

The Conditions of the Emergence of Innovation Ecosystems: A Panoramic View

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Abstract

Based on a bibliographic study, this contribution explores the conditions of birth of innovation Ecosystems (IEs). The main purpose is to give an overview of the current thinking on the theme. The conceptual models drawn from the literature including the factors of birth of an ecosystem constitute the result of this paper work. The main ambition is the study of the possibility of setting up an IE with analysis of the existing situation. Thanks to an exploratory study, we were able to prove that an ecosystem community come into existence through both emergent and deliberate strategies. Three major phases characterize ecosystems arrival: knowledge ecosystem (KE), IE and business ecosystem (BE). During the birth phase, many factors are likely to enhance its advent, in particular: the diversity of ecosystem's actors, the sharing of knowledge between members, the training for collaborative and inter-organizational skills and the establishment of a climate of trust within the community.

Keywords: business, collaboration, ecosystem, emergence, innovation

1. Introduction

Nowadays business strategies are multiplying due to the appearance of various organizational forms, among them we find: IEs, a concept that was initially borrowed from the field of biology (Tansley, 1935) as BE (Moore, 1993) in order to scan the natural environment and copy its advantages. The perfection of the ecological ecosystem continues to be second to none. Therefore, the business world not only decided to seize the concept, but also to appropriate its habits and its dynamics.

Consequently, there was the emergence of several organizational ecosystems such as the Silicon Valley, Netflix ecosystem or Boeing ecosystem ...

During the 00s, the evolution of the concept in the managerial field led the scientists to use the term innovation rather than business (Gomes et al., 2016). It actually has a direct link with the innovation flow and what we do with it: creation or capture? (Valkokari, 2015).

Currently, being part of these new reticular organizations is a must. It has become an unavoidable policy in both States and firms, since their development depends on the ability to support a significant flow of innovation.

In a concrete way, belonging to a community of researchers, entrepreneurs or incubators is nothing but a huge empowerment thanks to collaborative innovation between various actors in interaction within harmonious circumstances.

IEs have attracted particular interest. It is supported by the establishment of different kind of federations, such as: Start-Up Ecosystem Catalysts, Plug and Play... whose purpose is to promote permanent IEs, by supporting several start-ups undertaking in all fields.

In one hand, Moore (1993) introduces managerial ecosystems as organizations relating the hierarchy to the market. In the other hand, the worldwide markets are very promising. This analysis led us to notice a high potential of an ecosystem entity arrival.

From now on, it is no longer a question of ecosystems advantages but instead, how to make these entities emerge?

It is crystal clear that researchers have been generous about the factors conditioning the emergence of organizational ecosystems (Attour & Ayerbe, 2015; Barbaroux, 2011, 2012; BenMassou, 2020; Daidj, 2011; Edouard & Gratacap, 2010). However, there is neither an exhaustive nor a panoramic view of the situation. Making it difficult to understand these new entities holistically and therefore make analyzes on the subject.

Altogether, IEs remain an interesting possibility which requires a deep focus, with the ultimate goal to reframe the isolated strategies and clarify this new world for researchers, incubators and any other potential actor.

This paper work studies the factors of emergence of IE. The questions are as follows: what are the factors that allow the establishment of an IE? What is the connection between them? In what chronological order do they appear?

We will present in a first part the theoretical context of the research. The second part will be devoted to the development of the methodological approach. In the third part we will present the results and in the last part we will discuss the results.

2. Area Descriptions

In this section, we will rely on the theoretical background about organizational ecosystems in order to offer an exhaustive definition of the concept and clarify the ambiguities with similar notions. Then we will present ecosystem communities components and their types. Finally, we will focus on their life cycle by insisting on its emergence, the life stage on which we focus.

2.1 Theoretical Foundations and Definitions of the Concept

Before starting this part, it should be mentioned that for terminological evolution reasons (Gomes et al., 2016), we are going to use simultaneously the terms “BE” and “IE”. Then eventually, we will point out the reasons for this evolution and the differences between both of the concepts.

Since the 70s, several studies have referred to the concept of ecosystem in business, without dwelling on it. It was not until 1993, through the terminological borrowing made by Moore that its real introduction was in the managerial world. The latter authorized an analogical transposition starting from the field of biology (Tansley, 1935) towards the entrepreneurial environment. Thus, the ecological metaphor flourished giving way to a mixed glory. Indeed, the conceptual field in which this transposition is found is of high density. This comes down on the one hand to the existence of old concepts encompassed by the newcomer (cluster, hub...) and on the other hand to the presence of similarities towards contemporary terms such as: center of innovation, consortium...

