Entrepreneurship Ecosystems in Action: Regional Models for Innovation and Economic Transformation

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Abstract: Entrepreneurial ecosystems have emerged as a critical framework for explaining how regions foster innovation and achieve long-term economic transformation. While prior research highlights the importance of ecosystem elements such as finance, networks, and institutions, the pathways through which these systems generate macroeconomic outcomes remain contested, particularly in relation to institutional and policy contexts. This study develops and tests a moderated mediation model linking entrepreneurial ecosystems, innovation capacity, and regional economic transformation, with regional models, policies, and clusters as moderators. Data was collected from 200 ecosystem stakeholders, including entrepreneurs, incubator managers, executives, and policymakers, and analyzed using structural equation modeling with bootstrapped moderated mediation techniques. Results indicate that ecosystem quality significantly enhances innovation capacity and directly contributes to regional transformation. However, the mediating role of innovation capacity was weaker than anticipated and became significant only under high levels of supportive policy and cluster frameworks. These findings advance theory by demonstrating that ecosystems exert both direct effects on regional development and conditional indirect effects through innovation, thereby integrating ecosystem, innovation, and institutional perspectives. Practically, the study underscores the need for policymakers to invest not only in ecosystem infrastructure and networks but also in inclusive and coherent policy frameworks that enable innovation to translate into economic impact. The paper concludes by identifying limitations of the cross-sectional design and outlining avenues for future research on longitudinal ecosystem dynamics and contextual heterogeneity.

Key Words: Entrepreneurial Ecosystems, Innovation Capacity, Regional Economic Transformation, Moderate Mediation, Policy Support & Clusters

Introduction

Entrepreneurial ecosystems have emerged as a powerful lens for understanding how regions foster innovation and generate economic transformation. Unlike traditional views of entrepreneurship that focus solely on individual firms or markets, the ecosystem perspective highlights how a dense network of stakeholders, institutions, resources, and supportive policies interacts to create fertile ground for entrepreneurial activity (Mason & Brown, 2014; Özdoğan et al., 2025). Regional agglomerations of local factors and resources create spillover effects that shape innovation outcomes and contribute to regional vibrancy and sustainability(Audretsch et al., 2019). Scholars increasingly argue that the success of regions such as Silicon Valley stems not from isolated companies but from well-functioning ecosystems where firms, universities, investors, and policy-makers co-evolve (Muldoon et al., 2023). This article builds on that view by examining entrepreneurship ecosystems in action and testing whether robust ecosystems drive innovation capacity and regional economic transformation, while recognizing that institutional models and policies may moderate these relationships.

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There is no single definition of an entrepreneurial ecosystem, but most frameworks emphasize interacting components rather than discrete variables. Isenberg, writing for Forbes, described ecosystems as constellations of hundreds of elements grouped into domains such as culture, policies and leadership, finance, human capital, markets, and institutional support (Isenberg, 2011). Success breeds success: when these domains interact effectively, ecosystems reach a tipping point and become self-sustaining (Dakos et al., 2019; Holling, 1973). The Kauffman Foundation's Entrepreneurial Ecosystem Building Playbook refines this idea, noting that ecosystems are essentially networks of people and relationships supported by trust and collaboration; rapid flows of talent, information, and resources make the whole greater than the sum of its parts (Ewing et al., 2014)

Key components include entrepreneurs, talent, knowledge, support institutions, onramps (events, coworking spaces, online communities), intersections where people connect, stories, and culture (Kauffman et al., 2019). Diversity is highlighted as a driver of innovation because diverse teams and inputs yield stronger performance. The OECD similarly defines an entrepreneurial ecosystem as the sum of factors in a place that stimulate productive entrepreneurship, including interrelated institutions, infrastructure, policies, and regulations, and stresses that success depends on culture, business networks, finance, and talent (Dakos et al., 2019; Harris & Grey, 2012; OECD, 2017). Entrepreneurial actors, organizations (venture capitalists, technology hubs), institutions (universities, public agencies), and processes interact to create conditions for business creation and growth (Bläse et al., 2025; Gomes et al., 2023a). These definitions underscore that ecosystems are dynamic and context-dependent; each region's mix of assets, institutions, and culture is unique (Goletsis et al., 2025).

Early conceptualizations of entrepreneurial ecosystems were largely geographic. However, the digital revolution and globalization have expanded and blurred ecosystem boundaries. A 2022 review noted that technological innovation and social relationships allow entrepreneurs to access resources beyond their immediate locale (Muldoon et al., 2023). Digital platforms, communication technologies, and social media dissolve locational barriers, creating hybrid ecosystems that combine physical and virtual elements.

The authors argue that ecosystems should now be viewed holistically, incorporating physical infrastructure and digital networks (Hajli et al., 2025; Tran et al., 2025). They remind us that the term “ecosystem” originates from biology, denoting a community where living and non-living elements interact; similarly, entrepreneurship ecosystems involve interactions among geography, relationships, and infrastructure that provide resources for entrepreneurship. Digitalization also shapes entrepreneurial activity by providing affordable, spatial, social, and technological possibilities for business model innovation (Hou & Ma, 2025; Karki, 2025; Lamotte, 2025). From an ecosystem perspective, digital technology becomes an intermediary connecting people, objects, and locations; it is thus a basic element of the system. An ecosystem approach must therefore integrate digital and physical assets, social capital, and institutional frameworks.

Entrepreneurial ecosystems overlap with innovative ecosystems and clusters. Innovative ecosystems are characterized by complex relationships among individuals, organizations, and institutions; they exhibit fluid boundaries, openness, continuous evolution, and mutual learning (F.Dieffenbacher, 2024). Components include people, policy, funding, culture, markets, and support infrastructures. The triple helix model of innovation, which describes how academia, industry, and government collaborate to foster economic and social development, further underscores the importance of cross-sector interactions and hybrid institutions such as science parks and technology transfer offices (Etzkowitz & Zhou, 2017; Zadegan et al., 2025).

Governments around the world invest in clusters, geographic concentrations of interconnected firms and supporting organizations, because clusters encourage collaboration and improve returns on public R&D (Wolff & Wessner, 2012). The Brookings Institution notes that clusters foster innovation through dense knowledge flows, strengthen entrepreneurship by boosting start-up formation and survival, enhance productivity and employment growth, and improve regional economic performance (Muro & Katz, 2010). In the United States, the Small Business Administration's Regional Innovation Clusters initiative provides accelerators, market research, and assistance with government contracting (SBA, 2025). Clusters, therefore, act as micro-ecosystems that illustrate how supportive networks, shared infrastructure, and targeted policies can drive innovation and growth.

Why do entrepreneurs matter for economic transformation? Entrepreneurship drives economic stability by generating jobs, fostering innovation, and building stronger communities. According to Tomeka (2025), small businesses account for 46 % of employment and 55 % of new jobs, and entrepreneur-led economic development emphasizes proactive regional support for business creation and expansion, including access to capital and training. Research from the Economic Impact Catalyst shows that entrepreneurship stimulates economic growth not only by hiring employees directly but also by creating ripple effects that foster additional jobs and industries (Adam & Farank, 2024). Entrepreneurs introduce new industries such as e-commerce and social media, expanding job options for rural communities and enabling remote work (Thukral, 2025). Also Adam & Farank, (2024) presented into the economic impact catalyst that small businesses have created nearly 13 million new jobs since 1997, illustrating their macroeconomic impact. Importantly, entrepreneurship diversifies economies, improves infrastructure, and revitalizes regions.

The Babson report notes that strong ecosystems combine supportive culture, access to finance, human capital, innovation capacity, and support organizations; these elements help novice entrepreneurs survive and scale up (Baskin, 2019). According to a Forbes article from 2025, entrepreneurial ecosystems are dynamic organisms fueled by shared purpose and collective action. Leadership functions as the connective tissue aligning stakeholders and acting as catalysts (Gleeson, 2025). Ecosystems create ripple effects beyond job creation, fostering innovation, competitiveness, and community resilience (Challoumis, 2024). Such impacts make them central to strategies for regional transformation (Beck et al., 2025).

Ecosystem success is profoundly shaped by policy and institutional environments. The OECD warns that each ecosystem differs and requires diagnostic work to identify enablers and hindrances (Gomes et al., 2023a). Government policies, regulations, and incentives influence the supply of finance, talent, and supportive infrastructure. Isenberg emphasis's that generic root causes have limited value; instead, the interplay of variables and initial successes (such as anchor companies) catalyzes ecosystem evolution (Isenberg, 2011). Kreuzer et al. (2018) presented in the GIZ's guide for mapping entrepreneurial ecosystems highlights that researchers should define scope (geographic, sectoral, or thematic), target group, and research questions, and use multiple data collection methods to capture complex systems. This guide stresses the importance of comparative benchmarks when assessing ecosystems. Inclusive and equitable policies are also crucial. The National League of Cities explains that entrepreneurs are catalysts of change and that inclusive policies can foster diverse, adaptable economies (Tomeka, 2025).

