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Modeling the Structure and Dynamics of Regional Entrepreneurial Ecosystems: Evidence from Serbia

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Abstract

Although the literature on entrepreneurial ecosystems recognizes institutional, economic, technological, and social factors, integrated empirical tests of their interrelationships at the regional level remain limited, particularly in transition economies. This paper analyzes a structural-mechanism model of regional entrepreneurial ecosystems in Serbia using survey data from 401 enterprises in four regions. The study applies partial least squares structural equation modeling (PLS-SEM) to assess the measurement model, structural pathways, indirect effects, and predictive relevance of the proposed model. Additional regional comparisons and official regional GDP indicators are used to contextualize the survey-based findings. The results support the reliability and convergent validity of the reflective constructs. The structural model indicates that economic and social factors are associated with institutional and technological conditions, while institutional, technological, and social factors are associated with innovation development, new product and service development, innovation capacity, entrepreneurial activity, and entrepreneurial motivation. The indirect effects further support the proposed mechanism logic, especially through institutional and technological pathways. Regional comparisons show significant differences across the observed regions, with Southern Serbia recording less favorable perceived ecosystem conditions. The findings suggest that regional entrepreneurial ecosystems should be analyzed as context-dependent systems in which structural conditions and operating mechanisms are connected, but the cross-sectional and perception-based design does not allow definitive causal conclusions.

Keywords: regional entrepreneurial ecosystem; institutional framework; structural drivers; transition economies; PLS-SEM; structural-mechanism model; regional differences



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1. Introduction

Entrepreneurial ecosystems have emerged as an important framework for understanding the complex and systemic foundations of innovation, venture creation, and sustainable regional development (Spigel, 2017; Stam & Van de Ven, 2021). The regional level is particularly important because it provides the primary spatial context in which entrepreneurs access resources, develop networks, and interact with institutions (Audretsch et al., 2018; Leendertse et al., 2022). A systemic perspective is needed because it moves beyond the analysis of isolated factors and examines how interdependent components, such as institutions, markets, technologies, and cultures, interact dynamically and shape entrepreneurial

outcomes (Autio et al., 2018). The existing literature has improved the understanding of these ecosystems. A large body of research has defined their main elements, including formal and informal institutions, access to finance and markets, technological infrastructure, and social networks (J. Chen et al., 2019; Stam & Spigel, 2016). At the same time, research on transition economies such as Serbia has pointed to specific challenges and opportunities within their evolving institutional settings, where historical legacies and ongoing reforms shape entrepreneurial paths (Gangi & Idris, 2023; Milošev et al., 2025). Studies increasingly recognize strong regional heterogeneity within countries, where differences in resources, networks, and policy implementation lead to different levels of ecosystem performance levels (Rossoni et al., 2024). Despite these contributions, an important research gap remains. Although the literature recognizes the relevance of multiple and interrelated factors, a large part of existing research still focuses on individual ecosystem elements or qualitative single-case studies (Kansheba & Wald, 2020). Empirically validated and integrated models that specify and test structural relationships and causal mechanisms that connect these factors into a logical and meaningful systemic framework are still relatively rare (Spigel, 2017). This gap is particularly evident at the regional level and in the context of transition economies, where more nuanced quantitative models are needed to move from descriptive mapping to explanatory analysis of ecosystem dynamics (Ceci et al., 2026; J. Chen et al., 2019). Therefore, research is needed to develop and empirically test integrated models that clarify the structure and operating mechanisms of regional entrepreneurial ecosystems. The central research question which guided the research is: How economic and social factors are associated with innovation and entrepreneurship through institutional and technological mechanisms? This question has direct relevance for regional policy because public spending, legal development, business support, and technology support can have different effects depending on the structure of the regional ecosystem. The paper therefore treats the entrepreneurial ecosystem not as a list of separate elements, but as a system of connected layers: structural conditions, mechanisms, and entrepreneurial outcomes.

The aim of this paper is to develop and empirically test an integrated structural-mechanistic model of a regional entrepreneurial ecosystem. The model examines how institutional, economic, technological, and social factors are associated with innovation capacity and entrepreneurial activity in a regional context. Given that the research design is cross-sectional and based on perceptual data, the model is interpreted as evidence of theoretically grounded structural associations rather than definitive causal relationships. The model connects institutional, economic, technological, and social factors and analyzes their mutual relationships, as well as the mechanisms through which they contribute to innovation capacity and entrepreneurial activity in a regional context (Milošev et al., 2025).