The definitions of BEs are the subject of numerous questions insofar as they remain ambiguous (Daidj & Jung, 2011; Jacobides et al., 2018; Kapoor, 2018; Koenig, 2012). This is the reason why researchers intend to dig deeper and clarify the notion.

Moore (1993, 1996) defined BE as an economic community made up of quite a few actors (large and small companies, public and private organizations, research laboratories and universities, customers, suppliers and competitors...) interacting around a central enterprise (Keystone), enabling them to deliver value through the co-evolution of skills. Gueguen and Torres (2004) support the importance of the existence of a Pivot which monitors both the imposition of an innovative standard but also the coordination of relations between the different actors.

The merit of this conceptual popularization goes just as much to Moore (1993) as to Iansiti and Levian (2004). For Iansiti and Levian (2004), BE is manifested by a set of strategies that increasingly become the art of managing assets that we do not own. It is mainly a virtual platform that ecosystem members' use in order to look for solutions to shared problems. Thereby, through this platform, they can provide resources and skills (Inside out) or benefit from it (outside in). This mutual assistance between members is what we call open innovation (Chesbrough, 2006).

The pioneers in BE concept present not only convergence points but also of divergence one. In the first hand, they agree on the need for cooperation between actors that goes beyond sector boundaries. In particular, when they stipulate that “*a BE [...] crosses a variety of industries*” (Moore, 1993) or even “*Most companies inhabit ecosystems that extend beyond the boundaries of their own industries*” (Iansiti & Levian, 2004). Ultimately, the founders of this phenomenon extrapolate environmental notions on the theory of collective strategies. They share the same notions (Keystone, network, architecture ...) to promote the network relationship between companies and face the same difficulties such as the delimitation of ecosystem boundaries.

In the other hand, the textual analysis carried out by Gueguen and Passebois-Ducros (2011) regarding BE demonstrates two different conceptions: One, when Moore defends the term community as a global force

bringing together homogeneous actors despite their specializations. He emphasizes social control over individuality. The other where Iansiti and Levian define network as a set of interconnected nodes linking several actors who exploit it for personal ends. Thus, individual objectives go beyond those of the community.

This analysis is part of the semantic evolution of the term BE from cooperation between competing firms to a community of partners with one strategic vision. This lexical change is confirmed with the bibliometric study carried out by Gomes et al., (2016) that pays tribute to Adner (2006) as the author of the name: IE.

Adner (2006) relies on risk management and coordination to qualify IEs as a collaborative arrangement in which firms combine and shape their individual offerings to emerge with solutions that meet consumer needs.

Carayannis and Campbell (2009) gave priority to creativity, innovation and collaboration when defining IE. For them, it is above all, a point of interaction between cultures, technologies and populations. The objective is to accelerate creativity and innovation.

Regarding the similarity between definitions, Valkokari (2015) prompted to make a comparative analysis clarifying three basic notions (BE IE and KE). First of all, she affirms that a BE is a group of companies that mutually share skills and resources in order to create value and capture it. Secondly, she testifies that IEs are value co-creation organisms through the extension of borders. They are based on mechanisms and policies encouraging innovation start-ups. Finally, for her: “KEs *have their main interest and outcome in creation of new knowledge through joint research work, collaboration, or the development of knowledge base*”. In sum, Valkokari (2015) summarizes the relationship between these three ecosystem entities as follows: first, KEs ensure the creation of new knowledge by specific members such as research laboratories and technology entrepreneurs. This new knowledge is used by IEs so as to create value through innovators and founders. And finally, BEs try to capture this value under large corporations’ governance. Thus, the distinction between these contemporary designations relates to what is done with the value (Gomes et al., 2016). In terms of innovation, the essence is to create it and share it. As for the business world, it goes beyond creation to the capture.

After all, whatever complements that qualifies ecosystems in management. The latter follows three fundamental logics. An inter-sector logic is where the company belongs to a community and not to a sector. An anti-competitive logic based on the mutual sharing of skills and knowledge. Then, an important dynamic of relations between actors of the network.

2.2 Organizational Components and Categories of Managerial Ecosystems

A strategic community is made up of variety of actors who gravitate around one or more leaders. Moore (1996) distinguishes between: center and periphery. An ecosystem can be analyzed as an arrangement of positions and links (Koenig, 2012). The objective of this section is first to provide a global vision concerning various positions that actor might occupy and then to determine the organizational category resulting from it.

The work of Ronteau (2009) then Tellier (2015) characterized four strategic profiles according to their degree of innovation and the complexity of the relationships between members. Firstly, the central actor constitutes the focal point of the entity. He is a great innovator who maintains several relationships with members of the group. He can be the ecosystem’s creator, the key resources’ holder, a permanent investor or a sharing coordinator.

