UNPACKING THE NATURE OF ORCHESTRATION COHERENCE IN ENTREPRENEURIAL ECOSYSTEMS

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Abstract

Despite its importance to the functioning of Entrepreneurial Ecosystems (EEs), the orchestration of networks remains a largely undertheorized topic. To address this omission, we sought to explain the interplay between networks, their orchestrators, and their implications for ecosystem outcomes. To do so, we conducted an in-depth case study of the Agtech Valley in Brazil. This has led us to develop theoretical insights on the notion of ‘ecosystem coherence’ as a foundational driver of EE structuration. Findings revealed two dimensions of EE coherence: capabilities coherence (based on organizational and cognitive proximities) and relationship coherence (based on institutional and social proximities).

INTRODUCTION

Entrepreneurial ecosystems (EEs) have become the dominant analytical approach for understanding entrepreneurship from a contextual perspective (Audretsch & Belitski, 2017; Alvedalen & Boschma, 2017; Stam, 2015). This rationale has gained traction as researchers and policymakers increasingly recognized entrepreneurship as a systemic phenomenon (Cao & Shi, 2021). Early research on the characteristics and configurations of entrepreneurial ecosystems (EE) has underscored networks as a ‘systemic condition’ of healthy ecosystems (alongside leadership, finance, talent, knowledge and support services) (Stam, 2015). More recently, Stam and van de Ven (2021) adjusted this model and identified networks as ‘institutional arrangements’ that enable knowledge flows. While these models have proved to be useful to guide the theory and empirics of EE, they are somewhat in conflict with the notion that entrepreneurial ecosystems are networks. For instance, Mason and Brown’s (2014, p. 5) define an EE as, “a set of interconnected entrepreneurial actors, entrepreneurial organizations, institutions and entrepreneurial processes which formally and informally coalesce to connect, mediate and govern the performance within the local entrepreneurial environment” (emphasis added).

The EEs-as-networks versus networks-as-EE-components distinction goes beyond semantic concerns. If we treat networks simply as one dimension of EEs then an ecosystem might rely on networks as much as (or less than) other features. But this conceptualization is not an accurate representation of the phenomenon: without network connections between participants, an EE cannot exist. By not acknowledging their fundamental importance to the existence of ecosystems, networks are often taken for granted and remain largely undertheorized in the EE literature (Alvedalen & Boschma, 2017). As a result, a substantial gap remains in...
terms of understanding the dynamics and governance systems operating within the scope of these networks and how these networks “coalesce” and become “interconnected” and “interdependent” (Knox & Arshed, 2022; Mason & Brown, 2014; Stam, 2015).

Recent studies have begun to address this gap by recognizing that entrepreneurial support organizations that have their own network of relationships can cohere to implement different actions to develop EEs and pursue opportunities (Harper-Anderson, 2018). These studies offer valuable insights into the actions that network orchestrators (Knox & Arshed, 2022), sometimes referred to as “EE leaders” (Miles & Morrison, 2020; Roundy & Burke-Smalley, 2022), can take and reinforce that EE integration matters. Yet, they do not provide a refined view on what ecosystem integration is and how it functions, other than presenting coherence as an effort between multiple organizations to share information and collaborate in decision making.

The current state of the literature on EE integration, which can be considered a “bird’s eye view” of the phenomenon, has conceptual drawbacks. First, it overlooks that EEs are not ‘cohesive wholes’, but rather ‘nested’ structures that follow independent trajectories (Spigel, 2022) and, thus, can lack coherence (i.e., be fragmented; cf. Scheidgen, 2020). Second, it does not explain what the coherence between network orchestrators is made of. Third, it is not clear how orchestrators can foster coherence in EEs. And, finally, it provides limited insight into the extent to which the nature of EE coherence can influence ecosystem outcomes. As a result, the boundaries, implications, and the mechanisms explaining why EE coherence manifests are still unclear.

Against this background, we take up the challenge of theorizing what the coherence between ecosystem orchestrators actually is and explore its implications for the ecosystem. Specifically, we ask: How do EE orchestrators integrate their efforts and steer networks to promote enhanced outcomes in the ecosystem? To address this question, we build on the notion of ‘EE coherence’, which represents the degree of commonality among ecosystem participants based on their shared goals, rules, logics, and values (Roundy et al., 2018; Roundy, 2022). We theorize that EE coherence is a foundational driver of network orchestration in ecosystems. Empirically, we conducted an in-depth case study of an AgTech entrepreneurial ecosystem in Brazil. Our sectoral focus was a deliberate methodological choice that allowed us to study a relatively homogeneous ecosystem in terms of sectoral orientation, thus allowing a closer inspection of network dynamics while avoiding assumptions that EE function as ‘cohesive wholes’ (Spigel, 2021).

The remainder of this article is structured as follows. In the next section, we connect the concepts of entrepreneurial ecosystems, entrepreneurial network orchestration, and coherence as an ecosystem feature that affects coalescence among actors embedded in EEs. In synthesizing these topics, we highlight the opportunities and open questions addressed by our study. We then describe our methodological procedures (Section 3) and present our main findings and theoretical insights from our case study (Section 4). We conclude with final remarks, limitations, and avenues for future research on EE coherence and network orchestration.

ENTREPRENEURIAL ECOSYSTEMS

Literature has increasingly recognized that entrepreneurs are not isolated agents. Instead, they actively pursue complementary resources from myriad agents, as well as are embedded in institutional frameworks that set the rules and incentives for their undertakings (Hervás-Oliver et al., 2021). Accordingly, a shift in the analytical focus – from the entrepreneur to her context – has been observed in scholarly work, managerial practice, and policymaking processes (Stam & van de Ven, 2021; Mason & Brown, 2014; Ács et al., 2017). Central to this approach is the notion of entrepreneurial ecosystems. EE takes a biomimetic stance to embed the entrepreneur in a complex framework of linkages and connections that aim at fostering entrepreneurial firms within spatially concentrated settings (Cao & Shi, 2020; Adler et al., 2019; Isenberg, 2010). In this vein, entrepreneurial ecosystems are intrinsically shaped by linkages between individuals, firms (both nascent and incumbent), government, universities, research institutes and investors (Tsouri & Pegoretti, 2021; Stam & van de Ven, 2021; Clarysse et al., 2014). Hence, diverse interactions become the main formative process of entrepreneurial ecosystems (Cao & Shi, 2021; Stam, 2015; Autio et al., 2018; Alvedalen & Boschma, 2017).
Incidentally, the EE rationale suggests that entrepreneurial capabilities go well beyond the boundaries of the firm. Instead, these capabilities emerge from networks, spillovers, asset flows, support structures and policy initiatives targeted at strengthening system-level competitiveness (Fotopoulos, 2022; Audretsch et al., 2019; Namibian et al., 2018). These entrepreneurial contexts are reliant not only on the availability of key dimensions, but also on how they establish networks and nurture synergies between them. Thus, a further comprehension of governance conditions taking place in EE represents a pivotal subject to be explored in this domain.