In this paper, the model is based on the assumption that economic and social factors act as structural drivers that shape the institutional and technological subsystems. These subsystems function as mechanisms that directly affect innovation and entrepreneurial activity. The paper makes a theoretical contribution by proposing and supporting a model that defines economic and social factors as basic structural drivers. These drivers shape institutional and technological conditions, which then act as the main mechanisms affecting entrepreneurial outcomes. This clarifies the functions and pathways within the ecosystem. The paper also provides an empirical contribution through the quantitative testing of this model on a sample of 401 enterprises from four different regions of Serbia. Partial least squares structural equation modeling is used to test the integrated model, including the measurement model, structural pathways, explained variance, predictive relevance, and indirect effects. Welch's ANOVA is used as a supplementary analysis only to examine regional differences in perceived ecosystem conditions.

The paper contributes to context-specific literature on entrepreneurial ecosystems in transition economies and offers an analytical framework for policymakers (Santos, 2024). It is important to note that the model should be interpreted as a structured, association-based explanation of regional entrepreneurial ecosystem conditions. It does not claim definitive causal validation, but it clarifies how structural conditions and mechanism-based pathways are connected within the observed Serbian regional context.

The paper is organized as follows. After this introduction, the theoretical framework and hypothesis development are presented. This is followed by a detailed description of the research methodology and data analysis procedures. The results are then presented and discussed in relation to systemic ecosystem theory. The paper concludes with a summary of the main findings, policy implications, and directions for future research.

2. Theoretical Framework

2.1. Literature Review

Entrepreneurial ecosystems can be understood as complex systems composed of interdependent factors that jointly shape the conditions for entrepreneurship and innovation (Cavallo et al., 2019; Yuan et al., 2021). Instead of a simplified view focused on isolated components, the systemic approach highlights interdependence, structure, and dynamics (Stam & Spigel, 2016). An ecosystem has a recognizable structure, configuration, and hierarchy of its subsystems. It also has specific mechanisms through which these subsystems interact and produce outcomes such as innovation capacity, new product development, and entrepreneurial activity (Cavallo et al., 2026; Isenberg, 2010). Therefore, this paper conceptualizes the regional entrepreneurial ecosystem as a complex system in which the interaction between structural conditions and functional mechanisms shapes ecosystem performance. Institutional factors include formal and informal rules, regulations, support policies, and governance structures that shape entrepreneurial behavior (Spigel, 2017). In the ecosystem model, these factors have an operational function because they establish the rules of engagement and provide targeted support. This directly supports innovation and reduces uncertainty for entrepreneurs (Giblin et al., 2025; World Economic Forum, 2013). Such conditions create the necessary legitimacy and stability for innovative activities (J. Chen et al., 2019; Tot, 2025). Economic factors refer to the basic material conditions of the ecosystem, including market dynamics, access to finance, regional wealth, and industrial diversity (Harper-Anderson & Lewis, 2018; Pan et al., 2016). In the ecosystem model, their systemic function is structural because they form the resource base on which other elements are built. A developed economic base allows investment in institutional development and technological infrastructure, which shapes the capacity and quality of these subsystems (Content & Frenken, 2016). Technological factors include the level of technological progress, research and development intensity, the availability of digital infrastructure, and the presence of technical knowledge and patents (Bakator et al., 2023; Branstetter et al., 2018; Mai & Nguyen, 2022). Within the ecosystem model, technology acts as a main mechanism that directly supports innovation through tools, knowledge, and platforms (Hess et al., 2025; Zahra et al., 2023). This subsystem converts ideas into marketable products and services and contributes directly to the ecosystem's innovation output. Social factors cover human capital, entrepreneurial culture, social networks, education levels, and attitudes toward risk and entrepreneurship (Chaudhary et al., 2024; Čočkalović et al., 2020; Stam & Van de Ven, 2021). Within the system, these factors have a dual function. They act as a structural driver that shapes institutional norms and technology adoption (Gomez-Jorge et al., 2025; Mahfud et al., 2020). At the same time, they also function as a direct mechanism that supports entrepreneurial activity through networks and cultural support (Hindarsah et al., 2025; Tekic & Tekic, 2025). The dual position of social factors is based on their specific function in

entrepreneurial ecosystems. Social factors, such as trust, education, networks, and cultural attitudes, shape the development of institutional norms and technology adoption. At the same time, they are directly associated with entrepreneurial activity and motivation because they influence social legitimacy, role models, perceived risk, and readiness for entrepreneurial action. Economic factors are not specified as a direct mechanism in this model because they are treated as a resource base that mainly operates through institutional and technological subsystems. Direct economic effects on entrepreneurial outcomes may exist, but they are outside the proposed structural-mechanism architecture and should be examined in future model extensions.

