

# Innovation Ecosystem and its Conceptualizations: A Literature Review

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## **Abstract**

There is a perceived diversity in the conceptualization and definition of innovation (or entrepreneurship) ecosystem, particularly with the term ecosystem across management, strategy, entrepreneurship and innovation literature. The purpose of this paper is to provide a systematized review of the different conceptualizations and definitions of “innovation ecosystem” based on a review of literature. This review paper has three main objectives and potential contributions: a) analysing the convergence and divergence across multiple definitions of the term ‘ecosystem’ b) identifying the of levels of abstractions in the discourse on ecosystems c) a proposing analytical framework to help guide future research and theory development.

*Keywords:* Innovation Ecosystem, Business Ecosystem, Literature Review

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## 1. Introduction

“Ecosystem” is a term combining the words “eco” and “system”. The former has its origin in ecology and refers to the relation of living things to their environment. While the first application of ecological concepts to management literature was more than five decades ago ([Penrose \[1952\]](#)), there has been a surge of interest in the concept of “ecosystems” over the last few years. The ecosystem perspective on innovation and business has emerged as a new explanation of innovative organizations ([Durst and Poutanen \[2013\]](#)). In other words, an innovation ecosystem models the complex relationships between actors to enable innovation ([Jackson \[2011\]](#)). This enthusiasm is shared by scholars and practitioners alike. The use of the term “ecosystem” by scholars within business settings has grown exponentially over the last decade ([Kapoor \[2018\]](#)).

While ecosystems have been considered in the field of strategy and management for some time ([Adner \[2006\]](#); [Iansiti and Levien \[2004\]](#); [Moore \[1993\]](#)), the last few years have seen a boom. Searching the keyword ecosystem in the title or abstract of the top strategy journals shows that its frequency has increased seven-fold over the last five years ([Jacobides et al. \[2018\]](#)).

In the field of business strategy, the term ‘ecosystem’ was first introduced by Moore (1993), who introduced the idea that “firms can be viewed not as members of a single industry but rather as members of a business ecosystem

comprising of firms from a variety of industries and that business ecosystems, like biological ecosystems, evolve over time with implications for their members in terms of innovation, cooperation, and competition.” (Kapoor [2018]). Since then, many definitions of ecosystem have been advanced emphasizing different aspects of the ecosystem, and they are not always fully compatible as per scholars (Suominen et al. [2019], Kapoor [2018], Gomes et al. [2018], Jacobides et al. [2018]).

This review answers the call to discover the definitions of an innovation ecosystem and how the concept has been established in previous literature. I follow the literature review approach, which has been shown to be a powerful technique for making meaningful comparisons across studies, and study the topic in two sections. The first section is a literature review that identifies divergence and convergence in the various definitions of innovation ecosystem used in the literature. It builds upon a part of a review article by Gomes, Facin, Salerno, and Ikenami 2018 on the same topic. The second section is a two-part systematic review of articles on innovation ecosystem and national innovation ecosystem. A systematic review uses an explicit algorithm, as opposed to a heuristic approach, to perform a search and critical appraisal of the literature Crossan and Apaydin [2010].

## 2. Related Concepts

Ecosystems have been used with many related ideas concepts like business models, platforms, co-opetition, supply chains and value networks. In such a scenario, it becomes essential to define an ecosystem and distinguish it from similar constructs that have been used in earlier literature. As such, a literature review of popular scholarly articles may help to provide an understanding of how the concept of ecosystem is defined and is differentiated from the other constructs mentioned.

It is worthwhile to note that clusters, value networks and supply chain have been the predecessors of the concept of ecosystem in business literature. It will be worthwhile to discuss them briefly before turning to the ecosystem literature. Value chain, value network and supply chain perspectives are significantly different from an ecosystem perspective in terms of their focus. Accepting the premise made by Kapoor in their 2018 paper ([Kapoor \[2018\]](#)), the main theoretical premise for ecosystem research is the simultaneous presence of complementarities and interdependencies between actors. The same premise does not hold true for the other constructs that we discuss below.

