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Blueprint Silicon Valley? Explaining Idiosyncrasy of Startup Ecosystems

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The concept of startup ecosystems has received significant attention from policy makers, particularly in the hope of transferring Silicon Valley performance effects to their own region. Previous research emphasizes the need to consider the unique and distinctive nature of the specific regional ecosystem in focus when developing policies for ecosystem development without a thorough specification and theoretically founded explanations. In this article, we address this gap and develop propositions why each ecosystem is unique in nature by employing resource-based reasoning. The article concludes that ecosystems are highly idiosyncratic and are, therefore, inimitable and non-transferable to other regions due to working isolating mechanisms.

Keywords: startup ecosystem, idiosyncrasy, resource-based approaches.

Modelowa Dolina Krzemowa? Wyjaśnienie idiosynkrazji ekosystemów startupów

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Koncepcja ekosystemów startupów spotkała się z dużym zainteresowaniem decydentów, którzy mieli nadzieję na przeniesienie efektów działania Doliny Krzemowej do własnego regionu. We wcześniejszych badaniach podkreślano potrzebę uwzględnienia wyjątkowego i wyróżniającego charakteru ekosystemu regionalnego przy opracowywaniu polityk, nie przedstawiając jednak dokładnej charakterystyki i wyjaśnień opartych na teorii. W tym artykule zajęto się tą luką i opracowano propozycje wyjaśnienia unikalnego charakteru każdego ekosystemu przy zastosowaniu rozumowania opartego na podejściu zasobowym. Artykuł zakończono stwierdzeniem, że ekosystemy posiadają wysoce idiosynkratyczny charakter i dlatego są niepowtarzalne i nieprzenoszalne do innych regionów z powodu działania mechanizmów izolujących.

Słowa kluczowe: ekosystem startupu, idiosynkrazja, podejścia oparte na zasobach.

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1. Introduction

Being aware of the considerable impact of Silicon Valley on the regional economy in terms of job creation and regional innovative power (Gauthier et al., 2017), policy makers all around the globe have devoted close attention to the concept of startup ecosystems (Autio et al., 2014; Mason & Brown, 2014), particularly in the hope of transferring Silicon Valley performance effects to their own region (Gauthier et al., 2017). However, little is known on how to foster the emergence of such a system due to the complexity of its construct and the early state of research in this research field. With the rise of successful startup ecosystems around the globe, the debate on "best practices" of ecosystem development takes shape. High interest from policy makers in copying success stories and building strong ecosystems in their own region based on blueprints like Silicon Valley is evident. While the body of research on startup ecosystems is on the rise and offers meaningful insights into how ecosystem development could be fostered, previous findings address focused isolated ecosystem components (Roundy et al., 2018) and relate to the specific region (Stam & Spigel, 2017). Neglecting the context-specific nature of previous studies as well as the fact that research on startup ecosystems is still at its infant stage (and lacks in theoretical foundations, cf. Spigel & Harrison, 2018; Brown & Mason, 2017), strategy and policy consultants often suggest generalizations of policies derived from these best practice ecosystem samples (cf. Gauthier et al., 2018; Stam & Spigel, 2017).

However, does the application of these "instructions" and potential steps of "successful ecosystem development" really lead to strong ecosystems? Or is there simply no standardized strategy to ecosystem development at all – as Audretsch (2015) suggests? The question arises as practitioners' approach to compare their own region to Silicon Valley (see Hermann et al., 2017) stands in contrast to claims recently made by researchers. Researchers emphasize the need of considering the unique and distinctive natures of the specific regional ecosystem in focus when developing policies (e.g. Isenberg, 2010). While this suggestion is visible in recent research (cf. Amorós et al., 2016; Mack & Mayer, 2016; Auerswald, 2015; Hechavarria & Ingram, 2014; Mason & Brown, 2014; Motoyama et al., 2014; Isenberg, 2010; Zacharakis et al., 2003), it is in many cases made without thorough specifications and theoretically founded explanations, especially as neo-institutional approaches would also allow another conclusion referring to isomorph pressures of social systems (DiMaggio & Powell, 1983). Accordingly, this article aims to close this gap and analyzes why each ecosystem may be unique in nature. Drawing on the ecosystem as a unit of analysis, the research design of this paper acknowledges the ambiguous findings in prior research, builds on literature, and selects a theoretical foundation that directly addresses the anatomy of the subject matter. With this conceptual and theoretical grounding,

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the paper seeks to develop propositions deductively. As resource-based reasoning explains idiosyncrasies in the economic sphere (e.g. Penrose, 1959), we employ this part of management and organization theory that is rooted within the so-called "interpretive paradigm" according to Burrell and Morgan (1979). The interpretive paradigm adopts a subjectivist viewpoint and favors an evolutionary rather than a revolutionary one. As for ecosystem development, this paradigm seems to match the context better than any other of the three paradigms Burrell and Morgan (1979) refer to.

