






Strategic conditions for the emergence of innovation ecosystems: Lessons from food and gastronomy

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ABSTRACT

The establishment of innovation ecosystems has become an increasingly prevalent strategy for fostering territorial, economic and social development. However, the existing literature provides limited insights into the strategic conditions that enable the emergence of such ecosystems. This paper addresses this gap by identifying the critical elements and mechanisms underpinning their creation. Specifically, it examines five leading food and gastronomy-focused innovation ecosystems in high-cost economies – Japan, Singapore, Denmark, the Netherlands, and Israel –.

Using a case study approach, the research draws on 53 in-depth interviews with key stakeholders engaged in each ecosystem. The paper offers several theoretical contributions. First, it assesses the extent to which the mechanisms of ecosystem emergence proposed in the literature align with empirical reality, revealing variations in their intensity and manifestation. Second, it identifies nine dimensions as the foundational determinants necessary for ecosystem formation. Third, it underscores the need for a governance shift from centralised orchestration to a more adaptive and dynamic network choreography. Finally, it advances the theoretical debate on ecosystem life cycles by demonstrating that the boundaries between phases of emergence and maturity are more blurred in practice than assumed in existing models, thereby calling for further refinement of ecosystem development theories.

1. Introduction

The increasing complexity of societal challenges necessitates collaboration among diverse organizations and stakeholders to drive the development of innovative solutions, goods, and services (Chesbrough, 2003; Enkel et al., 2009; Nambisan and Sawhney, 2011; Ooms and Piepenbrink, 2021; von Hippel, 2007). This scenario of wicked problems, where heterogeneous actors converge to address grand challenges, has led to the emergence of innovation ecosystems (Adner, 2006).

Innovation ecosystems generate a range of benefits that extend beyond the firms and institutions directly involved. They enable stakeholders to better understand and respond to evolving societal demands, enhance firm competitiveness, stimulate entrepreneurship and intrapreneurship, create new employment opportunities, and attract talent to

the territories where the ecosystems are anchored (Wikhamn and Styhre, 2023). Moreover, these benefits are not confined to the boundaries of the ecosystem itself but also generate positive externalities for the broader society and the territory as a whole (Bittencourt and Figueiró, 2019; Linde et al., 2021; Porter and Kramer, 2011). Consequently, fostering innovation ecosystems has become a key strategic objective for many regions (dos Santos et al., 2022).

While the concept has gained traction, there is ongoing debate regarding the extent to which these ecosystems can be deliberately designed versus emerging organically through complex interactions (Autio and Thomas, 2015; Chaudhary et al., 2024; Su et al., 2018). Some scholars argue that innovation ecosystems can be actively shaped through strategic interventions. For instance, Etzkowitz and Klofsten (2005, p. 254) suggest that, unlike biological ecosystems, which evolve

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through natural selection (Moore, 1993), innovation ecosystems emerge through ‘institution formation’ and deliberate policy and managerial action. This interventionist perspective is echoed by Ritala and Almpapoulou (2017), dos Santos et al. (2022), Jacobides et al. (2018), and Tsujimoto et al. (2018), among others.

However, the literature remains fragmented in explaining how innovation ecosystems emerge. Empirical studies examining their formation are limited, and existing research offers only partial explanations of the phenomenon (Dedehayir et al., 2018; Pushpanathan and Elmquist, 2022; Ritala and Gustafsson, 2018). Some studies adopt an ego-centric perspective, focusing on central organizations that drive ecosystem creation (Dattée et al., 2018; Pushpanathan and Elmquist, 2022; Walrave et al., 2018). In contrast, this research adopts a macro-level perspective, analysing ecosystem formation from a systems perspective (Klimas and Czakon, 2021; Rabelo and Bernus, 2015).

To address this gap, this study seeks to answer the following research question: What are the necessary conditions for the emergence of an innovation ecosystem in a high-cost economy? The research employs a multiple case study approach, drawing on 53 in-depth interviews with key stakeholders across five leading food and gastronomy-focused innovation ecosystems: Singapore, Japan, Denmark, the Netherlands, and Israel. These ecosystems represent diverse and comprehensive contexts, offering valuable insights and best practices that can inform the intentional creation of innovation ecosystems elsewhere.

Existing research on innovation ecosystems has primarily concentrated on high-tech industries, while sectors such as food and agriculture remain underexplored (Youtie et al., 2023; Panetti et al., 2023). Yet, food systems are strategic for most economies, where policies are increasingly being designed to foster resilience, sustainability, and innovation in response to environmental pressures and evolving consumer demands (Neuberger et al., 2023). The five ecosystems analysed in this study are actively developing novel solutions to the pressing challenges facing global food systems, including climate change, sustainability, and health-related concerns (Bogers et al., 2020).

Our findings demonstrate that the development of innovation ecosystems can follow multiple trajectories rather than conforming to a single model. The comparative analysis of the five ecosystems underscores the central role of shared leadership in enabling their formation and sustainability, particularly at the national level, where ‘choreography’ emerges as the most effective governance mode. Furthermore, while geographical proximity among actors is a key driver in the initial emergence of ecosystems, their reach and influence frequently extend to the global scale. The study also confirms that the positive externalities generated by ecosystem activities extend beyond their immediate boundaries, creating broader societal benefits. This observation raises a novel debate in the innovation ecosystem literature regarding the scope and intensity of ecosystem outcomes. Finally, our evidence suggests that ecosystem evolution does not unfold through sharply delineated stages, as theory often implies, but rather through more fluid transitions that challenge the rigid phase distinctions commonly assumed in existing frameworks.

The remainder of this manuscript is structured as follows: Section 2 outlines the theoretical background and conceptual foundations of innovation ecosystems. Section 3 details the research methodology, describing the case study approach and the data collection process. Section 4 presents the empirical findings, first examining each ecosystem individually before offering a comparative analysis that addresses the research question guiding the study. Section 5 discusses the implications of the findings for theory and for the management of innovation ecosystems, while also identifying future research avenues. Finally, Section 6 concludes the paper.

2. Theoretical background

This section provides an overview of the concept of innovation ecosystems, their constituent actors, and internal dynamics. It then

examines the developmental phases of ecosystems and the main strategic activities underpinning their emergence. Finally, it explores the geographical boundaries of innovation ecosystems and their spheres of influence.

2.1. Defining innovation ecosystems, actors and internal dynamics

Despite being a widely used concept, there is no consensus in the literature on a unified definition of innovation ecosystems (Ritala and Almpapoulou, 2017; Su et al., 2018). Since Adner (2006) first characterised them as collaborative networks of firms with complementary capabilities that jointly develop solutions to customer needs, the concept has evolved, incorporating multiple perspectives.

Among the most comprehensive definitions, Nambisan and Baron (2013, p. 1071) describe innovation ecosystems as “a weakly interconnected and interdependent network of firms that develop their capabilities around a shared set of technologies, knowledge or competencies, and that work competitively and collaboratively for the development of new products and services”. Granstrand and Holgersson (2020, p. 3) similarly define them as “the evolving set of actors, activities, and artifacts, and the institutions and relations, including complementary and substitute relations, that are important for the innovative performance of an actor or a population of actors”. In turn, Bogers et al. (2019) emphasize the interdependent and self-interested nature of these actors, who jointly create value through innovation.

A central characteristic of innovation ecosystems is their networked and evolving nature, where actors interact, co-evolve, and adapt to changes in the external environment (Autio and Thomas, 2015; Bittencourt et al., 2021; Cinelli et al., 2019; Nambisan and Sawhney, 2011). Almpapoulou et al. (2019, p. 41) define innovation ecosystems as “systems that focus on innovation activities (goal/purpose), involve the logic of actor interdependence within a particular context (spatial/dimension) and address the inherent co-evolution of actors (temporal dimension)”. This study adopts the latter approach, which integrates the structural, spatial, and temporal dimensions of ecosystem development. Along the same lines, we consider that the perspective “ecosystem-as-structure”, which provides a valuable analytical lens for identifying ecosystem boundaries, is the most suitable for this study as it enables the characterization of which activities and actors are integral to the ecosystem and which lie outside its scope (Adner, 2016). Additionally, it helps determine whether an ecosystem truly exists, as the coherence and clarity of the value proposition serve as key indicators of ecosystem definition and legitimacy.

Actors within innovation ecosystems engage in coordinated interactions, where coherence – the alignment of their behaviors with the ecosystem’s broader strategic vision – is essential for effective functioning (Tsujimoto et al., 2018). While actors remain interdependent (Adner and Kapoor, 2010; Iansiti and Levien, 2004a; Teece, 2007), they do not operate under hierarchical control (Jacobides et al., 2018). Instead, they form fluid and adaptive ‘boiling’ environment characterised by continuous knowledge exchange and asset flows, both tangible and intangible (Shaw and Allen, 2018), which ultimately drive ecosystem emergence (Bittencourt et al., 2021).

A key feature of innovation ecosystems is the simultaneous presence of cooperation and competition, as firms and institutions collaborate to drive innovation while seeking competitive advantage (Feser, 2022; Hannah and Eisenhardt, 2018; Linde et al., 2021; Ritala and Hurmelinna-Laukkanen, 2009). As ecosystems evolve, their actors co-specialize (Adner and Kapoor, 2010) and co-evolve (Teece, 2007), continuously adapting to external dynamics.