*Value Chain:* [Porter \[1985\]](#) introduced the concept of a value chain to analyze the sources of a firm's competitive advantage. He described the value chain as: "Competitive advantage cannot be understood by looking at a firm as a whole. It stems from the many discrete activities a firm performs in de-

signing, producing, marketing, delivering and supporting its product. Each of these activities can contribute to a firm’s relative cost position and create a basis for differentiation. . . [E]very firm is a collection of activities that are performed to design, produce, market, deliver, support its product. All these activities can be represented using a value chain”

The primary concern for research grounded in a value chain perspective is to analyze a firms’ competitive position with respect to its rivals and to explain how value chain choices helps a firm create and sustain its competitive advantage ([Kapoor \[2018\]](#)).

Value Network: While the value chain is characterized by a linear flow of value in “dyadic relationships from raw material providers to manufacturers to suppliers to customers,” the value network is a multilateral construct, with a “myriad of B2B, B2C, and C2C relationships” ([Basole and Rouse \[2008\]](#)).

Supply Chain: The core concern for research on supply chains is to understand the coordination challenges between upstream and downstream actors (e.g., suppliers, distributors, retailers, customers) and to create a supply chain that is efficient and responsive to demand volatility ([Kapoor \[2018\]](#)). Within the perspective of supply chains, management scholars have concentrated on studying buyer-supplier relationships ([Mentzer et al. \[2001\]](#)).

### 3. Section A: Literature Review

The goal of this segment is to identify divergence and convergence in the various definitions of innovation ecosystem used in the literature. In doing so, I build upon the analysis by [Gomes et al. \[2018\]](#) and identify the divergence and convergence in the various conceptualizations of ecosystem in strategy and management literature. The articles chosen for analysis are the 17 most cited articles (as of 2018) with more than 20 citations, based on the sample in their review article ([Gomes et al. \[2018\]](#)).

The **second column** in Table 1 below lays out the definition of the ecosystem described in each article. The words in bold font describe the main features from each definition. For the **third column**, I identified three broad groups of papers while reviewing the literature, following the classification from the paper by [Jacobides et al. \[2018\]](#). These are based on the notion of ecosystem described in the paper :

- (a) a “business ecosystem” stream, which centers on a firm & its environment;
- (b) an “innovation ecosystem” stream, focused around a particular innovation or new value proposition & the constellation of actors that support it; and
- (c) a “platform ecosystem” stream, which considers how actors organize around a platform.

The **fourth column** is the level of analysis that the authors have used to describe their version of an ecosystem. The criteria used here to classify these papers is as below:

- (a) If the author(s) includes only a firm and it's actors in their definition of an ecosystem, then the respective paper falls under 'Firm Level'.
- (b) If the author(s) includes actors and entities in an industry and across firms in their definition of an ecosystem, then the respective paper falls under 'Industry Level'.
- (c) If the author(s) includes actors and entities across industries in their definition of an ecosystem, then the respective paper falls under 'Economy Level'.

Table 1: Definitions and main features of ecosystem from analysis of the 17 most-cited articles as per [Gomes et al. \[2018\]](#)

Article	Definition	Type	Level
<a href="#">Teece [2007]</a>	The community of organizations, institutions, and individuals <b>that impact the enterprise</b> and the enterprise's customers and suppliers.	Business Ecosystem	Firm Level
Continued on next page			

**Table 1 – continued from previous page**

<b>Article</b>	<b>Definition</b>	<b>Type</b>	<b>Level</b>
Moore [1993]	A business ecosystem [...] crosses a variety of Industries [...], companies co-evolve capabilities around a new innovation: <b>they work cooperatively &amp; competitively to support new products</b> , satisfy customer needs, and eventually incorporate the next round of innovations.	Business Ecosystem	Economy level
Santos and Eisenhardt [2005]	No clear definition	Business Ecosystem	Firm level
Adner and Kapoor [2010]	[...] <b>coordination among partners in exchange networks</b> that are characterized by simultaneous cooperation and competition.”	Innovation Ecosystem	Industry Level
Continued on next page			