The remainder of this article is structured as follows. We first review recent literature on startup ecosystems components, highlighting the resource elements and actor groups forming an ecosystem. We then relate the key aspects of the resource-based view to previous research findings on startup ecosystems to explain ecosystem heterogeneity. This article puts forward propositions on why ecosystems develop in a unique manner and, hence, supports the conclusion that guiding policy support based on generalizable implications will not lead to successful ecosystems. Policy implications are derived and a research outlook is given.

2. Startup Ecosystem Components

As for a definition of the term "startup ecosystem", several suggestions have already been made (Spigel, 2017; Stam, 2015; Mason & Brown, 2014; Isenberg, 2010). They vary in input and output factors. However, they all have in common that by analogy with biology – where the term "ecosystem" describes a complex system of interacting organisms with their particular surrounding environment (Tansley, 1935) – startup ecosystems refer to a holistic approach of geographically bounded, favorable environments of interdependent actors and resources that in interplay nurture the emergence of high-growth business activities (Mason & Brown, 2014; Spilling, 1996). Stam (2015) developed a condensed and widely used definition, describing startup ecosystems as "a set of interdependent actors and factors coordinated in such a way that they enable productive entrepreneurship" (Stam, 2015, p. 1765).

Jacobides et al. (2018, p. 2255) add to the debate by pointing out ecosystems' very nature: "Ecosystems, we posit, are interacting organizations, enabled by modularity, not hierarchically managed, bound together by the non-redeployability of their collective investment elsewhere."

The absence of hierarchy as well as the role of dedicated resources is a meaningful contribution to the understanding of ecosystems. Below we give an answer to the open question on the most meaningful resources of ecosystems. With the rise of successful startup ecosystems around the globe such as Berlin, Paris, Tel Aviv, Hong Kong, and New York, research makes progress in identifying key elements of ecosystems (World Economic Forum [WEF], 2013; Isenberg, 2011) and developing conceptual models

(Spigel, 2017; Stam, 2015; Aspen Network of Development Entrepreneurs [ANDE], 2013; Ahmad & Hoffmann, 2007; Neck et al., 2004). While these models vary mainly in their complexity, they illustrate more or less the same key resources that constitute an ecosystem. Table 1 illustrates the resource categories of ecosystems according to the authors (Table 1). Stam and Spigel (2017) recently classified ecosystem attributes into the two categories (i) framework conditions (formal institutions, culture, physical infrastructure, and demand) and (ii) systemic conditions (networks, leadership, finance, talent, knowledge and support services/intermediaries).

Author(s) (Year)	Categories	Components
Neck et al. (2004)	Components	Culture, physical infrastructure, large corporations, talent pool, capital sources, professional/support service, government, university, informal networks, formal networks, incubator organizations, spin-offs
OECD (2007)	Determinants	Regulative framework, R&D and technology, entrepreneurial capabilities, culture, access to finance, market conditions
Isenberg (2011)	Domains	Policy, finance, culture, supports, human capital, markets
Suresh & Ramraj (2012)	Support Factors	Moral, financial, network, government, technology, market, social, environmental
ANDE (2013)	Pillars	Accessible markets; human capital workforce; funding and finance; mentors, advisors, support systems; regulatory framework & infrastructure; education & training; major universities as Catalysts; cultural support
Mazzarol (2014)	Components	Government policy, regulatory framework & infrastructure, funding & finance, culture, mentors, advisors & support systems, universities as catalysts, education & training, human capital & workforce, local & global markets
Stam (2015)	Elements	Networks, leadership, finance, talent, knowledge, support services / intermediaries, formal institutions, culture, physical infrastructure, demand
Juling et al. (2016)	Capitals	Human capital, social capital, financial capital, infrastructure capital, political capital, economic capital, cultural capital, historical capital.
Stam & Spigel (2017)	Attributes	Cultural, social, material

Tab. 1. Components of startup ecosystems according to the authors.