Even though literature highlights the key role played by interactions within the conceptual framework of entrepreneurial ecosystems, governance schemes of such linkages remain relatively uncharted (Colombelli et al., 2019). In fact, influential conceptual models on EE configurations (e.g. Stam & van de Ven, 2021; Stam, 2015) set apart the dimensions of Networks and Leadership, thus creating a split between linkages and their intrinsic forms of governance. In any case, the dominant discourse criticizes top-down initiatives as triggers for EE, sustaining that these are inherently organic structures that cannot be ‘engineered’ (Chatterji et al, 2013). Nonetheless, this does not mean that the structure of relationships and collaborations cannot be channeled by the agency of public and private actors. In this respect, networks that compose EEs (Aarikka-Stenroos & Ritala, 2017) might benefit from ‘orchestrators’ that steer entrepreneurial agents without any sort of formal hierarchy (Dhanaraj & Parkhe, 2006). We now dig deeper into two governance-related aspects by addressing the topics of orchestration in EE.

2.1 ORCHESTRATION IN ENTREPRENEURIAL ECOSYSTEMS: THE NEXUS BETWEEN NETWORKS AND LEADERSHIP:

To nurture and guide EE networks, orchestrators are responsible for connecting the dispersed assets, resources and capabilities of the members embedded in the network (Dhanaraj & Parkhe, 2006; Giudici et al., 2018). In EEs, they do so by offering support to entrepreneurial firms and setting up governance structures (Daymond et al., 2022; Giudici et al., 2018). While the orchestrating role is often associated with large corporations, universities (Clarysse et al., 2014) and governmental agencies (Daymond et al., 2022; Giudici et al., 2018) might also play the role of startup networks ‘orchestrators’ by establishing socioeconomic targets and promoting events that facilitate the formation of linkages. Also, accelerators and venture capitalists might trigger cooperation among startups with complementary business models (Hurmelinna-Laukkanen & Näätä, 2018).

Closely related to the concept of orchestrators is the notion of EE leaders – actors that engage in specific actions aimed at developing the EE (Miles & Morrison, 2020). These actors go beyond strategies that benefit themselves and the ventures they work with and engage in initiatives to promote ecosystem-level outcomes (Roundy & Lyons, 2023). This involves feeding EE needs into national agendas, connecting local EEs to international ones (Knox & Arshed, 2021), campaigning for tax reliefs (Miles & Morisson, 2020), creating EE oriented events (Harper-Anderson, 2018), or selecting and attracting new EE members (Roundy & Burke-Smalley, 2022). Such actions can promote the development of EEs, through the creation of new ventures, attraction of companies, generation of income and local jobs (Miles & Morisson, 2020; Roundy, 2019; Roundy, 2021), increase in resource availability, and support for entrepreneurs (Knox & Arshed, 2021).

While such actions can be performed by a single organization, in consonance with what we see in complex innovation networks (Aarikka-Stenroos et al., 2017; Gray, 2008; Klerkx & Aarts, 2013; Ritala et al., 2012), the literature on EE leadership claims that these actors (or orchestrators) can perform such actions collaboratively. Roundy (2020b) offers the notion of EE behavioral integration to represent the degree to which orchestrators “engage in collective interactions based on collaboration, information sharing, and joint decision making”. In another theoretical effort, Roundy & Burke-Smalley (2022) propose these actors could even form a meta-organization” to coordinate their efforts and facilitate interactions. The integration function of EE leaders remains, however, largely undertheorized in the literature (Roundy & Lyons, 2023).

If we consider that EE governance and orchestration structures requires a balance between generating diversity while maintaining harmony between agents, as this is a requisite to spur entrepreneurial synergies
(Sepulveda-Calderon et al., 2022), then it is vital that orchestrators have common orientations and goals and set up a culture based on shared norms, beliefs, and goals (Roundy, 2020; Roundy et al., 2018). In other words, generating ‘coherence’ among orchestrators is essential as a platform for sharing knowledge. Next, we turn our attention to the concept of coherence.

2.2 COHERENCE: WHAT LIES BENEATH NETWORKS AND ORCHESTRATION IN ENTREPRENEURIAL ECOSYSTEMS?

Entrepreneurial ecosystems represent a community of multiple coevolving stakeholders, with their own goals and logic. For the ecosystem to thrive, these agents need to join forces to promote better returns for the entrepreneurial environment (Mason & Brown, 2014). However, linkages per se do not generate symbiotic relationships that can engender healthy EE. Although not explicitly, these perspectives resemble the notions of proximity in Evolutionary Economic Geography. This strand of literature defies the notion of traditional economic geography approaches, whereas it argues that geographical proximity per se cannot establish interorganizational relationships and interactions (Boschma, 2005). In this case, geography functions as a facilitator for other types of proximity (Broekel, 2015; Caragliu & Nijkamp, 2016; Nilsson & Mattes, 2015), such as cognitive, institutional, organizational, and social (Boschma, 2005; Sternberg, 2007). Combined (although variegated configurations are possible), these sources of proximity can enable the emergence of functional networks.

Hence, in order to strengthen aggregate capabilities in ecosystems, geographical proximity must be matched by other elements that promote alignment (Knox & Arshed, 2022). Roundy (2020) refers to this as coherence, a driving force of shared knowledge in EE. In an earlier paper, Roundy and colleagues (2017, p. 101) defined such coherence as “the degree of association between the components of an EE, which causes them to coalesce into an interconnected group (i.e., the ecosystem)”. In turn, such associations can derive from actors’ shared needs, values, beliefs, and interests (Roundy et al., 2018).

While coherence is an ecosystem-level construct, we believe that there is a mirroring effect that would suggest a correspondence between the coherence at the ecosystem level and at the networks of orchestrators. Orchestrators play a central role in promoting coherence, by exposing stakeholders to common logics and disseminating values and conventions that guide ecosystem participants (Roundy et al., 2017). Yet, such insights fall short in providing a thorough examination of coherence, often failing to address the full complexity of elements that enable proximity among agents in the ecosystem. We now dedicate attention to these issues.

2.2.1 Coherence as a social construct

Coherence in EE includes sociological alignments that need to take place as actors decide on how to cooperate and who participate to cocreate value (Neumeyer et al., 2019). According to Cao and Autio (2019), the presence of a shared community identity and culture that stimulates knowledge sharing, the use of means to promote the identification of EE actors and their socialization, and the valorization of collective gains can promote a community logic that fosters coherence. A key challenge then is one of promoting synergies in an articulated fashion, i.e., it seems paramount to have a governance system capable of balancing the needs and motivations of these different stakeholders (Autio and Levie, 2017; Colombo et al., 2017). Yet, it can hardly be expected that entire ecosystems operate as ‘cohesive wholes’ when it comes to their intrinsic social structure (Scheidgen, 2021). For instance, Neumeyer and Santos (2018) found the manifestation of multiple, non-overlapping social clusters in the entrepreneurial ecosystems of Chicago and Orlando, demonstrating the existence of rather fragmented communities within the same ecosystem. On the other hand, these communities presented high levels of social coherence in their respective dynamics of relationships.