Table 1 – continued from previous page

Article	Definition	Type	Level
<a href="#">Iansiti and Levien [2004]</a>	“The(se) <b>loose networks of</b> suppliers, distributors, outsourcing firms, makers of related products or services, technology providers, and a host of other <b>organizations</b> [...]”	Business Ecosystem	Industry Level
<a href="#">Adner [2006]</a>	The <b>collaborative arrangements</b> through which firms combine their individual offerings into a coherent, customer-facing solution	Innovation Ecosystem	Industry Level
<a href="#">Vargo [2009]</a>	The ecosystem model is one of the firm as part of a <b>loosely coupled network of</b> “keystone” and niche <b>firms</b> ( <a href="#">Iansiti and Levien [2004]</a> ) that sense and respond to the dynamic systems of which they are a part.	Business Ecosystem	Industry Level
Continued on next page			

Table 1 – continued from previous page

Article	Definition	Type	Level
Gawer and Cusumano [2008]	If a <b>platform leader</b> emerges and works <b>with the companies</b> supplying complementary products and services, they can together form an “ecosystem” of innovation	Platform-based Ecosystem	Industry Level
Carayannis and Campbell [2009]	[...] Innovation Ecosystem, where <b>people, culture and technology</b> , [...] meet and interact to catalyze creativity, trigger invention and <b>accelerate innovation</b> across scientific and technological disciplines, public and private sectors [...] and in a top-down, policy-driven as well as bottom-up, entrepreneurship-empowered fashion.”	Innovation Ecosystem	Economy Level
Rohrbeck et al. [2009]	Use the definition by Moore [1993]	Innovation Ecosystem	Firm level
Sunley [2008]	Not defined	Business Ecosystem	Industry Level
Continued on next page			

Table 1 – continued from previous page

Article	Definition	Type	Level
Li [2009]	Business ecosystems move beyond market positioning and industrial structure by having three major characteristics: <b>symbiosis, platform, and co-evolution</b> . An ecosystem provides an emerging landscape for business operations.	Business Ecosystem	Firm Level
Romero and Molina [2011]	“... a value co-creation system as a set of people, organizations and technology acting as a symbiotic business ecosystem in which organizations and customers interact in dynamic and reciprocal relations towards their commitment in the process of <b>co-producing offerings</b> :products, services and experiences, <b>in a mutually beneficial producer/customer relationship</b> .” (p. 11)	Business Ecosystem	Economy Level
Continued on next page			

**Table 1 – continued from previous page**

<b>Article</b>	<b>Definition</b>	<b>Type</b>	<b>Level</b>
Alexy et al. [2013]	Use the definition by Adner [2006]	Innovation Ecosystem	Firm Level
Garnsey et al. [2008]	Use the definition by Moore [1993]	Business Ecosystem	Industry Level
Iyer and Davenport [2008]	Use the definition by Iansiti and Levien [2004]	Business Ecosystem	Firm Level
Gawer and Cusumano [2014]	Use the definition by Iansiti and Levien [2004]	Platform- based Ecosystem	Industry Level

### *3.1. Discussion*

There is convergence and divergence in these definitions and this section discusses some of those aspects. The similarities among the definitions lie in a sharp contrast of this emerging perspective from other established perspectives of value chains, supply chains, alliances, and networks. The focus in most definitions is on symbiosis, interdependencies and complementarities among the actors and institutions in an ecosystem, especially the ones by

Romero and Molina [2011], Li [2009], Gawer and Cusumano [2008] and Adner [2006]. 8 out of the 17 articles (47%) of the articles describe ecosystems to be a collaborative exchange. 5 articles (30%) describe the phenomenon as simply an exchange in a network or interaction among members (that may work together) (Teece [2007], Iansiti and Levien [2004], Vargo [2009], Gawer and Cusumano [2008], Carayannis and Campbell [2009]). A second noteworthy similarity is that 5 of the 17 articles (30%) mention that the members of an ecosystem may have a competitive and a collaborative relationship with one another simultaneously. This is largely apparent in the definition produced by Moore [1993] and Adner and Kapoor [2010] as well as the articles that use their definition (Rohrbeck et al. [2009] and Garnsey et al. [2008]). Such simultaneous existence of both competition and collaboration and its link to innovation concept is also in agreement with the literature on Innovation networks by Hage [2011]. For the purpose of the synthesizing findings from this paper and developing a framework for integrating the various sub-categories of an innovation ecosystem, I have categorised such innovation with co-opetition ecosystems as **co-opetitive ecosystems**.

