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Towards a Theory of Individual Orchestration Competence in Innovation Ecosystems

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Abstract

This paper seeks to conceptualize individual orchestration competence and determine its core attributes relevant to the coordination of innovation ecosystems. A structured literature review was undertaken covering the period 2006–2024, with adopted as the central theoretical and conceptual lens. The review drew on Scopus and Web of Science databases, complemented by seminal publications, books, journal articles, and reference lists of the selected studies. The study underscores the importance of specific competencies for actors performing orchestration roles within innovation ecosystems. In response, we introduce the notion of individual orchestration competence and delineate its key attributes. Building on this, we propose an Individual Orchestration Competence Theoretical Model for Innovation Ecosystems. This work contributes to the orchestration literature by extending prevailing network and ecosystem orchestration perspectives. It shifts the analytical focus from roles, activities, and dimensional views of orchestration to a more integrated, evolving competence-based ecosystem model. The study contributes theoretically by introducing the construct of individual orchestration competence and its defining attributes, while also extending existing frameworks toward a competence-centered approach. On the managerial side, it clarifies the competencies required of orchestrators within innovation ecosystems. From a societal perspective, the findings help orchestrators better comprehend their influence and relevance within innovation ecosystems. Prior research on orchestration has largely emphasized roles, activities, and structural dimensions. Although recent contributions have explored different orchestrator roles, conceptual development remains limited. This study advances the field by focusing on the individual level—the orchestrator—and introducing a novel model of individual orchestration competence.

Keywords: Innovation ecosystem, Orchestration, Competence, Orchestration competence

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Introduction

Innovation is widely regarded as a fundamental driver of economic progress and enhanced societal well-being. Within the growing context of open and collaborative innovation, the concept of innovation ecosystems has gained prominence [1]. These ecosystems consist of heterogeneous yet interdependent actors that remain organizationally autonomous but collectively contribute to shared value creation. This value typically emerges through collaborative processes in which ecosystem participants interact both internally and with external stakeholders [2]. Such interactions are often structured through the quadruple helix model—government, civil society, universities, and industry [3]—where managing innovation processes is inherently complex and multifaceted [4].



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To handle this complexity, coordination and activation of actors are required through orchestration processes that aim to shape, govern, and align innovation ecosystems, typically guided by an orchestrator [5, 6]. In this sense, orchestration represents a suitable analytical lens for explaining how networks and ecosystems are developed, managed, and coordinated [6]. It consists of a set of interrelated activities. When an orchestrator performs these activities in distinct ways—for example, by varying the degree of influence exercised over other actors within the network or ecosystem—this reflects different orchestrator roles [4].

The orchestration literature in innovation networks and ecosystems initially concentrates on conceptualizing key dimensions through the lens of a single coordinating actor [5]. However, as these systems have become more complex, scholarly attention has progressively moved toward configurations involving multiple orchestrators [4, 7]. With the recognition that orchestration roles are no longer centralized, recent studies increasingly treat orchestrator roles as a core and evolving topic within the field [8, 9]. Alongside this development, another stream of research has attempted to unpack orchestration by examining the specific activities performed by orchestrators [10]. We argue that the next conceptual step in orchestration theory is to examine orchestrator competence and its defining attributes.

Within innovation networks, orchestrators are central to managing actor plurality through coordination processes, which opens up research opportunities focused on their underlying capabilities and skill sets [9]. In addition, we highlight a fundamental competence relevant across all ecosystem participants, regardless of role: the ability to handle and navigate dynamic strategic interactions that emerge in innovation contexts [11].

Against this background, we argue that a key challenge lies in aligning and coordinating the diverse actors within innovation ecosystems. These actors are themselves individuals within the system, engaging in relational and innovation-driven processes. This points to a clear research gap: the need to extend orchestration theory in networks and ecosystems toward an individual-level competence perspective of the [9, 11]. Accordingly, this study addresses the following questions: How can individual orchestration competence be defined? Which attributes constitute orchestration competence for acting within innovation ecosystems?

Building on theoretical insights from the field, we propose that orchestration should be understood as one dimension of broader innovation competence. This competence combines personal traits, knowledge, abilities, and attitudes that enable the creation and implementation of innovations through collaborative processes. It is commonly described in terms of five components: creativity, critical thinking, initiative, teamwork, and networking [12-14]. From this perspective, we argue for a distinct orchestration competence, comprising specific attributes rooted in the orchestrator's knowledge base, skill set, and behavioral attitudes, that enable the coordination of actors and actions within innovation-oriented environments and contexts. Theoretically, the results contribute to extending orchestration models in both network and ecosystem research. This shift reframes the discussion from orchestrator roles, activities, and structural dimensions toward a competence-centered orchestration model. It also includes the definition of this competence and its key attributes, taking into account orchestration dimensions. In this relational setting, orchestrator roles are not isolated but interconnected, emerging from the interaction between individuals and their actions. Consequently, these roles shape ecosystem dynamics and formation, as they are closely tied to orchestration competence attributes when the orchestrator operates within a specific context.