Within an entrepreneurial ecosystem, certain factors have a structural function because they shape the basic conditions of system operation. Economic factors (ECOF) exert a structural effect on institutional factors (INSF) and technological factors (TECF). They affect the development of the institutional environment through investment, market development, and financial institutions. They also affect technological factors through the development of technological infrastructure. Regional economic development provides financial resources and market stability needed for the development of efficient institutions, such as strong legal frameworks and support programs. It also creates the conditions for investment in technological infrastructure and research and development (Fuentes et al., 2024; Guerrero & Siegel, 2024). Similarly, social factors (SOCF) exert a structural effect on institutional frameworks and technology adoption. A society with higher education levels, supportive cultural norms, and dense networks encourages the development of more responsive institutions. It also creates demand for new technologies and the capacity for absorption (Daraojimba et al., 2023; Vuković et al., 2024). Therefore, ECOF and SOCF are conceptualized as structural pillars that establish the conditions for the development of the INSF and TECF subsystems.

The operation of the ecosystem and its mechanisms depends on how its main subsystems directly generate innovation (INO) and entrepreneurial activity (PRED). Institutional factors (INSF) act as a mechanism through a supportive regulatory environment and direct institutional support that improves the innovation capacity (INO) of enterprises (Komlosi et al., 2024; Spigel, 2017). Technological factors (TECF) act as a mechanism through the direct availability of technologies, research infrastructure, and technological knowledge needed for the development of new products and services (RNPU). They also improve the overall innovation capacity (INKAP) of the ecosystem (Ancona & Ceci, 2025; Ruggieri et al., 2018). Social factors (SOCF), in addition to their structural function, also act as a direct mechanism that supports entrepreneurial activity (PRED). They affect motivation through social networks and cultural norms, which support entrepreneurship and the willingness to start a business (MSB) in society (Ancona et al., 2023; Yani et al., 2024). These operational flows explain how internal ecosystem processes translate structural conditions into concrete outcomes.

Based on the literature review, entrepreneurial ecosystems can be understood as multi-layered systems in which economic and social factors perform a structural function because they shape the institutional and technological subsystems. Institutional, technological, and social factors then act as mechanisms through which the ecosystem generates innovation and entrepreneurial activity. Accordingly, this paper develops a structural-mechanism model of a regional entrepreneurial ecosystem. The hypotheses are formulated on the basis of the assumed relationships between the factors and the mechanisms of system operation. ECOF and SOCF are treated as prior structural drivers with a positive effect on INSF and TECF. Subsequently, INSF, TECF, and SOCF operate as direct mechanisms that positively affect ecosystem outcomes: innovation (INO), innovation capacity (INKAP), new

product and service development (RNPU), entrepreneurial activity (PRED), and individuals' motivation and willingness to start their own business (MSB).

Accordingly, the model can be presented as the following flow: economic and social factors, institutional and technological subsystems, mechanisms, innovation and entrepreneurial activity. In this way, the ecosystem functions as a multi-layered system in which structural conditions shape operational mechanisms, while mechanisms generate concrete entrepreneurial outcomes.

2.2. Hypotheses

Entrepreneurial ecosystems are multi-layered systems of interdependent factors and mechanisms that generate innovation and entrepreneurial activity. In line with the systemic approach, the model in this paper is structured through two dimensions: structural relationships between factors and the mechanisms through which the ecosystem produces its outcomes. Although the full model includes many possible relationships, this paper focuses on the main structural relationships and basic mechanisms that explain the core operation of the ecosystem. Accordingly, the hypotheses are grouped into two parts: (1) structural relationships within the ecosystem and (2) mechanisms of ecosystem operation. The proposed model is part of a broader research design. Prior quantitative studies that test these specific relationships within a regional entrepreneurial ecosystem model remain limited, especially in transition economies. For this reason, the hypotheses are grounded in ecosystem theory and supported with empirical evidence from different national contexts, while the Serbian setting is used to test whether these relationships are present in a transition economy with uneven regional development. Evidence from transition economies indicates that institutions, social capital, trust, entrepreneurial culture, and technology adoption are often shaped by historical legacies, reform paths, and uneven regional resources. This is particularly relevant for H3, H4, H8, and H9 because social norms, networks, and education may affect institutional responsiveness, technology acceptance, entrepreneurial activity, and motivation in contexts where formal support systems are still developing.

This paper focuses on the structural and mechanism-based relationships among ecosystem factors and outcomes, while regional differences are examined as a supplementary contextual layer. Business performance outcomes are outside the direct scope of the present paper and may be examined in future research. Within the entrepreneurial ecosystem, certain factors have a structural function because they shape the basic conditions for system operation. Economic factors (ECOF) affect the institutional environment through market development, investment, and financial institutions. They also affect the development of technological infrastructure and the availability of technological resources (Driouich & Kallis, 2025; Singh et al., 2024). At the same time, social factors (SOCF), such as education, social networks, and cultural norms, affect institutional development and the acceptance of new technologies (Moustakas, 2023; Neto et al., 2024). Therefore, ECOF and SOCF are considered structural pillars that shape the institutional (INSF) and technological (TECF) subsystems of the entrepreneurial ecosystem (Audretsch et al., 2019).