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Besides required resources, also relevant ecosystem actor groups and the role they play in ecosystem emergence stand at the fore. The heart of the ecosystem are the entrepreneurs themselves. This focus is the main difference from tightly related concepts such as clusters, industrial districts, and innovation systems (Stam & Spigel, 2017). Besides the entrepreneurs as the key driving actor group, research offers knowledge on the role other specific actor groups of ecosystems might play in their development. For instance, the unique contributions migrants add to ecosystem development have been brought into focus by previous research (Baron & Harima, 2019; Gauthier et al., 2018; Saxenian, 2002), and so has been the role policy makers (Mazzarol, 2014; Kantis & Federico, 2012; Isenberg, 2010), the state (Fuerlinger et al., 2015), universities and research institutes (Graham, 2014; McKeon, 2013), as well as accelerator institutions (Hochberg, 2016) might have. Despite these important achievements, little is known on support for vibrant ecosystem evolvement from a policy intervention perspective (Auerswald, 2015). Previous findings are based on focused isolated ecosystem components (Roundy et al., 2018), bound to the specific region (Stam & Spigel, 2017), and lack a clear theoretical foundation due to the absence of a theoretically well-backed conceptual model (Spigel & Harrison, 2018; Brown & Mason, 2017). Brown and Mason (2017, p. 14) notice that "(…) policy formulation runs the danger of running ahead of its theoretical and empirical underpinning." Nevertheless, the strong willingness of policy makers to invest in ecosystem development encouraged practitioners and policy consultants to create long lists of policies and actions based on these previous findings (cf. Mazzarol, 2014; ANDE, 2013), neglecting the mentioned shortcomings in deriving generalizable implications (Brown & Mason, 2017).

Even though previous researchers have already explicitly stated that ecosystems are heterogeneous and, therefore, a "one size fits all concept" for ecosystem support does not seem to be applicable (cf. Amorós et al., 2016; Mack & Mayer, 2016; Auerswald, 2015; Hechavarria & Ingram, 2014; Mason & Brown, 2014; Motoyama et al., 2014; Isenberg, 2010; Zacharakis et al., 2003), practitioners tend to assume that solely strengthening the identified resource categories and actor groups within their own region would lead to a successful ecosystem (development) as policy implication derived from best practices might indicate. Recent assertions about the impossibility of copying Silicon Valley might be unheard due to the missing theoretical underpinning of such statements. To provide the discussion with theoretical arguments, we refer to resource-based approaches to point out the idiosyncratic nature of startup ecosystems.

3. The Resource-Based View

The resource-based view of the firm (Freiling, 2004; Grant, 1991; Penrose, 1959) explains competitive advantages of firms by their unique and firm-specific endowments of resources. According to Barney (1991),

resources can become a driver of sustainable competitive advantage if they are valuable, rare, imperfectly imitable, and non-substitutional. The firm-specific heterogeneous resources rest on and reinforce isolating mechanisms (Dierickx & Cool, 1989; Rumelt, 1984; Teece, 1984; Penrose, 1959) due to their structural, knowledge-based, and developmental peculiarities. Following Freiling (2001, p. 101), "isolating mechanism" stands for "a causal structure – built on resource-based antecedents and isolating elements – explaining the emergence of sustainable resource-related competitive advantages." Thus, they enable organizations and institutions to build and sustain an individual profile. The term "idiosyncrasy" is the result of working isolating mechanisms and reveals that heterogeneity may be a rather durable state. Resource-based literature provides the discussion with the following set of isolating mechanisms:

- *Asset interconnectedness* (Dierickx & Cool, 1989) implies that asset development does not only rely on the existing asset stocks, but also on other asset stocks.
- *Social complexity* (Barney, 1991) points out that value creation within an organization takes place in complex relationships which internally lead to mutual understanding, shared conventions, and values. Outsiders of the firm cannot achieve an understanding about these complex internal settings (Freiling, 2004).
- *Causal ambiguity* (Rumelt, 1984) explains that a firm's success cannot be directly related to specific resources employed as these cause-and-effect relations are difficult to explain since they are based on firm-specific roots.
- *Asset mass efficiencies* (Dierickx & Cool, 1989) describes that the strengths of asset accumulation can be actively influenced by the firm's initial asset stock.
- *Time compression diseconomies* (Dierickx & Cool, 1989) terms the weaknesses of a firm's asset stock accumulation to keep pace with a competing firm over time.
- *Routines* (Nelson & Winter, 1982; Pentland & Rueter, 1994) *and tacit knowledge* (Nonaka, 1994). Routines are "pre-structured grammars of action, enabling a group of people to adapt to tasks in a goal-directed way due to the underlying knowledge the routines refer to" (Freiling, 2004, p. 35). Firms build up tacit knowledge which is routed in their own actions, cognitions, and its specific context (Nonaka, 1994).
- *(Intellectual) Property rights* (Freiling, 2004) restrict the usage of certain assets/resources to the owning firm. In case of developed property rights belonging to co-operating firms, the creation of these properties can only be developed in co-creation and not by a single firm (Freiling, 2004).
- *Absorptive capacity* (Cohen & Levinthal, 1990) is "the ability of a firm to recognize the value of new, external information, assimilate it, and apply it to commercial ends" (Cohen & Levinthal, 1990, p. 128).