The definitions also point to some differences in these conceptualizations. Firstly, the level of observation or inquiry of an ecosystem is different in many papers and hence, the definition differs as well. There are primarily three levels of analysis that the authors of most cited articles have used in Table 1: Industry level (47%), Firm level (35%) and Economy level (18%),

in that order of frequency. As such, the definitions give a part of the entire picture rather than the entire concept along with the precise level of inquiry or analysis. Surprisingly, none of the articles mention the level of analysis in their definitions. A second point of divergence in the articles is that only a few authors, four to be precise, ([Teece \[2007\]](#), [Iansiti and Levien \[2004\]](#), [Carayannis and Campbell \[2009\]](#) and [Romero and Molina \[2011\]](#)) explicitly mention the actors involved in the ecosystem. 11 definitions (65%) focus on describing the phenomenon.

Besides these similarities and differences, it is worth noting that 10 out of the 17 articles (60%) define their version of the ecosystem as what [Gawer and Cusumano \[2008\]](#) describe as business ecosystems - centered around a business and that 8 out of the 17 (47%) articles operate in the industry level classification, which means, across firms, as described earlier. Only 2 articles of the 17 (12%) do not provide a clear definition of an ecosystem while using the term ecosystem multiple times in the paper ([Santos and Eisenhardt \[2005\]](#) and [Sunley \[2008\]](#)).

#### **4. Section B: Systematic Review**

This section's objective is to conduct a systematic review to analyze published articles in the top journals in Management. This selection may appear biased to the reader. However, a systematic review approach, as used in this

paper, removes the subjectivity of data collection by using a predefined selection algorithm. Thus, as long as, the predefined selection algorithm leads the reader to the same set of articles, the review should be considered unbiased.

#### *4.1. Systematic Review A - Innovation Ecosystem*

The data for this part of the review was extracted from each journal's homepage. For the first part of the review, I searched for articles with *innovation ecosystem* in *all* fields. For the second part, I searched for articles with *national innovation ecosystem* in the *title* field. Only peer-reviewed articles from the past 15 years (2004-2019) are finally included in this systematic review.

The algorithm followed for arriving at the list of articles for review is as described below :

Step 1: Choose Journals for review

Step 2: Search for keywords "*Innovation Ecosystem*" in **all** fields

Step 3: Select peer-reviewed articles that were published in the last 15 years

Step 4: Filter out irrelevant articles based on reading the article

##### *4.1.1. Journals chosen to review*

Top journals in Strategy and Management were selected based on their impact factor, namely –

1. Academy of Management Review (AMR)

2. Journal of Management (JoM)
3. Academy of Management Journal (AMJ)
4. Journal of International Business Studies (JIBS)
5. Administrative Science Quarterly (ASQ)
6. Strategic Management Journal (SMJ)
7. Organization Science (Org Sci)
8. Research Policy (RP)
9. Management Science (Mgmt Sci)
10. Strategy Science (Strat Sci)

#### *4.1.2. Results - Part A*

This resulted in a total of 128 articles as shown in Table 2. The articles were then further reduced to 68 based on relevance. Surprisingly, there were 60 articles that mention the ‘innovation ecosystem’ in the body of the paper but the main idea or central theme is not relevant to our discussion in this paper. Table 3 describes the definitions and conceptualizations derived from the 12 **key articles** among these 68 articles. These 12 key articles were decided based on a high number of citations and on relevance to our discussion in this paper.



Table 2: Innovation Ecosystem in all fields

S.No.	Journal	Impact Factor*	# Articles
1	AMR	8.855	1
2	JoM	8.080	1
3	AMJ	6.700	0
4	JIBS	6.198	1
5	ASQ	5.878	1
6	SMJ	5.482	8
7	Org Sci	5.431	2
8	RP	4.661	39
9	Mgmt Sci	3.544	2
10	Strat Sci	1.722	13

Table 3: Definitions and main features of innovation ecosystem from select articles as per systematic review