The typology of actors in these networked ecosystems is very diverse

¹ In contrast to other conceptual approaches such as ecosystem-as-affiliation or ecosystem-as-coevolution, the authors have chosen the ecosystem-as-structure perspective for the reasons mentioned below.

(Carneiro Zen et al., 2023), including, among others (Bittencourt and Figueiró, 2019; Granstrand and Holgersson, 2020; Mäkinen and Dedehayir, 2013; Ritala and Thomas, 2025): companies, startups, knowledge generation centers – universities and technology centers –, public entities and living labs. The permeability of ecosystems to new entrants and the strength of connections among actors vary depending on contextual factors (Cinelli et al., 2019; Gulati et al., 2012), such as industry characteristics, governance structures, and technological trajectories.

2.2. Phases in the development of innovation ecosystems

Innovation ecosystems typically progress through four fundamental developmental stages: birth, expansion, leadership, and self-renewal (Moore, 1993). According to this interpretation, an ecosystem goes through an initial phase where the societal or market needs to be addressed are identified, a shared vision is created, fostering early connections among actors, initial participants are attracted, the possible ways to develop new products and services that satisfy the identified needs arise, and their commercialization occurs (Chen et al., 2014; Dedehayir and Seppänen, 2015; Neuberger et al., 2023; Thomas et al., 2022).

Then they go through an expansion phase, where the market grows, the relationships between the ecosystem members are strengthened, the participants co-evolve with their external environment, ecosystem leaders emerge, and the competitive dynamics of the ecosystem, both within the ecosystem and in relation to other ecosystems, gain relevance (Chen et al., 2014; Thomas et al., 2022). Along the same lines, Dedehayir and Seppänen (2015, p.147) state that “ecosystems expand into new territories of application”, which may stimulate rivalry with other ecosystems.

They progress to a leadership, or consolidation, stage where the ecosystem reaches maturity, networks grow further, benefits are generated and the sphere of influence of the ecosystem expands beyond its original scope. In this leadership phase, the legitimacy of the ecosystem is also established (Thomas et al., 2022). Finally, ecosystems reach a phase of self-renewal (or decline), where they are challenged by contemporary unforeseen disruptions, requiring adaptation (Gómez Uranga et al., 2014). Ecosystems that successfully restructure and innovate regenerate, while those unable to do so risk dissolution.

According to Dedehayir and Seppänen (2015), the birth phase is particularly critical, as decisions made at this stage shape both the value proposition and the long-term evolutionary trajectory of the ecosystem (Adner, 2016; Thomas et al., 2022). Given that ecosystem formation involves uncertainty and risk (Seidel and Greve, 2017), the ability to maintain alignment among stakeholders while navigating challenges is vital.

2.3. Main activities aimed at the creation of innovation ecosystems

Understanding the mechanisms underlying the creation of innovation ecosystems requires first addressing the question of who leads this process (Adner and Kapoor, 2010; Iansiti and Levien, 2004a, 2004b). This remains a contested topic in the literature, as leadership dynamics are critical for ecosystem health and sustainability (Heaton et al., 2019).

Scholarly debates consider that companies, as one of the main beneficiaries of the activities rolled out within the ecosystem, are responsible for exercising this central role (Adner, 2006; Adner and Kapoor, 2010; Autio and Thomas, 2015). Moreover, there is a subset of the literature that focuses on (innovation) platforms as tools through which this leadership function can be exercised (Cusumano and Gawer, 2002). In contrast, Brito (2018, p. 14) identifies universities as the ideal actors to play this role because they “are increasingly recognised as promoters of innovation, economic growth and regional development”. Public entities can also sometimes occupy this leading position (Adner and Kapoor, 2010). In turn, other authors consider that collective leadership

models, where multiple actors share governance responsibilities, are increasingly seen as essential sustainable ecosystem development (Almpanopoulou et al., 2019; Sahasranamam et al., 2024).

The recipe for the creation of ecosystems is made up of numerous ingredients. These ingredients are none other than the actions to be promoted and implemented for the traction of ecosystems. As we discuss below, these can be grouped into three main typologies: actions related to the strategic framework, actions focused on the governance and management of the ecosystem, and actions aimed at building what could be considered the ‘enablers’ for this creation.

At the strategic level, a clear and shared vision or goal is essential to align stakeholders and define the value proposition of the ecosystem (Cohen et al., 2016; Dedehayir et al., 2018). Some scholars refer to this as a “value proposition to the market” (Daymond et al., 2022; Wikhamn and Styhre, 2023), which serves as the guiding principle for ecosystem development. Likewise, identifying and retaining key stakeholders who contribute to the shared vision (Chesbrough and Appleyard, 2007) is of vital importance to contribute to the development of this shared objective (Daymond et al., 2022). To this end, it is essential to understand participant motivations to ensure long-term engagement (von Hippel, 2005). Another aspect to be worked on by the leading organization(s) is to ensure coherence between macro-level stability and micro-level flexibility (Bittencourt et al., 2021; Nambisan and Sawhney, 2011; Ritala et al., 2012), allowing ecosystem actors to operate with autonomy while maintaining strategic alignment (Daymond et al., 2022; Gomes et al., 2022b; Han et al., 2022). Finally, it is important to develop actions that allow traction to the ecosystem itself when environments are changing and complex (Gomes et al., 2022a) and there is a phase of great uncertainty, both market and technological (Dattée et al., 2018). In turn, the ecosystems themselves are embedded in diverse settings and, consequently, it is relevant to manage the relationships with external environments, ensuring that the ecosystems remain contextually relevant and integrated with broader innovation landscapes (Walrave et al., 2018).

At the governance level, effective ecosystem governance requires orchestrating interactions among diverse actors, ensuring that resources – both tangible (e.g., funding, technology) and intangible (e.g., knowledge, trust, legitimacy) – are allocated efficiently (Dedehayir et al., 2018; Drori and Lavie, 2024; Surie, 2017; Thomas et al., 2022; Wikhamn and Styhre, 2023). This demands, first, understanding and managing ‘value creation’ and ‘value capture’ strategies within the ecosystem (Adner and Kapoor, 2010; Dedehayir et al., 2018; Gomes et al., 2018; Ritala et al., 2013). A special focus needs to be given to knowledge management, ensuring that collective learning and innovation diffusion take place (Brito, 2018; Daymond et al., 2022; Dedehayir et al., 2018). On this same plane, the creation of a common language reduces misunderstandings and fosters efficient knowledge exchange across ecosystem actors (Thompson et al., 2018).

As regards the management of the ecosystem, another set of actions include: the generation of trust (Autio and Thomas, 2015; Brito, 2018; Daymond et al., 2022; Porto Gómez et al., 2016; Wikhamn and Styhre, 2023), the alignment of the interests of the various stakeholders (Bittencourt et al., 2021; Bogers et al., 2019; Nguyen and Marques, 2022), ensuring that ecosystem members perceive mutual benefits in participating, or the proactive management of both their expectations (von Hippel, 2005) and the conflicts that arise over time (Daymond et al., 2022). Balancing individual and collective goals is particularly complex, yet fundamental to ensuring ecosystem longevity and sustainability (Daymond et al., 2022; Nambisan and Baron, 2013).

Ecosystem creation also requires supporting instruments and enabling mechanisms, which facilitate collaboration, experimentation, and scale-up. According to the literature, elements such as living labs can boost the creation and consolidation of ecosystems (Fauth et al., 2024). Living labs serve as real-world testing environments where users and stakeholders co-create and experiment with new solutions (del Vecchio et al., 2017). These environments accelerate ecosystem

development by integrating real-time feedback into innovation cycles (Almirall et al., 2012). In turn, the creation of infrastructures (Wikhamn and Styhre, 2023), or support structures for the ecosystem, including incubators, accelerators, funding programs, research hubs and technological platforms, which facilitate interaction and knowledge-sharing, are also to be managed to create the desired innovation-friendly environment (Daymond et al., 2022). Finally, communication and dissemination strategies ensure that ecosystem achievements are visible both internally (among members) and externally (to attract new actors, investment, and legitimacy) (Wikhamn and Styhre, 2023).

These strategic, governance, and enabling activities collectively form the foundation of comprehensive innovation ecosystems. The framework outlined above (summarised in Table 1) serves as a theoretical basis for understanding how ecosystems emerge, evolve and sustain themselves over time. This framework is the fundamental pillar of the methodology that will be presented in Section 3.

2.4. Boundaries of the innovation ecosystems

As with other key aspects of innovation ecosystems, the definition of their boundaries and sphere of influence remains a subject of extensive debate. On one side, some scholars argue that geographical boundaries do not necessarily define the scope of an ecosystem (Tsujimoto et al., 2018). Similarly, Valkokari (2015, p. 18) states that “in the real world, present-day ecosystems are global, and setting ecosystem borders is a complicated issue.” Scaringella and Radziwon (2017, p. 7) further assert that innovative products and services can be developed by companies from different industries that are in close geographical or cognitive proximity. However, while firms may cluster within certain locations, their sphere of influence extends globally as they engage in cross-border collaborations and market interactions.

On the other side, other scholars emphasize the importance of spatially bounded ecosystems. Carneiro Zen et al. (2023) distinguish between spatial ecosystems, where geographical boundaries are a defining characteristic, and non-spatial ecosystems, where territorial constraints are less relevant. Dias Sant’Ana et al. (2020) propose a multi-level classification of ecosystems, categorizing them as national (macro), regional (meso), or local (micro). Pombo-Juárez et al. (2016) extend this classification by incorporating international ecosystems, acknowledging the increasing globalization of innovation networks.