Then there's the Niche-Player, it's a very specialized actor who drives new things. In order to innovate, he compensates his lack of connectivity by copyrights, skills and resources. Then, there are physical dominants, who are actors that rely on their strong relationship to control the nodes and capture the maximum of value. Finally, business centers are clusters that neither have strong relationships nor high innovation. However, they still ensure interconnectivity between actors.

These four strategic profiles constitute the starting point for categorizing ecosystem entities. Indeed, the condition of survival of an ecosystem is based on the agreement of its members for common projects’ development. This agreement is more complex when it concerns a heterogeneous group, particularly when the constituent members come from different fields. Thus, an innovative project depends on the existence of a network able to link various activities. Thus, the solution is either local arrangement in one world or compromise between worlds.

Koenig (2012) explains the diversity of ecosystems according to two axes: resources control and interdependence mode. In one hand, Moore (1996) separates the core from the periphery when determining the centrality of control. The more central an actor is, the closer he gets to the core. We say that an actor holds the control when he possesses an essential resource. However, control power can be distributed among different actors when it comes to necessary resources that are monopolized by more than one entity.

On the other hand, the interdependence can be either quantitative or qualitative. The quantitative one is based on actor relationship number. Qualitative interdependence is instead based on how deep is the relation between a member and each other actor of the community.

As a result, and by crossing degree of control and interdependence types, Koenig (2012) identifies four kinds of ecosystems: supply system, platforms, communities of destiny and flourishing communities.

To begin with, supply system is an ecosystem that combines both centralized control and mutual interdependence. In fact, centralized control means that the keystone detains the power. He gathers partners around him, gives them access to resources and coordinates between them. On account of the small number of the community, not only the relations are stronger but also the access to resources is loose. Yet, collective innovation is not favored in this ecosystem type since it is specific to the core and not to the periphery.

Secondly, platform ecosystem constitutes a reticular organization whose logic is more centered on reproduction rather than innovation. In this regard, control is held by the core that makes resources available for a large number of members. Nevertheless, leaders do not define actors' contributions but only the rules for using the platform. Hence, the act of doing is independent and accessible for products developments.

Thirdly, communities of destiny are based on the democratic functioning of all stakeholders without the existence of a focal actor who centralizes the power. In this case, the number is limited but actors are heterogeneous. As long as there is solidarity and a great sense of sharing, the community survives. Unlike other types of ecosystems, community of destiny remains ambiguous when it comes to innovation. Besides, community relationships are more important than the innovation itself.

At last, the particularity of the flourishing communities is the very large number of its actors and the fact that they prioritize the common good. To this end, the objective of an actor in this community is not only individual but also collective. As for innovation, it is created independently in places where members share and inspire.

All of these communities do not escape a life cycle specific to managerial ecosystems. The following part explains its origins, its chronology.

2.3 IE Life Cycle

Ecosystem life cycle has a strong managerial anchorage; many theoreticians have tried to study the stages through which an ecosystem passes but it is to Moore (1993) that we owe its real development. From his point of view, an ecosystem has a determined life cycle which begins with birth, followed by expansion, authority and then decline or renewal. Each phase is marked by instability that must be managed in order to evolve. The first two stages are weakened by doubts about the leader, the business plan and the dominance of the industry (Fautrero & Gueguen, 2012), while survival in the second periods depends on the choice of an adequate modality of governance. The main goal is to dissuade the actors from going towards other alternatives and accordingly avoid the death of the ecosystem.

Indeed, the interest given to BE's birth stage (Moore, 1996) goes to its importance for the development of the network. Actually, it is a creative phase where actors explore and learn so as to test an idea that's likely to offer an alternative to existing goods and services (Attour & Barbaroux, 2016). On top of that, the question Bes emergence is attractive given that a high number of innovative firms disappear before growing (Attour & Barbaroux, 2016).

Our objective in this writing is to identify IEs emergence factors. To this end, we will watch closely the birth stage because it constitutes a direct outcome of these factors.

According to its definition, "*A BE is a complex network, driven by leaders who bring together actors around an innovation with the objective of transforming it into an offer in the market thanks to collaborative thinking*" (Loilier & Malherbe, 2012). The birth of such an organization is not that simple. In fact, this phase is considered as a learning period for the whole community, where there is a gradual adjustment of the future vision through innovations, improvement tests and experiments. In other words, the arrival of a BE is an inter-organizational phenomenon of co-construction of collaborative skill, major innovation and common vision (Foss & Eriksen, 1995).