This social side to coherence has been identified as a pivotal lever for EE growth potential, enhancing access to resources, strengthening relationships, and promoting a sense of complementarity among agents embedded in the ecosystem (Theodoraki et al., 2018; Mack and Mayer, 2016). However, we understand that this offers only a partial take on the nature of coherence in entrepreneurial ecosystems. From the concepts outlined
above, we see elements that cover both social and institutional sources of proximity embedded within the place/region (geographical proximity). Indeed, it is well documented that Institutional proximity creates a sense of harmony about how agents perceive the underlying conditions of network operations, i.e., the norms and values that apply to relationships (Caragliu & Nijkamp, 2016), both of formal and informal natures (Sternberg, 2007). Also, social proximity can function as a critical trigger for the emergence of open innovation networks (Leckel et al., 2022), although lock-in effects may arise (Huggins & Johnston, 2010). But these components of the coherence construct do not tell us much about cognitive and organizational sources of proximity.

2.2.2 Coherence as a phenomenon attached to knowledge and related diversification

Spigel (2022) offers a rich analysis by assessing whether entrepreneurial ecosystems function as coherent wholes across diverse sectors or if they are composed of sub-ecosystems comprising different economic activities. Through an evaluation of the case of Fintechs in the United Kingdom, he finds substantial evidence pointing towards ‘nested’ EEs, that is, segmented ecosystems taking place within the same geographical area. In this respect, an important driver of coherence can be associated with the focus of economic activities taking place in the ecosystem, i.e., elements attached to cognitive and organizational proximities. Together, these aspects highlight the criticality of common knowledge bases and coordination mechanisms to foster effective regional innovation networks (Qian, 2018; Huggins & Thompson, 2013; Molina-Morales et al., 2014), and the underlying governance mechanisms on which networks rely (Sternberg, 2007; Boschma, 2005).

Literature has increasingly recognized potential conflicts associated with agglomeration economies arising from entrepreneurial diversity or specialization (O’Connor & Audretsch, 2023). While diverse sectoral profiles are attached to access to broader networks (Ortega-Argilés, 2022; Fritsch & Kublina, 2018), cities and regions still tend to evolve along trajectories close to the set preexisting capabilities (Pinheiro et al., 2022). Accordingly, although entrepreneurial capabilities have a lot to gain from knowledge variety, the existing dynamics are essentially associated to related variety (Auerswald & Dani, 2022; Boschma et al., 2022; Fritsch & Kublina, 2018). Following these reasonings, EE can benefit from achieving common targets that look not only to short-term gains related to static capabilities in agents, but also to long-term evolution based on acquiring and developing dynamic capabilities (Sepulveda-Calderon et al., 2022). In other words, some level of overlap in economic activities seems to be essential for agents to engage in the knowledge-sharing networks mentioned by Roundy (2020). In this respect, cognitive and organizational elements are likely moderators of knowledge creation and knowledge flows that lead up to network formation – and their level of coherence – within the dynamics of EE.

To explore the way orchestrators in EEs cohere (or fail to) and steer their networks to promote enhanced outcomes in the ecosystem, we conducted an in-depth case study of “AgTech Valley,” an entrepreneurial ecosystem in Brazil, described next.

METHOD

We conducted a single case study of an entrepreneurial ecosystem in the city of Piracicaba, Brazil to address our research question and refine our theoretical understanding of the orchestration of networks in EEs. This ecosystem demonstrates strong specialization in the development of innovation and entrepreneurial activity related to agricultural technologies, thus allowing a straightforward inspection of the dynamics of social, sectoral, and technological levels of coherence. This EE is colloquially referred to as “AgTech Valley”. In the next section, we introduce the research setting and justify the selection of this case. Then we present the data collection and analysis procedures.
3.1 RESEARCH SETTING: THE AGTECH VALLEY

Brazil’s expertise in the agricultural sector derives from the availability of natural resources, presence of established supply chains, multiple universities, and research institutes, as well as dedicated research policies. This context combined with the need to improve productivity in the sector created fruitful conditions for the emergence of Agtech ventures, new technological ventures that use technology to enhance efficiency in agricultural production. Brazil has 14 EEs specialized in the agricultural sector, with AgTech Valley, located in Piracicaba, being considered one of the most representative in terms of maturity and concentration of new ventures (Silveira et al., 2022). It is home to the second largest concentration of Agtechs in the country (14.9 per 100 thousand inhabitants) focused on the development of a wide range of technologies, products, and services representing an array of agricultural industries. Ventures focus on different stages of the agricultural process, like seeds, fertilizers, machinery, irrigation, plague protection, field monitoring, food processing, packaging, and traceability, waste management. There are also ventures focused on the specific needs of a range of producers, like energy generation, credit management, logistics, marketplace platforms, automation, and insurance.

The valley counts also with different stakeholders dedicated to spur entrepreneurial activity. Piracicaba is home to ESALQ, the leading research-oriented Higher Education Institution in the country dedicated to Agriculture. Large agro-industrial corporations have long established operations in the city. The AgTech Valley emerged in 2016, when a business executive founded ATG, an innovation hub, and gathered forces with two directors of ET, the incubator of ESALQ, to promote entrepreneurial activity in the region. This initiative gave force to Piracicaba’s technological park (founded in 2012). In 2017, PH, the innovation hub resulting from a joint venture between Royal Dutch Shell and a national Brazilian sugar cane producer started operating in the EE.

The EE then quickly attracted different players. Large corporations either established relationships with actors located there or opened office positions in innovation hubs. Venture capital funds not physically located in the city assumed an essential funding role in the region. National agencies, and entrepreneurship and small business associations created programs and funding opportunities that benefited the region. For instance, the National SME’s Support Agency (SBE), and the Brazilian Agency of Industrial Development (BAID) have specific programs that reach the Valley’s startups. The Brazilian Research Institute for Agriculture (EBP) also supports the AgTechs with meetup initiatives and technical services provision. Finally, the National Association of Research and Development of Innovative Companies (NARDIC), the National Association of Incubators and Accelerators (NAIA), and the National Association of Innovation and Technology Transfer (NAITT) and the Secretary for Open Innovation of the Ministry of Agriculture (MAOIS) monitor initiatives of the EE to understand trends and identify eventual needs they might address.

3.2 CASE SELECTION AND UNIT OF ANALYSIS

AgTech Valley is a valid laboratory to investigate our research questions for two reasons. First, the AgTech Valley is known for being a community specialized in fomenting AgTechs, capable of promoting connections, supporting new ventures, and attracting external investments. ET (the incubator), the two innovation hubs - PH and ATG, and large corporations with a specific interest in the EE all mentor, accelerate, or incubate a pool of AgTechs, promote connections, and attract investments to stimulate entrepreneurial activity.

National SME’s Support Agency (SBE) and the Brazilian Research Institute for Agriculture (EBP) also created acceleration programs dedicated to AgTechs that benefit new ventures from the region. Over the years, these actors assumed a leadership role in the EE, steering their networks to promote entrepreneurial activity of AgTechs without using hierarchical control (c.f. Dhanaraj & Parke, 2006). As such, they can be considered orchestrators of their networks. These actors do not operate in isolation but keep connections between them. Therefore, this case is representative of our phenomenon of interest, allowing an in-depth
assessment of this network of orchestrators, its potential coherence, and the outcomes for the ecosystem and the organizations operating in it. Figure 1 represents the orchestrators and the structure of relationships between them in the AgTech Valley, which was our unit of analysis.