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The state in which resources are idiosyncratic and bound to an organization is caused by the required long time and complexity of building up these assets elsewhere (Freiling et al., 2008; Freiling, 2004). Particularly the required experience of building and leveraging these resources is missing elsewhere and must be gathered so that so-called "time compression diseconomies" (Dierickx & Cool, 1989) apply. Knowledge and experience need a certain structuring. Routines and practices provide this frame and help accessing (tacit) knowledge easily (Freiling, 2004) – despite the given structural complexity. Also, these structural entities provide isolation in competition. As a consequence of complexity in asset creation, resources (like capabilities) cannot be easily bought on markets but must be created (Zander & Kogut, 1995; Teece, 1982).

While the original resource-based view focused on exploiting firm-specific assets to gain sustainable advantages, the dynamic capability approach (Teece, 2007; Teece et al., 1997), as an extension, addresses a "firms' ability to integrate, build, and reconfigure internal and external competences to address rapidly changing environments" (Teece et al., 1997, p. 516); hence, it adds the perspective of renewing an organization's capability over time in changing environments by sensing, seizing, and reconfiguring activities (Teece, 2007). According to this approach, firm-specific assets and competences rely on choices made in the past. This path-relatedness defines a "(…) long-term, quasi-irreversible commitment to certain domains of competence" (Teece et al., 1997, p. 515).

Building on the work of resource-based approaches, Dyer and Singh (1998) extend the resource-based view to relationships among organizations, introducing the "relational-view." This approach proposes that competitive advantages emerge in inter-firm relationships, arguing that the sources of distinctive resources are relation-specific assets, knowledge-sharing routines, complementary resources/capabilities, and effective governance (Dyer & Singh, 1998). Building on these streams, we further extend the resource-based reasoning to the meta-level of the entrepreneurial environment, more precisely to the multilateral relationship sphere of startup ecosystems to explain their uniqueness in structure heterogeneity – the startup ecosystem idiosyncrasy.

4. Idiosyncrasy of Startup Ecosystems

Are startup ecosystems idiosyncratic and dynamic entities? Resource-based reasoning suggests supporting this view. Fueled by the interaction of several ecosystem actors, a considerable structural complexity develops. The density of network relationships increases over time as more and more people get to know each other and, thus, become connected. In interplay the actors create the endowment of ecosystem resources (Freiling & Baron, 2017). It is undisputed that ecosystems consist of several resources. They can

be classified along certain identified elements of ecosystems (see Table 1). Hence, in theory, the replication of the presence of resource categories and actor groups in the own region based on static best-practice observations might be possible. However, the way in which these elements are combined and connected within the resource-structure of ecosystems and, consequently, how they affect the outcome of ecosystems makes ecosystems highly heterogeneous and, therefore, inimitable. Freiling and Baron (2017) argue that the combination of available regional resources by the various actors of ecosystems leads to a highly complex "capital structure." We argue that this structure is idiosyncratic in structural, process, and context terms. This implies that neither can Silicon Valley structures be copied or transferred, nor will other regional startup ecosystems really run the risk of resources depletion thanks to working isolating mechanisms. Against this background, we develop a set of research propositions supporting this overarching perspective. These propositions rest on the following considerations: (i) The presence and meaning of resources differ among regions due to specific trajectories; (ii) The regional setting of actor groups involved in organizing the capital structure is idiosyncratic based on different isolating mechanisms; (iii) The ecosystem culture is unique in each ecosystem and acts as an isolating mechanism itself; (iv) The ecosystem structure changes continuously at an idiosyncratic pace based on system-specific drivers.

4.1. Structure: The Presence and Meaning of Ecosystem Resources

Research considering the setting of specific ecosystems (Baron & Harima, 2019; Gauthier et al., 2018; Rampersad, 2016; Spigel, 2016; Segers, 2015; Corno et al., 2014; Stam 2014; Arruda et al., 2013; Cohen, 2005) as well as studies comparing the resource endowments of ecosystems (Gauthier et al., 2017) illustrate that ecosystems consist of resources classified in Table 1. In the initial phase of ecosystems, regions possess strengths in the availability of certain resources while they may lack others as they develop under unique conditions and distinctive prerequisites (Isenberg, 2010). This sets the foundation for an isolating mechanism in ecosystem development in terms of "asset mass efficiencies" (Dierickx & Cool, 1989) as the initial asset stock impacts the accumulation of future asset stocks and, thereby, the ecosystem's unique development in terms of resources. Over time, startup ecosystems seem to fill critical resource gaps where bottlenecks occur or where other regions are stronger. The Genome ranking (Gauthier et al., 2017) ranks ecosystems based on five categories. Comparing the recent ranking with the forerunner versions (Gauthier et al., 2017; Herrmann et al., 2015 and 2012), most listed ecosystems have increased their performance in this metric. However, copying addressable resources does not mean that ecosystem success will be copied as well, as "causal ambiguity" (Rumelt, 1984) exists. This implies that it is barely possible for outsiders to fully understand an ecosystem's resource set including all tangible and intangible