Besides, ecosystem's birth phase is critical since in it, opportunities are transformed into value proposition. Moore (1996) divided it into four sequences: first, ideation, where community actors come with new ideas and seek for competitive advantages that are able to bring innovative offer to the market. Second, experimentation is where members select an offer and put it under early user's pressure. Third, the value expansion is the time when actors adjust the proposed offer and expand the value architecture. In it, other members integrate the ecosystem

in order to fill value creation gaps. The last step is characterized by survey feedback through which actors evaluate past actions for better a future.

3. Methods

This paperwork analyzes multiple scientific articles so as to identify their general ideas and build a link between them. In fact, the literature has shown itself affluent about longitudinal case studies of BEs. However, there wasn't a study that summarizes the advances related to this object. Thus, this article takes it in charge.

"review article" is a journal-length article that has an overarching purpose of summarizing or synthesizing the literature in a field without collecting or analyzing any primary data" (Pare et al., 2015). It is based on a "secondary" analysis of various "primary" documents. In particular, articles previously validated and published in indexed journals. Indeed, it is a meta-analysis or a double analysis of data from different publications.

In this regard, we relied on secondary data while being careful in the choice of information which had to be the most complete. On top of that, we have favored the most credible and trustworthy sources. We also combined different kind of sources so that to ensure the veracity of the information (Mathison, 1988). To this extent, the collected data come from more than a few sources: articles, case studies and theses.

The decision of focusing our analysis on secondary data is justified with the need to understand the existing reality. Actually, this type of data allows us to identify IEs dynamics' in both community and company level.

When handling the database, we took care to follow, as much as possible, the approach of De Weerd-Nederhof (2001) and Miles and Huberman (1994), which consists in going by three concurrent steps: In the first place, we intend to purify the collected data. To this end, we identified the essential components by selecting, simplifying and transforming the raw data. Then, we coded and analyzed the collected data (Catterall & Maclaran, 1997; Huberman & Miles, 1994). In most cases, this operation was carried out through grouping the information into paragraphs after several readings to become more familiar with the content and, above all, to be more aware of the overall meaning emerging from it (Aktouf & Chrétien, 1987). At last, the process was completed analyzing the codified data.

In fact, the selection of articles was made from different documentary sources (Cairn, Open Edition journals, TIM review, Elsevier...). Having as keyword the term: "BE" then "IE ". As explained above, the use of BE notion comes down to the semantic evolution of the concept. In addition to that, the choice of articles was made according to two imperatives: the attachment management field and the effective presence of the concept in the text. There was also a work of identification in accordance with: the text, the year, the author and the keywords... This allowed a general analysis of the publications and then a concentration on the paragraphs which aim to determine the factors conditioning the emergence of IEs.

To some extent, the search in the documentary bases under the aforementioned conditions gave rise to more than 500 results. Filters such as (fields, articles,) and the reading of abstracts (articles dealing in whole or in part with ecosystems birth) allowed a refinement to 50 articles. We had to exclude those who only mentioned ecosystems birth very slightly. On the whole, we ended up with 35 articles published in 5 different journals from 1993 to 2022.

In this part, we have presented the pursued methodology. Even though we are aware of the limits of theoretical studies based on secondary data, we have opted for a review article in order to understand the current situation. Consequently, it is necessary to complete this paperwork with a case study so as to carry out an analysis of ecosystems birth phase and then emerge with results of strong external and internal validity about the innovation context.

4. Results

The will behind this article comes mainly from the desire to offer an exhaustive review about IE births. Actually, being part of it increases the flow of innovation and allows a real saving of time and money. That's the reasons why many researchers have focused their energy on the study of ecosystem communities. Besides, it represents both interesting and hidden opportunities that should be identified so that not only the great managers seize them but also every potential actor of the community. Therefore, the following section is dedicated to the determination of factors that contribute to the birth of these reticular entities.

The attentive reading of articles has appointed three common factors of IE births. First, there is knowledge management. Then, we count organizational skills. And finally, we found proximity.

4.1 Knowledge Development, Sharing and Management

Knowledge has always been an innovation booster. Sharing it not only enables renewal, but also improves

production, lowers costs and promotes working conditions.

Knowledge management is a multidisciplinary strategic approach used in order to achieve goals through their optimal use (Laurent et al., 2005). It involves many steps: creation and sharing, codification, storage, valorization...

On top of that, knowledge architecture (Attour & Barbaroux, 2016), copyrights management (Attour & Ayerbe, 2015) and Knowledge sharing (Attour & Ayerbe, 2012) are very relevant in structuring IEs.