Hypothesis 1 (H1). *Economic factors (ECOF) are positively associated with institutional factors (INSF).*

Economic factors, such as growth, stability, and resource allocation, provide the material basis for efficient governance structures (R. Chen et al., 2025). Accordingly, they act as main drivers of institutional adaptation, reform, and overall strength (Bosco et al., 2025; Singh et al., 2024).

Hypothesis 2 (H2). *Economic factors (ECOF) are positively associated with technological factors (TECF).*

A favorable economic environment provides the necessary resources, funding, and infrastructure (Surya et al., 2021). This directly supports and drives technological progress through innovation and broader diffusion (L. Song & Wen, 2023). Strong economic factors are a primary structural driver of technological progress (Rosario et al., 2024).

Hypothesis 3 (H3). *Social factors (SOCF) are positively associated with institutional factors (INSF).*

Social connectedness, trust, and civic engagement provide social capital and legitimacy for the development of resilient institutions (Burdon & Sorour, 2020; Moustakas, 2023). This directly supports institutional adaptation and reform. Social factors have a strong effect on institutional factors (Fahrati, 2023).

Hypothesis 4 (H4). *Social factors (SOCF) are positively associated with technological factors (TECF).*

Social attitudes and cultural openness create a normative environment for technology adoption, while network dynamics directly shape its diffusion (Paska & Budnik, 2023). These social factors jointly act as drivers or barriers and therefore affect technological factors themselves (Ahmad et al., 2025; Wibowo et al., 2023).

In addition to structural relationships between factors, it is necessary to analyze the mechanisms through which the entrepreneurial ecosystem generates innovation and entrepreneurial activity. Institutional, technological, and social factors represent the main mechanisms through which the ecosystem directly affects innovation, new product and service development, and entrepreneurial activity. Institutional factors affect innovation through the regulatory framework, availability of institutional support, and protection of intellectual property (Spigel, 2017; Thompson et al., 2018). Technological factors affect new product and service development and innovation capacity through the availability of tools and knowledge (Badzinska, 2023; Radičić & Petković, 2023). Social factors affect entrepreneurial activity and motivation through social networks, cultural norms, and the perception of entrepreneurship in society (Gorgievski et al., 2024).

Hypothesis 5 (H5). *Institutional factors (INSF) are positively associated with innovation development (INO).*

Strong institutions improve innovation through lower transaction costs and lower uncertainty. They also provide support mechanisms such as intellectual property protection (Abdin et al., 2024; Kijek & Kijek, 2019). These mechanisms create a stable and supportive environment that directly encourages innovative activities and supports innovation development (W. Song & Zhao, 2024). RNPU and INKAP are treated as distinct innovation-related outcomes. RNPU refers to realized development activity, namely the use of technology in the design, testing, and improvement of new products and services. INKAP refers to a broader capacity, namely the ability of an enterprise to absorb knowledge, generate ideas, adapt processes, and apply technological knowledge. Therefore, technological factors are expected to be associated with both constructs, but through different outcome logics. The first concerns concrete development activity, while the second concerns the internal capacity that supports future innovation. The empirical proximity between innovation-related constructs is expected in an ecosystem model, but the constructs are retained because they represent different theoretical dimensions.

Hypothesis 6 (H6). *Technological factors (TECF) are positively associated with the development of new products and services (RNPU).*

Technological progress provides the necessary tools and knowledge for more efficient design and testing of innovative offerings (Saura et al., 2022). These mechanisms support product differentiation and market expansion through better development processes (Long, 2019). Technological factors create important opportunities for the improvement of new products and services (Broekhuizen et al., 2023).

Hypothesis 7 (H7). *Technological factors (TECF) are positively associated with innovation capacity (INKAP).*

Technology improves an enterprise's capacity to generate new ideas and improve processes through advanced tools and platforms. These mechanisms support activities such as experimentation, collaboration, and adjustment to changing conditions (Adomako & Nguyen, 2024; Triwahyono et al., 2023). Technological factors directly strengthen the basic capacities needed for sustainable innovation (Nalmpanti et al., 2024).

Hypothesis 8 (H8). *Social factors (SOCF) are positively associated with entrepreneurial activity (PRED).*

A social environment that values innovation and risk-taking, together with strong networks and community support, strengthens entrepreneurial orientation and supports the mobilization of mechanisms (Aboobaker et al., 2023; Peng et al., 2022). This collective encouragement reduces perceived barriers and increases individual confidence to engage in new ventures. In this way, it positively affects the development of entrepreneurial activity (Toepler & Velamuri, 2025).