Journal	Article	Definition
AMR	<a href="#">Alexy et al. [2013]</a>	Use the definition by Adner (2006) “the <b>collaborative arrangements</b> through which firms combine their individual offerings into a coherent, customer-facing solution”
JoM	<a href="#">Adner [2017]</a>	The alignment structure of the <b>multilateral set of partners that need to interact</b> in order for a focal value proposition to materialize
ASQ	<a href="#">Davis [2016]</a>	Used the definition by Adner (2010)
Continued on next page		

Table 3 – continued from previous page

Journal	Article	Definition
SMJ	<a href="#">Adner and Kapoor [2010]</a>	[...] coordination among partners in exchange networks that are characterized by <b>simultaneous cooperation and competition.</b> ”
SMJ	<a href="#">Hannah and Eisenhardt [2018]</a>	[...] we define ecosystems as <b>groups of firms</b> that produce products or services that together comprise a coherent solution.
SMJ	<a href="#">Jacobides et al. [2018]</a>	An ecosystem is a <b>set of actors with</b> varying degrees of multilateral, nongeneric <b>complementarities</b> that are not fully hierarchically controlled.
SMJ	<a href="#">Adner and Kapoor [2016]</a>	No clear definition provided
RP	<a href="#">Gawer [2014]</a>	[...] larger <b>networks of firms</b> that are not necessarily linked through buyer–supplier relationships – also known as “innovation ecosystems”
RP	<a href="#">Clarysse et al. [2014]</a>	A business ecosystem finds its roots in the idea of value networks and can be seen as a <b>group of companies</b> , which simultaneously create value by combining their skills and assets.
Continued on next page		

**Table 3 – continued from previous page**

<b>Journal</b>	<b>Article</b>	<b>Definition</b>
RP	<a href="#">Autio et al. [2014]</a>	No clear definition provided
RP	<a href="#">Jarvi et al. [2018]</a>	<b>Knowledge ecosystems</b> have been characterized as geographically co-located hotspots, in which local universities and public research organizations are typically the central actors ( <a href="#">Clarysse et al. [2014]</a> ), and where the key activity of knowledge exploration is accomplished through collaborative research work
SS	<a href="#">Vedula and Fitza [2019]</a>	A <b>Regional Entrepreneurial Ecosystem</b> can be defined as “combinations of social, economic, and cultural elements within a region that support the development of innovative startups, and encourage entrepreneurs and other actors to take the risks of starting, funding, and otherwise assisting high-risk ventures” ( <a href="#">Spigel [2017]</a> , p. 2)

#### *4.2. Discussion*

Among these key articles identified, Research Policy and Strategic Management Journal are the top two journals in terms of the number of articles published on the topic of innovation ecosystem (33% each). SMJ leads in

terms of impact of the articles published (citation count). Again, a key observation is that a few articles do not provide a definition (17%) of the term innovation ecosystem and one among them (8%) use the definition provided by previous literature. While the latter may not necessarily be an anomaly it certainly is a disadvantage because the progress of a concept in academic literature is path-dependent. Another similarity among the definitions is the emphasis on collaboration and co-operation among actors (firms or research organizations). 5 out of the 12 identified articles (42%) share this similarity. The other definitions focus more on the structure and its elements and do not focus so much on the process that occurs when these elements /actors get together. For instance, [Gawer \[2014\]](#) and [Hannah and Eisenhardt \[2018\]](#) describe ecosystems as networks of firms and group of firms that produce products or services together but may not be lined through specific relationships.

One of the recent definitions of an ecosystem in the management literature that deserves a mention here, is a definition by [Kapoor \[2018\]](#) : “an ecosystem encompasses a set of actors that contribute to the focal offer’s user value proposition”. However, this definition is in context with a business ecosystem than an innovation one. Another definition of a related term - innovation system - provided by [Cirera and Maloney \[2017\]](#) is the “interactions among the various actors and non-market institutions necessary for knowledge creation and diffusion”. Such a broad definition has an advantage that it is

applicable across the levels of analysis (firm, industry or economy level). On the flip side, it does not clearly lay out the roles of these actors and the relationship among themselves. These two definitions are significant in the literature (based on the citation count) but were not covered, in this review so far, as they fell outside the criteria chosen for selection of articles. For the purpose of identifying sub-classifications of ecosystems, I would like to highlight that definition provided by [Jarvi et al. \[2018\]](#) points to a different sub-category of innovation ecosystems, namely, **knowledge ecosystems**. This sub-category is referred to in Section 5 later to develop a framework for innovation ecosystems.