Attour and Ayerbe (2012) explain how knowledge sharing leads to the conception of innovation. In most cases, it goes through managing circumstances between the desired situation and the available knowledge. When the held knowledge does not allow to reach the desired grade, the development of new knowledge is encouraged (Lemasson et al., 2016). This happens through mutual sharing of complementary information. The shared information (use, users, support products, etc.) are not only necessary for the design of the innovation, but also grants to its holders a special place in the community (pivot, niche player, etc). In other words, knowledge promote IEs' creation by structuring its actors.

Actually, before being shared, some knowledge must be built. According to Attour and Barbaroux (2016), ecosystem birth is related to a phase of exploration, learning and collaborative experimentation that lead to the constitution of an architectural block, namely: tangible knowledge such as early user's feedback and intangible knowledge like innovation path... Knowledge creation tends to connect different components, enlarge the architectural circle and banish borders between actors who become gradually members of the same entity. On the whole, organizational birth results from an architectural block of knowledge that is the fruit of collaborative experimentation and exploration.

Another point is that community members are reluctant when it comes to share valuable information. It is crystal-clear that openness is a feature of sharing and transparency. However, it goes hand in hand with copyrights and idea's protection. This incongruity finds its origin in the theory of contingency which explains the conflicts between actors in collaboration.

At this level, opportunistic behaviors may appear especially when it comes to informational asymmetry. Actors tend to capture the maximum value by taking advantage of the outside in and retaining the inside out. This is the reason why ecosystem communities tend to manage intellectual properties and limit the risk of conflicts by legal anticipation of collaboration outcome according to the contribution of each actor.

Therefore, openness, complementarily and copyright management are ecosystems basics (Attour & Ayerbe, 2015). IEs constitute an intermediate openness between Open Sources (Chesbrough, 2006) and closed models. In short, unless it is misused, knowledge is a factor of IEs emergence. In 2015, Valkokari referred to a whole KE as an entity that prepares IEs birth.

Simultaneously to knowledge co-construction, exploration and learning in birth phase foster different kind of skills creation. The following part explains that development.

4.2 The Dynamics of Organizational Skills in Favor of Ecosystem Development

Moore (1996) divide ecosystem life cycle into four phases: birth, expansion, dominance and renewal. The first phase is considered as a stage of learning and experimentation where ecosystem skills are created. They might be collective or inter-organizational (Loilier & Malherbe, 2012) and individual or intra-organizational (Attour & Barbaroux, 2016). These skills take shape step by step during the four sequences of the birth stage.

Looking for new ideas and opportunities constitutes the first stage. Being called ideation sequence, it is characterized by a great entrepreneurial dynamic focused on the discovery, the identification and the construction of competitive advantages. It's a kind of brainstorming where actors are brought together as a resources' and skills' sharing group for innovation motives. After testing the innovative idea, the sequence of experimentation takes care of commercial design thanks to early user's feedback. During the third sequence, other actors integrate the community in order to adjust the initial offer according to their expertise. Finally, the renewal stage constitutes the outcome of birth phase. In which actors learn from previous actions in order to better meet future expectations.

Every sequence of the birth stage witnesses the arrival of new skills, namely: technical skills, relational skills and adjustment skills. In fact, technical skills are necessary for innovation development, relational skills increase the dependence between members and adjustment skills enable product development and offer structuring.

Loilier and Malherbe (2012) were interested in the nature and chronology of ecosystem skills appearance during the birth stage. As a matter of fact, perpetual innovation and constant need for adjustment mean that technical

skills are developed all the way through birth phase. They mainly concern technological solution seek. As for relational skills, they only emerge when the community begins to take shape, that is, during the value creation sequence. They are represented by every connection between members. At last, in the sequence of value proposition, we notice the offer structuring skills as soon as there is product or service commercialization.

Furthermore, Attour and Barbaroux (2016) go beyond inter-organizational logic towards another that combines both inter-organizational and intra-organizational skills. Actually, the mobilization of skills internally is the starting point for creating shared skills. In fact: relational skills between actors appear when some actors require individual technical skills of other actors. We find ourselves in a virtuous circle articulating of intra- and inter-firm skills. Thus, relationships between the actors are strengthened, innovation is accelerated and IEs are created.

New insights might take the lead when it comes to managed ecosystems. Some capabilities are considered necessary for organizations intending to implement governance structure such as ecosystems (Altman, Nagle & Tushman, 2022). They are usually related to the need of adaptation from closed hierarchical governance structure to open integrative ways of operating. It is mainly organization capacity to engage combined resources within ongoing adjustment process (Dattee ,Alexy &Autio, 2018), and to effect a desired end (Altman & al., 2022).

Firstly, shepherding communities without exploiting them (Altman & al., 2022) is a salient capacity of ecosystem governance structure. This includes, guiding numerous independent and heterogeneous actors to value creation, while being fair when sharing the fruits of collaboration. All this, without having a single authority over them and only provide guidance and boundaries using formal Intellectual property regimes and informal norms.