Hypothesis 9 (H9). *Social factors (SOCF) are positively associated with motivation and readiness to start a business (MSB).*

Social norms, role models, and community support shape personal attitudes and readiness for entrepreneurship (Martins et al., 2023; Maziriri et al., 2024). These mechanisms jointly build confidence and reduce perceived fears related to business creation. Therefore, they significantly affect individual motivation to start a business (Terstriep et al., 2025).

Based on the defined hypotheses, the proposed entrepreneurial ecosystem model has two basic dimensions: structural and mechanism-based. Economic and social factors have a structural function because they shape the institutional and technological subsystems of the ecosystem. Institutional, technological, and social factors act as mechanisms through which the ecosystem generates innovation, new product development, and entrepreneurial activity. In this way, a structural-mechanism model of the entrepreneurial ecosystem is formed and empirically tested in this paper. The proposed entrepreneurial ecosystem model focuses on structural relationships between ecosystem factors and the main mechanism-based pathways through which the ecosystem is associated with innovation and entrepreneurial activity. Business performance outcomes are outside the direct scope of this paper and may be examined in future research.

The proposed model can be clearly presented as the following flow: economic and social factors act as prior structural drivers and shape the institutional and technological subsystems. These subsystems then function as mechanisms that directly affect innovation, new product and service development, and entrepreneurial activity. In this way, the proposed model conceptualizes the ecosystem as an integrated multi-layered system in which structural conditions are linked with operational mechanisms and entrepreneurial outcomes. Based on the defined hypotheses, the conceptual model of the entrepreneurial ecosystem is presented in Figure 1.

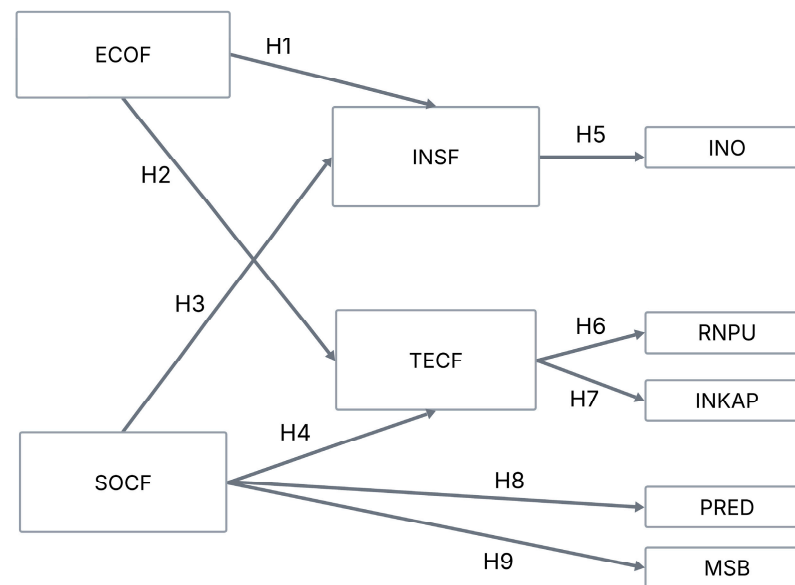


Figure 1. Conceptual model of entrepreneurial ecosystem hypotheses.

3. Methodology

3.1. Research Design

This study uses a quantitative cross-sectional research design to examine the proposed structural-mechanism model of regional entrepreneurial ecosystems. The empirical analysis is based on survey data collected from entrepreneurs, managers, and executives of enterprises in Serbia. The survey items are presented in Appendix A.

The proposed model contains two analytical layers. The first layer refers to structural ecosystem conditions, where economic factors and social factors are specified as antecedents of institutional and technological factors. The second layer refers to mechanism-based pathways, where institutional, technological, and social factors are specified as predictors of innovation development, new product and service development, innovation capacity, entrepreneurial activity, and entrepreneurial motivation.

Partial least squares structural equation modeling (PLS-SEM) was selected because the research objective was to examine a prediction-oriented model with several latent constructs, multiple indicators, and theoretically defined structural pathways.

PLS-SEM was selected for several reasons. The study examines a relatively complex model with nine latent constructs, forty-five indicators, several direct paths, and indirect pathways. Next, the research objective is prediction-oriented because the analysis focuses on explained variance, predictive relevance, and the strength of structural associations. Third, the survey is based on Likert-type perceptual data, so the analysis did not assume strict multivariate normality. Fourth, the model includes regional heterogeneity, which makes a variance-based method suitable for an initial empirical test of the proposed structure. All constructs were specified as reflective because the indicators were treated as manifestations of the latent constructs. CB-SEM could also be applied in future research, especially for confirmatory model comparison and global model fit assessment. However, PLS-SEM was retained because the main aim was to test the predictive and mechanism-based logic of the proposed model.