**FIGURE 1 AROUND HERE**

### 3.3 DATA COLLECTION

We obtained data from interviews with orchestrators, AgTechs, and supporting actors, available online documents, and participated in two events of the EE. After reading internet articles about the AgTech Valley, we identified PH and ATG as relevant orchestrators in the ecosystem and contacted them through LinkedIn. In these two initial interviews, we initiated a snowball process to identify the other actors in the EE that could be considered as orchestrators. To do so, at each interview, we asked who the actors steering a network of startups were and stopped the interviews when no new names appeared. This effort led us to identify 11 orchestrators who we interviewed. The snowball process also indicated an additional five actors involved in the ecosystem that we should interview due to their involvement in events and activities happening at the ecosystem. We contacted them through LinkedIn but one showed no interest in participating. We also asked orchestrators to indicate AgTechs in different development stages (c.f. Baraldi et al., 2018) and interviewed nine of them. Table 1 provides a list of the interviews conducted.

For the interviews, we created a research protocol (Appendix A) based on our research question and the theoretical concepts supporting it (Gioia et al., 2013). This research protocol was used in all interviews, with adaptations in the wording depending on the interviewee. To minimize the risk of guiding interviewees towards our research interests, we did not directly pose questions related to coherence, orchestration, or ecosystems outcomes, as recommended by Gioia et al. (2013). Rather, we asked interviewees about 1) who they saw as leaders in the EE, 2) the extent to which they worked together, how they coordinated efforts, if there were shared knowledge bases, responsibilities, interests, and goals, if collective actions in the EE, and 3) on the benefits and downsides they saw associated with such modes of interaction.

The following measures were adopted to assure the validity of our data collection (c.f. Yin, 2009. These interviews were based on a pre-defined protocol (Appendix A), recorded and transcribed to increase construct validity. We also triangulated the data collected from interviewees from diverse backgrounds (orchestrators, supporting actors, and AgTechs) to capture different perspectives and identify inconsistencies. Many orchestrators also mentioned conducting events and programs, so we searched for additional information about them online, and participated in two events, taking notes of relevant aspects. Finally, to increase the validity of our findings, we discussed our preliminary findings with a researcher specialized in Brazilian entrepreneurial AgTech ecosystems.

**TABLE 1 AROUND HERE**

### 3.4 DATA ANALYSIS

An abductive logic guided our data analysis. We started the data analysis using the notion of coherence (i.e., connections between actors due to social bonds, shared knowledge, and related diversification) as a sensitizing construct (Bowen, 2006) to identify pieces of text that could represent coherence between orchestrators or the lack of it. We also looked for quotes portraying the benefits and downsides of the ecosystem for the interviewees. Following the Gioia methodology (Gioia et al., 2013), we coded pieces of text according to ideas they represented rather than following pre-defined categories. After this effort, we named these codes according to what they represented and then combined concepts and eliminated duplicated ideas. This effort led to the identification of 33 first-order categories. To increase the internal validity of our findings (Yin, 2009), we cross-checked the data structure. The second and third authors reviewed the quotations allocated in the first-order categories that the first author categorized. We then discussed the results to create a mutual understanding of our outcomes and identified seven second-order categories.
During our discussions, we could see the notions of organizational, cognitive, social, and institutional proximity (Boschma, 2005) reflected in the first-order categories. According to this reference, cognitive proximity refers to the extent to which actors share similar knowledge bases and, thus, are capable of sharing information, while organizational proximity involves the capacity to coordinate the exchange of these complementary knowledge bases. Social proximity captures if relationships between actors are based on trust, friendship, and kindness, while institutional proximity represents if actors are guided by common habits, cultural norms, values, and beliefs. As such, ending our abductive cycle, we grouped these four first-order categories further in two main concepts relevant to answer our research question: “Capabilities coherence” to represent the fact that actors have coherence between knowledge bases and routines and “Relationship coherence” to capture the nature of social relations between actors.

Our analysis also led us to identify three different types of ecosystem-level outcomes in the view of interviewees. One type captures outcomes related to the availability (or not) of resources to support the entrepreneurial process (resource availability). Another type of outcomes encompasses the ability to create connections and benefit from them (partnerships promotion) and the third—ecosystem development—represents the ability of the ecosystem to improve its capacity to foment entrepreneurial activity and change. Our discussions led us to group these three second-order categories into the aggregated concept of “Ecosystem health” that captured positive and negatives aspects of the ecosystem dynamics in the perception of interviewees. The idea to name this aggregated concept “Ecosystem Health” came from the work of Stam (2015), which argues that leadership is critical to build and maintain a healthy ecosystem.

Figure 2 presents the outcome of our data analysis. The final data analysis effort consisted in parsing the dual nature of coherence and the extent to which it related to the health of the ecosystem.

**RESEARCH OUTCOMES**

Through our abductive approach, we find two sides to orchestrators’ coherence: capabilities coherence and relationship coherence. In this section, we first demonstrate how orchestrators in AgTech Valley displayed coherence in their capabilities and relationships. We then explore how these two aspects of coherence interrelate and their implications for the ecosystem’s health.

### 4.1 CAPABILITIES COHERENCE

Capabilities refer to a general reliable capacity to bring something about as a result of an intended action (Dosi et al., 2000). As the knowledge, experience and skills inside and outside of organizations, capabilities often explain the nature of cooperative activity among organizations and industries (Richardson, 1972).

Capability coherence in entrepreneurial ecosystems is described in two dimensions: Cognitive proximity refers to the extent to which knowledge bases in the EE are complementary and actors cohere to integrate them (Huggins & Thompson, 2013; Molina-Morales et al., 2014). Organizational proximity captures actors’ ability to orchestrate their efforts to the exchange of knowledge and achieve common goals as well as the mechanisms used for this purpose (Boschma, 2005; Sternberg, 2007).

Our data suggest the existence of cognitive proximity between all the orchestrators studied in the AgTech Valley. All actors have a strong focus on entrepreneurial activity related to agricultural technology, even though they are specialized in different parts of the entrepreneurial process. All multinational companies (A to F) operate in different fields in the sector, focusing on seeds and crop protection, fertilizers, irrigation, machinery, fuel, and financial solutions. These companies help new ventures understand market needs, while the ATG, PH (the innovation hubs), and the incubator ET provide advisory work on how to create sustainable business models through acceleration and incubation programs.

EBP, the research institute, provides technical knowledge on the use of agro-related technologies, while SBE (the National SME’s Support Agency) supports startups overcoming the challenges of opening and
managing a small business in the country through an internal area dedicated to the agricultural sector.

ET is an incubator located within ESALQ, the leading research-oriented Higher Education Institution in the country dedicated to Agriculture, and as such, only incubates AgTechs. There is specialization and complementarity in the services of innovation hubs (ATG, PH), and the incubator (ET). Given the nature of their activities, the former two are focused on accelerating new ventures, while the latter is specialized in incubating early-stage ventures. PH is more focused on stabilized new ventures that develop energetic solutions from sugarcane. ATG, on the other hand, accelerates consolidated startup in a broader range of agricultural areas. According to the R&D Manager 2 of the research institute EBP, the focus on the agricultural technologies and specialization of actors facilitates the interaction with the ecosystem because everyone knows who to talk to.