Secondly, actors not only manage their internal organization but also their relationships with the community. The struggle to balance between both its own hierarchical internal system and the whole ecosystem structure is considered to be essential for actors in the community (Altman & al., 2022).

Thirdly, the condition to reach value creation remains sharing between members. For that, managing data and intellectual property is without a doubt very relevant (Athey, Catalini, & Tucker, 2017; Bonneau & Preibusch, 2010; Casadesus-Masanell & Hervas- Drane, 2020; Goldfarb & Tucker, 2012). Actually, when private data is managed, actors are more likely to share. It is mainly due to a feeling of trust and safety. Being able to differentiate between back-ground knowledge (the knowledge held by each actor before the collaboration), side-ground knowledge (Knowledge created alongside collaboration) and fore-ground knowledge (Knowledge gained through collaboration) allows actor to know their exact level of participation and by then how the fruit of collaboration will be shared, what and how much value will be captured (Attour & Ayerbe, 2015).

Whether it is shepherding communities without exploding them, balancing between internal and external governance or managing private data, capabilities must be gained through an open adaptation process. The transition from hierarchical closed governance to an open ecosystem structure must be encompassed by driven open adaptation which is the ultimate and main skill to hold by ecosystem actors.

All in all, the establishment of knowledge and skills results from a process of experimentation and collective learning where organizations adjust, readjust, integrate and learn in order to build a space of opportunities. However, openness and mutual sharing of resources is only achieved in an atmosphere of trust (Assens & Ensminger, 2015). The following section focuses primarily on factors that promote ecosystem trust.

4.3 From Territorial Proximity to Virtual Proximity

In management, an ecosystem is an organization of complementary actors within a community of mutual trust and collaborative exchanges. The analysis of the literature allowed us to highlight two factors that promote community trust: geographical proximity and virtual proximity.

On the one hand, territorial anchoring occurs when entities are located in the same land. This geographical proximity gives actors a common identity based on local customs, mutual values and shared practices. Actually, collective identity facilitates inter-organizational trust, fosters social relationships and enhances knowledge transmission (Assens & Ensminger, 2015). In this respect, business climate becomes user-friendly so much so that legal contracts replace moral ones.

On the other hand, industrial proximity occurs in response to virtual platforms. As against industrial proximity, virtual one does not attach importance to the distance between members. For the most part, modern technologies have reduced the importance of geographical proximity and community trust is henceforth strengthened through experiences.

As for cognitive proximity, it may result either from virtual or geographical closeness (Assens & Ensminger, 2015). However, the need of a guarantor (platform, State, keystone...) is an absolute reality. Given that he arbitrates conflicts between members and oversees the creation of institutional trust. On second thoughts, it is necessary to remain vigilant when technological platforms are used as a guarantor of trust (Assens & Ensminger, 2015), especially in the absence of a solid trust foundation between members.

From a different point a view, ecosystem creation game is filled with uncertainty witch enhance the lack of trust whether it is virtual or geographical. It starts from generative inventions or even yet to be discovered (Alexy et al., 2018). This uncertainty complicates providing guidance to actors willing to collaborate. This drives actors to remain reluctant when it comes to share their resources. They are suspicious and less committed because they ignore if there will be a created value. Consequently, actors delay their commitment in order to keep their options open over time. Maneuvering in poor visibility becomes an ordinary task for ecosystem actors (Alexy et al., 2018). It consists on a creation process where actors try to clarify the situation according to feedback loops where they try to determine what will be the created value and how to capture it. By then, ecosystem creation game is determined through uncertainty, commitment and ongoing adjustment. First, uncertainty manifests itself by the lack of visibility about the innovation and value creation. Second, engagement appears as soon as valuable opportunities are noticed and clear signals and resources commitment are shown by other members. Finally, ongoing adjustment stands out through feedback loops and actors reactivity's to signals within it (Alexy et al., 2018).

On the whole, as long as trust is established, the dilemma is no longer to choose between territoriality and virtual. We can go either for geographical proximity, completely overcome borders or simply use technological platforms in territorialized ecosystems. The following section deals with specific birth conditions, such as keystone governance mode and diversity management.

4.4 Ecosystem Emergence in a World of Diversity

Recently, ecosystem's birth is a problematic that has been pondering the scientific community. The subject was studied using different methods (single case studies, historical studies, longitudinal studies) in several academic journals. In this regard, various logics explained the formation of IEs. This section is devoted to both a summary and a linking of isolated but important cases dealing with ecosystem field.