The results are interpreted as association-based evidence of theoretically proposed pathways, not as definitive proof of causality, because the research design is cross-sectional and based on perceptual data.

3.2. Sample and Data Collection

The sample consists of 401 enterprises from the Republic of Serbia. To ensure regional representativeness and allow comparative analysis, the sample was stratified into four main regions: Vojvodina, Belgrade, Central Serbia, and Southern Serbia. The sample size was determined using Cochran's formula for finite populations, which ensured a 95% confidence level with a 5% margin of error for an estimated population of 400,000 active enterprises (Cochran, 1977). Data were collected through a structured questionnaire distributed both online and in printed form, depending on respondent preferences and regional accessibility. The target respondents were entrepreneurs, managers, and executives from enterprises of different sizes, including micro, small, medium-sized, and large enterprises.

Enterprise size are categorized into four categories: micro, small, medium-sized, and large enterprises. The classification follows the Serbian legal framework, which classifies legal entities and entrepreneurs according to the average number of employees, business income, and total assets at the balance sheet date. Since the questionnaire did not collect full financial statement data for each enterprise, the size category was based on respondent self-report according to these commonly used legal categories. Therefore, enterprise size is used as a descriptive sample variable and not as a directly audited financial classification.

The sample covered all represented sectors and industries in Serbia: agriculture, forestry, and fishing; industry, including manufacturing and mining; electricity, gas, and water supply; construction; trade, repair, and maintenance of motor vehicles; transportation and storage; accommodation and food service activities; information and communication; financial and insurance activities; real estate activities; professional, scientific, and technical activities; administrative and support service activities; public administration and defense, compulsory social security; education; health and social work activities; arts, entertainment, and recreation; and other service activities. This structure provides a multidisciplinary view of the entrepreneurial environment. Data collection was conducted from August 2025 to January 2026, over a period of five months. This regional distribution of the sample allows a detailed analysis of regional differences in ecosystem development (Harper-Anderson & Lewis, 2018).

3.3. Variables and Measurement

The model includes nine reflective latent constructs: institutional factors, economic factors, technological factors, social factors, innovation development, development of new products and services, innovation capacity, entrepreneurial activity, and entrepreneurial motivation and readiness to start a business. Each construct was measured using five items on a five-point Likert-type scale, ranging from 1, "strongly disagree," to 5, "strongly agree."

All constructs were specified as reflective constructs because the items were treated as observable manifestations of the underlying latent variables. This means that changes in the latent construct are expected to be reflected in changes in the associated indicators. Therefore, the measurement model was assessed through indicator reliability, internal consistency reliability, convergent validity, and discriminant validity before the structural model was interpreted.

3.4. Data Analysis

Data analysis was conducted in several stages. Descriptive statistics were calculated to describe the sample structure and the central tendencies of the main constructs. Pearson correlations were used only as a preliminary overview of bivariate associations among constructs. They were not treated as the main test of the proposed model. Next, the measurement model was assessed because all main constructs were specified as reflective multi-item constructs. Indicator reliability was examined through outer loadings. Internal

consistency reliability was assessed using Cronbach's alpha and composite reliability. Convergent validity was assessed using the average variance extracted. Discriminant validity was examined using the Fornell-Larcker criterion and the heterotrait–monotrait ratio.

Third, potential common method bias was examined because the data were collected through a single survey instrument. Harman's single-factor test was used as an initial diagnostic procedure, while full collinearity VIF values were used as an additional diagnostic indicator. Afterwards, the structural model was tested using partial least squares structural equation modeling. The analysis included standardized path coefficients, bootstrap standard errors, *t* values, *p* values, confidence intervals, explained variance, effect sizes, predictive relevance, and indirect effects. The indirect effects were used to examine whether the proposed mechanism-based pathways were supported by the data.

The analytical procedure was structured to connect measurement quality and structural testing. Reliability and validity indicators were used first to assess whether the constructs were suitable for structural interpretation. Direct path coefficients and bootstrap results were then used to test the hypotheses. R^2 , adjusted R^2 , Q^2 predict, and f^2 values were used to assess explained variance, predictive relevance, and the relative contribution of predictors. Indirect effects were used to test whether the proposed mechanism-based pathways were supported by the data.

