurture the ecosystem (Iansiti & Levien, 2004; Nambisan and Sawhney, 2011). In the VC literature, nurturing primarily refers to firm level characteristics, with the aim of reducing uncertainty in the early stages of venture creation (e.g., Amit et al., 1990; Maula et al., 2005). In our study, nurturing is instead examined at two levels, the portfolio firm and the ecosystem level. First, Active Hubs take a long-term perspective on venture development, and involve themselves in the early stages of venture development in order to create long-lasting relationships (life-cycle perspective) with entrepreneurs and co-investors. In contrast to VC studies (e.g., Van Onsabrugge, 2000; Bacon-Gerasymenko et al., 2020), which point to a limited investment horizon (five years), our study shows that Active Hubs seek a long-term commitment of ten years and beyond. Thus, Active Hubs differ from complementors in that they can add NFVA to a firm throughout its lifecycle. At the ecosystem level, Active Hubs nurture various VC players and entrepreneurs through knowledge sharing, when providing, for instance, knowledge on technology development in emerging fields, offering reciprocal scout-models, and creating novel startup programs. However, some of these network activities are offered to only a limited number of partners, while others are more open in nature. This finding complements previous ecosystem studies, claiming that loosely coupled "alliances" are formed in ecosystems (Jacobides et al., 2018).

6.2. Managerial implications

Entrepreneurs should thoroughly study investor behaviour and learn about the differences in behaviour among Active Hubs and Complementors. Knowing about such differences would make it possible for entrepreneurs to fine-tune their investor selection decisions and strategic investor relationships. This type of network and capability-related knowledge is of special relevance to entrepreneurs, so that they can create their own networks of investors and maximize the value-added that can be provided by various players.

In our study, we witnessed that smaller VC investors tend to have only local investor networks. From an ecosystem perspective, this limitation hampers their competitive advantage and the capacity to create unicorns. We have observed that investment activities are becoming more competitive, with many investors competing for the best deals. Therefore, individual VC investors or managers of VC firms should dedicate resources to identify, map, and manage investor relationships, including international VC actors. A central question for a VC investor to answer is: "How do we qualify for membership in various networks?"

6.3. Future research

First, in this study, we have theorized around the VC-ecosystem in general, and identified a diverse community of VC actors engaging in different roles. However, BE studies have provided deep and specific details on the ecosystems of hubs such as Microsoft, Apple, or Amazon. These firms are considered to be hubs in their respective industries. In a similar fashion, it would be of value to gain further and more detailed knowledge on the Active Hubs' respective firm-based VC-ecosystems, their architecture, ecosystem strategies, partner management programs, nurturing behaviour, and other dynamics.

Second, we have shown that complementors in the VC-ecosystem have opportunities to occupy a niche in the ecosystem. However, little is known about such differentiation behaviour. For example, What strategic opportunities are available to complementors in the VC-ecosystem? How do complementors go about positioning themselves in the VC-ecosystem?, and How do complementors respond to Active Hubs' nurturing activities?

Third, we acknowledge that the European VC market is highly fragmented, and has different ecosystem qualities and characteristics relevant to being a part of the global VC-ecosystem. This implies differences in the capacity to produce unicorns. Some European countries (e.g., the UK, France, Sweden, Germany, Switzerland) have a relatively mature VC market, while in others (e.g., Hungary, Romania, Bulgaria, Poland) it is relatively underdeveloped. Thus, it would be of value to study how country-specific conditions influence VC firms' opportunity to become members of Active Hub networks.

Finally, AI can nowadays play a central role in ecosystem development (Burström et al., 2021; Stahl, 2022), and our study indicates that AI adaption in the VC-ecosystem is at an early stage. Hence, it appears that only a limited number of actors are utilizing AI to create cost savings and competitive advantages. We therefore propose studies to assess the pros and cons of AI implementation and decision-making in investment analysis, and for the formation of the global VC-ecosystem. In such studies, research could be conducted on the relationship between AI/data suppliers and investors. In this context, the implications of using AI in investment firms and what that implies for the global VC-ecosystem could be in focus.

CRedit authorship contribution statement

Thommie Burström: Methodology, Formal analysis, Data curation, Conceptualization, Visualization, Writing - original draft, Writing - review & editing. **Tom Lahti:** Methodology, Formal analysis, Data curation, Conceptualization, Visualization, Writing - original draft, Writing - review & editing. **Vinit Parida:** Writing - review & editing, Formal analysis, Conceptualization. **Markus Wartiovaara:** Resources, Funding acquisition, Data curation. **Joakim Wincent:** Conceptualization, Writing - review & editing.

Declaration of Competing Interest

The authors declare that they have no known competing financial interests or personal relationships that could have appeared to influence the work reported in this paper.

Acknowledgement

None.

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