The previous section explains the different methods able to bring together community actors. This might be through reducing the geographical distance or setting up a virtual platform. Yet, the connection between community members remains necessary but not enough. Ecosystems must go beyond meetings to strategic visions alignment and why not: the validation of a common strategy (Parize-Sufrin, 2012).

Parize-Sufrin (2012) suggests participatory strategic prospective approach (PSP) as solution for a common vision. Actually, the PSP is an innovative governance mode that involves bringing together organizations in order to predict future scenarios related to innovation in highly strategic topics. The objective is to ensure complementarity between partners and to respond to environment expectations.

It is a kind of a thinking circle formed by leaders and integrated little by little by members. Progressively, new ecosystem emerges endowed with all the characteristics, namely: heterogeneity, interaction, collective skills and common vision.

Actually, these multiple meetings reinforce collaborative experimentation and exploration and as a result improve incremental innovation. Then, the keystone has recourse to willful strategies in order to reinforce the spontaneous creation of the ecosystem. In other words, IE's birth comes certainly from keystone strategies but, above all, from the innovation process that prior them. When an invention becomes a breakthrough innovation, new ecosystem emerges following leaders' strategies (Barbaroux, 2014).

Overall, IE's birth is a combination of spontaneity and programming. Frery et al., (2012) describe it as a "parrot walk" between deliberate strategy and emergent one where the keystone aims for strategies to intentionally create the community, while other actors are involved more or less by chance (Bonnardel et al., 2014). Keystone birth strategies include: managing actors' diversity (Avadikyan et al., 2014) which is mainly a question of managing the variety of numerous actors within the same community.

However, the presence of a keystone or any other influential actor in the community should not affect value capture and creation (John & Ross, 2021). Actually, value capture by high-power company discourages other companies from collaborating. Three solutions might solve the problem: enforceable contracts, cooperative governance and/or self-organization.

First, contracts enable the leader and other agents to bargain over each party's ultimate value capture. Then,

cooperative governance can be done by according financial claims in proportion to transaction volume or by establishing social norms in order to manage both firms' private interest and ecosystem health on the whole (Klein, Mahoney, McGahan & Pitelis, 2019). Finally, self-organization is an alternative to contracting. It occurs when actors are flexible about the efforts that maximize their own volume capture.

5. Discussion

This research identifies initial ideas and hypotheses about ecosystem's birth. It can be the subject of an empirical investigation as regards of existing inter-organizational networks. The trends recognized during documentation would be promising for potential studies describing the conditions of ecosystem's emergence. Actually, the empirical investigation may not only bring out new birth factors but also validate or dismiss the one discussed in this review article. Anyway, the use of theoretical background is for sure, a great contribution for management ecosystem's field.

Supposing a mutual trust between community members, ecosystem's birth begins with a spontaneous process of exploration, learning and experimentation linking organizational entities. This might be through virtual, geographical or institutional proximity.

In fact, the establishment of a virtual platform would strengthen relationships and promote mutual sharing of resources, skills and knowledge. Similarly, physical meeting of members would design a knowledge base ready for exploitation thanks to inter-organizational brainstorming.

These same entities will begin a process of continuous innovation through perpetual experimentation using feedback from early-adopters to refine service offering and make value proposition. It is from this moment that community leaders would proceed to develop strategies on behalf of the whole network.

Still, in a trusted environment, other capabilities are important ecosystem's development. Keystone must be very careful while shepherding the community. As soon as he starts to exploit it for his own needs, actors will notice the imbalance and for sure will delay their commitment to IEs. Another thing is that actors must be led from a closed environment to openness. Besides the fact that the first step of ecosystem's birth is filled with spontaneous exploration and learning, leaders must help edges by encouraging data sharing and management, organizing brainstorming and driving the adaptation to this whole new world. Actually, while taking places in specific ecosystems, actors must be clarified about roles that will fit them. Being aware about the structure of interdependencies might be highly productive. For instance, down-stream firms can benefit from mixing and matching components produced upstream and up-stream firms can benefit from optimizing their search more narrowly around their focal components (Ganco, Kapoor & K. Lee, 2020). When actors are set in the right place (up-stream or down-stream), they enhance their respective innovativeness and by then structure the nascent ecosystem.

Finally, Parize-Suffrin (2012) opens the debate about a new birth factor, namely: management ecosystem's emergence in a context of crisis. From her point of view, collaboration between actors would result from a situation of strong economic degradation. Therefore, wouldn't the current pandemic "covid19" situation push community actors to cooperate?