Orchestrators then create joint events, like workshops, meetup sessions, and acceleration programs, in which they can share their knowledge between them and with startups. The complementarity between actors as well the joint organization of events can be seen in the words of the project scoping manager of company A:

“In our last conference, we organized a panel together – we, AGT, and another partner. Each one of us was talking about its objectives and how it is trying to achieve it, no overlap. So I think this is very beneficial. I see this tendency to work as a network and the co-creation of events between innovation hubs because their [is] a considerable complementarity in our purposes.”

Further on this point, we identified that all the orchestrators analyzed executed at least one of these initiatives with another partner or group of partners. Supporting actors, such as the National Association of Incubators and Accelerators (NAIA), venture capitalists, and the Ministry of Agriculture, are also commonly involved in them. Our analysis of the interviews led to the identification of 21 events involving at least one of these orchestrators. Figure 3 represents graphically the connections formed to create these events. Some of these events take place on a frequent basis, like the “ET day” – an annual workshop organized by the incubator ET to discuss innovation and technological trends in Agrobusiness that counts with the participation of other two innovation hubs - ATG, PH - and Company A (ET website, 2022). EBP, the research institute, also works with ATG and companies A and D to run its annual meetup event to connect AgTechs with investors. Other events, like the ones named Agrotech Skyup and Innovation journey (our translation), happened only once to address a specific topic of interest of PH.

We did not observe organizational proximity between all the orchestrators but rather the presence of a group of actors working in a more coordinated manner and other orchestrators uniting efforts when convenient. The innovation hub ATG and companies A, B, C, and D form the group with closer organizational proximity. They organize joint planning initiatives, share information and resources, have common agendas and are co-located in the ATG office, thus having many opportunities for informal interactions. ATG considers these companies “Innovation Partners” and looks for ways to add value to these partners, by promoting brainstorming session to understand their pains and what can be done to support them. The companies also contribute to the strategic positioning of the innovation hub. The co-founder of ATG explained that before past strategic decisions, like investing in AgTechs, internationalizing the hub, or establishing a partnership with a venture capital fund, they interacted with the “Innovation Partners” to capture their perspectives, discuss if it made sense, and assess the alignment with their common agendas.

Every month, they sit together to discuss what they believe is missing in the EE, share experiences (pains and needs), and exchange information (c.f. interviewee of company B). In one of these meetings, they discussed the need to further understand the challenges associated with the adoption of modern technologies and digitalization in the field and then organized sessions in the “Agro Innovation week” to discuss the topic. This group also run annually a mentoring program for new ventures named “Intensive Connection”, a mentoring program run by ATG.

We did not observe common agendas and regular joint planning mechanism between other orchestrators in the EE. Rather, they tend to unite efforts to create joint programs when they see the need, like the innovation challenge organized ATG and Company E to identify technological irrigation solutions, or the
Hackathon that the other innovation hub (PH) and Company F created to identify new payment mechanisms for logistics providers. The National SME’s Support Agency (SBE) also organizes annually an acceleration program, in which ET incubator, ATG, PH and EBP research institute provide support. The interviewee from company C also mention that ET and ATG have an initiative to foment some themes that are of interest to the ecosystem, like funding for agricultural production or public policies to foment sustainability in the field. Figure 3 captures all the connections between the orchestrators, mapped in the data collected, in terms of joints events, programs, and planning, providing a visual representation of the orchestrators’ capabilities coherence in the AgTech Valley.

Our interviews also revealed the lack of a forum or formal meetings in which all orchestrators are present to discuss what the ecosystem needs. Many interviewees (e.g., R&D manager of EBP research institute, representatives of Company B, C and D) declared they were unaware of such an initiative. According to the R&D Manager 2 of EBP and Innovation Manager of PH, for a while there was a meeting in which all participated, but slowly people stopped engaging. As a result, ecosystem-level discussions happen but in a decentralized way and without clear planning initiatives, as explained:

“We are frequently invited, together with other companies, to join different events and talk about specific topics. So, these higher-level debates end up happening, but more in an expositive way rather than “let’s create an initiative to collaborate and see how we can work together” (Business Development Manager, Company C)

This point became very clear in the “Agro Innovation Week”, event we participated in as observers. In this event, the orchestrators were present and explored the need to increase connectivity in farms to enable a wider adoption of new technologies. Yet, no clear goals and actions were established to achieve this objective. When probed further on why such common forum did not exist, different orchestrators suggested the way their organizations operated prevented the engagement in such initiative. For instance, one interviewee explained that Company C is very traditional and averse to sharing information, restricting the engagement in collective actions. Three of companies interviewed (Companies A, B, and C) also highlighted they leave advocacy efforts to their public affairs departments, suggesting that issues that would require the involvement of multiple orchestrators to be solved are not in their radar.

We also observed that some orchestrators assume specific roles, which allows them to individually attract resources and stimulate public policy to foment the ecosystem, and suggests that full organizational proximity between all orchestrators is not necessary. For instance, the innovation hub PH plays an important advocacy role to promote public policies for the sector, as this hub counts with backup from its shareholder, the national Brazilian sugar cane producer that has strong connections with sectorial associations and governmental representatives. EBP, the research institute, and company D represent the ecosystem in Ministry of Agriculture and at the innovation committee organized by the federal government to discuss the implementation of the Agro 4.0 paradigm in Brazil. The incubator has frequent interactions with the local government to discuss tax benefits and the need to create media exposition to attract external stakeholders’ attention to the Valley.

4.2 RELATIONSHIP COHERENCE

This dimension was named Relationship Coherence to represent the fact that relationships are forged within specific social contexts. Social proximity captures if the closeness between actors derives from the trust, friendship, kindship, and positive experiences between the parties (Huggins & Johnston, 2010), while institutional proximity is associated with the extent to which actors share common habits, beliefs, and values (Caragliu & Nijkamp, 2016). Our data suggests the presence of social proximity between all orchestrators in the AgTech Valley. For instance, the executive director of the incubator ET explained that relationships emerge organically between them and without vested interests:

“The Silicon Valley is an organic system where relationships naturally develop. This is the model I believe in
and what happens here too. Each actor, e.g. ET, AGT, PH, Animal Hub, looks for what is best to meet its goals and end up attracting positive thing to the ecosystem... everyone is a protagonist... no one is jealous of anyone.”

Moreover, parties display a cooperative spirit and tendency to avoid conflict, creating a sense of kindship. For instance, there is tacit agreement of not competing for AgTechs, as explained by the Innovation Hunter of Company D. Another issue raised in the interviews was that orchestrators do not want to engage in difficult conversations (Commercial Manager SBE, R&D Manager 1 EBP). These aspects suggest a tendency to avoid conflicts. This is corroborated by the “win-win” spirit represented in the words of the innovation manager of the innovation hub PH.

“it is not like that, ‘to enter in this initiative you have to pay’. No, we say: “we will help you access the ecosystem. You advertise in your social networks and bring a list of startups. Then you can participate on my pitch day, sit in the selection committee, help select the startups, and mentor them during the program”.

The data also shows a cooperative relationship between the innovation hubs and the incubator. Although they all have an intermediation function and, thus, compete for similar resources, like connections with AgTechs, angel investors, and media exposition, these players try to avoid engaging in actions that might affect each other negatively, like having events on the same day. They also coordinate efforts when actors external to the EE want to visit and understand better how the AgTech Valley works. The co-founder of ATG explained:

“We have a good relationship, so we do not compete directly, but we have our own agendas and, when it makes sense, we are together. When it does not, each one does its own thing.”