Table 1
Conceptual framework: activities and enablers for the foundation of an innovation ecosystem.

Actions related to the strategic level	Actions related to the management of the ecosystem	Enablers
To establish a common objective	To ensure the shared creation and capture of value	To create a living lab for ecosystem development
To identify and attract key actors	To organize all the resources towards a common goal	To create new structures to support the ecosystem,
To provide stability (strategy, objectives) to the network	Knowledge management for driving innovation	To carry out communication activities
To manage uncertainty within the ecosystem	To foster trust among all stakeholders	
To manage external uncertainties	To establish a common language	
	To align the interests of all participants	
	To manage the expectations of all actors	
	To address conflicts that have arisen over time	
	To achieve a balance between individual and community goals	

Source: own elaboration.

Similarly, Klimas & Czakon (2022, p. 2250) highlight that innovation ecosystems are highly contextual, with both national and industry-specific factors shaping their evolution (see also Beliaeva et al., 2019; Suurs and Hekkert, 2009).

Given the complexity of ecosystem boundaries, this study adopts a national-level perspective in analysing ecosystem emergence. The decision to anchor the unit of analysis at the national level allows for a manageable and structured examination of the key elements and conditions required for ecosystem formation. However, recognizing the global reach and interconnectedness of innovation ecosystems, the analysis also considers spillover effects and transnational influences, following the approach outlined by Scaringella and Radziwon (2017). This perspective aligns with Oh et al. (2016), who identify four key characteristics that distinguish innovation ecosystems from earlier constructs such as national innovation systems: (i) the philosophy of open innovation, emphasizing cross-organizational knowledge flows; (ii) evolutionary dynamics, highlighting the continuous adaptation of ecosystem structures; (iii) high interaction density, where ecosystem participants engage in frequent and intensive exchanges; and (iv) diversity of actors, encompassing firms, research institutions, policy-makers and other stakeholders. Granstrand and Holgersson (2020) further reinforce this distinction by emphasizing the dual nature of collaboration and competition within ecosystems, which transcends geographical boundaries.²

3. Methodology

3.1. Research design

Innovation ecosystems represent a complex and dynamic phenomenon, requiring methodological approaches capable of capturing their multi-dimensional nature. Given this complexity, this study employs a multiple case study methodology, which is particularly suitable for analysing complex and context-dependent realities (Bittencourt et al., 2021; Eisenhardt and Graebner, 2007; Goffin et al., 2019; Tsujimoto et al., 2018; Yin, 2018).

The research builds upon the analysis of five innovation ecosystems in the field of food and gastronomy, located in Denmark, the Netherlands, Israel, Japan and Singapore (see Table 2). These ecosystems emerged from a three-step process. First, a panel of 10 globally recognised experts in food and gastronomy innovation was consulted. These experts, holding leadership positions in academia, industry, clusters and startups, were asked to identify key global benchmark food and gastronomy ecosystems.³ To validate expert recommendations, these results were triangulated with various socio-economic indicators, confirming the relevance of the selected ecosystems (see Appendix 2).

According to the experts consulted, each selected ecosystem exhibits distinctive strengths that contribute to its role as an innovation ecosystem in food and gastronomy. Denmark is recognised for its exceptional concentration of high-quality restaurants, world-class universities, the ‘New Nordic Culture’ (i.e., a movement to redefine the gastronomy and food sector), substantial research funding, and robust networks among academia, startups and the food industry. The Dutch case is home to Food Valley,⁴ a globally recognised agrifood innovation hub that integrates public institutions, startups and corporates. The

² Since we have limited the scope of the studied ecosystems to the national level, our unit of analysis could be confused with that of a national and sectoral innovation system (Pushpanathan and Elmquist, 2022). For a discussion about the similarity among these concepts, their differences and their relative contribution to academia, see Spigel and Harrison (2018), or Doloreux et al. (2019).

³ Appendix 1 provides the list of ecosystems identified by each of the consulted experts, together with their personal characteristics.

⁴ See <https://foodvalley.nl/en/> (Accessed August 2025).

Table 2
Typology of interviewees.

Country	Universities/Technology Centers	Corporates	Startups & SMEs	Accelerators/Incubators	VC's & Funding entities	Public entities	Others (*)	Total
Japan	1	5	2	3		1		12
Singapore	3	1	1	2	1		1	9
Denmark	2	1	4	1	1		6	15
The Netherlands	2	3	3	1			1	10
Israel	3		3				1	7
Total	11	10	14	7	2	1	9	53

(*) The category 'others' includes: associations, clusters, NGOs and innovation intermediaries.

Source: own elaboration.

Netherlands excels in food science, technology and agrifood leadership. Israel is notable for its cutting-edge advancements in food science and technology, a thriving startup ecosystem, the constant outflow of products that are being launched to the market, strong investment flows and pioneering agriculture technology solutions. Japan is a global reference in gastronomic culture and craftsmanship, supported by strong university-based fundamental research, proactive government-led (open) innovation initiatives and advanced food-related technological capabilities. Finally, Singapore represents a diverse gastronomic hub, actively fostering entrepreneurship and culinary innovation. It leads in food science and technology, including cell-based meat and alternative protein solutions, shaping the future of the food industry.

To empirically assess whether the dimensions identified in the literature in relation to ecosystem emergence do or do not occur in these five realities, a structured questionnaire was prepared (Appendix 3). This detailed questionnaire was grounded in the theoretical dimensions identified in Section 2, integrating both closed-ended and open-ended questions. The overall approach to the methodology followed in the research is detailed in Fig. 1.

The questionnaire was sent in advance to interviewees who confirmed participation. Interviews were conducted with key stakeholders in each ecosystem, selected, in a first step, through the expert referrals from the initial consultation phase, second, through snowball sampling (Noy, 2008), where interviewees recommended additional relevant stakeholders, and third, through LinkedIn searches to complement expert recommendations and ensure broad sectoral representation.

Face-to-face and online interviews were conducted between October 2023 and April 2024, following a structured (i.e., closed-ended questions that required specific answers to complement what was said in the questionnaire) and semi-structured (i.e., open-ended discussions to contextualize and deepen responses) format. Interviews were transcribed in real-time, with interviewees validating the transcription during the interview to ensure accuracy. As a result, no additional post-interview coding was required.

The interviews had an average duration of 60 min, although some lasted up to 2 h, with the shortest taking around 45 min. Cross-checking of the main statements was carried out, both during the interviews and after their transcription, so the interviewees who participated in the study could confirm their veracity (Dattée et al., 2018).⁵

A total of 53 interviews were conducted, distributed as follows: 12 in

⁵ A caveat to this methodological approach should be mentioned, which has been presented in Japan. In that country, at the request of the interviewees, the information was obtained in written form only, except for two interviews that were conducted online. Namely, the identified individuals preferred to answer the questionnaire without the physical presence of the research team. Before the person answered the questionnaire, a face-to-face meeting was held, in which the research team introduced itself, the general framework of the research was presented and the general lines of the work of the organization in which the person works were explained, generating an appropriate space of trust prior to receiving her/his vision of the ecosystem.

Japan, 9 in Singapore, 15 in Denmark, 10 in the Netherlands and 7 in Israel. Interviewees held senior leadership positions across various sectors, ensuring a diverse representation of stakeholders (see Table 2).⁶

3.2. Data analysis

While one of the authors conducted the interviews, a second author produced a verbatim transcript in real time. Drawing on the dimensions outlined in the conceptual framework (Table 1), all authors independently reviewed the transcripts and identified the main drivers of the emergence of each ecosystem. Grounded theory was used as the methodological approach guiding the analysis of the empirical data, as it is particularly well-suited for inductively discerning patterns, identifying salient themes, and uncovering relationships among them (Charmaz, 2014). We acknowledge that our use of grounded theory does not correspond to its strict form, since the interview guide was partially informed by dimensions identified in the innovation ecosystem literature. Rather, our analysis follows a grounded theory-inspired strategy (Suddaby, 2006; Gioia et al., 2013), in which prior research served as a sensitizing device while the empirical analysis foregrounded the interpretations of ecosystem actors and facilitated the emergence of new theoretical insights.

The two core principles of grounded theory informed our analysis, namely: constant comparison, whereby data are iteratively compared across cases and against emerging conceptual categories; and theoretical sampling, in which the evolving theoretical insights guide subsequent data collection and refinement (Suddaby, 2006). The preliminary interpretations of each author were then subjected to a process of collective discussion until analytical consensus was reached.

The analysis of the five ecosystems was structured into three analytical blocks, designed to capture different facets of ecosystem emergence. The moment at which the ecosystem begins to emerge in each of the territories has been established according to the vision of the interviewees (Section 4.1). The timing of ecosystem emergence was thus determined based on interviewees' retrospective accounts, rather than on archival data or statistical benchmarks. In relation to this point, three analytical blocks have been analysed.

The first block assessed the territorial conditions preceding ecosystem emergence, focusing on: collaborative and entrepreneurial culture (Grama-Vigouroux et al., 2022; Harms and Groen, 2017; Spigel, 2017), diversity of actors (Rabelo and Bernus, 2015), capabilities of the human factor (Bittencourt et al., 2021), institutional factors supporting innovation and availability of funds (Rabelo and Bernus, 2015) and favorable legislation (Almpanopoulou et al., 2019).