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resources and the relationships between all the resources. There is typically no way to copy ecosystem performance due to structural and process ambiguity. While the ecosystem ranking reveals that over time the listed ecosystems agglomerate the same categories of resources, the emphasis on these capitals is rather different (Gauthier et al., 2017; Morris et al., 2015). While, for instance, Paris and Amsterdam are listed among the top twenty global ecosystems, Paris lacks specialized talent, while Amsterdam lacks actors providing financial capital (Gauthier et al., 2017). The different emphasis of ecosystem elements and actor groups in ecosystems can be explained in terms of resource-based reasoning with "time compression diseconomies" (Dierickx & Cool, 1989) as competing ecosystems cannot accumulate the same asset stocks over time due to own weaknesses in resource endowments in the past. This involves a certain path commitment (Teece et al., 1997) determined by resource agglomerations (e.g. Jennen & Verwijmeren, 2009) in regional history and policy decisions in the past on fostering specific sectors. For instance, the presence of successful big corporates from a certain industry might have let policy makers address the development of expertise in a specialized sector (Gauthier et al., 2018; Zacharikis et al., 2003). Based on specific human resources available in the region, the human capital of regions with, for instance, a strong automotive industry such as Munich (Germany) differs from the human capital of the banking center Frankfurt (Germany) and, thus, has an impact on business ideas or entrepreneurial culture generated in the region. This leads to a different emphasis on ecosystem resource categories forming the specific capital structure of an ecosystem. Moreover, lock-in effects of the regional history play an important role in this regard. While Tel Aviv is well known for cyber-security startups due to the military imprint of Israel's society (Senor & Singer, 2009), Berlin startups are mainly involved in the field of creative clusters as the city does not possess strong industrial corporates due to its younger history. Thus, distinctive expertise developed with specific sector focus that may also constitute an isolating mechanism in terms of the region's "absorptive capacity" (Cohen & Levinthal, 1990) to identify and assimilate required external resources. Changing the focus of developed ecosystem completely is, hence, almost impossible. In addition to the focus on specific industry sectors or clusters, the overall cultural surrounding reflecting historical impacts, such as whether an ecosystem is situated in former communist countries, might have an impact on the availability of resources as well (Juling et al., 2016) as entrepreneurial policy is shaped by a region's tradition (Hechavarria & Ingram, 2014). Moreover, the lack and variety of certain resources in ecosystems could also result from ecosystem competition. Regions compete in a "war for talent" for entrepreneurs and experts with their impact of resource endowments (Gauthier et al., 2018). Therefore, regions need to gain a certain reputation as established and strong ecosystems among entrepreneurs to attract external actors and resources.

Some regions such as Silicon Valley and Berlin have achieved reputation as a non-transferable, region-specific, and intangible competitive advantage. Other regions might still be undervalued because they lack well-established reputation owing to the short time of ecosystem existence. The establishment of a strong reputation, thus, leads to an isolating mechanism in contrast to ecosystems lacking reputation, which is considered in the resource-based view by "time compression diseconomies" (Dierickx & Cool, 1989). Finally, whether a strong ecosystem of the present has been strategically supported by effective policies depends on the implementation of an ecosystem strategy (Isenberg, 2011) in the past and resource investments over time (Gauthier et al., 2017). If actively engaged in supporting ecosystem development, policy makers can help create such a regional isolating mechanism in terms of "asset mass efficiency" (Dierickx & Cool, 1989).

We conclude that ecosystem emergence depends on decisions made in the past and historical resource path commitment which make an ecosystem idiosyncratic. Even if intended, imitating these unique strengths of several ecosystem elements cannot be easily done since replication takes time (Teece et al., 1997), and asset mass efficiencies and time compression diseconomies act as isolating mechanisms. Ecosystems are highly dynamic and are subject to fast paced evolutionary processes (Mack & Mayer, 2016). Hence, reaching an imitation of Silicon Valley success factors of the past would not lead to a successful ecosystem in the present. Isenberg (2011) argues that even Silicon Valley would not be able to replicate its own success. This can also be explained in the way that historical influences of the past such as the World Wars and the resulting massive investment of the US military in the Bay Area would not happen in the same way again.

Proposition 1. Startup ecosystems are idiosyncratic due to the presence and meaning of their available regional resources.