Further, Welch's ANOVA was used as a supplementary analysis to examine whether perceived ecosystem conditions differ across regions. This test was selected because it is robust when the assumption of homogeneity of variance is not fully satisfied. The regional comparison was not treated as a substitute for structural model testing, but as a contextual analysis of regional ecosystem variation. Because the study is cross-sectional and based on perceptual data, the results are interpreted as association-based evidence rather than causal proof.

To complement the survey-based analysis, official regional GDP indicators were included as a contextual benchmark. These indicators were not treated as direct replacements for the latent perceptual constructs used in the PLS-SEM model. Instead, they were used to provide macro-regional background for interpreting differences in perceived ecosystem conditions. This distinction is important because the survey regions and official NSTJ regional categories are not fully identical. Therefore, the objective indicators are interpreted as contextual benchmarks rather than direct explanatory variables in the structural model.

4. Results

4.1. Sample Characteristics and Descriptive Statistics

Descriptive statistics provide an overview of the sample structure and the main constructs used in the analysis. The sample consists of 401 enterprises from four regions of Serbia: Vojvodina, Belgrade, Central Serbia, and Southern Serbia. The sample includes micro, small, medium-sized, and large enterprises, as well as enterprises with different durations of business operation. This structure supports the analysis of perceived entrepreneurial ecosystem conditions across a heterogeneous business population. The sample structure is presented in Table 1.

Table 2 shows that Vojvodina and Belgrade account for the largest shares of the sample, while Central Serbia and Southern Serbia are also represented. The sample includes enterprises of different sizes, with micro and small enterprises forming the largest groups. Most enterprises have operated for more than 15 years, which indicates that the sample includes a substantial share of established enterprises.

Next, Table 2 presents the means and standard deviations of the latent constructs. These values provide a descriptive overview of how respondents perceive the main ecosystem dimensions and outcome-related constructs.

Table 1. Sample structure.

Factor	Category	Frequency (n)	Percentage (%)
Region	Vojvodina	141	35.2
	Belgrade	124	30.9
	Central Serbia	71	17.7
	South Serbia	65	16.2
Enterprise size	Micro	133	33.2
	Small	107	26.7
	Medium	77	19.2
	Big	84	20.9
Duration of business operation	up to 5 years	35	8.7
	5–15 years	84	20.9
	more than 15 years	282	70.3
Job position	Entrepreneur	132	32.9
	Manager	129	32.2
	Other	140	34.9

Table 2. Construct means and standard deviations.

Constructs	Number of Items	Mean	SD
Institutional factors	5	3.18	0.62
Economic factors	5	3.22	0.63
Technological factors	5	2.92	0.75
Social factors	5	3.03	0.71
Innovation	5	3.06	0.82
Development of new products and services	5	3.13	0.83
Innovation capacity	5	2.94	0.79
Entrepreneurial activity	5	3.34	0.74
Entrepreneurial motivation and readiness to start a business	5	3.52	0.74

The construct mean values indicate moderate levels of perceived ecosystem development. The lowest mean values are observed for technological factors and entrepreneurial activity, suggesting that respondents perceive technological infrastructure and entrepreneurial dynamism as weaker dimensions of the ecosystem. The highest mean value is observed for entrepreneurial motivation and readiness to start a business, indicating that motivational and attitudinal aspects are evaluated more favorably than some structural conditions. The standard deviations show moderate dispersion, which is consistent with the regional and sectoral heterogeneity of the sample.

4.2. Measurement Model Assessment

The measurement model was assessed before the structural model. Since all constructs were specified as reflective constructs, the analysis examined indicator reliability, internal consistency reliability, convergent validity, discriminant validity, and common method bias diagnostics (Table 3).

The measurement model results indicate acceptable reliability and convergent validity for all reflective constructs. Cronbach's alpha values range from 0.831 to 0.936, while composite reliability values range from 0.884 to 0.952. These values exceed the recommended threshold of 0.70. The AVE values are above 0.50 for all constructs, which supports convergent validity. The minimum outer loading is 0.718, indicating adequate indicator reliability. These results provide stronger evidence of construct reliability and convergent validity than a model assessment based only on Cronbach's alpha.

Table 3. Measurement model reliability and convergent validity.

Construct	Items	Cronbach Alpha	Composite Reliability	AVE	Min Loading	Max Loading
INSF	5	0.831	0.884	0.606	0.718	0.829
ECOF	5	0.846	0.892	0.622	0.734	0.812
TECF	5	0.872	0.908	0.663	0.785	0.851
SOCF	5	0.888	0.919	0.694	0.800	0.848
INO	5	0.932	0.949	0.787	0.860	0.928
RNPU	5	0.936	0.952	0.799	0.832	0.932
INKAP	5	0.888	0.921	0.699	0.795	0.888
PRED	5	0.923	0.943	0.767	0.818	0.912
MSB	5	0.916	0.938	0.751	0.830	0.888

Next, discriminant validity was first assessed using the Fornell-Larcker criterion. The diagonal values represent the square roots of AVE, while the off-diagonal values represent correlations between constructs (Table 4).