Each aspect was evaluated on a Likert scale (1–9), where one reflects absolute disagreement and 9 absolute agreement (see the questionnaire in Appendix 3). A consensus was considered reached when the score exceeded the mean by at least one point. The results, expressed as percentages, are detailed in Table 3 (Section 4.2).

⁶ Appendix 4 provides additional information about each interviewee.

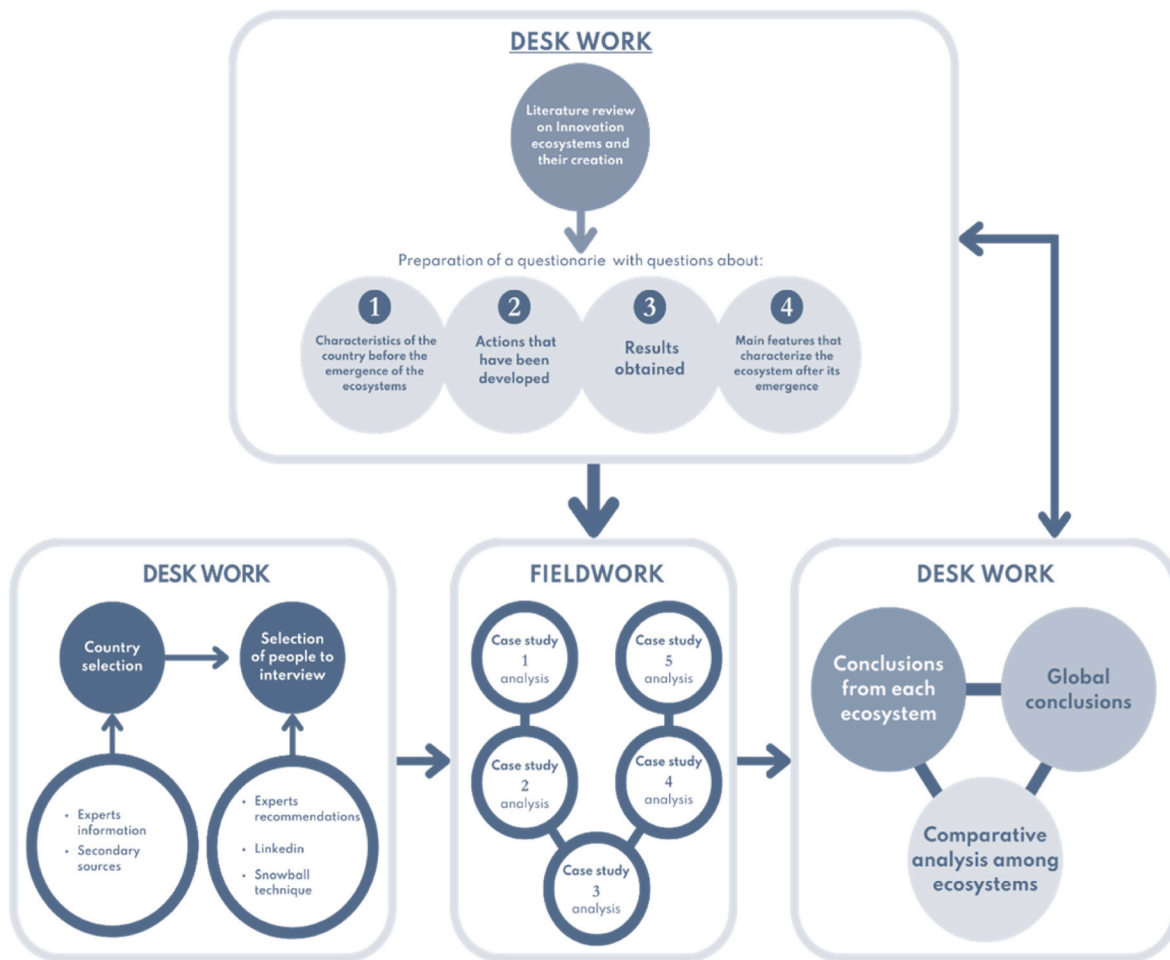


Fig. 1. Methodological process.
Source: own elaboration.

The second block – central to the research – examined the key strategic actions that facilitated ecosystem formation. These activities, drawn from the conceptual framework in Section 2, were analysed using a Likert scale (1–9; 1 strongly disagree and 9 strongly agree) to assess the level of agreement among respondents. Again, to assess whether there was consensus on each action being examined, a threshold-based approach was followed, identifying actions where the average score exceeded the mean by at least one point, signalling stronger agreement. The findings, summarised in Table 4 (Section 4.2), highlight the specific actions perceived as essential for ecosystem emergence.

The third analytical block assessed the long-term impacts and transformations within the five ecosystems (see Tables 6 and 7 in Section 4.2). The analysis covered: economic results (Bittencourt et al., 2021; Dedehayir et al., 2018; Porter and Kramer, 2011; Thomas and Autio, 2020), scientific outputs (De Silva and Wright, 2019; dos Santos et al., 2022; Etzkowitz, 2001), entrepreneurial dynamics (De Silva and Wright, 2019; Etzkowitz, 2001; Porter and Kramer, 2011; Seidel and Greve, 2017; Thomas and Autio, 2020; Thompson et al., 2018), talent attraction and retention (Etzkowitz, 2001; Grama-Vigouroux et al., 2022; Wikhamn and Styhre, 2023), legislative changes favoring innovation (Almpanopoulou et al., 2019), startup ecosystem development (Thompson et al., 2018) and investment and funding (ibid).⁷

⁷ We consider entrepreneurial activity to be a fundamental driver of innovation ecosystems (Radosevic and Yoruk, 2013). Accordingly, the creation of new ventures is vital for the expansion of any ecosystem.

The final stage of the analysis examined the structural evolution of each ecosystem, once the previous actions have been developed (Table 8 in Section 4.2). In this analysis we explore the degree of interdependence between actors (Adner and Kapoor, 2010; Iansiti and Levien, 2004b; Teece, 2007), the degree of strength in the connections between them (Cinelli et al., 2019), their degree of openness (Gulati et al., 2012; Jacobides et al., 2018; Nambisan and Sawhney, 2011), the impact of the ecosystem stakeholder evolution (Adner and Kapoor, 2010; Hannah and Eisenhardt, 2018; Linde et al., 2021; Feser, 2022; Ritala and Thomas, 2025; Teece, 2007), and decision-making structures and governance models (Cinelli et al., 2019; dos Santos et al., 2022; Nambisan and Sawhney, 2011; Provan and Kenis, 2008). The same considerations as in previous sections have been followed to highlight those results that bring together a greater consensus.

4. Empirical findings and analysis

This section presents the key empirical results from the study. Section 4.1 provides a detailed synthesis of each ecosystem, drawing on the interview data. Section 4.2 offers a comparative analysis, highlighting similarities and divergences across ecosystems. Finally, Section 4.3 distils the key determinants underpinning the emergence of innovation ecosystems.

Table 3
Characteristics of the country before the emergence of the ecosystem (in %).

Dimension	Japan	Singapore	Denmark	The Netherlands	Israel
Collaborative culture (Grama-Vigouroux et al., 2022; Warner, 2006)	46	58	53	67	87
Entrepreneurial culture (Grama-Vigouroux et al., 2022; Harms and Groen, 2017; Harms and Groen, 2017)	53	58	56	75	100
Wide variety of actors: universities, large and small companies, startups (Rabelo and Bernus, 2015)	60	65	52	68	82
Financing innovation (Rabelo and Bernus, 2015)	33	51	48	67	81
High professional skills in the food field (Bittencourt et al., 2021)	63	50	63	75	81
Existence of favorable regulatory settings (Almpanopoulou et al., 2019).	45	58	35	62	63

Note: Each cell shows the percentage of respondents who agree with that statement.

Source: own elaboration.

4.1. Detailed presentation of the results for each ecosystem

4.1.1. The food and gastronomy ecosystem of Japan

A slight majority of respondents (55 %) indicate that Japan's food and gastronomy innovation ecosystem emerged approximately five years ago and is still in its early birth phase. Several interviewees identify the Smart Kitchen Summit Japan as a key catalyst for ecosystem development (Garud et al., 2014).⁸

The Japanese ecosystem is characterised by distributed leadership, involving corporations, startups, universities, government agencies, and visionary individuals. However, the absence of a clearly defined common goal remains a challenge. While interviewees point to different drivers, key objectives mentioned include⁹: “the contribution to sustainable development goals” (JLE1), “avoiding food waste” (JS1), “the development of delicious yet sustainable food” (JA1), “the creation of smart food value chains, improving livelihoods, promoting balanced diets for the Japanese population and increasing Japanese startup activity” (JG1).

Before its emergence, Japan already possessed a diverse pool of actors and highly qualified professionals, serving as a strong foundation (see Table 3 in Section 4.2). However, few targeted actions have been implemented to support the ecosystem's growth (Table 4, Section 4.2), primarily led by the public sector and private firms, with limited contributions from universities.

Despite these challenges, interviewees perceive positive socio-economic outcomes, beyond those listed in Tables 6 and 7 (Section 4.2). These include: “the exponential growth of the ecosystem” (JS1), “the promotion of agriculture, the food industry, the food service sector, which are crucial for regional economic development, job creation, and ensuring a sustainable food supply” (JU1), and a “shift in consumers'

mindset towards healthier and more sustainable food choices” (JA1).