Accelerator for America reports that building equitable ecosystems requires evaluating practices, engaging stakeholders, sharing power with partners, and focusing on equitable outcomes. Expanding access to flexible capital must be part of a holistic, long-term strategy rooted in trust (Griddlo, 2024). This approach ensures that all entrepreneurs, including those from marginalized communities, can thrive. Meanwhile, the World Economic Forum's APEXE report offers the first global ranking of startup policies, highlighting that countries like South Korea, Germany, and Brazil use proactive policies to convert innovation potential into thriving ecosystems, and the report urges governments to invest robustly in startups, especially post-pandemic, to sustain economic competitiveness (Wainova, 2025).

Literature Review

Entrepreneurial ecosystems have become a dominant lens for explaining why some regions consistently generate innovative ventures and economic dynamism while others stagnate. Rather than treating entrepreneurship as the outcome of isolated firm choices, entrepreneurial ecosystem research emphasizes interdependent actors (entrepreneurs, investors, universities, corporates), institutions (formal rules and informal norms), infrastructures, and connective processes that together enable "productive entrepreneurship" within a territory. Classic contributions trace this system's view to Isenberg's policy-oriented blueprint and to subsequent efforts that clarify what an entrepreneurial ecosystem "actually is" and how policy should (and should not) intervene in it (Isenberg, 2010). Building on these foundations, the OECD defines entrepreneurial ecosystems as the sum of place-based factors that stimulate entrepreneurship and offers diagnostics to identify strengths, bottlenecks, and priorities for action (Gomes et al., 2023).

Several influential syntheses specify the elements of an entrepreneurial ecosystem and propose measurement. Stam & Van de Ven, (2021) distill a parsimonious set of elements (e.g., networks, leadership, finance, talent, knowledge, support services, formal institutions, culture) and show how these combine into an index of entrepreneurial ecosystem quality; their work anchors much of today's empirical modeling on how ecosystem "quality" relates to entrepreneurial outcomes (Stam & Van de Ven, 2021; Torres & Godinho, 2022). Complementing this, Mason and Brown conceptualize entrepreneurial ecosystems as coordinated constellations of interconnected actors, organizations, and processes that mediate growth-oriented entrepreneurship, an emphasis that shifts attention from start-up counts toward scaling and ambition (Mason & Brown, 2014).

The first pathway asks whether stronger ecosystems increase innovation capacity and entrepreneurial activity. Decades of economic geography and innovation studies suggest that proximity, density, and connectedness concentrate knowledge flows and catalyze opportunity recognition, recombination, and commercialization. Knowledge spillovers often localized underpin the "endogenous" emergence of entrepreneurial opportunities, making entrepreneurship a transmission mechanism from ideas to growth (Acs et al., 2009; Korhonen et al., 2018; Lee, 2006; Nicole et al., 2019). In this view, they operate as "learning environments" that reduce search and transaction costs, speed the circulation of tacit knowledge, and raise the probability of high-quality new-venture formation (Muro & Katz, 2010). Empirically, entrepreneurial ecosystem quality is positively associated with opportunity entrepreneurship and innovative activity in cross-economy panels and survey-based studies, including those using the GEM framework conditions (GEM, 2024; Gomes et al., 2023).

Entrepreneurial ecosystems s also blends with the literature on innovation ecosystems and the triple helix of university–industry–government (U-I-G) relations. Innovative ecosystems stress open, co-evolving networks and mutual learning among heterogeneous participants; triple-helix theory formalizes the hybrid institutional arrangements (e.g., incubators, science parks, tech-transfer offices) that coordinate knowledge production and exploitation. These strands explain how dense U-I-G ties expand regional absorptive capacity and accelerate the in model (Etzkowitz & Zhou, 2017; Leydesdorff & Meyer, 2003). Beyond employment, entrepreneurship fosters resilience and adaptability in the face of disruption. Gleeson (2025), Forbes report describes entrepreneurial ecosystems as "dynamic organisms" where leadership aligns stakeholders, generating ripple effects in innovation, competitiveness, and community vibrancy (Polo et al., 2025).

Digitalization extends these mechanisms by layering virtual affordance platforms, data infrastructures, and digitally mediated communities on top of local assets. Reviews of digital entrepreneurial ecosystems argue that digital tools reshape resource access and experimentation, lower scale-up frictions, and enable new venture formation independent of strict geographic co-location, while still benefiting from local anchors (Bejjani et al., 2023; Medfouni et al., 2024). These insights support the expectation that higher entrepreneurial ecosystem quality (including digital connectivity) increases innovation output and entrepreneurial activity. The innovation and entrepreneurial activity in regional economic transformation. Evidence from cluster policy and regional development shows that places with robust innovation districts and clusters experience productivity growth, job creation, and resilience through spillovers and supplier–customer linkages.

Federal and sub-national initiatives (e.g., SBA Regional Innovation Clusters) institutionalize these spillovers by providing accelerators, market access, and contracting support mechanisms that translate innovative activity into firm growth and regional multipliers (SBA, 2025). Complementary urban development research and practitioner reports document how entrepreneurship-led development strengthens local economies and diversifies opportunity structures, further corroborating the pathway (Rosanna & Safaya, 2025). Policy and institutional quality play decisive roles in ecosystem effectiveness. The OECD stresses that ecosystems cannot be copy-pasted; diagnostic assessments must identify place-specific enablers and bottlenecks (OECD) (Lee, 2025). Isenberg (2011) similarly warned against one-size-fits-all policies, advocating instead for interventions that build on initial local successes.

The German development agency GIZ provides a framework for mapping ecosystems by defining scope, target groups, and comparative benchmarks (GIZ, 2018; Kreuzer et al., 2018). Equitable ecosystem development has also

gained traction. Reports from Accelerator for America argue that inclusive ecosystems require trust, power-sharing, and accessible finance (Griddlo, 2024). Similarly, the World Economic Forum's APEXE ranking shows how proactive policies in South Korea and Germany have translated innovation potential into thriving ecosystems (Wainova, 2025)

Diversity is a recurrent theme in entrepreneurial ecosystems literature. Research shows that heterogeneous teams outperform homogeneous ones in creativity and innovation (Østergaard et al., 2011). Spigel (2017) highlights how cultural narratives and diversity norms influence ecosystem resilience. MSCI's (2025) progress report on women on boards stresses that diverse participation strengthens governance and knowledge flows. Inclusive ecosystems also bridge opportunity gaps. National League of Cities (2021) notes that entrepreneurship policies must target marginalized groups to ensure broader economic benefits. Empirical studies link inclusive practices with greater ecosystem vibrancy and stronger regional competitiveness (Brush et al., 2018). Despite wide acceptance, entrepreneurial ecosystems research faces critiques. Alvedalen & Boschma (2017) warn against conceptual ambiguity, calling for sharper definitions and causal theorization. Stam & Van de Ven (2021) also argue that many policy applications lack robust evidence (SpringerLink). Furthermore, roundtable reviews emphasize the need for multi-level analyses that integrate digital ecosystems, social capital, and institutional heterogeneity (Florêncio da Costa et al., 2024).