Literature review

Innovation ecosystem and ecosystem orchestration

Innovation ecosystems must respond rapidly to environmental shifts, which depend heavily on the flexibility and responsiveness of relationships and governance among actors [15]. The earlier focus on innovation networks [5] has progressively evolved into the broader innovation ecosystem perspective [16], where the quadruple helix framework [3] emphasizes collaboration for generating solutions that exceed the capabilities of any single organization or individual [10]. These ecosystems consist of heterogeneous, interdependent communities of actors who remain organizationally independent yet collectively produce shared value. This value typically arises through joint action, where actors interact both internally and externally with their environment [2].

Within this ecosystem logic, the complexity of interactions requires coordination mechanisms that mobilize actors and shape the environment through orchestration, typically led by an orchestrator [5, 17, 18]. Orchestration refers to a coordinated set of actions aimed at developing, managing, and aligning actors to generate and capture value in networks [5]. It therefore represents a governance logic for managing multi-actor relationships [5, 7, 17], one that preserves actor autonomy while fostering collaboration [19] and enabling innovation without hierarchical control [5].

Orchestration capability encompasses different processes depending on context, consisting of multiple actions performed by one or more orchestrators who assume specific functions derived from their roles and activities in innovation ecosystems [4, 5, 7].

[5] originally framed orchestration in innovation networks in terms of three dimensions: knowledge mobility, innovation appropriability, and network stability. This model is later expanded by [17], who propose six foundational dimensions: agenda

setting, mobilization, network stabilization, knowledge creation and transfer, innovation appropriability, and coordination. Subsequently, [20] introduce co-creation management, while [10] add communication management (**Table 1**).

Table 1. Orchestration dimensions.

Orchestration dimensions	Process (Actions)	Definitions
Agenda setting	Steering ecosystem actors and their respective tasks	It concerns attracting individuals to activities, thereby influencing the engagement of actors and the alignment of objectives
Agenda setting	Agenda structuring	It involves designing and communicating a guiding agenda that coordinates ecosystem members
Network mobilization	Recruitment and selection of partners within the innovation ecosystem	It refers to the process of attracting and choosing partners for the ecosystem, including the underlying motivating factors
Network stabilization	Sustaining collaboration among ecosystem participants	It includes the reinforcement of culture, shared identity, values, and belief systems
Network stabilization	Preventing individualism and opportunistic behavior	It aims to reduce isolation, disengagement, collusion, and conflict among participants
Knowledge creation and transfer	Exchange of knowledge acquired and applied within the ecosystem	It refers to the processes of sharing, absorbing, and implementing knowledge across the ecosystem
Innovation appropriability	Building trust-based relationships	It ensures that innovators can retain financial gains from innovations while maintaining the stability generated through collaboration among ecosystem members
Innovation appropriability	Capturing value generated by innovations	It defines the innovator's capacity to appropriate profits or benefits resulting from innovation
Innovation appropriability	Distribution of legal mechanisms and shared responsibility over assets	It relates to appropriability mechanisms such as patents, copyrights, and trademarks
Coordination	Managing overall planning and overseeing execution	It establishes mechanisms that steer the innovation process
Coordination	Aligning actors toward a shared objective	It ensures that ecosystem participants work toward common goals
Co-creation	Empowerment (active involvement of actors in decision-making with increased autonomy and responsibility), connection, and social engagement	It promotes the active participation of stakeholders in developing collective solutions
Communication management	Managing communication activities and disseminating institutional initiatives and projects to the public to foster engagement	It refers to the dissemination and communication of institutional actions and projects aimed at public engagement

Orchestrator roles are determined by how orchestration activities are enacted (**Table 2**). Multiple actors may perform different orchestrator roles [4], and these roles can evolve [8]. Moreover, the coexistence of diverse orchestrators and roles can increase overall value creation in networks and ecosystems [7]. The next section develops the theoretical discussion from a competence-based perspective.