Stakeholders' motivations for participating in the ecosystem reflect a combination of economic incentives and aspirational goals (von Hippel, 2005). Some of the interviewees indicated that the rationales to be part of this environment are: “economic, ecological and social” (JS1), “to access accurate knowledge about the future of food” (JS1), “the search for glamour” (JLE2), “preserving Japan's own culinary heritage” (JLE2), “the desire to see new technologies emerging from Japanese startups and to stimulate and improve the Japanese ecosystem further to make it more competitive globally” (JG1), “knowledge sharing” (JA3), and “international visibility, guidance and support” (JS2).

Most interviewees agree that Japan's ecosystem boundaries are largely national, influenced by language barriers and geographical isolation. Looking ahead, interviewees acknowledge that significant development is still needed: “the movement is still somewhat disorganised, lacking a common goal and a shared language” (JA3) and “despite private entities have recently begun tackling a broader range of issues, private sector efforts are still fragmented and lack coordination” (JU1).

4.1.2. The food and gastronomy ecosystem of Singapore

56 % of the interviewees indicate that Singapore's innovation ecosystem emerged five to six years ago and is still in a nascent phase. Its core strategic objective is defined by the government's “30 by 30” initiative, which emphasizes the following pillars¹⁰: food security, food safety, and self-sufficiency in food production. The COVID-19 pandemic amplified awareness of Singapore's vulnerability in food supply chains, reinforcing the government's role as the central driving force of the ecosystem, with secondary contributions from universities and private firms.

Singapore's pre-existing conditions were favorable for ecosystem emergence, including: a strong entrepreneurial and collaborative culture, the existence of strategic policy frameworks supporting food innovation, favorable regulatory conditions and a diverse set of actors (Table 3, Section 4.2). It should be noted that a great majority of the key actions identified in the literature were implemented in Singapore (Table 4, Section 4.2), contributing to positive socio-economic impacts (Tables 6 and 7, Section 4.2). Beyond economic benefits, interviewees highlight “a healthier and more sustainable diet is being promoted, raising the national standard of living” (SU2).

The main motivations for ecosystem participation include: “participating in the development of new products” (SU1), “being at the forefront of innovation” (SU1), “obtaining economic returns” (SU2, SU3, SA2, SS1), “participating in the transformation of the food system” (SO1), or “addressing climate change” (SS1). Finally, the boundaries of the ecosystem transcend the borders of the country itself, as Singapore is seeking to become a reference for the whole of Southeast Asia.

4.1.3. The food and gastronomy ecosystem of Denmark

60 % of interviewees identify the early 2000s as the period when Denmark's food innovation ecosystem began to take shape, with the “New Nordic Food Manifesto”¹¹ acting as a pivotal catalyst. This manifesto, spearheaded by visionary chefs, farmers, policymakers, and industry representatives, sought to establish Nordic cuisine as a global benchmark. This declaration was presented in 2004 in Copenhagen, at a congress attended by chefs, farmers, politicians and representatives of the entire “gastro-food” chain in the Nordic countries, with two chefs standing out in this movement. This manifesto led to the creation of a shared and inspiring vision that acted as a catalyst for the ecosystem and, subsequently, dragged different actors. It is worth mentioning that

¹⁰ 30 by 30 strategy. See <https://www.sfa.gov.sg/search?q=%2230%20by%2030%20vision%22&tab=all> (Accessed August 2025).

¹¹ New Nordic Food Manifesto. See <https://www.norden.org/en/informatio/n/new-nordic-food-manifesto> (Accessed August 2025).

⁸ See <https://unlocx.tech/sksj2025/en/> (Accessed August 2025).

⁹ See the codes used to identify each of the interviewees in Appendix 4.

Table 4
Main actions that promote the emergence of ecosystems (in %).

Dimension	Japan	Singapore	Denmark	The Netherlands	Israel	Total (*)
1. A common objective has been defined so that the territory works towards it (Cohen et al., 2016; Dedehayir et al., 2018; Drori & Lavie, 2024)	58	100	53	80	57	Yellow
2. Key actors have been identified to develop the ecosystem, and they have been invited to participate (Chesbrough & Appleyard, 2007)	75	100	73	90	86	Green
3. Actions/strategies have been developed to ensure that everyone contributes to the creation of value within the ecosystem. (Adner & Kapoor, 2010; Ritala, et al., 2013)	50	89	60	90	86	Green
4. Actions/strategies have been developed for all participants to capture a share of the value generated, both in economic and non-economic terms (Adner & Kapoor, 2010; Gomes et al., 2018; Ritala et al., 2013)	33	56	13	50	71	Red
5. Resources, both tangible and intangible, contributed by all participants, have been organised towards a common goal (Dedehayir et al., 2018; Thomas et al., 2022)	42	78	27	80	57	Yellow
6. Actions have been designed/implemented for knowledge management with the aim of driving innovation (Brito, 2018; Clarysse et al., 2014)	42	78	80	80	57	Yellow
7. Actions have been implemented to foster trust among all stakeholders (Autio & Thomas, 2015; Brito, 2018; Daymond et al., 2022; Russell et al., 2015)	25	56	53	50	86	Red
8. A common language has been created (Thompson et al., 2018)	50	89	53	50	86	Yellow
9. Actions have been taken to provide stability (strategy, objectives) to the network of actors within the ecosystem (Bittencourt et al., 2021; Nambisan & Baron, 2013; Nambisan & Sawhney, 2011; Ritala, et al., 2012)	67	89	33	60	71	Green
10. Actions have been developed to align the interests of all participants (Bittencourt et al., 2021; Bogers et al., 2019; Nguyen & Marques, 2022)	50	56	47	50	67	Red
11. Measures have been taken to address conflicts that have arisen over time (Daymond et al., 2022)	17	44	20	70	33	Red
12. Expectations of all actors have been proactively managed (von Hippel, 2005)	8	56	20	40	67	Red
13. Companies have achieved a proper balance between responding to the common objective and their individual goals (Nambisan & Baron, 2013; Daymond et al., 2022).	25	44	47	60	50	Red
14. Actions have been developed to manage uncertainty generated within the ecosystem, including technological and market uncertainties (Dattée et al., 2018; Gomes et al., 2022a)	17	68	33	80	50	Yellow
15. Actions have been developed to manage uncertainties within the ecosystem in relation to its external environment (Gomes et al., 2022a; Walrave et al., 2018)	25	44	47	70	67	Yellow
16. A living lab has been created as a formula for ecosystem development (del Vecchio et al., 2017)	25	56	47	80	33	Red
17. New structures have been established to support the ecosystem, such as shared laboratories and coworking spaces (Daymond et al., 2022)	50	100	73	100	67	Green
18. The activities carried out by all the agents of the ecosystem have been disseminated both inside and outside the ecosystem (Daymond et al., 2022)	58	67	67	90	83	Green

Note: Each cell shows the percentage of respondents who agree with that statement.

(*) The colors represent the degree of overall implementation of each dimension. Green indicates that it has occurred in three or four (out of the five) territories; yellow that it has occurred in only two or three; and red shows that it has occurred in only one. To reflect that this dimension has been implemented in the territory, the authors considered that the percentage of consensus in each territory was 60% or more.

Source: own elaboration.

Table 5
Leadership by the main actors in each ecosystem (in %).

	Japan	Singapore	Denmark	The Netherlands	Israel
Government/ Administration	35	45	19	26	36
Companies and startups	35	21	26	24	29
Universities	19	32	34	34	31
Others (*)	11	2	21	16	4

Note: Each cell shows the percentage of respondents who agree with that statement.

(*) The category ‘others’ includes: associations, clusters, NGOs and innovation intermediaries.

Source: own elaboration.

Table 6
Main results achieved by the leading ecosystems worldwide in food and gastronomy (in %).

Dimension	Japan	Singapore	Denmark	The Netherlands	Israel
Revenue generation (Porter and Kramer, 2011).	75	88	100	100	100
New products and services (Bittencourt et al., 2021; Dedehayir et al., 2018; Porter and Kramer, 2011; Thomas and Autio, 2020)	100	100	100	100	100
New business generation (De Silva and Wright, 2019; Etzkowitz, 2001; Porter and Kramer, 2011; Seidel and Greve, 2017; Thomas and Autio, 2020)	75	100	93	100	100
Attraction of new companies (Markkula and Kune, 2015)	75	100	100	100	100
High value-added jobs have been created (Porter and Kramer, 2011)	75	88	100	100	100
Attraction of talent to the ecosystem (Grama-Vigouroux et al., 2022; Wikhamn and Styhre, 2023)	75	88	93	100	100
Training of highly skilled people (Etzkowitz, 2001)	64	100	100	100	100
Patents (De Silva and Wright, 2019; Etzkowitz, 2001)	83	88	100	80	100
Publications (dos Santos et al., 2022; Etzkowitz, 2001)	50	100	86	100	100

Note: Each cell shows the percentage of respondents who agree with that statement.

Source: own elaboration.

this declaration is set in a country with a strong food sector, and therefore, some of the interviewees consider that the ecosystem began to take shape before the New Nordic Food Manifesto (see Table 3 in Section 4.2).

Denmark’s ecosystem features broad participation from all possible

Table 7
Achieved outcomes and impacts by the leading ecosystems worldwide in food and gastronomy (in %).