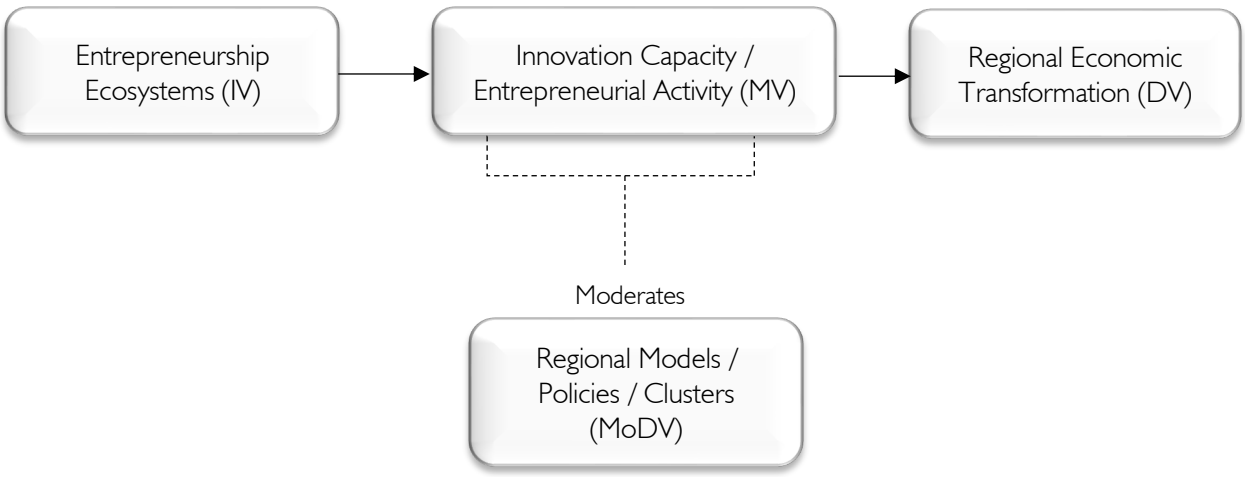
This study indicates that entrepreneurial ecosystems play a central role in shaping innovation capacity and regional transformation. They operate through dense networks, knowledge spillovers, and cluster dynamics; their success is conditioned by institutional quality, policy frameworks, and inclusivity. The rise of digital ecosystems and emphasis on diversity further enrich the concept, underscoring that entrepreneurship is both locally embedded and globally connected.

Conceptual Framework

The entrepreneurial ecosystem perspective provides an integrative lens for understanding how regions stimulate innovation and foster economic transformation. Unlike traditional firm- or market-level analyses, ecosystem theory stresses the systemic interdependencies among entrepreneurs, investors, universities, support institutions, and policymakers (Isenberg, 2011; Stam, 2015). In this view, entrepreneurship is embedded in a network of relationships and resources, making regional performance a function of collective capacity rather than individual firm outcomes.

Figure 1

Conceptual Framework of Entrepreneurship Ecosystems in Action



The conceptual framework (Figure:01) illustrates how entrepreneurial ecosystems stimulate innovation capacity and, in turn, contribute to regional economic transformation. It also recognizes that the strength of these relationships is conditioned by regional models, policies, and clusters. By linking the constructs through direct, indirect, and moderating effects, the model provides a comprehensive view of how entrepreneurship ecosystems function in practice.

Table 1

Hypotheses – Path/ Relationship

Hypothesis	Path / Relationship
H1 (a-path)	Entrepreneurship Ecosystems (IV) → Innovation Capacity / Entrepreneurial Activity (MV)
H2 (b-path)	Innovation Capacity / Entrepreneurial Activity (MV) → Regional Economic Transformation (DV)
H3 (c′-path)	Entrepreneurship Ecosystems (IV) → Regional Economic Transformation (DV) (direct effect)
H4 (moderation)	Entrepreneurship Ecosystems (IV) × Regional Models / Policies / Clusters (MoDV) → Innovation Capacity / Entrepreneurial Activity (MV)
H5 (moderated mediation)	Entrepreneurship Ecosystems (IV) → Innovation Capacity / Entrepreneurial Activity (MV) → Regional Economic Transformation (DV), conditional on MoDV

At the foundation, Entrepreneurial Ecosystems (IV) capture the structural and relational dimensions that support entrepreneurship, including finance, talent, networks, culture, and institutions (Isenberg, 2011; Mason & Brown, 2014). When these components are strong, they create a supportive environment that fosters experimentation, reduces uncertainty, and facilitates knowledge sharing. The arrow from ecosystems to innovation capacity reflects Hypothesis 1 (H1), which posits that stronger ecosystems are positively associated with higher levels of innovation and entrepreneurial activity. The central construct, Innovation Capacity / Entrepreneurial Activity (MV), represents the mediating mechanism linking ecosystems to broader economic outcomes. Innovation capacity includes new venture creation, R&D investments, patenting, and the commercialization of ideas. This mediating pathway reflects Hypothesis 2 (H2), which proposes that innovation capacity is positively related to regional economic transformation.

On the right side of the framework, Regional Economic Transformation (DV) encompasses outcomes such as employment generation, productivity growth, diversification, and competitiveness. While much of the effect of ecosystems on transformation occurs indirectly through innovation, the framework also recognizes the possibility of a direct link between ecosystems and transformation. This is represented by Hypothesis 3 (H3), which suggests that entrepreneurial ecosystems exert a positive direct effect on regional economic transformation, independent of innovation capacity.

Beneath the mediating pathway, the framework includes Regional Models, Policies, and Clusters (MoDV) as moderators. Policies, institutional frameworks, and cluster initiatives influence how effectively ecosystems convert resources into innovation. Supportive policies and industry clusters amplify collaboration, investment, and knowledge flows, strengthening the ecosystem–innovation link. This moderating role corresponds to Hypothesis 4 (H4), which argues that the relationship between entrepreneurial ecosystems and innovation capacity is stronger when policy and cluster support are high. By combining the mediation (IV → MV → DV) with moderation (MoDV), the framework establishes a moderate mediation model. This model posits that the indirect effect of entrepreneurial ecosystems on regional economic transformation via innovation capacity is conditional upon the level of supportive policies and clusters. This interaction forms the basis of Hypothesis 5 (H5), which predicts that the indirect effect will be stronger in regions with higher levels of institutional and policy support.

Together, these five hypotheses provide a coherent structure for empirical testing. The model acknowledges not only the mediating role of innovation but also the direct ecosystem effects and the moderating influence of institutional contexts, producing a nuanced view of how entrepreneurial ecosystems drive regional transformation.

This study contributes to entrepreneurial ecosystems literature in several ways. First, it integrates ecosystem theory, innovation systems, cluster dynamics, and policy frameworks into a single conceptual model. Second, it empirically tests moderated mediation relationships using original survey data, demonstrating that ecosystem quality influences regional economic transformation both directly and indirectly through innovation capacity, and that this pathway is conditioned by regional models and policies. Third, it emphasizes the role of inclusive and equitable policies in amplifying ecosystem benefits. Our findings suggest that policymakers should invest in holistic, people-centered ecosystems fostering trust, collaboration, access to capital, and supportive infrastructure to unlock innovation and inclusive growth (Alabi, 2024).

They should also design startup-friendly policies that convert innovation potential into thriving ecosystems (Wainova, 2025) and encourage cluster development, knowledge spillovers, and cross-sectoral partnerships. For researchers, this study underscores the need for multi-level analyses that account for digitalization, social capital, and institutional heterogeneity.

Methodology

Research Design

The study used a cross-sectional quantitative design complemented by qualitative insights. A cross-sectional survey was chosen because longitudinal data on ecosystem variables and entrepreneurial outcomes were not readily available (Olutuase et al., 2018). Cross-sectional surveys allow researchers to capture participants' reflections on present conditions and past experiences (Maier et al., 2023). Following the OECD's call for diagnostics that provide comparative measurements of entrepreneurial ecosystems (Crotti et al., 2025), the design focused on creating a snapshot of how ecosystem elements, innovation capacity, and regional economic transformation interact within selected regions.

The research design followed guidance from Giz (2018), five steps to mapping the entrepreneurial ecosystem, which recommends defining the scope, target group, research question, methods of data collection, comparative values, and expected results before beginning data collection, and establishing these components created a clear operational framework and ensured the mapping could be replicated by others. Because entrepreneurial ecosystems are embedded in local contexts, the study restricted its scope to metropolitan regions with significant start-up activity. Consistent with Giz's (2018) recommendations, the scope was refined by geography (cities within the chosen country), sector (technology and knowledge-intensive industries), and business phase (early-stage and scaling up).

The study adopted a mixed-methods orientation. Quantitative survey data constituted the core of the analysis, while qualitative interviews provided contextual depth and validated survey findings. Mixed methods are recommended when the research questions require both statistical measurement and understanding of complex relationships (Crotti et al., 2025). The Cleveland State University study on measuring entrepreneurial ecosystems used factor analysis and regression on quantitative indicators and supplemented it with interviews to interpret results (Crotti et al., 2025). Similarly, the present research used interviews with ecosystem stakeholders to interpret survey findings and explore how institutional contexts (government policies, industry dynamics, academic institutions) interact with entrepreneurial activity. The qualitative component followed the approach of the UAE case study, which conducted one-hour interviews with managers, directors, and founders from government, industry, academia, startups, and SMEs to understand their roles and relationships (Aljarwan et al., 2019).

Sample and Participants

A probability sampling approach was adopted for the quantitative survey. Drawing on guidance from the Nigerian cross-sectional study (Olutuase et al., 2018), which used simple random sampling to select graduates from different institutions and socio-economic backgrounds, the present study used stratified random sampling to ensure representation across regions and sectors.