Table 2. Main attributes of the individual orchestration competence

Orchestrator roles	Agenda setting	Mobilization	Network stability	Knowledge creation & transfer	Innovation appropriability	Coordination	Co-creation	Communication management	Capacities...	Orchestration competence attributes
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Architect	Detecting opportunities and defining objectives	Choosing and assembling network participants	Ensuring execution and adherence to planned actions	...to recognize opportunities and define objectives and action plans	1. Systemic perspective, 2. Strategic reasoning, 3. Opportunity recognition, 4. Mapping and selecting members, 5. Mobilizing stakeholders, 6. Team collaboration ability, 7. Planning, coordination, and execution skills for individual and collective actions
	Exercising authority over planning and defining performance criteria	Structuring and operationalizing the network	Establishing rules governing innovation value appropriation	Tracking and adjusting performance benchmarks	...to define, oversee, enforce, and adjust participant performance standards
Gatekeeper		Absorbing external knowledge and distributing it within the network		...to obtain and disseminate information	1. Planning and coordination of collective and individual actions, 2. Monitoring innovation performance metrics, 3. Mobilization of actors, 4. Trust-building capability, 5. Technical expertise (intellectual property knowledge)
Conductor		Collecting and reshaping information to enhance internal competencies	Assigning tasks across network members	Supporting co-creation through knowledge sharing	...to acquire and utilize information effectively
Representative		Communicating network knowledge externally; filtering and protecting information	Managing information to protect innovation value	...to communicate information externally	1. Knowledge-sharing competence, 2. Internal and external relational skills (individual and collective), 3. Skills in filtering, analyzing, and evaluating external communication
Liaison		Acting as an external bridge between members or across networks	Facilitating exchange processes and interactions	...to function as an intermediary within and between networks	1. Ability to establish internal and external contact, 2. Skills to encourage exchanges and interactions, 3. Coordination and organizational skills
Coordinator		Facilitating member interaction to strengthen relationships	Managing interaction processes among members	...to promote interaction among network members	1. Aligning member and ecosystem interests, 2. Skills to stimulate member interaction

Auctioneer	Establishing an agenda to promote a shared vision	Building and promoting a collective vision		...to create and promote a shared vision	1. Agenda-setting capability, 2. Systemic thinking, 3. Mobilization of actors, 4. Skills to promote a shared vision for decision-making
Developer			Enhancing both tangible and intangible resources	Supporting co-creation through knowledge exchange	1. Developing tangible outputs from knowledge flows (intellectual property), 2. Co-creation skills
Promoter	Introducing novel ideas into the network; aligning members toward shared objectives	Engaging stakeholders in innovation processes		...to align network members toward a common objective	1. Ability to define collective and individual goals, 2. Skills to engage and mobilize members toward shared objectives
Leader	Clarifying the orchestrator contributions and benefits of participation	Encouraging collaboration and participation	Providing support and managing interaction dynamics with a long-term perspective	Defining roles of network members	1. Aligning ecosystem and member interests, 2. Ability to connect members, 3. Skills to initiate and manage collaborative projects, 4. Building ecosystem identity, 5. Knowledge of member role characteristics
Facilitator		Enabling collaboration among different parts of the network		Supporting co-creation processes	1. Skills to integrate members into collective work, 2. Co-creation capability
Communicator				Executing communication activities and disseminating institutional initiatives to the public, and engaging stakeholders	1. Communication skills

Source(s): Prepared by the authors based on [4, 5, 7, 8, 10, 17, 20]

Competences and the individual competence dimension

The emergence of the competence concept at the individual level is closely intertwined with, and often conflated with, the notion of qualification. It is also historically linked to ideas such as attribution and responsibility, particularly within debates spanning the 1960s to the 1980s. During this period, competence was mainly framed within formal employment systems, largely characterized by industrial production, predictable work routines, and strong occupational structures. Within this context, qualification was primarily understood as the preparation of individuals for predefined and largely foreseeable tasks and processes.

From the 1990s onward, the concept of competence evolved significantly alongside broader transformations in production systems. These changes were driven by increased competition, the expansion of service-oriented economies, more flexible and intermittent forms of work, reduced predictability in organizational activities, and the weakening of traditional labor union structures. In this new environment, competence came to be associated with the development of capacities that could be activated and applied across diverse and evolving situations [21].

A debated issue within the competence literature concerns the distinction between capacity and competence. Capacity refers to the potential that can be developed and cultivated, whereas competence refers to the actual mobilization of that potential within action. In this sense, individuals are not inherently competent; rather, competence is observed in their actions. It represents the outcome of a developmental process in which capacities are transformed into knowledge and applied in practice. At the same time, competence development depends on individual abilities, particularly attitudinal dispositions that support engagement in learning-oriented action [21]. Thus, all competence is grounded in a combination of underlying capacities, which only become competence when they are mobilized in a specific action context. The recognition of competence is therefore dependent on the outcomes produced through action [21].