4.2. Actors: The Regional Setting of Actor Groups

Ecosystem actors in interplay are driving forces of resource creation and combination in ecosystems. While ecosystems consist of resources that can be classified in certain identified categories as shown above, resources vary among the ecosystems as ecosystem actors combine them into a unique resource structure (Freiling & Baron, 2017). This reflects the isolating mechanism of "social complexity" (Barney, 1991). Hence, the local agglomeration and combination of resources in an ecosystem is highly dependent on the variety of ecosystem actors (Roundy et al., 2017; Stangler and Bell-Masterson, 2015), their density in the region (Napier & Hansen, 2011; Zacharakis et al., 2003), and their various interactions, as all actors are ecosystem co-creators (Freiling & Baron, 2017). At an initial point, a critical mass of relevant actors is needed to drive ecosystem emergence (Napier & Hansen, 2011). Regions possessing this critical mass

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have the advantage of "asset mass efficiencies" (Dierickx & Cool, 1989) as their future success and pace of ecosystem development depend on this initial asset stock. In contrast to regions which lack relevant actor groups, successful regions profit from "time compression diseconomies" (Dierickx & Cool, 1989) as the weaknesses of the competing ecosystems is beneficial for the development of own ecosystem. In this vein, Morris, Neumeyer, and Kuratko (2018) as well as Malecki (2018) highlight the importance of variety among actors in ecosystems. This reveals the effective work of "social complexity" (Barney, 1991) as an isolating mechanism. Each actor group has distinctive impacts on resource agglomeration, some of them even as an accelerating factor. For instance, migrant entrepreneurs add resources to ecosystems that native entrepreneurs might not possess (Baron & Harima, 2019). The number of these actors varies extremely among ecosystems, and so do the resources they add and combine with present ecosystem resources. While migrants in Silicon Valley and Berlin represent between 42 and 46% of the founders, Barcelona has a share of 10% and Sao Paulo of 4% (Gauthier et al., 2017). Similarly, the share of female founders among the entrepreneurs varies between 8% (Tel Aviv and Helsinki) and 34% (Chicago) in the top ranked ecosystems. Female entrepreneurs act differently from their male counterparts and, therefore, address partly different resources (Gauthier et al., 2018). Besides, the sector focus on certain regions with their specific venture types defines what kind of actors are attracted to a region (cf. Neumeyer & Santos, 2018), and also historical setting impacts actor availability such as in case of Berlin where the English speaking and open culture attracted Bohemian entrepreneurs and the creative class (Florida, 2003) to its ecosystem. Zacharakis et al. (2003) support the argument of varying types of entrepreneurs by regions with their finding that types of internet companies vary significantly by regions. The success of sustaining ecosystems cannot be traced back to the initial influence of a certain actor as the complex impacts of the different actor groups in interplay with other resources are opaque. The cause-and-effect structure cannot be specified and, thus, imitated by other regions. Hence, "causal ambiguity" (Rummelt, 1984) leads to ecosystem idiosyncrasy. In addition, the co-creation of ecosystem resources leads to another isolating mechanism in the sense that certain "property rights" (Freiling, 2004) emerge. In contrast to the original theory, the term "right" is in this context misleading. However, the resources only emerge in co-creation and their usage is limited to the actors who have access to them. As ecosystems are region specific, predominantly actors involved in the regional community might get access to these aspects. This makes it difficult for outsiders to understand which mechanisms are at play. Furthermore, high dynamics in labor mobility in ecosystems with its resulting recombination of knowledge (Stam, 2014) leads to a varying composition of actors over time even within the same ecosystem. In addition, impacts of actor groups might come

from different levels as a continuous interpenetration of ecosystem levels is reported (Roundy et al., 2018). For instance, in case of policy makers, regional, national, and sub-national policy makers influence ecosystem structures by their specific policies (Spigel, 2017). Hence, the composition of the actors in ecosystems is heterogeneous itself and idiosyncratic. This aspect reflects the region's "social complexity" as an isolating mechanism (Barney, 1991).

To summarize, due to the unique composition of the diverse ecosystem actors in a region, their mutual relations in interaction with the available resources, and the specific "historical load", the complex capital structure emerges over time in each ecosystem uniquely and cannot be imitated due to its social complexity and dynamics. The resource-based approaches suggest that the ecosystem structure – made of the human capital of individuals, specific relationships, and unique trajectories – is a highly idiosyncratic issue. As resources combined with actors in a region form an ecosystem, their interplay and composition are specific to the territorial context (García-Cabrera & Carcía-Soto, 2010), leading to a structure that is imperfectly mobile as the interconnectedness of the resources and the related effects result from the specific local embeddedness of the resources and actor compositions. Therefore, the combination of the resources and the interplay of the actors are unique and cannot be imitated (and only incompletely substituted) by other regions even if the single resources or the presence of identified actor groups could be copied (García-Cabrera & Carcía-Soto, 2010). Hence, "asset interconnectedness" (Dierickx & Cool, 1989) is an isolating mechanism leading to ecosystem idiosyncrasy as the combination and interplay of the resources form an ecosystem (Freiling & Baron, 2017). What makes the ecosystem capital structure far more complex than the underlying complex composition of the actors itself is that actors can actively take steps to change characteristics of the system by their actions (Roundy et al., 2017). Therefore, individual choices, behaviors, and intentions (Stam & Spigel, 2017) impact the resource combinations as well. Thus, ecosystems are idiosyncratic due to the complex combination of a region's resources based on social complexity. This leads to a unique composition of ecosystem actors and helps create the resource structure of ecosystems.