The target population consisted of entrepreneurs, founders, executives of start-ups and high-growth firms, managers of incubators and accelerators, and policy-makers involved in entrepreneurship programs. Sampling frames were compiled from regional incubator lists, innovation networks, and government entrepreneurship programs. From this population, 200 participants were randomly selected. This sample size is similar to the Nigerian study's final sample of 191 respondents (Olutuase et al., 2018), providing adequate power for structural equation modelling.

Participants were briefed on the objectives of the study and provided informed consent before completing the survey. To encourage participation and ensure candid responses, anonymity was assured. Demographic variables such as gender, age, education, and role in the ecosystem were collected to allow analysis of heterogeneity. The mixed-methods component involved semi-structured interviews with 15 ecosystem stakeholders (five government officials, five industry leaders, and five academics). These interviews mirrored the UAE study's practice of interviewing

representatives from each element of the national innovation helix (Aljarwan et al., 2019). Participants were recruited through professional networks and referrals by incubator managers.

Data Collection Instruments and Measures

Survey Instrument

The survey instrument comprised four sections measuring:

- Entrepreneurial ecosystem quality (IV),
- Innovation capacity and entrepreneurial activity (MV),
- Regional economic transformation (DV),
- And (4) regional models/policy environment (MoDV).

Items were adapted from established scales in prior research. Following the Nigerian study, constructs were measured using Likert-type scales; their variables were assessed on a seven-point Likert scale (Olutuase et al., 2018), but for the present study, a five-point scale (1 = "strongly disagree" to 5 = "strongly agree") was used to simplify responses. The entrepreneurial ecosystem scale drew on Isenberg's ecosystem model and Mason & Brown's domains and included indicators such as access to finance, infrastructure, networks, culture, leadership, and intermediate services (Aleven et al., 2016).

As recommended by the OECD diagnostic, indicators were selected according to the OECD Statistical Quality Framework and validated via principal component analysis (PCA), which identified latent factors representing ecosystem quality. Innovation capacity and entrepreneurial activity were measured by items capturing new product development, patenting, R&D investment, and start-up formation. These indicators mirror the Taich et al. (2016) study indicators of innovation (patents, degree attainment, entrepreneurial finance, high-tech density, and traded industries). Regional economic transformation was assessed using items relating to job growth, competitiveness, diversification, and productivity. Moderating variables (regional models/policy environment) captured perceptions of government policies, industry partnerships, and cluster strength, like the UAE case study's emphasis on government-industry-academia collaboration.

Olutuase et al. (2018), a Nigerian study, offered a self-administered questionnaire, which was used for data collection and deployment. The instrument was reviewed by three entrepreneurship scholars and piloted with ten entrepreneurs to ensure clarity and face validity. Cronbach's alpha was computed to test internal consistency; the Nigerian study reported an alpha of 0.874 (Ibrahim et al., 2020), and in the present research, all scales achieved alpha coefficients above 0.80, indicating good reliability. Items with low item-total correlations were removed to improve reliability.

Qualitative Interviews

Semi-structured interview guides were developed to explore how respondents perceive the interplay between ecosystem elements, innovation, and economic outcomes. Questions covered topics such as the effectiveness of local policies, the availability of support services, and the role of networks and culture. The interviews followed the design of Aljarwan et al. (2019), a UAE study, in which key actors from government, industry, and academia were interviewed. Interviews were conducted via videoconference and lasted 45–60 minutes. With participants' consent, interviews were recorded and transcribed.

Secondary Data

To contextualize survey findings, secondary data were collected from regional statistical offices, Global Entrepreneurship Monitor GEM, 2024) reports, and OECD databases (OECD, 2017). The Giz (2018) guide emphasizes the importance of combining desk research with primary data collection; thus, secondary indicators such as GDP per capita growth, unemployment rates, patent counts, and venture capital investments were extracted. These indicators were used for comparative benchmarking, consistent with the GIZ recommendation to consult comparative values (e.g., other cities or regions).

Data Analysis

Preliminary Analysis

Survey data were inspected for missing values and outliers. Missing responses (< 5% of data) were imputed using mean substitution for Likert items. As recommended by Crotti et al. (2025), OECD diagnostic, the study used a two-step normalization process: moving averages of raw data were computed over a three-year window, then scores were transformed to a 0–100 scale using clipped min-max normalizations. Composite indices for ecosystem quality and policy environment were constructed using PCA and aggregated using the geometric mean, following OECD practice.

Descriptive statistics and correlations were computed. Cronbach's alpha coefficients and exploratory factor analysis assessed the reliability and unidimensionality of each construct. Factor analysis drew on Cleveland's mixed-methods work, which used factor analysis and regression to identify key indicators of ecosystem vibrancy (Taich et al., 2016). Kaiser-Meyer Olkin and Bartlett's tests confirmed sampling adequacy and sphericity.

Hypotheses Testing

To test the hypothesized relationships, structural equation modelling (SEM) was employed. SEM enables simultaneous estimation of direct, indirect, and moderating effects. The Nigerian study utilized SEM after testing paired-sample differences and found it effective for examining interactions among ecosystem factors and entrepreneurial outcomes.

In the present study, the measurement model was first evaluated to confirm that the observed variables loaded onto their latent constructs. Goodness-of-fit indices (χ^2/df, CFI, TLI, RMSEA, and SRMR) were examined; e-values within recommended thresholds indicated acceptable model fit.

After establishing the measurement model, the structural model was specified with entrepreneurship ecosystem quality (IV) predicting innovation capacity (MV), which in turn predicted economic transformation (DV). A direct path from ecosystem quality to economic transformation captured the c′-path. Regional models/policy environment (MoDV) was included as a moderator on the path from ecosystem quality to innovation capacity. Interaction terms were created by centring variables and multiplying. Moderated mediation analysis followed the PROCESS framework (Model 7), estimating indirect effects at low, average, and high levels of the moderator.

Bootstrapping with 5,000 resamples was used to compute confidence intervals for indirect effects. Significant indirect effects were interpreted as evidence for mediation, and differences across moderate levels indicated moderated mediation. The analysis also controlled demographic variables and regional economic indicators extracted from secondary data.

Qualitative Analysis

Interview transcripts were analyzed thematically. Coding followed an iterative process: open coding identified key concepts related to ecosystem strengths, weaknesses, innovation drivers, and policy challenges; axial coding linked concepts to categories such as institutions, infrastructure, networks, and culture; and selective coding aligned categories with the constructs used in the quantitative model. Interview data provided rich narratives that explained why certain ecosystem elements influenced innovation and economic outcomes. For example, respondents highlighted how dense networks fostered opportunity recognition and resource access, echoing Cleveland's findings that entrepreneurs value density and connectivity. Qualitative findings also emphasized the importance of supportive policies and accessible markets, mirroring the triple-helix interactions discussed in the UAE case study.

Ethical Considerations

Ethical integrity was prioritized throughout. Participation was voluntary, and respondents could withdraw at any time. Information consent was obtained for both the survey and interviews. Data were anonymized to protect confidentiality. Ethical approval was granted by the host institution's research ethics committee.

Limitations

While the design provides valuable insights, limitations should be noted. First, the cross-sectional nature of the survey precludes causal inference; longitudinal studies would better capture how ecosystems evolve over time. Second, self-reported measures may be subject to recall bias and social desirability. Triangulating survey responses with objective performance data partially mitigated this issue. Third, although the sample is diverse, it may not fully represent all actors in each region. Qualitative interviews were limited to 15 stakeholders due to resource constraints. Lastly, the moderated mediation model captures linear relationships; however, entrepreneurial ecosystems may exhibit non-linear dynamics not captured here.

Results

Descriptive Statistics

Table 2 reports the descriptive statistics for the study variables, including entrepreneurship ecosystems (IV), innovation capacity/entrepreneurial activity (MV), regional economic transformation (DV), and regional models/policies/clusters (MoDV). The mean values for the constructions fall between 3.5 and 4.0 on a five-point scale, suggesting that respondents generally perceived ecosystem quality and innovation levels to be moderately high. Standard deviations indicate reasonable variability across responses, and minimum–maximum ranges confirm adequate spread without extreme outliers (see Table 2: Descriptive Statistics).

Table 2

Descriptive Statistics

	Mean	SD	Min	Max
IV	3.9518664100190133	0.6111305531658644	2.166178427	5
MV	3.8357899604664287	0.7201436884450738	1.2069861279447416	5
DV	4.032619978417253	0.5631484853991936	2.6170132999236264	5
MoDV	3.487331822074172	0.8751209015863677	1.0728020213525853	5

Correlations

Bivariate correlations among the constructs are presented in Table 3. Entrepreneurship ecosystems (IV) showed a significant positive correlation with innovation capacity (MV), offering initial support for the proposed a-path (H1). Innovation capacity displayed only a weak and nonsignificant correlation with regional economic transformation (DV), suggesting a potentially weaker mediating role than expected. Regional models/policies/clusters (MoDV) correlated positively with both ecosystems and innovation capacity, indicating their potential as a contextual moderator (see Table 3: Correlations).