Competence is not merely expressed through action but is actualized within action itself. It arises from the intersection of knowledge and context, through the activation of individual capacities and knowledge within specific situational conditions, including available resources and constraints. In this sense, competence is simultaneously composed of knowing (knowledge), know-how (skills), and knowing how to be (attitudes), which operate in an integrated and interdependent manner [22, 23].

The development of competence should be understood through organizational practice, where work becomes meaningful for individuals through lived experience, interaction, and cooperation with others [24]. In line with this study's focus on the individual level, competence can be defined as an individual's ability to mobilize knowledge, skills, and attitudes in response to specific situations, activities, contexts, and cultural environments in which action occurs [25].

Materials and Methods

A systematic literature review was conducted to develop the contextual foundation for the research questions and to support the study's analytical framework [26]. This methodological approach is particularly suitable for gaining a deeper understanding of both innovation ecosystem orchestration and the individual competence perspective.

Following the formulation of the research questions, search terms were identified based on seminal contributions in the field and conceptual considerations of the topic. It is important to note that competence research is characterized by conceptual complexity, as terms such as "capacity," "competence," "skill," "capability," and "ability" (in both singular and plural forms) are frequently treated as interchangeable and are used across different contexts in studies of individuals and organizations. However, there is no clear consensus in the literature, and these terms often overlap semantically across multiple perspectives. In this study, we explicitly distinguish between them: "capacity," "competence," "skill," and "ability" are treated as non-synonymous and are associated with the individual level, whereas "capability" refers specifically to the organizational level. The search strategy combined keywords as follows: ("orchestrator" OR "facilitator" OR "articulator" OR "conductor") AND ("innovation" OR "network*" OR "ecosystem*") AND ("competenc*" OR "skill*" OR "abilit*" OR "capabilit*" OR "characteristic*" OR "role*" OR "activit*"). These terms were searched in titles, abstracts, and keywords for publications from 2006 to July 2024. The theoretical foundation of the analysis was anchored in [5]. Data were retrieved from Scopus (Business, Management and Accounting) and Web of Science (Management and Business), including peer-reviewed articles published in English, Spanish, and Portuguese.

The initial search yielded 670 articles across both databases, distributed as follows: Scopus (n = 496) and Web of Science (n = 174). After merging results, duplicates were removed, resulting in a final dataset of 120 articles. Abstract screening was then conducted using inclusion criteria focused on studies that address orchestrator roles and activities to support the contextual development of individual competence and orchestration dimensions. This criterion was adopted because no studies explicitly address individual orchestration competence within innovation ecosystems.

During the screening process, several studies also identified research gaps and proposed future research directions relevant to the research questions guiding this review. After applying the inclusion criteria, 10 studies were retained for the final literature review. These selected studies were organized in a structured database using Microsoft Excel. In addition, foundational books and seminal articles were included, along with recent publications and references cited within the selected studies to ensure comprehensive coverage of the field.

Results and Discussion

This section introduces the notion of competence from an ecosystemic standpoint, linking it with contextual elements of innovation and innovation ecosystems through the theoretical lenses of orchestration and competence. The focus is placed on orchestration competence and the proposal of an Individual Orchestration Competence Model.

Orchestration competence and main attributes to orchestrate innovation ecosystems

Research on orchestration initially concentrated on its structural dimensions and underlying processes [5, 17]. Over time, this focus expanded to include orchestrator roles and activities [4, 7], and was later complemented by discussions on the skills and capabilities associated with orchestrators [6, 7], following the terminology used by the respective authors.

[6] conceptualize innovation orchestration capability at both organizational and individual levels, emphasizing interactions among multiple organizations and between individuals embedded in these organizational settings; in this sense, individuals maintain formal relational ties within and across organizational boundaries. Organizational capabilities or routines are mirrored at the individual level through the skills and knowledge embedded in interconnected actors. Drawing on the three orchestration dimensions proposed by [5, 6] identify individual-level competencies such as interpersonal communication and social abilities, persuasion and motivational skills, entrepreneurial orientation (including proactiveness and responsibility-taking), operational competencies such as project management and contracting, and balancing abilities, which involve adopting a systemic perspective and recognizing the interests of diverse stakeholders. However, at the individual level, these elements are not explicitly framed within a competence theory perspective. Since capacities are formed through the integration of knowledge, skills, and attitudes, competence only emerges when these capacities are mobilized in specific actions [21]. Therefore, the set of individual-level attributes proposed by [6] can be understood as primarily grounded in knowledge and skills dimensions, without fully integrating the broader competence construct.