Our data, however, suggests that there is limited institutional proximity between the orchestrators as they seem to have different beliefs, values, and mindsets. One evidence in this sense are the different opinions in relation to the need for an initiative to promote collective actions in the ecosystem. Some orchestrators think that there is no need to have one single organization or common effort to govern the ecosystem. In this vein, the Executive Director of ET, the incubator, shares a similar view to the one expressed by the co-founder of the innovation hub AGT below:

“I do not have this vision that we need a leader, someone to orchestrate and coordinate the EE... Actors will interact and make things happen... So much so that things are happening here.”

Questions emerged in relation to which common agendas these diverse orchestrators could have, as they have different demands (R&D Manager 1 of the research institute EBP), to the added value of this initiative, and on how to organize and lead it. Both the Innovation Hunter of Company D and the Corporate Director from NAIA (National Association of Incubators and Accelerators) mentioned that it is difficult to make agents see the value of engaging in such initiative.

Other orchestrators, however, believe it would make sense to have a forum where all actors unite efforts to address issues that require multi-stakeholder collaboration (e.g., interviewees from the innovation hub PH, the National SME’s Support Agency - SBE, and Company B). Some interviewees see public actors as potential leaders to stimulate collective action (Innovation Manager, PH) and the use of multiple forums to address specific topic, but there is a fear that actors may lose interest and focus (Business Development Manager, Company C). The innovation scouter of company B also highlights that actors in the ecosystems come from different industries and have different ways and abilities to deal with the ecosystem. As such, it seems very challenging to integrate their actions. Another aspect that indicates an institutional distance between actors is that public and private actors have difficulties working together because of their different mindset and ways of doing business as explained below:

“Nothing against any specific institution, but the interaction with public actors is complicated. We (private actors) do not have time to waste. So, if something does not work as planned, we cannot wait. We said to one public actor once, look this is what I have to offer. I can put you in contact with my AgTechs. You can look for new AgTechs in Latin America and put us in contact with them. They said, this is great, it works.
But then the job does not get done. I see a big mismatch in timing, speed, and bureaucracy in terms of how we work.” (Co-founder, ATG)

4.3 THE REINFORCING NATURE OF CAPABILITIES AND RELATIONSHIP COHERENCE

Our data suggests that capabilities and relationship coherence are intrinsically related. On the one hand, interview data suggests that the fact that orchestrators are specialized in specific and complementary roles (cognitive proximity) creates a collaborative spirit because they need to work together to meet their targets. The executive manager of the incubator ET explained:

“When someone comes to visit ET, we presented the entire Valley because I know that alone I cannot meet the demand for innovation in a systemic way. This is my policy, my way of working is meeting the demands of the ones that come looking for help and alone I cannot do that.”

On the other hand, the actors suggested that the collaborative spirit leads them to engage in joint events and programs (capabilities coherence). For instance, the business development manager at Company A explained that he does not believe in competition and aims to cooperate. So, when the company joined the ecosystem, it started working together with the innovation hub ATG on mentorships. Similarly, the interviewee from company B reported that the collaborative spirit speeds up her work, because she knows she will deliver and the other party too. Yet, the organic relations and tendency to avoid conflicts, traits of social proximity, seems to influence the lack of a collective action between all the orchestrators analyzed (organizational proximity). The innovation hunter of Company D mentioned that in his view “everyone has the liberty and autonomy to do as it pleases” and so there is no meeting or forum in which the orchestrators meet to define what should be done. The R&D manager 2 at the EBP research institute also explained:

“No one wants to engage in difficult conversations… For instance, let’s strengthen our ecosystem. How do we do that? Who will do this? How will we do that? Someone has to do this. These are difficult conversations to have.”

The fact that orchestrators also have different opinions in relation to the need for an initiative to promote collective actions in the ecosystem and the actual absence of such forum further corroborates the idea that institutional proximity is related to organizational proximity. We also did not find evidence of an event that all orchestrators organize together. Furthermore, the interviewee from the National SME’s Support Agency highlighted that companies have different perspectives and interests that prevent such initiatives.

“It is a behavioral aspect. There are people and organizations that want to be ‘owners’, references in the ecosystem… It can be easily identified. I believe this aspect prevents the development of such an initiative”. (Commercial Manager, SBE).

4.4 ECOSYSTEM HEALTH AND ORCHESTRATORS COHERENCE

By looking at the benefits and downsides of being in the AgTech Valley in the perception of the interviewees, we identified three types of outcomes that indicate the health of this ecosystem. We could observe that the ecosystem is promoting partnerships. New AgTechs are constantly emerging and establishing relationships with big companies (c.f. ATG innovation hub co-founder) and financing agents. Executive Assistant of Company E also added that the new ventures also have the possibility to validate and improve their business models by interacting with orchestrators. The AgTechs interviews corroborate this finding. The founder of the early-stage venture NatPlant mentioned that his company gained visibility since he joined the EE. ET, the incubator, helped them have access to many opportunities, establish connections with three companies, and maintain constant contact with new investors. The co-founder of DSL, a more mature AgTech, expressed a similar perception, emphasizing the importance of the EE for the creation of new connections.
The ecosystem also seems to be able to promote the **availability of resources** to its participants. The AgTechs interviewed also were unanimous in highlighting high availability of events, e.g., workshops, meetup sessions, and acceleration programs, in the ecosystems. According to them, the events and programs that happen in the ecosystem also provide new ventures with the resources and connections needed to overcome challenges of the entrepreneurial process. The big companies interviewed also highlighted their gains, adding that participating in the EE as “innovation partners” improved and speeded up their open innovation process (Companies A and B). Such data suggests that important elements of capabilities coherence promote resource availability and partnerships. However, there seems to be redundancy in these events due to the absence of a more centralized coordination effort and the presence of distributed goals between orchestrators (trait of lack of stronger organizational proximity), leading to inefficient resource use.

“Today we have several acceleration programs happening at the same time. Why can’t we see who is doing what and ask to support initiatives already in place? Why do I need to have my own version? Because interests, motivations are different and so results end up being different. But then questions arise. Is it good for the ecosystem? Am I having the biggest impact possible?” (R&D Manager 2, EBP)

In a similar vein, the R&D manager 1 of the research institute (EBP) complemented saying that this situation generates competition between programs for new ventures, money, and time. The multiplicity of programs can also create a prejudice in the farmers that support proof-of-concept trials for new products and solutions because many disperse initiatives do not generate concrete results for them (Innovation Hunter, Company D). It could be inferred that such redundancy on programs and event derives from a sort of “ecosystem buzz”, in which actors fearing to miss out on the opportunity to engage in the ecosystem create initiatives without much concern for their outcomes. Such behavior can, however, be detrimental to the new ventures. One of the co-founders of an early-stage venture pointed out their difficulties in dealing with these multiple events:

“It is difficult because it is just too much to manage. It is so much new knowledge, information, and recipes of success that we ask ourselves: what do I do now? If I could give my humble advice to someone starting today, I would say - choose wisely the programs you will take part in, or you are going to go crazy and get nowhere”. (Co-founder, KRN)