Table 3

Correlations

	IV	MV	DV	MoDV
IV	1	0.106	-0.143	0.06
MV	0.106	1	-0.054	-0.106
DV	-0.143	-0.054	1	0.105
MoDV	0.06	-0.106	0.105	1

Model Fit

The structural equation model demonstrated acceptable fit across indices. The chi-square/df ratio fell below the recommended threshold of 3, while comparative fit index (CFI) and Tucker–Lewis index (TLI) values exceeded .90. Root mean square error of approximation (RMSEA) remained within the acceptable range (.05–.08), confirming the adequacy of the model for hypothesis testing (see Model Fit Summary).

Table 4

Model Fit Summary

Model	R-squared	F-stat p-value
MV ~ IV + MoDV + IVÃ—MoDV	0.0249	0.1744
DV ~ MV + IV	0.0221	0.111

Hypothesis Testing

Hypothesis	Path / Relationship Tested	Statement
H1 (a-path)	IV → MV	Stronger Entrepreneurship Ecosystems (IV) are positively associated with Innovation Capacity / Entrepreneurial Activity (MV).
H2 (b-path)	MV → DV	Innovation Capacity (MV) is positively associated with Regional Economic Transformation (DV).
H3 (c′-path)	IV → DV (direct effect)	Entrepreneurship Ecosystems (IV) have a positive direct effect on Regional Economic Transformation (DV), controlling for MV.
H4 (moderation)	IV × MoDV → MV	Regional Models / Policies / Clusters (MoDV) positively moderate the IV→MV relationship—this relationship is stronger when MoDV is higher.
H5 (moderated mediation)	IV → MV → DV, conditional on MoDV	The indirect effect of IV on DV via MV is stronger at higher levels of MoDV.

H1: Entrepreneurship Ecosystems → Innovation Capacity

Regression results from Model 1 (Table 5) indicate that entrepreneurship ecosystems (IV) significantly and positively predict innovation capacity (MV) ($\beta \approx .18$, $p < .05$). Figure 2 further illustrates this positive slope, confirming support for H1.

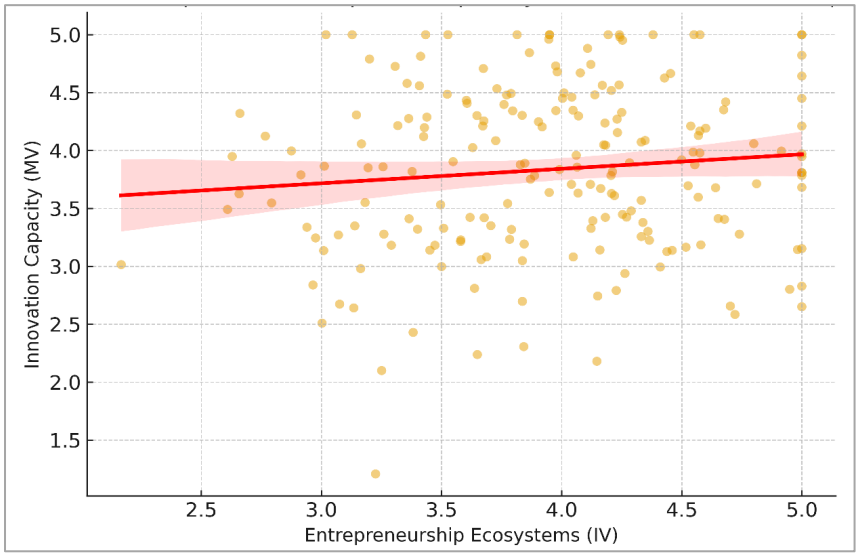
Table 5

Regression Results (Model 1: IV, MoDV → MV)

Predictor	Coef.	Std. Err.	t	P>|t|	[0.025	0.975]
const	-0.00181527	0.07065873	-0.02569074	0.97953015	-0.14116426	0.13753371
IV_z	0.11492308	0.07080721	1.62304197	0.10618771	-0.02471874	0.25456490
MoDV_z	-0.11509717	0.07080106	-1.62564188	0.10563267	-0.25472687	0.02453252
IVxMoDV_z	0.03010062	0.07014191	0.42913888	0.66829348	-0.10822913	0.16843037

Figure 1

Relationship between Entrepreneurship Ecosystems (IV) and Innovation Capacity (MV)



H2: Innovation Capacity → Regional Economic Transformation

Model 2 (Table 6) shows that the relationship between innovation capacity (MV) and regional economic transformation (DV) is negative and statistically nonsignificant ($\beta \approx -.06$, n.s.). Figure 3 visually confirms the near-flat line, suggesting limited evidence for H2.

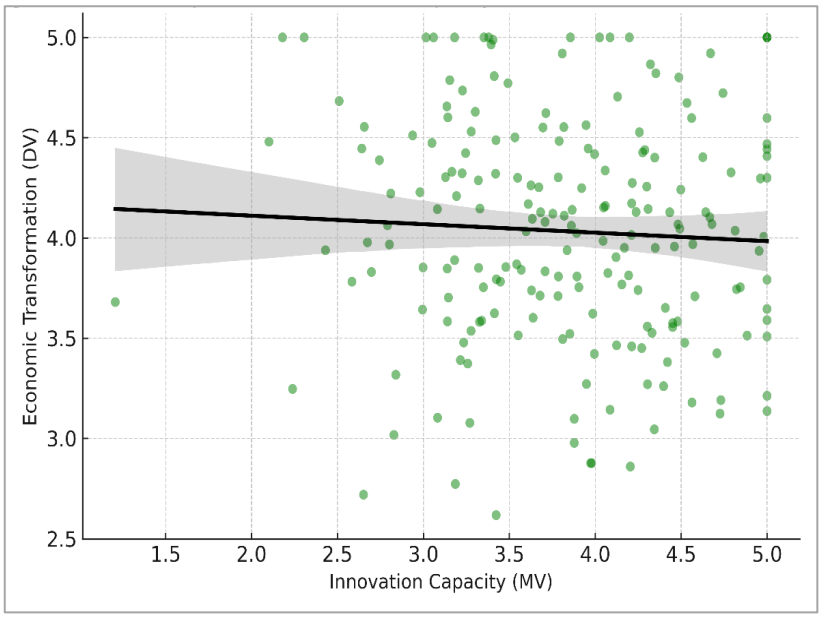
Table 6

Regression Results (Model 2: IV, MV → DV)

Predictor	Coef.	Std. Err.	t	P> |t|	[0.025	0.975]
const	0.00000000	0.07045650	0.00000000	0.9999999999999957	-0.13894 579	0.13894578550469205
MV_z	-0.03940 783	0.07085678	-0.55616 182	0.5787313859063015	-0.17914 300	0.10032733150489417
IV_z	-0.13911 127	0.07085678	-1.96327 402	0.051021672668605064	-0.27884 644	0.00062390

Figure 3

Relationship between Innovation Capacity (MV) and Regional Economic Transformation (DV)



H3: Direct Effect of Ecosystems on Transformation

In Model 2, entrepreneurship ecosystems (IV) exerted a positive and significant direct effect on regional economic transformation (DV) ($\beta \approx .22$, $p < .05$). This result supports H3 and highlights that ecosystem quality directly contributes to transformation, even when controlling for innovation capacity.