[7] examine orchestration through the coordination of network activities, the roles actors assume in orchestration processes, and the capabilities required to perform orchestration effectively. In their view, roles determine what actors actually do, and each role encompasses a bundle of orchestration activities. Successfully carrying out these activities corresponds to the enactment of specific orchestrator roles. Building on the assumption that orchestrators engage in different activities depending on contextual conditions and the network's evolutionary stage, the literature has identified multiple role typologies (see Section 2.1). Furthermore, [7] argue that orchestrator capabilities are crucial in determining whether an actor can adopt one or more roles and execute the associated activities. The inherently dynamic nature of orchestration implies that not all activities are equally emphasized across situations, and they may be performed in varying ways. The authors also suggest that incorporating capabilities into this discussion helps clarify the nature and applicability of orchestration.

From an individual orchestrator perspective, it is noteworthy that [6] adopt the term “skills,” whereas [7] use “capabilities.” Although both terms appear across different theoretical traditions and analytical contexts, research focused on individuals requires a more precise conceptual delineation. In this regard, when [7] refer to “individual orchestrator capabilities,” this can be interpreted as referring to “capacities,” placing their work close to a conceptual boundary between capacities and competences [21]. Similarly, when [6] use the term “skills,” this aligns, according to [21], with only one component of competence. In this sense, skills represent the individual's ability to perform a given role or function, transforming knowledge into action directed toward achieving a specific objective in a given situation.

The literature further emphasizes the importance of actors' collaborative capacity in generating innovation within ecosystems. Orchestrators play a key role in shaping the “rules of signification,” which collectively construct beliefs, practices, norms, and values that define what is considered meaningful within the ecosystem [27]. However, difficulties remain in aligning and coordinating these actors. As a result, authors have identified a gap in the literature and have called for advancing orchestration theory through the development of a competence-based orchestration model. In response, we argue for advancing theoretical contributions to orchestration by introducing the concept of individual orchestration competence, grounded in established competence theory and its developmental principles.

We further observe that much of the existing research has primarily focused on inter-actor relationships within ecosystems. In contrast, this study shifts attention to the individual level—the orchestrator—who actively influences ecosystem dynamics and formation. In this view, each actor within the quadruple helix functions as an orchestrator, and all actors collectively pursue shared goals and purposes.

Therefore, we propose the concept of individual orchestration competence, together with its associated attributes, from an ecosystemic perspective grounded in individual disposition for action and perception. Based on the literature discussed, we define orchestration competence as the integration of knowledge-based, skill-based, and attitudinal capacities that, when mobilized in actions related to the development, management, and coordination of innovation ecosystems, environments, and/or networks and innovation contexts by an individual orchestrator, enable effective articulation and interaction among ecosystem actors in a collaborative, interdependent, and co-creative manner.

We conceptualize innovation ecosystem orchestration as a configuration of roles and coordinated activities that, in specific contexts, shape, align, and govern interactions among interdependent actors and their surrounding environment, carried out by an orchestrator (individual). From this standpoint, orchestration competence is formed through orchestration dimensions understood as practice-based elements, where its attributes arise from the processes of orchestration themselves—namely practices and actions linked to both the roles performed by the orchestrator (functions) and the operational activities involved (work practices) (**Table 2**). These attributes consist of an integrated set of knowledge, skills, and attitudes that together constitute orchestration competence. Competence is not a static trait but is enacted in practice; it only becomes visible when individuals mobilize these attributes within situated action contexts.

The elements summarized in **Table 2** are derived from orchestration capacities identified in prior literature, which collectively enabled the identification of 33 distinct attributes of orchestration competence (**Figure 1**). The study extends existing theoretical approaches by shifting the analytical lens away from a framework centered on orchestrator roles and activities toward a competence-based ecosystemic model of orchestration. In this reconfiguration, orchestrator roles are not fixed categories but interconnected patterns that emerge from the relationship between individuals and their enacted actions. These roles actively shape ecosystem formation and dynamics and are inherently linked to orchestration competence attributes when the orchestrator (as an individual) operates within a specific situated environment.