The main limitations identified in the interviews, however, related to the difficult to promote the **ecosystem development**. For instance, to implement new technologies in farms, there is the need to increase connectivity in the field. Yet, although there have been events to discuss how to implement the Agro 4.0 paradigm, there is little effort in the ecosystem to enable the access to 4G and 5G networks to small and medium sized producers (Innovation Hunter, Company D). There is also overlap in the public funding coming from the Federal Government. The interviewee of Company A pointed out that the acceleration programs of the EBP research institute and of the Brazilian Association for Industrial Development could be combined to create a more robust initiative. Yet, the Valley also does not have a strong representation in the Federal Government (ecosystem advocacy) that would help address these issues, or the creation of tax benefits for startups and regulatory frameworks, as can be seen below:

“If we had someone doing this intermediation, it would be great. Someone understanding our demands and how the government works… There is room for someone to do that, a company, a person, an association, there is room for the macro-level coordination. No doubt.” (Co-founder, ATG)

The AgTech Valley also seems to have difficulties in improving aspects that are central to promote the entrepreneurial process. For instance, we observed a bottleneck in terms of incubation capacity. Not only there was a limited early-stage ventures incubation capacity, but also the only local incubator had plans to become an innovation hub. Both the innovation manager of the innovation hub PH and the researcher specialized in the Brazilian entrepreneurial AgTech ecosystems criticized this fact. In the eyes of the R&D manager 2 of EBP, this difficulty to address gaps in the ecosystem is associated with the lack of forum or common initiative in which all orchestrators work together to address the needs of the ecosystem.
DISCUSSION

Recent studies have advanced our understanding of the actions specific EE actors take to promote ecosystem development (Knox & Arshed, 2021; Miles & Morisson, 2020; Roundy, 2019; Roundy, 2021); however, scholars increasingly emphasize the need for theory to explain how EE actors work together, the role of networks in connecting EE actors (Alvedalen & Boschma, 2017), and the governance structures of these networks (Brown et al., 2023). Specifically, it is not clear how the lead actors responsible for steering ecosystem networks (i.e., orchestrators) integrate their efforts and the potential implications for EEs. Based on our in-depth analysis of the Agtech Valley EE, we propose a framework to represent the foundational elements of the coherence between networks orchestrators and the way coherence can enhance the health of an ecosystem (Figure 4).

The framework shows that orchestrators' coherence exists when actors have coherent capabilities (i.e. share information, display complementary knowledge bases, plan actions together, and have common agendas) and coherent relationships (i.e. organic interactions based on kinship, limited conflict, and cooperation, as well as, aligned perspectives, mindsets, and organizational similarities). Relational coherence is vital to nurture the capabilities coherence, which in turn reinforces the coherence in ecosystem relationships. Geographical proximity functions as a background enabler of coherence by representing the co-location of agents in geographical space. Hence, we propose:

**Proposition 1.** Orchestrator coherence in entrepreneurial ecosystems emerges from the interplay between capabilities coherence and relationship coherence. The former is derived from cognitive and organizational proximities, while the latter is a function of social and institutional proximities. These dynamics take place within a context of geographical proximity based on the ecosystem locational boundaries.

Our findings also suggest that, by working together, orchestrators lay the foundations to bring resources to the EE, promote partnerships, and develop the EE. In contrast, lower levels of capabilities and relationships coherence can generate overlapping initiatives that drain resources from EE actors and lead to difficulties in executing activities that are essential to minimize gaps in the EE, promote its development, and shape its evolutionary trajectory. We thus state:

**Proposition 2.** Orchestrator coherence is positively associated with ecosystem health, which can be assessed in terms of resource availability, partnerships promotion, and ecosystem development and evolution.

Of course, Proposition 2 must be taken as conditional upon the non-linear effects of coherence. In this respect, prior literature has identified that dense and stable networks can present decreasing returns over time due to risks of technological lock-in (e.g. Prokop & Thompson, 2022). Hence, while coherence can enable multiple EE actors to productively combine resources, it must be met by evolving sets of capabilities and network flexibility that allows fluidity in its members and adaptation to changing market and technological conditions.

These propositions and the framework help explain how orchestrators in EEs integrate efforts and steer their networks to promote enhanced outcomes in the ecosystem.

5.1. THEORETICAL IMPLICATIONS

Network orchestration is a critical issue in debates about EE governance because networks represent the formative core of EEs. Furthermore, while EE can hardly be thought of as ‘engineered’, top-down structures (Mason & Brown, 2014; Chatterji et al., 2013), they also should not be understood in the same strictly-self-organizing and organic way as natural ecosystems. Instead, with EEs, the volition (agency) of individuals and organizations is inextricably associated with why and how ecosystem networks appear and evolve. Incidentally, our findings suggest that splitting EE networks and leadership into different dimensions can
be unproductive, but that considering EE network orchestrators is particularly insightful for understanding ecosystem dynamics.

In examining EE network orchestration, we complement the existing literature in the following ways. First, by exploring the nature of orchestrator coherence and identifying two dimensions of coherence, we add theoretical precision to the coherence concept, which will allow EE scholars to more easily articulate how it aligns with and differs from related concepts (e.g., ecosystem coordination). We also provide a nuanced explanation for the integration of EE orchestrator, an aspect of EEs that was still undertheorized (Roundy & Lyons, 2023) and we extend existing studies that have begun to explore this subject (Harper-Anderson, 2018; Roundy & Burke-Smalley, 2022).

A direct implication of the interplay between capabilities coherence and relationship coherence lies the complementary nature of these constructs. While the two forms of coherence can be deemed as interconnected to some extent, they present distinct dynamics – as our case study empirically demonstrates. From this insight, we can theorize about archetypical configurations of coherence within orchestrator networks in EEs. Table 2 presents this combinatory (“2x2”) structure.

**Table 2 AROUND HERE**

If relationship coherence is high and capabilities coherence is low this will produce *unrelated coherence*, a situation in which actors are socially cohesive but lack the complementarities to generate effective flows of information and knowledge that improve aggregate competitiveness in the ecosystem. In turn, capabilities coherence in the absence of relationship coherence will likely generate *opportunistische coherence*, that is, loose networks based on short-term relationships that fail to trigger dense linkages. Only in the presence of both relationship and capabilities coherence will *effective coherence* emerge. Alternatively, when both relationship and capabilities coherence are lacking, networks in the ecosystem can be deemed as *incoherent*. This tentative taxonomy offers a nuanced comprehension of EE coherence as a mechanism shaping the dynamics of networks. Although our empirical appraisal has been oriented towards linkages between orchestrators, its composing features – we hope – can be transposed to EE connections writ large.

Our second theoretical contribution concerns how coherence elements can affect the trajectory of ecosystems. While previous studies showed that specific activities of EE orchestrators led to gains in the ecosystem (Harper-Anderson, 2018; Knox & Arshed, 2022; Miles & Morrison, 2020; Roundy, 2019; Roundy, 2021), we provide evidence that the type of coherence between orchestrators that shape the structure of their relationships also influences these outcomes. We also provide empirical evidence on how leadership in networks that compose EE’s have the capacity to build and maintain ecosystems healthy. Combined, these two aspects provide a deeper comprehension of the governance structure taking place within EEs, a call made by Colombelli et al. (2019).