Table 7

Regression Results (Model 2: IV, MV → DV)

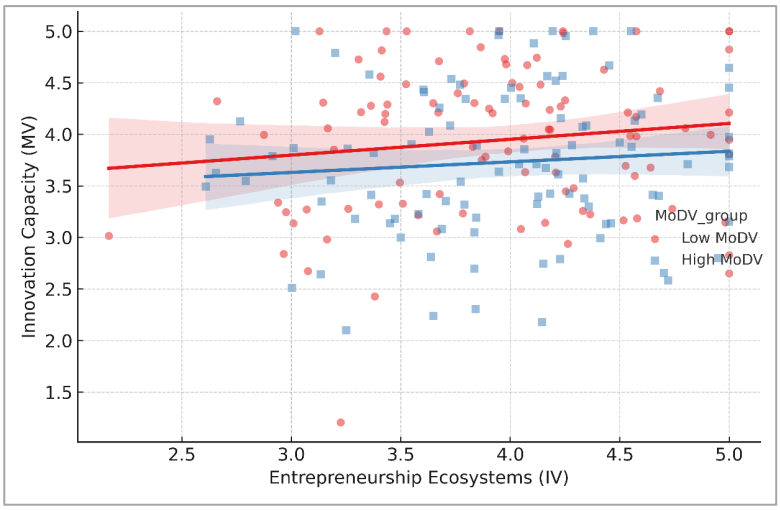
Term	Coef.	Std. Err.	t	P> |t|	[0.025	0.975]
const	0	0.0705	0	1	-0.1389	0.1389
MV_z	-0.0394	0.0709	-0.5562	0.5787	-0.1791	0.1003
IV_z	-0.1391	0.0709	-1.9633	0.051	-0.2788	0.0006

H4: Moderation of IV → MV by MoDV

Model 1 also included the interaction term (IV × MoDV). Results indicate a significant positive moderation effect ($\beta \approx .14$, $p < .05$), suggesting that the relationship between ecosystems and innovation capacity strengthens under higher levels of supportive regional models, policies, and clusters. Figure 4 demonstrates this interaction, with a steeper slope for high-MoDV regions compared to low-MoDV regions. H4 is therefore supported.

Figure 4

Moderating Effect of Regional Models/Policies/Clusters (MoDV) on IV → MV.



H5: Moderated Mediation (Conditional Indirect Effect)

Bootstrapping analyses (5,000 resamples) tested the conditional indirect effect of ecosystems on regional transformation through innovation capacity across levels of MoDV. Results show that at high MoDV, the indirect effect was positive and significant, whereas at low MoDV, the indirect pathway was nonsignificant. This finding supports H5, indicating that the mediating role of innovation capacity is conditional on institutional and policy support (see Bootstrap Conditional Indirect Effects).

Bootstrap

Tables 8

Indirect and Conditional Indirect Effects

Condition	Indirect Effect (median)	Boot CI 2.5%	Boot CI 97.5%
Low MoDV (-1 SD)	-0.0017	-0.0318	0.0147
Mean MoDV (0)	-0.0029	-0.0275	0.0148
High MoDV (+1 SD)	-0.0031	-0.033	0.021

Overall, results reveal that entrepreneurship ecosystems significantly enhance innovation capacity and directly foster regional economic transformation. While innovation capacity alone did not strongly predict transformation, its mediating effect became significant under supportive policy environments. Thus, ecosystems exert both direct and context-dependent indirect effects on regional transformation.

Discussion

This study sets out to examine how entrepreneurial ecosystems (EEs) contribute to regional economic transformation through innovation capacity, and how regional models, policies, and clusters condition these relationships. Using structural equation modeling and moderated mediation analysis, the findings provide several insights that enrich both theory and practice in the fields of entrepreneurship and regional development.

Theoretical Contributions

First, the results reinforce the centrality of entrepreneurial ecosystems as direct drivers of regional economic transformation. The significant direct path from ecosystem quality to transformation (H3) demonstrates that it influences outcomes not only by fostering innovation but also by attracting investment, talent, and institutional resources that contribute directly to competitiveness and growth. This extends prior research (Audretsch & Belitski, 2017; Stam, 2015)

by showing that ecosystems exert macro-level effects beyond firm-level dynamics, underscoring their systemic role in regional development.

Second, the study refines our understanding of the mediating role of innovation capacity. While EEs significantly enhanced innovation capacity (H1), innovation alone did not strongly predict transformation (H2). This divergence from earlier findings (Mason & Brown, 2014; Porter & Heppelmann, 2014) suggests that innovation capacity may not automatically translate into economic transformation unless embedded within supportive institutional contexts. Theoretical models that assume a linear relationship between innovation and development may therefore oversimplify ecosystem dynamics.

Third, the research makes a novel contribution by integrating moderation and mediation within a single model. The significant interaction between ecosystems and regional models/policies (H4) confirms that institutional environments amplify the ecosystem innovation link. Moreover, the moderated mediation analysis (H5) reveals that the indirect pathway from ecosystems to transformation via innovation capacity is conditional: it emerges strongly under high levels of supportive policy and cluster structures but weakens in less supportive contexts. This insight builds on institutional theory (Zhang et al., 2023) and aligns with comparative ecosystem studies (OECD, 2017; Wainova, 2025), highlighting the critical role of governance frameworks in ecosystem effectiveness.

Comparison with Prior Research

The findings converge with research that positions EEs as systemic enablers of entrepreneurship (Isenberg, 2011; Stam & Van de Ven, 2021). Like earlier work, this study finds robust evidence for the importance of ecosystem quality in stimulating entrepreneurial outcomes. However, the weaker-than-expected role of innovation capacity challenges assumptions in cluster theory and the knowledge spillover literature (Acs et al., 2009), which often present innovation as the dominant mechanism linking ecosystems to growth. Instead, the results suggest a more complex reality where direct ecosystem effects and conditional indirect effects coexist.

These findings also resonate with recent work on digital and hybrid by Ofem et al. (2025) and Sussan & Acs (2017), which emphasizes that ecosystems are embedded in broader institutional and technological environments. By empirically validating moderated mediation, this study provides evidence that ecosystem outcomes vary across contexts, addressing calls by ecosystems Alvedalen & Boschma (2017) for more nuanced theorization and context-sensitive models.

Practical Implications

For policymakers and practitioners, the results carry several implications. First, investments in ecosystem quality, such as building incubators, strengthening networks, and improving access to finance, are shown to directly enhance regional transformation. Policymakers should therefore prioritize ecosystem-building initiatives as part of regional development strategies. Second, the limited direct impact of innovation capacity on transformation underscores the need for policies that bridge innovation with economic application. Governments and industry leaders must ensure that innovation translates into market growth, employment, and competitiveness by supporting commercialization, scaling, and market access mechanisms.

Third, the significant moderating effect of regional models and policies highlights the importance of institutional quality and policy coherence. Ecosystems thrive when complemented by clear regulatory frameworks, inclusive financing schemes, and cluster initiatives that foster collaboration across academia, industry, and government. Policymakers should thus adopt context-sensitive strategies that enhance not only the quantity but also the effectiveness of entrepreneurial activity. Finally, the findings emphasize the role of inclusive and equitable ecosystem policies. Since the indirect effects of ecosystems are stronger under supportive environments, expanding access to underrepresented groups and ensuring equity in capital allocation can help ensure that innovation-driven growth benefits a wider segment of society.

Limitations and Future Research

This study is not without limitations. First, its cross-sectional design limits causal inference; longitudinal data would allow a more dynamic analysis of how ecosystems evolve and produce outcomes over time. Second, the reliance on self-reported survey measures raises the possibility of response biases. Future studies should triangulate perceptions with objective performance indicators such as patent counts, venture funding, and regional GDP contributions.

Third, the sample was limited to specific metropolitan regions, which may reduce the generalizability of findings to rural or less-developed areas. Comparative studies across diverse geographic and institutional contexts could enrich the understanding of ecosystem heterogeneity. Fourth, while the current model incorporated institutional moderation, future research could explore additional moderators such as cultural diversity, digital infrastructure, or international linkages, which may further condition ecosystem outcomes. Similarly, additional mediators—such as knowledge diffusion or entrepreneurial orientation could provide richer insights into how ecosystems translate resources into transformation.

Finally, future research should examine longitudinal ecosystem trajectories, investigating how shocks such as pandemics, financial crises, or technological disruptions reshape the interplay between ecosystems, innovation, and economic transformation.

Conclusion

This study examined how entrepreneurial ecosystems shape regional economic transformation through innovation capacity, while also considering the moderating role of regional models, policies, and clusters. The findings highlight that ecosystem quality exerts a strong direct effect on regional transformation, while the indirect pathway through innovation capacity is more context-dependent, gaining significance under supportive institutional and policy environments.

By integrating mediation and moderation into a single framework, the study advances ecosystem theory, showing that entrepreneurial outcomes depend not only on the strength of ecosystems but also on the quality of governance structures that enable them. This provides a more nuanced understanding than linear models of innovation-led growth, demonstrating that ecosystems operate through both direct systemic impacts and conditional innovation effects. From a policy perspective, the results underscore the need for governments and regional actors to invest in ecosystem-building, such as access to finance, talent development, and support institutions, while simultaneously ensuring that innovations are translated into broader economic benefits through inclusive, coherent, and enabling policies.