Dimension	Japan	Singapore	Denmark	The Netherlands	Israel
Creation of a favorable legislative environment towards innovation (Almpanopoulou et al., 2019)	25	100	53	67	86
Financial backing needed to boost the ecosystem (Rabelo and Bernus, 2015; Thompson et al., 2018)	68	89	73	100	100
Creation of an environment favorable to the startup world (Thompson et al., 2018)	68	100	73	100	100

Note: Each cell shows the percentage of respondents who agree with that statement.

Source: own elaboration.

actors: government agencies, private firms and startups, universities, clusters, investors, chefs and restaurants, associations, individuals and foundations. Accordingly, the leadership of this ecosystem is more distributed than in the others.

In relation to the actions detailed in the conceptual framework, several key actions identified in the literature have been implemented (Table 4, Section 4.2). The positive perception of the results (Table 6 in Section 4.2) and impacts achieved (Table 7 in Section 4.2) must complemented with the fact of having created a “culinary culture” (DS4) and having succeeded in “attracting international attention” (DS1, DS2).

The motivations of the players to participate in the ecosystem are diverse: “professional opportunities” (DS1), “networking” (DA1), “entrepreneurship” (DLE1), “learning” (DO2), “promoting the development of gastronomic tourism” (DO3) or “developing high quality food products” (DS2). These are complemented by broader societal aspirations, including: “helping to build a better world” (DS1), “justice” (DU1), “addressing climate change and sustainability” (DU1), “searching for collective achievement” (DLE1), “passion” (DO2) or “occupying an international place in the world of food and gastronomy” (DO3).

Half of the respondents see Denmark’s ecosystem as Nordic in scope, while the other half view its influence as global.

4.1.4. The food and gastronomy ecosystem of the Netherlands

A majority (55 %) of respondents identify the first decade of the 2000s as a turning point for the Dutch ecosystem. Its origins trace back to post-WWII policies aimed at ensuring food security.¹² Most interviewees agree that, at present, the ecosystem is evolving towards a “green transition” (i.e., to achieve a healthier and more sustainable food system), though some interviewees describe its trajectory as unclear.

Unlike Singapore, no single entity dominates ecosystem leadership (Table 3, Section 4.2). Instead, all actors play an active role in shaping the ecosystem, jointly developing the necessary actions for its emergence (Table 4 in Section 4.2). Notable achievements include (Tables 6 and 7, Section 4.2): despite the size of the country, the Netherlands ranks among the world’s largest food producers, and it has succeeded in

¹² In the 2000s a common vision began to take shape, with the participation of different levels of government, including the European Union, companies and universities (especially Wageningen). At that time, a cluster called ‘Food Valley’ was created, which acted as one of the main drivers of the ecosystem.

Table 8
Characterization of the leading ecosystems in food and gastronomy after all the undertaken actions (in %).

Dimension	Japan	Singapore	Denmark	The Netherlands	Israel
Permeable to new entrants (Gulati et al., 2012; Jacobides et al., 2018; Nambisan and Sawhney, 2011)	83	100	100	100	100
High degree of interdependence between actors (Adner and Kapoor, 2010; Iansiti and Levien, 2004b; Teece, 2007)	33	88	86	90	100
Strong connection between participants (Benitez et al., 2020; Cinelli et al., 2019)	42	88	86	90	100
Stakeholder specialization (Adner and Kapoor, 2010)	75	75	93	90	100
Firms collaborate and compete (Feser, 2022; Hannah and Eisenhardt, 2018; Linde et al., 2021)	75	100	100	100	86
Evolution of stakeholders' own capabilities (Ritala and Thomas, 2025; Teece, 2007)	92	100	100	100	100
Centralised ecosystem governance (Cinelli et al., 2019; dos Santos et al., 2022)	25	50	0	20	29
Centralised decision making (Cinelli et al., 2019; Nambisan and Sawhney, 2011; Provan and Kenis, 2008)	33	25	0	10	0

Note: Each cell shows the percentage of respondents who agree with that statement.

Source: own elaboration.

creating a strong entrepreneurial environment, particularly around Wageningen University and Food Valley (NLE1) (also see Omta and Fortuin, 2013). The international reputation and prestige of Wageningen, as well as of the 'Food Valley' brand and the importance that this has in the traction of the ecosystem is noteworthy (see Gueler and Schneider, 2021).

The motivations of the ecosystem's players for participation include, apart from generating business: "being part of a broader global objective, which ultimately involves transforming the sector and having a positive impact on the well-being of the planet" (NO1), and "driving positive impact on planetary well-being" (NS2). Finally, most actors consider that the influence of the Dutch food innovation ecosystem is international.

4.1.5. The food and gastronomy ecosystem of Israel

The emergence of Israel's food and gastronomy innovation ecosystem is generally traced back to 2010, when it began to attract increasing global attention and investment. The origins of the ecosystem are deeply intertwined with the country's structural constraints and

strategic needs, particularly regarding limited natural resources and food security challenges. Several interviewees highlight the key motivations driving ecosystem formation: "the lack of water and the need to ensure food security" (IS1), "developing a better, more sustainable food system" (IS3), and "accelerating the production of food to meet population demands" (IS2). The generation of profits was also mentioned by the interviewees. Beyond addressing basic food security, the ecosystem has also been shaped by broader societal and industry challenges, such as: creating healthier and more sustainable food solutions, ensuring affordability without compromising quality, enhancing food taste and consumer acceptance, and driving economic growth through innovation and entrepreneurship.

Unlike other ecosystems analysed in this study, Israel's food innovation ecosystem does not converge around a single, clearly defined objective. Instead, its mission appears broader and more fluid, encompassing multiple overlapping goals.

The Israeli ecosystem follows a distributed leadership model, with industry, government, universities, and other stakeholders all playing active roles (see Table 3, Section 4.2). This collaborative dynamic has enabled the widespread implementation of ecosystem-supporting actions (see Table 4, Section 4.2), which have, in turn, contributed to positive socio-economic outcomes (see Table 6, Section 4.2) and notable structural impacts (see Table 7, Section 4.2).

The motivations driving participation in the ecosystem are diverse, valuing the possibility "to generate economic returns for the country through innovation" (IO1), reflecting a strong national commitment to technological advancement, or "to drive food tech worldwide, to have better food and better nutrition" (IS3), highlighting the ecosystem's global ambitions. "Financial returns are also important" (IS3), recognizing the dual imperative of innovation and profitability.

Despite its national origins, Israel's food and gastronomy innovation ecosystem has a strong international orientation, with stakeholders actively positioning the country as a global leader in food technology. Consequently, the sphere of influence of this ecosystem extends well beyond national borders, reinforcing its strategic importance in shaping the global food industry.

4.2. Comparative analysis

The following tables provide a structured summary of the results discussed in the previous sections. Table 3 presents an overview of the pre-existing conditions in each country before the emergence of their respective food and gastronomy innovation ecosystems. Notably, Japan and Denmark exhibit, a priori, less favorable conditions for ecosystem formation, as compared to the Netherlands, Singapore and Israel, which display stronger foundational elements for ecosystem emergence.

Table 4 presents the results of the comparative analysis of the five ecosystems, specifically examining the key actions undertaken to promote their emergence. The green cells indicate actions that have been implemented in four or all five ecosystems, signifying core determinants of ecosystem development. The yellow cells represent actions that lack unanimous consensus, having been implemented in only two or three of the ecosystems studied. Finally, red cells highlight actions that, despite their theoretical relevance in the literature, are not widely supported by empirical evidence, as they have been implemented in only one of the five cases.

The comparative analysis reveals that Japan and Denmark have undertaken the fewest actions in relation to ecosystem creation, whereas Singapore, Israel and the Netherlands have implemented a more comprehensive range of activities, closely aligning with the key actions identified in the literature (see Section 2)

Table 5 provides a comprehensive overview of leadership dynamics in each ecosystem, identifying the key actors driving the implementation of various ecosystem-building actions. For each of the dimensions previously analysed (see Table 4), interviewees were asked to specify which actors – whether government, industry, universities, or other

stakeholders – played a leading role in the development of the ecosystem. Respondents could select one or multiple agents, reflecting the collaborative nature of leadership.

The findings reveal that, in all countries except Singapore, leadership is shared among multiple ecosystem stakeholders, with government, universities, and industry playing complementary roles. However, Singapore stands out as an exception, where the government assumes a dominant leadership role, surpassing the involvement of other actors.

Table 6 presents the main results achieved by the five ecosystems, as regards the generation of new income, creation of new products, services and companies and attraction of talent to the ecosystem, among others. In turn, Table 7 provides an overview of their structural outcomes. Across both dimensions, the perspectives of interviewees regarding ecosystem performance appear largely homogeneous, suggesting that despite variations in starting conditions, all ecosystems have been able to generate significant results and long-term impacts.

Table 8 presents the key structural characteristics of the analysed ecosystems after the implementation of the actions identified in Table 4, enabling an assessment of how these actions contribute to fostering structural transformation. Consistent with the patterns in Tables 6 and 7, the ex-post characterization of these ecosystems appears relatively homogeneous, suggesting that similar structural transformations have occurred across different ecosystems, regardless of variations in their initial conditions or specific actions undertaken. This finding challenges the prevailing assumptions in the literature on innovation ecosystems, which suggest that specific strategic actions should lead to distinct structural outcomes. Instead, our results indicate that ecosystems may follow different pathways but still converge toward similar structural transformations, warranting further investigation.