Proposition 2. Startup ecosystems are idiosyncratic due to the composition of ecosystem actors.

4.3. Culture: Unique Regional Ecosystem Culture

Besides ecosystem resources and actors, institutional settings such as culture are distinctive "(…) in coherence around shared values and activities" (Roundy et al., 2017) and, therefore, make ecosystems idiosyncratic (Mack & Mayer, 2016). Impacted by historical backgrounds of a region such as its economic history (Spigel, 2017), for instance whether there has been

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a long-lasting business tradition or not (Juling et al., 2016), resource combinations of a region vary due to the culture-impacted behavior of a startup community and, thus, are affected by a certain "asset mass efficiency" (Dierieckx & Cool, 1989) as ecosystem culture contains prior regional cultural aspects. Ecosystem communities establish certain common logics (Cunningham et al., 2002) and a community logic with hidden rules (Thornton et al., 2012; Marquis et al., 2011). The way actors in an ecosystem behave and interact is dependent on this aspect as ecosystems form specific informal institutional settings (Bosma & Holvoet, 2015) such as exchanging knowledge in startup events. This can be understood as an established routine (Pentland & Rueter, 1994; Nelson & Winter, 1982) in dynamic startup communities which cannot easily be grasped by outsiders without this tacit knowledge (Nonaka, 1994) how the specific ecosystem community works and interacts. Isomorph pressures (DiMaggio & Powell, 1983) to gain legitimacy as entrepreneurs among the peers within the startup communities and the demand to learn from peers (Motoyama et al., 2014) lead to mimicking behavior within a specific ecosystem. This creates distinctive logics of actor behavior compared to other ecosystems. Mimicking established ways of communication with venture capital firms within a specific sector in a region could be an example (cf. Zacharakis et al., 2003). The ecosystem culture is, therefore, a moderating factor for the level of financial resource availability among ecosystems (Li & Zahra, 2012). In a similar manner, the availability of other resource categories might be explainable as culture is seen as glue between ecosystem elements (Bosma & Holvoet, 2015). In this way, the institutionalized practices within startup communities become "VRIO" and form an isolating mechanism (Dierickx & Cool, 1989) that creates bonds between ecosystem actors by being favorable to them but not to outsiders. These specific aspects are inimitable as they are organization specific. In addition, Hechavarria and Ingram (2014, p. 3) show in their study on entrepreneurial policy in the United States context that "different traditions of entrepreneurial thought have shaped the development of entrepreneurial policy", which might explain differences in ecosystem's resources impacted by policies. Culture changes continuously (Malecki, 2018), which is not independent of the institutional and social structure change over time (Spigel, 2017). The strong influence that migrant entrepreneurs exert on the cultural change in the Berlin ecosystem (Baron & Harima, 2019) might be an example of this. Hence, ecosystem culture and institutional practices are distinctive in nature and, therefore, not transferable or imitable. They are organization specific and impacted by historical path commitment and social complexity. Hence, ecosystem culture acts as an isolating mechanism itself.

Proposition 3. Startup ecosystems are idiosyncratic due to their distinctive cultures.