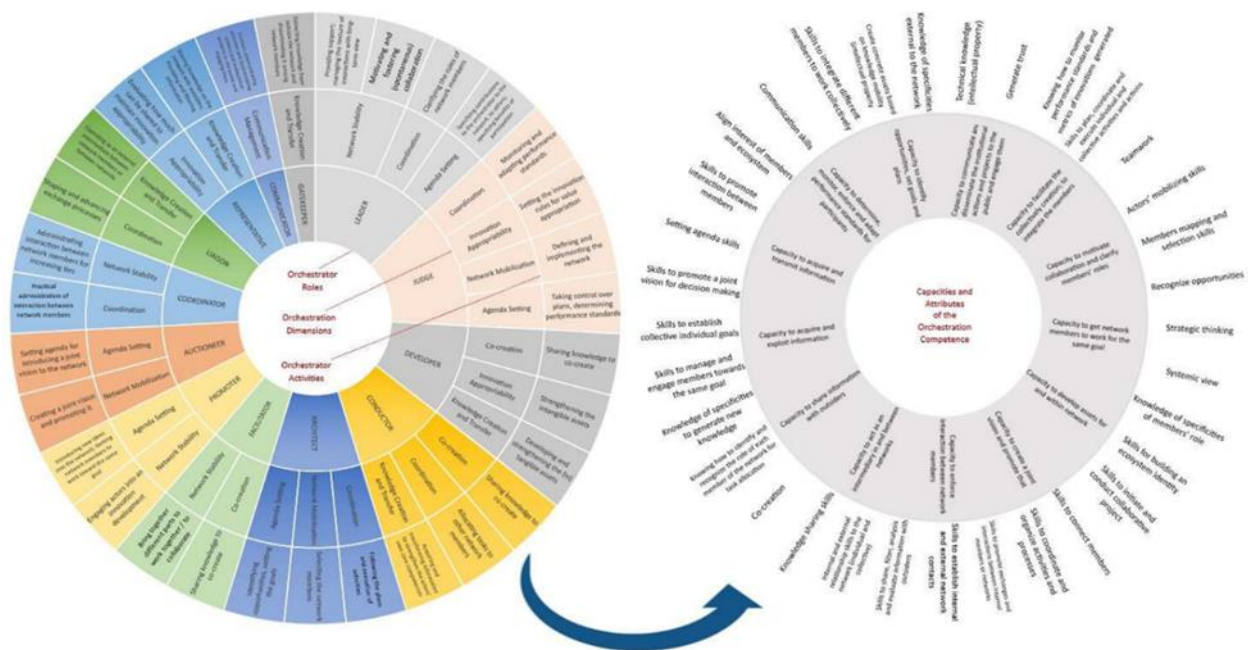


Figure 1. Theoretical model of individual orchestration competence in the innovation ecosystem. Source(s): Prepared by the authors based on [4, 5, 7, 8, 10, 17, 20, 28].

Individual orchestration competence theoretical model in the innovation ecosystem

The orchestrator occupies a key position in the early stages of ecosystem formation, where design, mapping, and analytical activities take place and later inform the development of guiding principles for the ecosystem [29]. Beyond this foundational role, the orchestrator also shapes the ecosystem's trajectory by planning initiatives that both stimulate member engagement and establish governance mechanisms [30].

As network configurations progressively evolve into innovation ecosystems, the concept of competence becomes increasingly relevant, understood as the activation of capacities rooted in knowledge, skills, and attitudes. In this setting, orchestration competence is required from the orchestrator, who coordinates actors and activities within a given innovation context or environment. This competence is not static but is expressed through a set of attributes that emerge across three interconnected levels: the orchestrator's individual actions, their interactions with ecosystem participants, and their engagement with the ecosystem as a collective system.

The Individual Orchestration Competence Theoretical Model (**Figure 1**) reorganizes the theoretical discussion linked to the constructs summarized in **Table 2**. It broadens the original framework—initially focused on orchestrator roles and activities aligned with orchestration dimensions—by shifting toward a competence-centered perspective. In this expanded view, orchestration competence attributes are derived from the orchestrator's principal roles and activities and are aligned with orchestration dimensions, building on the work of [4, 5, 7, 8, 10, 17, 20, 28].

Orchestration becomes evident as ecosystem actors actively participate and recognize the value generated through engagement [31]. The proposed model (**Figure 1**) advances theoretical insight by adopting a dynamic, ecosystem-oriented perspective in

which orchestration competence attributes are continuously constructed through the orchestrator's interactions with both actors and context. This also contributes to redefining how the orchestrator is conceptually understood.

Figure 1 shows the left side, which depicts the existing literature on orchestrator roles and activities, organized by orchestration dimensions. The right side illustrates orchestration capacities alongside 33 competence attributes, emphasizing that competence comprises multiple capacities that become effective only when their corresponding attributes are activated during specific actions. Overall, the model provides a conceptual framework for developing orchestration competence through training and practical guidance for managing and coordinating innovation ecosystems.