A particularly notable insight from Table 8 relates to the role of governance structures in ecosystem transformation. According to existing literature, the presence or absence of centralised governance is a critical factor in shaping ecosystem evolution. However, our findings reveal that all ecosystems – except for Singapore – exhibit decentralised governance structures. This observation reinforces the argument that when innovation ecosystems are spatially anchored at the national level (i.e., operating across large territories), multi-actor involvement becomes essential. Unlike ecosystems centered around a focal firm or platform, which tend to be more closed and hierarchical, national-scale ecosystems rely on a broader network of interconnected stakeholders. Consequently, these ecosystems demonstrate a more open and distributed governance model, emphasizing collaborative leadership and collective action rather than top-down orchestration.

4.3. The key determinants of an innovation ecosystem

Based on the findings presented in Section 4.2, several recurring elements emerge as critical determinants for the existence of an innovation ecosystem.

1. Common goals and shared vision: a well-functioning ecosystem requires alignment around common objectives. Actors must understand individual expectations while committing to the collective vision that guides ecosystem development.
2. Diversity of actors: a successful ecosystem thrives on heterogeneity, integrating large corporations, clusters, small experimental labs, startups, investors and universities. The coexistence of different stakeholders fosters knowledge exchange, resource sharing, and dynamic collaboration.
3. Collaboration and interaction among actors: cross-sectoral collaboration between universities, startups, multinational companies and policymakers is fundamental for a well-functioning ecosystem. The frequency, depth, and scope of interactions, as well as the number of joint initiatives and partnerships, significantly impact ecosystem performance.

4. Funding and investment: the availability of capital is crucial for ecosystem emergence. Multiple funding sources (e.g., venture capital, government grants, private investment, public-private partnerships) enhance innovation potential.
5. Talent and human capital: attracting and retaining highly skilled talent is essential for sustaining innovation. The presence of specialised knowledge and entrepreneurial mindsets strengthens ecosystem dynamism.
6. Government and regulatory support: proactive government policies play a critical role in facilitating ecosystem emergence and sustainability. Support mechanisms include subsidies, interest-free loans, flexible regulations, tax incentives and infrastructure investments.
7. Customer/consumer orientation: successful ecosystems are market-driven, meaning they establish strong linkages with end consumers. Bridging the gap between innovation actors and consumer needs ensures that products and services align with market demand.
8. Legitimacy: for an ecosystem to gain credibility and attract participants, it must build external recognition and internal cohesion. Publicizing achievements, fostering engagement, and ensuring continuous visibility help consolidate its institutional legitimacy.
9. Innovative results: the effectiveness of an innovation ecosystem is ultimately measured not only by its capacity to generate tangible outcomes (e.g., new products, technologies, patents, and processes), but also by intangible outcomes including the capacity to address collective needs, the development of a shared identity, and the strengthening of trust and reputational capital.

The existence of an innovation ecosystem (and therefore, its birth) is primarily determined by its ability to produce innovative outcomes (Point 9 in the above list) and its legitimacy (Point 8). However, the identified foundational structural actions (Points 1 to 7) tend to be associated with successful ecosystem emergence in our sample and may represent a repertoire of enabling conditions, rather than an invariant set of requirements. This interdependence highlights that innovation ecosystems emerge not only from technological advancements but also from strategic governance, collaboration, and market-driven initiatives.

5. Discussion: implications for theory and practice

Dedehayir and Seppänen (2015) pointed out that each ecosystem, depending on its typology and the environment in which it operates, may require a different approach to its development, and hence called for further research aiming at clarifying differences across innovation ecosystems. The findings of our study reinforce the idea that there is no single ‘recipe’ for creating an innovation ecosystem. Ecosystems emerge through context-dependent pathways, influenced by territorial characteristics, stakeholder configurations and governance models. In this sense, the findings indicate that initially favorable or unfavorable ex-ante conditions do not necessarily determine the final success of an ecosystem. This counterintuitive observation aligns with the conclusions of Rabelo and Bernus (2015) and Harms and Groen (2017), who argue that while each ecosystem follows its own institutionalised culture and approach (i.e., the ‘recipe’ for ecosystem creation), these differences do not necessarily dictate the nature or scale of outcomes. In other words, the processes and governance mechanisms (the ‘hows’) may vary, but the results and structural transformations (the ‘whats’) tend to converge across different ecosystems, regardless of their underlying cultural or organizational paradigms (Durst and Poutanen, 2013).

In this regard, as far as the results achieved by each ecosystem are concerned, the Japanese case presents an interesting anomaly. Despite lacking strong pre-existing assets and having implemented fewer strategic actions, Japan’s food and gastronomy innovation ecosystem has still managed to yield positive perceived outcomes. However, our findings suggest that while the ecosystem exists, its intensity and scale of innovation may be lower than in other ecosystems. This supports the idea that ecosystem emergence does not always correlate with

immediate high-impact innovation – some ecosystems may require longer gestation periods to achieve full innovation potential –.

Piqué et al. (2019) contended that additional evidence was needed to understand the factors that explain the creation and evolution, whether organic or intentional, of ecosystems. According to our study, one key insight is the heterogeneity in governance structures across ecosystems. In some cases, such as Singapore, the government plays a dominant role in ecosystem creation. In contrast, other ecosystems follow a bottom-up approach, where universities and industry take the lead, with government playing a supporting role. However, even in bottom-up ecosystems, government involvement remains crucial, highlighting the importance of shared leadership in fostering ecosystem development.

Our research also supports a paradigm shift in ecosystem governance models. Traditionally, ecosystems have been conceptualised as being orchestrated by a central hub (e.g., a lead firm or institution) (Dattée et al., 2018; Gomes et al., 2022a; Sahasranamam et al., 2024; Tsujimoto et al., 2018). However, growing empirical evidence – including our findings – suggests that large-scale ecosystems are better explained by “network choreography” (dos Santos et al., 2022), where: multiple interconnected hubs coordinate activities, rather than a single orchestrator; governance is highly decentralised, with ecosystem actors interacting on an equal footing; and the activities undertaken remain similar to traditional orchestrated ecosystems, but leadership responsibilities are distributed. This shift is particularly relevant for large ecosystems that span multiple sectors, have a broad geographical reach, or address complex, multi-dimensional challenges.

According to our study, ecosystems that emerge with broad, multi-stakeholder leadership often exhibit less consensus over their primary mission. This contrasts with ecosystems that form around a focal firm or platform, where the value proposition is more clearly defined. The broader the scope of participation, the greater the risk of divergence in strategic priorities, potentially leading to coordination challenges. Thus, our results add a new approach to the ongoing dialogue about the issues that enable (or inhibit) alignment in innovation ecosystems (Jacobides et al., 2018).

The relationship between geographical proximity and ecosystem formation remains an unresolved issue in the literature (Scaringella and Radziwon, 2017). Our findings confirm that geographical proximity (at the national level) facilitates ecosystem emergence. However, the sphere of influence of innovation ecosystems is often global, as the demand for products, services and knowledge spillovers transcends national borders. An exception is Japan, where the ecosystem remains predominantly national in scope, potentially due to its early-stage development, its isolated geographical location and its linguistic and cultural barriers, which may limit international collaboration.

Finally, our findings reaffirm that the impact of innovation ecosystems extends beyond economic returns. In addition to fostering business growth, entrepreneurship, and technological advancements, ecosystems generate significant societal and environmental benefits. The most frequently cited spillovers across the ecosystems studied include improved societal well-being (e.g., healthier food systems), advancements in sustainability (e.g., reducing environmental footprints in food production), and higher standards of living through access to better, more affordable and sustainable food products.

5.1. Implications for theory

This study advances theory in three complementary ways. First, it synthesizes a dispersed body of scholarship into an integrative framework of 18 dimensions that specify the actions and conditions associated with the emergence of innovation ecosystems (Table 4). By systematically organizing these dimensions, the framework enhances construct clarity, delineates the domain of “ecosystem emergence” (as distinct from growth or maturity), and offers an analytically tractable basis for cumulative theory-building. It also renders the concept more operationalizable by distinguishing among categories of ecosystem-

promoting actions (e.g., alignment, value creation), which can guide comparative analysis across settings.

Second, the study empirically refines this framework by identifying nine elements that consistently function as foundational determinants of ecosystem emergence. These elements constitute a necessary core configuration—individually insufficient but jointly indispensable—for an innovation ecosystem to materialize. Based on this refinement, we specify which are the most instrumental determinants that facilitate crossing the threshold from a fragmented activity to an operational innovation ecosystem, while repositioning the remaining dimensions as peripheral or contingent factors. Theoretically, this core-periphery articulation moves the literature beyond exhaustive checklists toward conditional necessity claims and testable configurational propositions about ecosystem formation.

Third, while extant theoretical models often depict innovation ecosystems as progressing through clearly demarcated stages of emergence, expansion, and leadership, our empirical evidence suggests that these transitions are far less distinct in practice. The boundary between emergence and expansion is often blurred, with judgments about whether an ecosystem has “fully emerged” depending heavily on the analytical perspective and evaluative criteria employed. This finding points to the need for further refinement of ecosystem life cycle models, particularly regarding the contingent and path-dependent nature of phase transitions.