Next, I move on to another new level of analysis of innovation, though not in the business context. The next section presents the concept of a national innovation ecosystem and its various definitions based on a systematic review. Innovation systems matter because a nation's innovation success depends on its national innovation system working effectively and synergistically ([Atkinson \[2014\]](#)).

#### *4.3. Systematic Review B- National Innovation Ecosystem*

For the second part of the systematic review, I looked at the articles with the keyword *national innovation ecosystem* in the *title* field across all journals and across a time span from 1900 to 2019. The database chosen

for this review was Google Scholar and the ISI Web of Science database by Thomson Reuters.

Step 1: Search for keywords “*National Innovation Ecosystem*” in *title*

Step 2: Filter out irrelevant articles based on reading the article

#### 4.3.1. Results - Part B

This resulted in 10 unique articles and out of which 7 were relevant to the concept of national innovation ecosystem (NIE). The conceptualizations and definitions of NIE from these articles are presented in Table 4.

Table 4: Definitions and main features of national innovation ecosystem

Article/Book	Definition
<a href="#">Tabansky and Ben-Israel [2015]</a> (Book Chapter 3)	“The National Innovation System concept refers to all the interacting social and political factors inside a country that affect the creation and diffusion of innovation: culture, education, research institutions, credit system, fiscal policies, government incentives, law and intellectual right protection, political structure, market conditions and so on.”
<a href="#">Marques et al. [2015]</a>	No clear definition provided
Continued on next page	

**Table 4 – continued from previous page**

Article/Book	Definition
Akoijam and Krishna [2017]	Innovation ecosystem refers to the perspective where a sense of the environment or ecology of various institutions, actors and various other factors surrounds the activity of research and innovation.
Khorsheed [2014]	Though not explicitly defined, the NIE framework as per this article consists of Enterprises, Entrepreneurs, Associations, Financiers, Knowledge Transfer Centers, Social Networks, Research Centers and the Government
Fatma [2018]	No clear definition provided
Suseno and Standing [2018]	[.we] adopt Metcalfe’s (1995, p. 3) definition on national innovation ecosystem as “that set of distinct institutions which jointly and individually contribute to the development and diffusion of new technologies and which provides the framework within which governments form and implement policies to influence the innovation process”.
Continued on next page	

**Table 4 – continued from previous page**

Article/Book	Definition
<a href="#">Frenkel and Maital [2014]</a>	<p>NIE is mentioned as a special case of National Innovation System (NIS). “A NIS is defined as a complex network of institutions, in which the output of one institutions serves as inputs for another, and is comprised of a series of sub-systems. It is a national system in which private firms and government bodies interact and cooperate, to fund and encourage research and innovative technology and products.”</p>

#### *4.4. Discussion*

In the late 1980’s the concept of National Innovation System came to be one of the important topics in the economics literature. Christopher [Freeman \[1987\]](#) defined a national innovation system as “the network of institutions in the public and private sectors whose activities and interactions initiate, import, modify and diffuse new technologies.” Today however, the literature on national innovation systems is not as developed as it could be in terms of clearly defining and demarcating it from the other concepts to explain innovation at a national scale ([Durst and Poutanen \[2013\]](#)). We have discussed here a related and almost synonymous concept called the National Innovation Ecosystem and it is not clear from the literature review about



how it is different from a more studied concept of National Innovation System. The two terms are used interchangeably in the literature. In other words, our knowledge on the evolution and evaluation of national innovation ecosystems is still relatively limited (Suseno and Standing [2018]).

A key definition missing from this literature is one provided by Jackson [2011]: An innovation ecosystem is essentially an economic system that comprises resources, people and their capabilities, government, universities, organizations as well as venture capital organizations.

## 5. Conclusion and Recommendations

The results of the study as presented in this article provide valuable information concerning how contemporary authors and scholars define ‘innovation ecosystem’.