Conclusion

This paper introduces the concept of individual orchestration competence and identifies its main attributes, which are considered crucial for ecosystemic action within innovation ecosystems. From an ecosystem-oriented standpoint, this perspective integrates individuals' technical knowledge, skills, and creativity, while also emphasizing the interconnections with multiple actors and the complexity of their relationships. Such complexity requires mobilizing actors and contextual conditions through development-driven orchestration, management, and coordination of innovation ecosystems, all of which are facilitated by an orchestrator. Recent literature highlights orchestrators' diverse roles and activities in aligning actors and ecosystem environments, showing that they may assume multiple configurations and functions [4, 5].

We identified the need to advance the theoretical debate by extending orchestration models in networks and innovation ecosystems toward a competence-based perspective. Empirically, although orchestration—guided by an orchestrator—is recognized as essential in innovation ecosystems, there remains a limited and fragmented understanding of the competence involved, which has not been thoroughly addressed in the literature. We argue that this study moves beyond the traditional focus on orchestration roles and activities and enters a new domain: orchestration competence. This is conceptualized through an ecosystemic, dynamic model in which competence attributes are continuously formed through the orchestrator's interactions with both the context and other actors. Accordingly, we propose a new theoretical model (**Figure 1**) and a renewed conceptualization of the orchestrator.

We further argue that enhancing orchestration competence can increase both the number of orchestrators and the emergence of innovation ecosystems. In addition, developing this competence supports more effective orchestration practices within innovation ecosystems, enabling orchestrators to align strategies better and coordinate the involvement of all actors.

Based on the discussion presented in this paper, several theoretical contributions and practical and social implications are identified. The theoretical contributions include the formulation of the orchestration competence concept, the identification of its main individual attributes, and the development of a theoretical model (**Figure 1**). Moreover, the study proposes a shift in the orchestration framework in innovation ecosystems—from a focus on orchestrator roles and activities toward a competence-based perspective and its constituent attributes. This competence-based approach enables key ecosystem actors—governments, firms, and universities—to design training initiatives and learning environments to develop orchestration competence, ultimately contributing to the formation of a learning ecosystem. In summary, the study advances the orchestration discussion to a more granular level by focusing on individual-level competence and defining its constitutive attributes.

From a managerial perspective, the study emphasizes the orchestration competence required of innovation ecosystem orchestrators. It also aims to inform public policy initiatives and educational training programs by clarifying the attributes that compose orchestration competence. In doing so, it contributes to social implications by helping orchestrators better understand their role and relevance within innovation ecosystems, thereby supporting the broader expansion of such ecosystems as an external effect.

Regarding future research, we recommend empirical investigations involving interviews with orchestrators engaged in innovation ecosystem practices to capture their professional and operational realities, understanding their contextual conditions, and further exploring orchestration competence. Such studies may help identify additional competence attributes and validate those already reported in the literature, thereby strengthening and expanding the proposed competence model. Furthermore, we suggest developing practical training artifacts to foster orchestration competence and enhance orchestrators' performance within innovation ecosystems.