From our point of view, there are three observations that stem from the study and which call for a rethinking of phase-based models: (i) simultaneity of phases; (ii) strategic ambiguity; and (iii) lack of observable inflection points. From a theoretical standpoint, we argue that current lifecycle models may be too rigid to capture the complexity, emergence, and non-linearity of innovation ecosystems. Our findings instead point to the need for adaptive, dimension-based models, where maturity is assessed through a configuration of indicators (e.g., actor diversity, interaction density, institutional embeddedness, outcome breadth) rather than assumed stage transitions.

5.2. Implications for practice

The creation of innovation ecosystems serves as a strategic tool for enhancing territorial competitiveness, particularly in the face of growing global uncertainty, rapid technological advancements, and shifting economic landscapes. Departing from the literature, the paper offers an actionable framework (see Table 4) that can inform policy-makers and practitioners seeking to promote the establishment of innovation ecosystems in their territories, by highlighting the strategic activities that require particular attention during the early stages of ecosystem formation. As our findings demonstrate, fostering an effective innovation ecosystem requires a multi-faceted approach that integrates visionary leadership, strategic governance, and stakeholder engagement.

Based on the empirical insights from this study, the following key actions are recommended to facilitate the successful creation and development of innovation ecosystems.

- Develop an inspiring vision and a strong leadership: a compelling shared vision provides strategic direction and ensures alignment among diverse stakeholders. In turn, a visionary leadership is critical to mobilizing resources, fostering commitment, and sustaining momentum.
- Foster a diverse and inclusive actor base: innovation ecosystems thrive on heterogeneous participation, including corporations, startups, universities and research institutions, investors, policy-makers, clusters, industry associations, etc. Ensuring openness to new entrants, particularly entrepreneurs and SMEs, fosters agility and innovation dynamism.
- Build and maintain trust-based relationships: trust is a foundational element of successful ecosystems, enabling collaboration, knowledge

sharing, and risk-taking. Creating neutral platforms for interaction (e.g., industry consortia, living labs, co-creation spaces) strengthens inter-organizational engagement.

- Attract and develop highly-skilled talent: human capital is a critical determinant of innovation ecosystem success. This requires both training programs to upskill local talent, and talent attraction strategies to draw global expertise into the ecosystem.
- Enable self-management and effective governance: encouraging self-organization among ecosystem participants enhances its adaptability.
- Secure financing: access to diverse funding sources is essential, including venture capital and angel investment for startups, government grants and incentives to stimulate R&D, public-private partnerships to co-fund strategic initiatives.
- Develop common infrastructure and support mechanisms: establishing shared physical and digital infrastructures (e.g., innovation hubs, living labs, accelerators) facilitates collaboration and experimentation together with final users/consumers.
- Cultivate an engaged and collaborative community: community-building efforts strengthen ecosystem cohesion and sustainability. Actively promoting cross-sectoral collaboration enhances the ecosystem's capacity for breakthrough innovations.

5.3. Further research and limitations

This study opens several avenues for future research, particularly regarding the measurement of ecosystem performance, the nature of spillovers, and ecosystem dynamics in different economic contexts. Current research on innovation ecosystems often focuses on whether specific results have been achieved, rather than assessing their quantity, quality, and overall impact. Future studies could move beyond binary success/failure evaluations to explore the scale and intensity of ecosystem-generated outcomes. Recent approaches, such as those proposed by [Leendertse et al. \(2022\)](#), could provide novel evidence in this regard, addressing a critical gap in the literature. Given the limited attention to quantitative assessments, further research could develop robust metrics to evaluate the long-term effectiveness of innovation ecosystems.

A key unresolved question in the literature concerns the spillover effects generated by innovation ecosystems, their scale and the actors benefitted from them, as this represents a clear gap in the literature on the dynamics of innovation ecosystems. A better understanding these knowledge and economic spillovers could lead to new theoretical contributions that expand our understanding of how ecosystem benefits diffuse beyond their direct participants ([Baldwin et al., 2024](#)).

Given the focus of this special issue, this study has analysed five ecosystems operating in high-cost economies, specifically within a limited set of European and Asian countries. While this geographical scope provides important insights, it necessarily restricts the generalizability of the findings. For example, it remains an open question whether the same actors and dynamics apply in low-cost economies. Future research could thus investigate whether the role of key actors differs in lower-income settings, whether bottom-up ecosystem formation is more prevalent in low-cost economies (where public sector resources and funding mechanisms may be less dominant) and whether differences in institutional and economic conditions shape alternative pathways for ecosystem emergence. Likewise, the ecosystems studied in this paper are anchored in an extensive geographical area (i.e., country level), which may mean that the analysed ecosystems reflect the coordination of multiple sub-national ecosystems. Further research could therefore address the functioning of innovation ecosystems, assessing them at a higher level of granularity, and identifying which of the drivers for ecosystem emergence are observed at the global, national, and sub-national levels.

The study's limitations stem primarily from its research design. While our case selection and interview sampling aimed for maximum

diversity across stakeholder categories, the reliance on qualitative interviews introduces potential limitations such as response bias, social desirability effects, or unequal representation across actor types (e.g., fewer voices from funding bodies or civil society). These constraints may have influenced the emphasis placed on certain ecosystem dynamics over others. We also call for mixed-method or longitudinal designs that can complement interview-based insights with large-scale survey data, network analysis, or bibliometric mapping to trace ecosystem evolution and stakeholder interactions over time.

6. Conclusions

This study aimed to shed new light on the fundamental elements and conditions necessary for the creation of innovation ecosystems by examining five leading ecosystems in high-cost economies: Singapore, Japan, Denmark, the Netherlands and Israel. Despite variations in initial conditions and strategic actions undertaken, as identified in the framework developed in the manuscript, our findings suggest that all five territories have successfully developed innovation ecosystems. In most cases, the ecosystem emerges as a result of an inspiring vision, sometimes motivated by the will to achieve a mission (i.e., a goal), and in others, from a tangible need or a physical constraint.

One of the key insights from this study is that there is no fundamental difference in outcomes between ecosystems that emerge through evolutionary (bottom-up) processes and those that are policy-driven (top-down). While governance structures vary – ranging from government-led initiatives (e.g., Singapore) to industry- and university-driven collaborations (e.g., Denmark and the Netherlands) – all ecosystems eventually develop collaborative, multi-actor leadership models. We contend that beyond identifying the nature of the leadership (public or private) it is also necessary to consider the type of actions undertaken in the development of the ecosystem, and their scale of operations. In this regard, all the ecosystems addressed in the paper seem to reach comparable results, outcomes and impacts. However, our results suggest that the intensity of the innovations achieved in each case may not be the same. The inherent difficulties in measuring the outcomes of an ecosystem do not allow us to quantify those differences that are apparent in an overview of the ecosystem. This therefore represents a challenge that further research could elucidate.

Our results highlight that innovation ecosystems do not emerge solely from the actions of a single actor or organization. Instead, they evolve through the coordinated efforts of a diverse group of stakeholders, including universities and technology centers, corporates and governments, but also considering other actors such as startups, accelerators, incubators, living labs, investors, clusters, NGOs and innovation intermediaries, in a collective leadership. While all these actors contribute toward the ecosystem's overarching mission, their roles and degrees of influence differ depending on the specific territorial and sectoral context. Crucially, no single entity was found to be solely responsible for driving and sustaining an ecosystem at the national level.

The benefits found in economic terms are as expected: greater income generation, creation and attraction of new companies to the territory, generation of new jobs and attraction of talent from outside the ecosystem itself. However, beyond economic gains, innovation ecosystems also yield substantial societal benefits, contributing to higher levels of well-being or enhancing sustainable practices. The rationale of ecosystem actors to engage in an ecosystem is thus related to both economic and non-economic returns, elements that need to be considered when mobilizing stakeholders to promote the emergence of these environments. This dual rationale should inform how policymakers, firms, and universities mobilise and coordinate resources when promoting ecosystem emergence. By identifying the foundational conditions that make such environments viable, our study offers a roadmap for translating the promise of innovation ecosystems into enduring contributions for economies and societies alike.

CRedit authorship contribution statement

Begoña Rodríguez-Romera: Writing – review & editing, Writing – original draft, Visualization, Validation, Supervision, Project administration, Methodology, Investigation, Funding acquisition, Formal analysis, Data curation, Conceptualization. **Jon Mikel Zabala-Iturriagoitia:** Writing – review & editing, Writing – original draft, Visualization, Validation, Methodology, Investigation, Funding acquisition, Formal analysis, Conceptualization. **Erich Eichstetter:** Writing – original draft, Visualization, Validation, Supervision, Project administration, Methodology, Investigation, Formal analysis, Data curation. **José Francisco Peláez:** Writing – original draft, Visualization, Validation, Supervision, Project administration, Methodology, Investigation, Formal analysis, Data curation.

Conflict of interest statement

This is to let you know that the authors of the manuscript “Strategic conditions for the emergence of innovation ecosystems: lessons from food and gastronomy”, by Begoña Rodríguez-Romera, Jon Mikel Zabala-Iturriagoitia, Erich Eichstetter and José Francisco Peláez, and submitted for its consideration in *Technovation*, certify that.

- (i) they have NO competing financial interests or personal relationships that could have appeared to influence the work reported in this paper,
- (ii) this manuscript has not been published elsewhere and is not under consideration by another journal, and
- (iii) all authors have approved the manuscript and agree with its submission to *Technovation*.

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Appendix A. Supplementary data

Supplementary data to this article can be found online at <https://doi.org/10.1016/j.technovation.2025.103383>.

Data availability

The authors do not have permission to share data.

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