As we discussed in previous sections (3.1 and 4.2) , four key sub-themes seem to emerge across multiple literature streams on innovation ecosystem,: **co-competitive ecosystem, knowledge ecosystem, platform ecosystems** and **national innovation ecosystem**. The first three ecosystem types have been clubbed as business ecosystem in some cases, however it will enables the gradual strengthening of boundaries between these sub-topics if we begin to study them distinctly. Although scholars have tried to provide a clear definition, a review of the most cited contributions in these clusters reveals unclear boundaries and overlaps between them.

To summarize the findings of this paper, Figure 1 presents an analytical framework. The left-most part of the figure is a depiction of the business ecosystem at a firm level which consists of various actors - a firm, its suppliers, customers and employees. This is largely in coherence with the definition of a business ecosystem provided by Teece [2007]. The next level is at an industry scale where the firms have a co-competitive relationship among them (Adner and Kapoor [2010]). If the industry in which these firms operate has a significant reliance on technology and platforms then their innovative ecosystem can also be described better in terms of a platform-based ecosystem (Gawer and Cusumano [2008]).

Lastly, the national innovation system comprises of these actors who have various sub-ecosystems which have relationships of their own as well as, the government and research centers. This conceptualisation is also in coherence with the definition of NIS provided by the OECD in 1997. In its 1997 report on “National Innovation Systems”, the OECD (Organisation for Economic Co-operation and Development) lays out a brief summary: “The national innovation systems approach stresses that the flows of technology and information among people, enterprises and institutions are key to the innovative process. Innovation and technology development are the result of a complex set of relationships among actors in the system, which includes enterprises, universities and government research institutes.” (Frenkel and Maital [2014]). This conceptualisation is indeed comprehensive and aggregates the various

sub-ecosystems within it. The same systemic concepts can be applied at regional and local governments to develop innovation hubs and to properly design and gain benefits from innovation ecosystems.

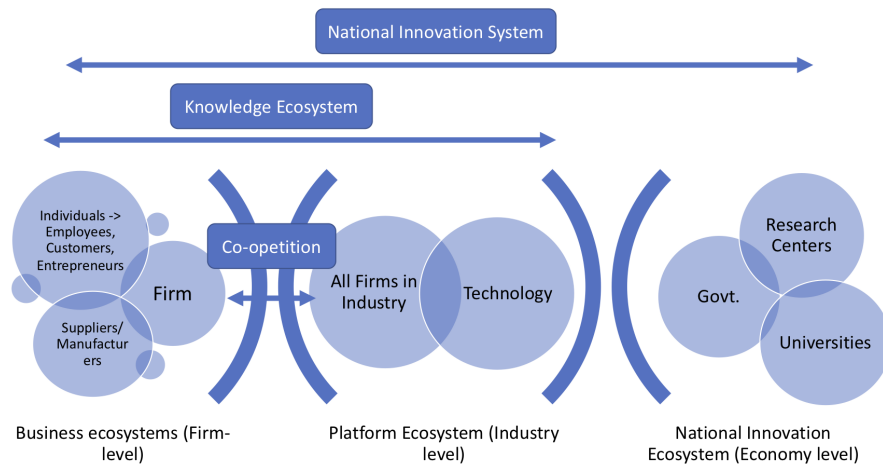


Figure 1: Innovation Ecosystem Framework

The author’s first and primary future research recommendation would be studying each type of ecosystem distinctly with an attempt to demarcate it from the other types in the definition used and provided. Secondly, scholars studying business ecosystem at an industry level could possibly study the birth, emergence and evolution of these ecosystems. Thirdly, it will be worthwhile to study how co-operative and competitive relationships emerge in a co-opetitive ecosystem and whether companies compete for such relationships within the ecosystem. Lastly, the research community in this field

could definitely benefit from finding out how these various types of ecosystems interact with one another.

## **6. Limitations**

There are two limitations that the reader should consider. First, Part A of this paper has presented the results of a literature review for which, the data set was gathered from the Thomson Reuters Web of Science by the authors. Although the Web of Science database includes a good coverage, it does not capture the comprehensive scholarly literature ([Suominen et al. \[2019\]](#)). Second, Part B of this paper limits its search to the leading ten journals in Strategy and Management, based on their impact factor. While, it may be a popular method to filter out articles, this method may leave out articles that may very well have stronger theoretical foundation and conceptualization of innovation ecosystem than the articles covered in this paper.

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