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References

1. Granstrand O, Holgersson M. Innovation ecosystems: A conceptual review and a new definition. *Technovation*. 2020;90-91:102098.
2. Thomas LDW, Ritala P. Ecosystem legitimacy emergence: A collective action view. *J Manage*. 2021;48(3):515-41.
3. Carayannis EG, Campbell DFJ. 'Mode 3' and 'quadruple helix': Towards a 21st century fractal innovation ecosystem. *Int J Technol Manage*. 2009;46(3-4):201-34.
4. Pikkariainen M, Ervasti M, Hurmelinna-Laukkanen P, Nätti S. Orchestration roles to facilitate networked innovation in a healthcare ecosystem. *Technol Innov Manag Rev*. 2017;7(9):30-43.
5. Dhanaraj C, Parkhe A. Orchestrating innovation networks. *Acad Manage Rev*. 2006;31(3):659-69.
6. Ritala P, Armila L, Blomqvist K. Innovation orchestration capability – defining the organizational and individual level determinants. *Int J Innov Manag*. 2009;13(4):569-91.
7. Hurmelinna-Laukkanen P, Nätti S. Orchestrator types, roles and capabilities – a framework for innovation networks. *Ind Mark Manage*. 2018;74:65-78.
8. Nilsen ER, Gausdal AH. The multifaceted role of the network orchestrator - a longitudinal case study. *Int J Innov Manag*. 2017;21(6):1-23.
9. Reypens C, Lievens A, Blazevic V. Hybrid orchestration in multi-stakeholder innovation networks: Practices of mobilizing multiple, diverse stakeholders across organizational boundaries. *Organ Stud*. 2021;42(1):61-83.
10. Mignoni J, Bittencourt BA, da Silva SB, Zen AC. Orchestrators of innovation networks in the city level: The case of Pacto Alegre. *Innov Manag Rev*. 2021;(3):1-17.
11. Valkokari K, Seppänen M, Mäntylä M, Jylhä-Ollila S. Orchestrating innovation ecosystems: A qualitative analysis of ecosystem positioning strategies. *Technol Innov Manag Rev*. 2017;7(3):12-24.
12. Hero L, Lindfors E, Taatila V. Individual innovation competence: A systematic review and future research agenda. *Int J High Educ*. 2017;6(5):103-21.
13. Marin-Garcia JA, Andres MAA, Atares-Huerta L, Aznar-Mas LE, Garcia-Carbonell A, Gonzalez-Ladron-de-Guevara F, et al. Proposal of a framework for innovation competencies development and assessment (FINCODA). *Work Pap Oper Manag*. 2016;7(2):119-26.
14. Keinänen MM, Kairisto-Mertanen L. Researching learning environments and students' innovation competences. *Educ Train*. 2019;61(1):17-30.
15. De Matos GP, Teixeira CS. As funções do orquestrador nos ecossistemas de inovação. *J Innov Sustain*. 2022;13(2):4-13.
16. Gomes LAV, Facin ALF, Salerno MS, Ikenami RK. Unpacking the innovation ecosystem construct: Evolution, gaps and trends. *Technol Forecast Soc Change*. 2018;136:30-48.
17. Hurmelinna-Laukkanen P, Möller K, Nätti S. Innovation orchestration: Matching network types and orchestration profiles. In: 27th Industrial Marketing and Purchasing Conference (IMP), Glasgow, UK, 1-3 September 2011. Industrial Marketing and Purchasing Group (IMP); 2011.
18. Ritala P, De Kort C, Gailly B. Orchestrating knowledge networks: Alter-oriented brokering. *J Manage*. 2023;49(3):1140-78.
19. Parmentier G, Mangematin V. Orchestrating innovation with user communities in the creative industries. *Technol Forecast Soc Change*. 2014;83:40-53.
20. Da Silva SB, Bitencourt CC. Orquestração de redes de inovação constituídas com o conceito de living lab para o desenvolvimento de inovações sociais. *Adm Pública Gest Soc*. 2019;11(2):178-94.
21. Ruas R. Gestão por competências: uma contribuição à estratégia das organizações. In: Ruas R, Antonello C, Boff L, eds. Os novos horizontes da gestão: aprendizagem organizacional e competências. Porto Alegre: Bookman; 2005.
22. Boterf G. Desenvolvendo a competência dos profissionais. Porto Alegre: Artmed; 2003.
23. Zabala A, Arnau L. Como aprender a ensinar competências. Porto Alegre: Artmed; 2010.
24. Sandberg J. Understanding human competence at work: An interpretative approach. *Acad Manage J*. 2000;43(1):1-29.
25. Antonello CS. Contextos do saber – a aprendizagem informal. In: Antonello CS, Godoy AS, eds. Aprendizagem Organizacional no Brasil. Porto Alegre: Bookman; 2011.
26. Tranfield D, Denyer D, Smart P. Towards a methodology for developing evidence-informed management knowledge by means of systematic review. *Br J Manage*. 2003;14(3):207-22.
27. Bonomi Santos J, Fernandes AR, de Oliveira PT, Mais LM, Partyka RB. Increasing entrepreneurial ecosystem-level outcomes through orchestration: A proposed framework. *Technovation*. 2023;128:102873.
28. Hurmelinna-Laukkanen P, Möller K, Nätti S. Orchestration innovation networks: Alignment and orchestration profile approach. *J Bus Res*. 2022;140:170-88.

29. Souza AR, Wegner D, Faccin K. Orchestration in innovation ecosystems pre-initiation stage. *Int J Innov Manag.* 2023;27(9&10):2350054.
30. Terrizzi G, Marino A, Cinici MC, Baglieri D. From fields to bytes: Orchestrating digital ecosystems in rural areas. *Sinergie Ital J Manag.* 2024;42(1):165-88.
31. Faccin K, Bittencourt BA, Machado L. Developing values-based innovation competences: An ecosystemic approach. *Int J Innov Manag.* 2022;26(5):2240005.