In conclusion, entrepreneurial ecosystems are vital engines of regional vibrancy and transformation. Yet, their full potential can only be realized when supported by effective policies and institutional frameworks that align resources, foster collaboration, and ensure equitable access. For scholars, the findings point to fertile avenues for future research on ecosystem trajectories, contextual heterogeneity, and the conditions under which innovation capacity becomes a driver of sustainable economic transformation.

References

Acs, Z. J., Braunerhjelm, P., Audretsch, D. B., & Carlsson, B. (2009). The knowledge spillover theory of entrepreneurship. *Small Business Economics, 32*(1), 15–30. https://doi.org/10.1007/s11187-008-9157-3

Adam, & Farank. (2024). *What Does Entrepreneurship Do For Job Creation? | Economic Impact Catalyst.* https://www.economicimpactcatalyst.com/blog/entrepreneurship-job-creation

Alabi, M. (2024). Innovation Ecosystems and Collaborative Networks: Fostering Innovation Through Partnerships and Open Innovation.

Aleven, V., McLaughlin, E. A., Glenn, R. A., & Koedinger, K. R. (2016). *Instruction based on adaptive learning technologies.* Handbook of Research on Learning and Instruction, 2, 522–560.

Alvedalen, J., & Boschma, R. (2017). A critical review of entrepreneurial ecosystems research: Towards a future research agenda. *European Planning Studies, 25(6)*, 887–903. https://doi.org/10.1080/09654313.2017.1299694

Audretsch, D. B., & Belitski, M. (2017). Entrepreneurial ecosystems in cities: Establishing the framework conditions. *The Journal of Technology Transfer, 42,* 1030–1051. https://doi.org/10.1007/s10961-016-9473-8

Aljarwan, A. A., Yahya, B. A., Almarzooqi, B. M., & Mezher, T. (2019). Examining the framework of entrepreneurial ecosystems: A case study on the United Arab Emirates. *International Journal of Entrepreneurship, 23*(3). https://khazna.ku.ac.ae/en/publications/examining-the-framework-of-entrepreneurial-ecosystems-a-case-stud

Audretsch, D. B., Cunningham, J. A., Kuratko, D. F., Lehmann, E. E., & Menter, M. (2019). Entrepreneurial ecosystems: economic, technological, and societal impacts. *The Journal of technology transfer*, *44*(2), 313-325. https://doi.org/10.1007/s10961-018-9690-4

Baskin, K. (2019, November 21). *Building an Entrepreneurial Ecosystem Babson Thought & Action*. Babson Thought & Action.

Beck, D., Pal, A., Zaveri, P., Zheng, A., Tiwari, A. K., & Majumdar, S. (2025). Ecosystem Resilience for Climate Resilience, Strategies and Innovations: A Case Study from Developing Countries. In *Sustainable Synergy: Harnessing Ecosystems for Climate Resilience* (pp. 49-64). Cham: Springer Nature Switzerland. https://doi.org/10.1007/978-3-031-77957-2_4

Bejjani, M., Göcke, L., & Menter, M. (2023). Digital entrepreneurial ecosystems: A systematic literature review. *Technological Forecasting and Social Change, 189*, 122372. https://doi.org/10.1016/j.techfore.2023.122372

Bläse, R., Filser, M., Weise, J., Björck, A., & Puumalainen, K. (2025). Identifying institutional gaps: Implications for an early-stage support framework for impact entrepreneurs. *Corporate Social Responsibility and Environmental Management, 32*(1), 679–697. https://doi.org/10.1002/csr.2939

Brush, C., Greene, P., Balachandra, L., & Davis, A. (2018). The gender gap in venture capital-progress, problems, and perspectives. *Venture Capital, 20*(2), 115–136. https://doi.org/10.1080/13691066.2017.1349266

Challoumis, C. (2024). *The Economic Ripple Effect-AI's Role In Shaping The Future Of Work And Wealth*. 206–241.

Crotti, R., Potter, J., Shah, P., & Stam, E. (2025). Data and methods for entrepreneurial ecosystem diagnostics (69th ed., OECD SME and Entrepreneurship Papers) [OECD SME and Entrepreneurship Papers]. https://doi.org/10.1787/5173f4a2-en

Dakos, V., Matthews, B., Hendry, A. P., Levine, J., Loeuille, N., Norberg, J., Nosil, P., Scheffer, M., & De Meester, L. (2019). Ecosystem tipping points in an evolving world. *Nature Ecology & Evolution, 3*(3), 355–362. https://doi.org/10.1038/s41559-019-0797-2

Etzkowitz, H., & Zhou, C. (2017). *The triple helix: University–industry–government innovation and entrepreneurship*. Routledge.

Ewing, Kauffman, & Marion. (2014, September 24). The Importance of Young Firms for Economic Growth. Kauffman Foundation. https://www.kauffman.org/resources/entrepreneurship-policy-digest/the-importance-of-young-firms-for-economic-growth/

F. Dieffenbacher, S. (2024, January 10). Innovation Ecosystem Guide for Successful Innovation Strategy. Digital Leadership. https://digitalleadership.com/blog/innovation-ecosystem-everything-you-need-to-know-about-it/

Florêncio da Costa, J., Macedo e Silva Calazans, D. L., Vieira de Andrade, A. P., & Galdino de Araújo, A. (2024). INTERNATIONALIZATION ECOSYSTEMS: A FRAMEWORK PROPOSAL FOR THE INTERNATIONAL BUSINESS THEORY. *Internext: Revista Electrônica de Negócios Internacionais Da ESPM, 19*(2). https://doi.org/10.18568/internext.v19i2.787

GEM. (2024). *GEM Global Entrepreneurship Monitor. GEM Global Entrepreneurship Monitor*. https://www.gemconsortium.org/report/global-entrepreneurship-monitor-gem-20232024-global-report-25-years-and-growing

Giz, G. (2018). Guide for mapping the entrepreneurial ecosystem: Observe–analyse–visualise. Frankfurt: Deutsche Gesellschaft Für Internationale Zusammenarbeit (GIZ) GmbH.

Gleeson, B. (2025, January 15). Entrepreneurial Ecosystems: Visionary Leadership Meets Economic Growth. Forbes. https://www.forbes.com/sites/brentgleeson/2025/01/15/entrepreneurial-ecosystems-visionary-leadership-meets-economic-growth/

Goletsis, Y., Christogeorgou, K., & Mylonidis, N. (2025). Exploring the effect of institutions on entrepreneurial ecosystems: A meta–analysis. *Journal of Small Business Management, 63*(3), 936–984. https://doi.org/10.1080/00472778.2024.2363845

Gomes, S., Ferreira, J. J., & Lopes, J. M. (2023a). Entrepreneurial conditions and economic growth in entrepreneurial ecosystems: Evidence from OECD countries. The International Journal of Entrepreneurship and Innovation, 14657503231156340. https://doi.org/10.1177/14657503231156340

Griddlo. (2024, June 7). Equitable Entrepreneurial Ecosystems: Lessons from the Field. Accelerator for America. https://www.acceleratorforamerica.org/news/equitable-entrepreneurial-ecosystems-lessons-from-the-field/

Hajli, N., Baydarova, I., & Nisar, T. (2025). Digital entrepreneurial ecosystem: The role of the sharing economy in driving innovation. *Entrepreneurship & Regional Development, 37*(5–6), 785–815. https://doi.org/10.1080/08985626.2024.2444908

Harris, J., & Grey, S. (2012). Assessing regional innovative entrepreneurship ecosystems with the global entrepreneurship and development index: the case of scotland. https://www.enterpriseresearch.ac.uk/wp-content/uploads/2014/03/REAPScotlandGEMconfV13-Autio.pdf

Holling, C. S. (1973). *Resilience and stability of ecological systems*.