Finally, we show EE orchestrators value other types of outcomes than measures of resource availability and new venture creation. They also see the creation of partnerships and actions to eliminate gaps in the EE to promote its development as vital outcomes at the ecosystem-level. Our study, thus, helps give further meaning to the concept that Stam (2015) introduced and gives one step further in relation to the one of Shi & Shi (2022) that started refining the concept of ecosystem health by showing the need to look at the resource dynamics within the ecosystem.

5.2. PRACTICAL IMPLICATIONS

Beyond the theoretical set of contributions derived from our research, some implications for policymakers, managers and other decision-makers associated with entrepreneurial ecosystems emerge from our assessment. First, policies targeted at nurturing entrepreneurial ecosystems need to take into account the complex nature of coherence. From our analysis, coherence emerges as a foundational feature of networks. Accordingly, it is unlikely that ‘incoherent’ linkages will endure and create dense ties among orchestrators, entrepreneurs and other actors. This comes as a criticism to shortsighted approaches that just aim at creating entrepreneurial buzz.
Second, and as a complement of our first practical implication, ecosystem orchestrators need to develop clear views on the possibilities to create synergies in entrepreneurial ecosystems. Although entrepreneurial ‘fads’ can be highly attractive and generate visibility to the ecosystem, if they are detached from pre-existing capabilities and relationships in the ecosystem, they will likely fall under the ‘incoherent’ ecosystem category. This does not mean predetermination of trajectories. Rather, it suggests that path-defying approaches cannot emerge from scratch. Third, as our analysis demonstrated, orchestrators can have significant multiplying effects in the ecosystem. This happens because of their role as EE Leaders and enablers of networks. Hence, engaging these actors of multiple natures in EE initiatives – be they of top-down or bottom-up nature – can be critical in structuring entrepreneurial networks.

Fourth, and last, managers shall benefit from our exposition on the nature of coherence. By internalizing the knowledge on the complexity of coherence and its simultaneous association of multiple forms of proximity, firms ought to address their embeddedness in entrepreneurial ecosystems as a strategic position. This is so because of the evolutionary nature of social, organizational, institutional and cognitive proximities, making them constructs that can take long time to mature and become consolidated. Indeed, the 2x2 suggested by our findings could be used as a diagnostic tool by practitioners to assess the level of coherence in EEs.

CONCLUDING REMARKS, LIMITATIONS, AND FUTURE RESEARCH

By unpacking foundational elements of network dynamics embedded in EE, our research represents a step forward in building a theoretically robust perspective on such ecosystems. Furthermore, it generates insights for scholars, managers and policymakers concerning the key factors that enable and hinder emergence and evolution of coherence through orchestration. We expect these elements to open up new avenues of investigation in the field of EE studies.

Despite our efforts to guarantee the quality of our research, there are inherent limitations to this study. Our assessment is limited to a case conducted in a geographically bounded EE focused in fomenting AgTechs that has a certain level of development. This context may have influenced the nature of the cognitive and social proximities observed and number of orchestrators in the EE. For instance, in EEs without sectoral focus, we may see less complementarities in the technological knowledge bases. In EEs localized in larger cities, the lack of proximity may also reduce the social proximity, as lower levels of co-location may inhibit informal meetings that reinforce trust and friendship bonds. Younger ecosystems may also display less dense networks and a smaller number of orchestrators (Miles & Morrison, 2020). Relatedly, scholars could also explore the “zones of effectiveness” of the entrepreneurial ecosystem coherence matrix (Table 2) that we propose.

Future research could, for instance, explore if in some types of EEs (or depending on its evolutionary stage) it is more effective to have opportunistic coherence (or even incoherence). In such contexts, the need for orchestrator coherence may be less significant. Finally, the fact that we observed only one case limited our ability to see the variance in types of orchestrators coherence, which would have revealed more information on the interrelation between capabilities and relationships coherence. Moreover, future studies could extend our efforts to understand the dynamics of networks in EE with different trajectories and at distinct evolutionary stages. Complementarily, evidence that can generate clarity on the connections between different types and profiles of network coherence and the multifaceted nature of ecosystem health is due.

REFERENCES


Appendix A. Interview protocol

Link to research question and theoretical lenses

| Orchestators in the EE | Actors that steer entrepreneurial agents without any sort of formal hierarchy to create and extract knowledge from the EE.
| Coherence between orchestrators | Knowledge variety and related variety (Boschma et al., 2022) Coordination efforts, based on these connections.
| Ecosystem level outcomes associated with orchestrators coherence outcomes | that increase the value participating in the ecosystem.

Figure 1. Structure of orchestrators relationships in the AgTech Valley
Figure 2. Data Structure

Figure 3. Elements of capabilities coherence between orchestrators
Table 1. Summary of interview data

<table>
<thead>
<tr>
<th>Role</th>
<th>Name</th>
<th>Organization</th>
<th>Interviewee</th>
</tr>
</thead>
<tbody>
<tr>
<td>Supporting Actor</td>
<td>BAlD</td>
<td>Brazilian Association for Industrial Development</td>
<td>Innovation Analyst</td>
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<tr>
<td>MAOIS</td>
<td></td>
<td>Ministry of Agriculture, Livestock and Supply</td>
<td>General Coordinator of Innovation</td>
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<td>NAIA</td>
<td></td>
<td>National Association of Incubators and Accelerators</td>
<td>Corporate Director</td>
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<td>NAITT</td>
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<td>National Association of Innovation and Technology Transfer</td>
<td>Director</td>
</tr>
<tr>
<td>Orchestrator</td>
<td>EBP</td>
<td>Brazilian Research Institute</td>
<td>R&amp;D manager 1</td>
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<td></td>
<td>SBE</td>
<td>National SME’s Support Agency</td>
<td>R&amp;D manager 2</td>
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<td>PH</td>
<td>Innovation Hub</td>
<td>Commercial Manager</td>
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<td>Innovation Hub</td>
<td>Innovation Manager</td>
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<td>ET</td>
<td>Incubator</td>
<td>Co-founder</td>
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<td>Company A</td>
<td>Seeds &amp; Crop protection</td>
<td>Executive Manager</td>
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<td>Company B</td>
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<td>Project Scoping Manager</td>
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<td></td>
<td>Company C</td>
<td>Farming Machinery</td>
<td>Innovation Scouter</td>
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Figure 4. Elements of capabilities coherence between orchestrators
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<th>Interviewee</th>
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<td>Innovation Hunter</td>
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<td>Company E</td>
<td>Irrigation Solutions</td>
<td>Executive Assistant</td>
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<td>Company F</td>
<td>Fuels for Agriculture</td>
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<td>AgTechs</td>
<td>JBio Solutions</td>
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<td>Founder</td>
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<td>Stabilized venture</td>
<td>Marketing Director</td>
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Table 2. Entrepreneurial Ecosystem Coherence Matrix

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<th>Capabilities Coherence</th>
<th>Capabilities Coherence</th>
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</thead>
<tbody>
<tr>
<td>High</td>
<td>Unrelated Coherence</td>
<td>Effective Coherence</td>
</tr>
<tr>
<td>Low</td>
<td>Incoherence</td>
<td>Opportunistic Coherence</td>
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