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Leveraging complexity for ecosystemic innovation

Highlights

•Ecosystemic innovation focuses on the non-linear complexity of knowledge-based economies, where new values are co-created interactively at the level of collaborative networks.

•To meet high global uncertainty and motivate innovation-led growth, modern economies are moving toward ecosystem-based design. Unlike rigid hierarchic systems, agile heterarchical ecosystems display properties of complex adaptive systems (CAS), such as self-organization, self-adjustment, and self-governance.

•The CAS concept, a stream of complexity science, helps to highlight the contrast between the modern ecosystem approach and the traditional system approach to innovation and growth.

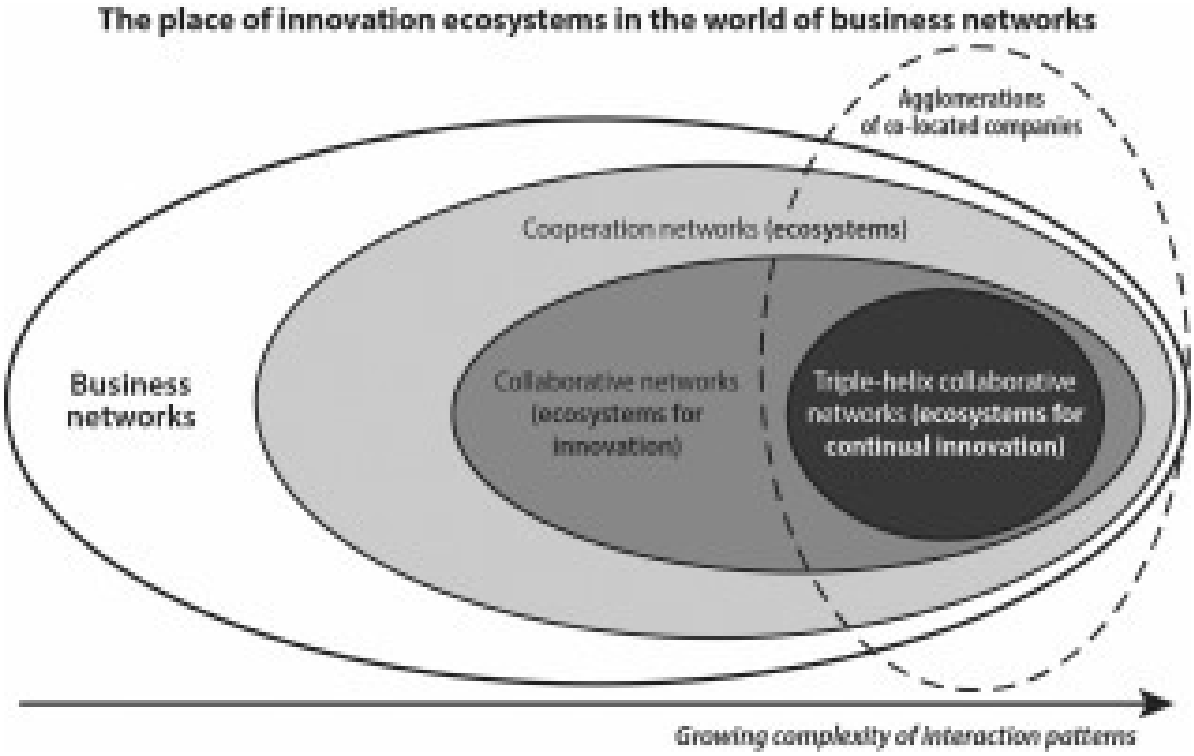
•Business networks with a higher complexity in interaction patterns are able to generate greater innovation synergy effects. Innovation ecosystems are thus generated by networks that have advanced from cooperation to collaboration among agents. Those innovation ecosystems that enable continual innovation, such as innovation clusters, have a more complex, triple helix pattern of collaboration.

•To ensure sustainable growth in the age of globalization and non-linearity, countries need active policies facilitating the ecosystem-based transformation of their institutional and industrial landscapes, which also implies measures to accelerate the replacement of hierarchies by collaborative models of governance at micro- and macro-levels.

Abstract
This paper looks at innovation ecosystems through the lens of complexity science, considering them as open non-linear entities that are characterized by changing multi-faceted motivations of networked actors, high receptivity to feedback, and persistent structural transformations. In the context of the growing organizational

complexity of economies, driven by their adaptation to high uncertainty, and the central role of collaboration, we differentiate the innovation capacity of various types of business networks by the complexity of their internal interactions, thus identifying the place of innovation ecosystems in the world of business networks, as well as the place of innovation clusters among other innovation ecosystems. We observe how innovation ecosystems have been viewed in four different research streams: management literature; the inter-firm and business network stream of economic and sociological literature; the innovation policy and competitiveness agenda in economic literature; and the dichotomy of localized and economy-wide innovation ecosystems in policy studies (in economic literature, evolutionary geography, and regional research). We then describe generic properties of innovation ecosystems in terms of complexity science, viewing them as complex adaptive systems, paying special attention to the complexity of innovation clusters. We compare complexity thinking of modern economies, deriving from their emerging ecosystem design, with traditional thinking conceived for industrial era, drawing insights for a better transition to innovation-led growth. We conclude with a summary of key findings, practical and policy implications and recommendations for further study.

Graphical abstract



Source: authors' elaboration

Keywords:
Business network; Collaboration; Complexity; Innovation ecosystem; Innovation cluster; Global economy; Non-linearity