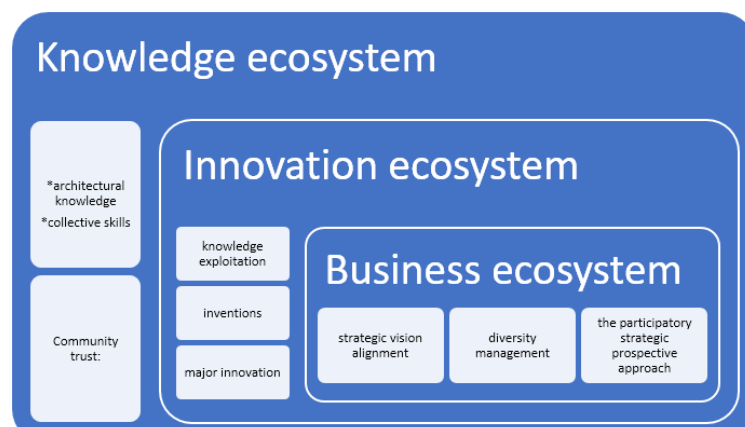


Figure 1. Ecosystem community birth

The figure above offers both a panoramic and procedural review of factors encouraging ecosystems' birth in

management.

In fact, KEs rely on community trust, collaborative exploration and mutual learning in order to mold collective skills and develop fresh knowledge. IEs use the formed knowledge so as to invent and reach major innovation. Ultimately, BEs try to capture the created value through community management, namely: diversity management, reunions, collective vision...

As a reminder, we've identified four different factors of emerging ecosystem: initially, we drew attention to the importance of knowledge management; which is considered as an innovation booster who has a positive impact on the production, costs and working conditions. Secondly, organizational skills dynamics develop ecosystems within the different birth stages proposed by Moore (1996), namely: birth, expansion, dominance and renewal.

Actually, an ecosystem is above all an organization of complementary actors characterized by mutual trust and collaborative exchanges. We have highlighted two factors promoting community trust: geographical proximity and virtual proximity. Territorial anchoring is when entities are located in the same territory. It gives actors a common identity based on local customs, mutual values and shared practices. Industrial proximity occurs in response to virtual platforms. It enhances the exchange between members and thus common experiences. Unlike territorial proximity which gives importance to the distance between members, virtual proximity reinforces trust by enhancing exchanges between members and their common experiences.

Finally, we highlighted the emergence of ecosystems in a world of diversity. Indeed, the emergence of IEs can occur thanks to either the reduction of geographical distance or the establishment of a virtual platform. The importance is to reach vision alignment and validate common strategies (Parize-Sufrin, 2012).

In the end, IEs birth is a combination of spontaneity and programming. According to Frery et al. (2012) it is a "parrot walk" between deliberate strategy and emergent strategy where the keystone aims at strategies to intentionally create community and actors the actors are integrated more or less instinctively.

6. Conclusion

We are aware that our scientific contribution constitutes an elementary presentation of a theoretical analysis, obviously documentary, but whose exhaustiveness ensures richness. That is to say that it requires validation and probably generalization by confronting empirical tests and running a series of interviews with IE's actors. The qualitative analysis will allow us to corroborate the results of the literature review but also generate new factors that are certainly specific to every context.

In reality, empirical studies about ecosystems are not as simple as they look like; despite the fact that ecosystem actor's heterogeneity enables innovation, it accentuates the diversity which remains challenging for setting up a harmonious entity.

This document deals with IEs birth. As we have argued before, this research can be the subject of an empirical study with regard to existing inter-organizational networks. The theoretical bases presented in this paper can serve as a basis for potential studies. The results of the confrontation of theoretical knowledge with the field can not only emerge from birth factors but also corroborate or refute the propositions this article.

Now, our literature review determines a conceptual model that traces all the work published about ecosystem life cycle in general and its birth in particular. In other word, we intended to explain IE birth process under the influence of leader's strategic choices.

Ecosystem emergence is characterized by three major stages and three different kind of managed ecosystem: KE, IE and BE. Constant development put various and different environmental actors in process of collaborative exploration, learning and experimentation. Thanks to geographical and/or virtual proximity, trust is established although the very low visibility about value creation and capture. This uncertainty is managed by feedback loops where actors seize opportunities by ongoing adjustment and resource commitment. When finally, the invention occurs, influential actors try to reinforce the nascent ecosystem through strategies: Managing diversity, shepherding communities without exploiting them, managing private data, driving to open adaptation, ambidextrous governance... it is necessary to hold in mind that multiple risks may happen, especially when it comes to value capture, in this situation, other solution are suggested by the literature: enforceable contract, cooperative governance and self-organization.

By way of conclusion, factors favoring ecosystems birth are community trust, collaborative exploration and mutual learning to shape collective skills and develop new knowledge. Then, the IE uses the new knowledge to achieve a major innovation. Ultimately, BEs try to capture the value through community management.

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