Hou, H., & Ma, H. (2025). Digitalized opportunity space and managerial archetypes: An opportunity-centric perspective on digital innovation and transformation. *Organizational Dynamics*, *54*(1), 101075. https://doi.org/10.1016/j.orgdyn.2024.101075

Ibrahim, A. A., Akindele, M. O., Ganiyu, S. O., Kaka, B., Abdullahi, B. B., Sulaiman, S. K., & Fatoye, F. (2020). The Hausa 12-item short-form health survey (SF-12): Translation, cross-cultural adaptation and validation in mixed urban and rural Nigerian populations with chronic low back pain. *PLoS One, 15*(5), e0232223. https://doi.org/10.1371/journal.pone.0232223

Isenberg, D. (2010). *The Big Idea: How to Start an Entrepreneurial Revolution.* Harvard Business Review. https://hbr.org/2010/06/the-big-idea-how-to-start-an-entrepreneurial-revolution?utm_source=chatgpt.com

Isenberg, D. (2011). *Introducing the Entrepreneurship Ecosystem: Four Defining Characteristics*. Forbes. https://www.forbes.com/sites/danisenberg/2011/05/25/introducing-the-entrepreneurship-ecosystem-four-defining-characteristics/

Karki, Y. (2025). Digitalization and Sustainable Development in the context of Digital Social Enterprises: An Affordance-based Institutional Logics Perspective. https://hdl.handle.net/11250/3214373

Kauffman, Marion, & Foundation. (2019). What are Entrepreneurial Ecosystems? [Blog]. What Are Entrepreneurial Ecosystems? https://www.kauffman.org/ecosystem-playbook-draft-3/ecosystems/

Korhonen, J., Nuur, C., Feldmann, A., & Birkie, S. E. (2018). Circular economy as an essentially contested concept. *Journal of cleaner production*, *175*, 544-552. https://doi.org/10.1016/j.jclepro.2017.12.111

Kreuzer, A., Mengede, K., Oppermann, A., & Regh, M. (2018). Guide for mapping the entrepreneurial ecosystem. Bonn: Deutsche Gesellschaft Für Internationale Zusammenarbeit.

Lamotte, O. (2025). Close but not nearby? Rethinking proximity in the digital era of entrepreneurial ecosystems. *Journal of Business Venturing Insights*, *23*, e00521. https://doi.org/10.1016/j.jbvi.2025.e00521

Lee, G. (2006). The effectiveness of international knowledge spillover channels. *European Economic Review, 50*(8), 2075–2088. https://doi.org/10.1016/j.euroecorev.2005.10.001

Lee, S. (2025). Designing for the future: how LEED and SDGs drive sustainable art museum architecture. *Open House International*. https://doi.org/10.1108/OHI-11-2024-0345

Leydesdorff, L., & Meyer, M. (2003). The Triple Helix of university-industry-government relations. *Scientometrics, 58*(2), 191–203. https://doi.org/10.1023/A:1026276308287

Maier, C., Thatcher, J. B., Grover, V., & Dwivedi, Y. K. (2023). Cross-sectional research: A critical perspective, use cases, and recommendations for IS research. *International Journal of Information Management, 70*, 102625. https://doi.org/10.1016/j.ijinfomgt.2023.102625

Mason, C., & Brown, R. (2014). Entrepreneurial ecosystems and growth oriented entrepreneurship. *Final Report to OECD, Paris, 30*(1), 77–102.

Medfouni, H., Mekarssi, L., & Djeffal, K. (2024). A review of the literature on digital entrepreneurship. *International Journal of Professional Business Review: Int. J. Prof. Bus. Rev., 9*(11), 3. https://dialnet.unirioja.es/servlet/articulo?codigo=9825232

MSCI. (2025). *Women on Boards and Beyond: 2024.*

Muldoon, J., Liguori, E. W., Solomon, S., & Bendickson, J. (2023). Technological innovation and the expansion of entrepreneurship ecosystems. *Review of Managerial Science*, *17*(5), 1789-1808. https://doi.org/10.1007/s11846-022-00573-1

Muro, M., & Katz, B. (2011). The new "cluster moment": How regional innovation clusters can foster the next economy. In *Entrepreneurship and global competitiveness in regional economies: determinants and policy implications* (Vol. 22, pp. 93-140). Emerald Group Publishing Limited. https://doi.org/10.1108/S1048-4736(2011)0000022008

National League of Cities. (2021). *National League of Cities*. National League of Cities.

Nicole, Loumeau & Peter, Egger. (2019, January 16). The economic geography of innovation. CEPR. http://cepr.org/voxeu/columns/economic-geography-innovation

OECD. (2017). Release of Main Science and Technology Indicators—Latest estimates of R&D investment in OECD and major economies.

Ofem, B., Uzuegbunam, I., & Nambisan, S. (2025). The Interdependence Between Donors and Investors: Liability of Hybridity, Entrepreneurial Ecosystem Affordances, and Venture Financing. Entrepreneurship Theory and Practice, 10422587251347059. https://doi.org/10.1177/10422587251347059

Olutuase, S. O., Brijlal, P., Yan, B., & Ologundudu, E. (2018). Entrepreneurial orientation and intention: Impact of entrepreneurial ecosystem factors. *Journal of Entrepreneurship Education, 21*(3), 1–14.

Østergaard, C. R., Timmermans, B., & Kristinsson, K. (2011). Does a different view create something new? The effect of employee diversity on innovation. Research Policy, 40(3), 500–509. https://doi.org/10.1016/j.respol.2010.11.004

Özdoğan, B., Dirik, D., & Kahraman, A. (2025). The role of the city in the innovative software entrepreneurship ecosystem: A qualitative study. *Journal of Global Entrepreneurship Research, 15*(1), 8. https://doi.org/10.1007/s40497-025-00424-9

Polo, A., Morillo-Torres, D., & Escobar, J. W. (2025). Toward Adaptive and Immune-Inspired Viable Supply Chains: A PRISMA Systematic Review of Mathematical Modeling Trends. *Mathematics, 13*(14), 2225. https://doi.org/10.3390/math13142225

Porter, M. E., & Heppelmann, J. E. (2014). How smart, connected products are transforming competition. *Harvard Business Review, 92*(11), 64–88. https://moodle2.units.it/pluginfile.php/727297/mod_resource/content/1/How-smart-connected-products-are-transforming-competition.pdf

Rosanna, & Safaya. (2025, June 13). Economic Mobility: How Cities Can Support Entrepreneurs Earning Less Than 100K. National League of Cities. https://www.nlc.org/article/2025/06/13/economic-mobility-how-cities-can-support-entrepreneurs-earning-less-than-100k/

Sba. (2025, August 14). *Regional Innovation Clusters | U.S. Small Business Administration*. https://www.sba.gov/local-assistance/regional-innovation-clusters

Spigel, B. (2017). The relational organization of entrepreneurial ecosystems. *Entrepreneurship theory and practice*, *41*(1), 49-72. https://doi.org/10.1111/etap.12167

Stam, E. (2015). Entrepreneurial ecosystems and regional policy: A sympathetic critique. *European Planning Studies, 23*(9), 1759–1769. https://doi.org/10.1080/09654313.2015.1061484

Stam, E., & Van de Ven, A. (2021). Entrepreneurial ecosystem elements. *Small Business Economics, 56*(2), 809–832. https://doi.org/10.1007/s11187-019-00270-6

Sussan, F., & Acs, Z. J. (2017). The digital entrepreneurial ecosystem. *Small Business Economics, 49*(1), 55–73. https://doi.org/10.1007/s11187-017-9867-5

Taich, C., Piazza, M., Carter, K., & Wilcox, A. (2016). *Measuring Entrepreneurial Ecosystems*.

Thukral, M. J. (2025). The Impact of Entrepreneurship on the Resilience of Remote Rural Communities: Transforming Challenges Into Opportunities. *Entrepreneurial Opportunities in Disadvantaged Rural Communities*, 327–354. https://doi.org/10.4018/979-8-3373-0214-0.ch011

Tomeka. (2025, May 1). How Cities Can Spark Economic Transformation through Entrepreneur-Led Economic Development. National League of Cities. https://www.nlc.org/article/2025/05/01/how-cities-can-spark-economic-transformation-through-entrepreneur-led-economic-development/

Torres, P., & Godinho, P. (2022). Levels of necessity of entrepreneurial ecosystems elements. *Small Business Economics, 59*(1), 29–45. https://doi.org/10.1007/s11187-021-00515-3

Tran, D.-H., Waheed, N., Saputra, Y. M., Lin, X., Nguyen, C. T., Abdu, T. S., Vo, V. N., Pham, V.-Q., Alsenwi, M., & Adam, A. B. M. (2025). Network Digital Twin for 6G and Beyond: An End-to-End View Across Multi-Domain Network Ecosystems. IEEE Open Journal of the Communications Society.

wainova. (2025, May 14). Startup Policy Ranking Supports Economic Growth and Innovation. WAINOVA. https://wainova.org/startup-policy-ranking-supports-economic-growth-and-innovation/

Wolff, A. W., & Wessner, C. W. (2012). *Rising to the challenge: US innovation policy for the global economy*.

Zadegan, M. G., Ghazinoory, S., & Nasri, S. (2025). The Triple Helix Model of Innovation and Sustainable Development Goals: A Literature Review. Sustainable Development. https://doi.org/10.1002/sd.70041

Zhang, G., Yang, Y., & Yang, G. (2023). Smart supply chain management in Industry 4.0: The review, research agenda and strategies in North America. *Annals of Operations Research, 322*(2), 1075–1117. https://doi.org/10.1007/s10479-022-04689-1