4.4. Dynamics: Continuous Change in Ecosystem Structure

The idiosyncrasy of an ecosystem's resource structure also gets evident when considering the time dimension. The specific regional context and composition of actor groups change over time, as explained above. Since the context influences the ecosystem construct, the evolutionary perspective of ecosystems mirrors the heterogeneity of ecosystem structure (cf. Pitelis, 2012; Mack & Mayer, 2016). Besides talent mobility and changes in actor compositions over time, even the actors remaining the same over time evolve and interact in different manners over time. This is caused by individual learning and the accompanying recombination of resources, for instance through certain established routines such as social meetings (Stam, 2014). Evolutionary dynamics can, hence, be traced back to the changing needs and circumstances of the ecosystem actors, reflecting the "social complexity" (Barney, 1991) of resource combination in ecosystems. Dynamic capabilities of the region comprise the regions' capability to adapt to such changes over time. Roundy et al. (2018) highlight that ecosystems are not only adaptive systems but are very complex in nature (Roundy et al., 2018). Thus, the evolution of the ecosystem structure can only be ecosystem specific. Ecosystems undergo certain life cycle phases (Gauthier et al., 2017). While the phases are the same, the characteristics within the ecosystems are different (Gauthier et al., 2017). Scarce resources in an early phase of the life cycle impact the overall structure of ecosystems also in later phases, which makes ecosystems idiosyncratic as the isolating mechanisms of "asset mass efficiencies" and "time compression diseconomies" (Dierickx & Cool, 1989) lead to this outcome. This might explain the different levels of entrepreneurial outcomes in terms of "unicorn companies" in different regions that Acs et al. (2017) reported. Research proved that successful entrepreneurial policies to strengthen entrepreneurial regions such as the Yozma Program are not replicable with the same success in other regions (Gauthier et al., 2018), which also indicates the regional specificities and differences in ecosystem qualities and expertise (Zackarakis et al., 2003) at different points in time. This is caused by the different ability of regions to react to these changes in the regions due to their strengths in resource structure. In resource-based reasoning, dynamic capabilities (Teece et al., 2007) describe the capability of organizations to adjust to changes by reconfigurations and reinforcements of the unique resources. Following this logic, resource structures in ecosystems change continuously. Replication of these dynamic processes may be illusive as the resource-based approaches suggest (Teece et al., 1997).

Proposition 4. Startup ecosystems are idiosyncratic due to the complex evolution of their structure over time.

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5. Discussion and Conclusions

The evolving literature on startup ecosystems has identified various resources and actors that in interplay nurture the creation of innovative entrepreneurship in startup ecosystems. While being meaningful to knowledge generation, previous findings are context specific and not transferable to a generalizable context. In this article, we have applied resource-based approaches to the context of startup ecosystems to support this important understanding by explaining the uniqueness of startup ecosystems through regional working isolating mechanisms. In so doing, we shifted the focus from previous findings on isolated elements to the meta-structure of ecosystems in order to add to the holistic understanding of ecosystems as the concept requires.

We propose that ecosystem resource structure is idiosyncratic and, therefore, inimitable and non-transferable to other regions due to four aspects: (i) The presence and meaning of resources differ among regions due to specific trajectories; (ii) The regional setting of actor groups involved in organizing the capital structure is idiosyncratic based on different isolating mechanisms; (iii) The ecosystem culture is unique in each ecosystem and acts as an isolating mechanism itself; (iv) The ecosystem structure changes continuously at an idiosyncratic pace based on system-specific drivers. By this, we explained which kinds of isolating mechanisms cause the idiosyncrasy of startup ecosystems and identified regional culture as being an isolating mechanism itself in the context of startup ecosystems (see Table 2).

Isolating mechanism	(P1) Structure	(P2) Actors	(P3) Culture	(P4) Dynamics
Asset interconnectedness		x		
Social complexity		x		x
Causal ambiguity	x	x		
Asset mass efficiencies	x	x	x	x
Time compression diseconomies	x	x		x
Routines			x	
Tacit knowledge			x	
Property rights		x		
Absorptive capacity	x			

Tab. 2. Overview of isolating mechanisms causing idiosyncrasy of startup ecosystems.

In contrast to the initial resource-based theory, however, isolating mechanisms in contexts of startup ecosystems are not actively created by

an actor but are an effect of the complex interaction of regional specific actor groups and resources. Our theorizing supports previous claims that there is no "one size fits all approach" for the development of ecosystems and has implications for policy makers. The article explains that practitioners need to consider the uniqueness of regional development in the resource, actor, institutional, and time dimensions. Thus, simply copying actions observed in best practices would not lead to a replication of successful ecosystems. It is rather important to adjust any relevant identified action from best practices to the regional context brought into focus, considering the regional specificities we described in this article as the initial idea of blueprinting desires (Shostack, 1984). Acknowledging the complex evolution of ecosystem structure over time opens up the chance for policy makers to regularly adjust and further develop the policy strategy in line with the specific needs of the region. Therefore, addressing the needs of key actors of a local ecosystem as well as taking action to keep the own region attractive for entrepreneurs are important contributions policy makers can deliver. Implementing a platform for regular interactions with relevant ecosystem stakeholders could be a target in order to grasp the changing necessities of a region. In addition, the regular exchange of experiences with other regions to identify relevant policy actions adjustable to own regional requirements seems to be promising.

To build on such knowledge, research is required to further advance the understanding of the complex structure of ecosystems. Examining our propositions based on empirical data from the field would contribute to the discussion stimulated in this article. Identifying specific examples of unsuccessful imitations of an ecosystem policy would strengthen the idiosyncrasy thesis. In contrast, future research could also address the isomorphism construct of social systems described in neo-institutional approaches (DiMaggio & Powell, 1983) in order to provoke a contradicting position.

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