Table 4. Fornell-Larcker criterion.

	INSF	ECOF	TECF	SOCF	INO	RNPU	INKAP	PRED	MSB
INSF	0.778	0.736	0.589	0.677	0.478	0.405	0.501	0.580	0.517
ECOF	0.736	0.789	0.658	0.794	0.627	0.460	0.707	0.739	0.678
TECF	0.589	0.658	0.815	0.712	0.833	0.562	0.636	0.652	0.564
SOCF	0.677	0.794	0.712	0.833	0.698	0.566	0.628	0.790	0.562
INO	0.478	0.627	0.833	0.698	0.887	0.605	0.693	0.613	0.602
RNPU	0.405	0.460	0.562	0.566	0.605	0.894	0.520	0.437	0.470
INKAP	0.501	0.707	0.636	0.628	0.693	0.520	0.836	0.601	0.777
PRED	0.580	0.739	0.652	0.790	0.613	0.437	0.601	0.876	0.553
MSB	0.517	0.678	0.564	0.562	0.602	0.470	0.777	0.553	0.867

The Fornell-Larcker results indicate acceptable discriminant validity for most construct pairs. However, some construct pairs show high empirical proximity, especially among closely related ecosystem dimensions. This suggests that the constructs are theoretically distinct but empirically connected, which is expected in a systemic entrepreneurial ecosystem model. Therefore, discriminant validity should be interpreted together with the HTMT results. Furthermore, the HTMT ratio was used as an additional and stricter assessment of discriminant validity (Table 5).

Table 5. HTMT ratio.

	INSF	ECOF	TECF	SOCF	INO	RNPU	INKAP	PRED	MSB
INSF	1.000	0.875	0.690	0.785	0.542	0.458	0.580	0.661	0.591
ECOF	0.875	1.000	0.765	0.915	0.705	0.516	0.814	0.835	0.769
TECF	0.690	0.765	1.000	0.808	0.923	0.621	0.721	0.727	0.630
SOCF	0.785	0.915	0.808	1.000	0.766	0.621	0.705	0.871	0.622
INO	0.542	0.705	0.923	0.766	1.000	0.648	0.760	0.661	0.651
RNPU	0.458	0.516	0.621	0.621	0.648	1.000	0.569	0.470	0.507
INKAP	0.580	0.814	0.721	0.705	0.760	0.569	1.000	0.663	0.860
PRED	0.661	0.835	0.727	0.871	0.661	0.470	0.663	1.000	0.601
MSB	0.591	0.769	0.630	0.622	0.651	0.507	0.860	0.601	1.000

The HTMT results provide additional evidence on discriminant validity. Most HTMT values are below the commonly used threshold of 0.90, while a small number of construct

pairs exceed this stricter criterion but remain below the more liberal threshold of 0.95. This indicates that discriminant validity is generally acceptable, although some constructs are empirically close. This result is consistent with the conceptual nature of entrepreneurial ecosystems, where institutional, economic, technological, social, and innovation-related dimensions are expected to be interdependent rather than fully isolated.

Next, common method bias was examined using Harman's single-factor test and full collinearity VIF values. Harman's single-factor test indicated that the first unrotated factor explained 47.1% of the total indicator variance, which is below the conventional 50% threshold but close enough to require caution (Table 6).

Table 6. Full collinearity VIF values.

Construct	Full Collinearity VIF
INSF	2.480
ECOF	4.569
TECF	4.033
SOCF	4.571
INO	4.289
RNPU	1.760
INKAP	3.473
PRED	3.044
MSB	2.829

Full collinearity VIF values range from 1.760 to 4.571 and remain below the threshold of 5. This suggests that severe collinearity and a dominant common method factor are not indicated. However, because the data are cross-sectional and perceptual, common method bias cannot be completely ruled out. Because all main constructs were measured through the same survey instrument, common method bias remains a possible limitation. The diagnostic results do not indicate a dominant common method factor, but they do not eliminate the possibility of respondent bias or shared measurement variance. Future studies should reduce this risk through multi-source data, objective regional indicators, and time-separated measurement of predictors and outcomes. The results should therefore be interpreted with appropriate caution.

4.3. Structural Model Assessment

After the measurement model assessment, the structural model was examined using PLS-SEM. The direct hypotheses were tested through standardized path coefficients, bootstrap standard errors, *t* values, *p* values, and confidence intervals. The results are presented in Table 7.

Table 7. Structural path results based on bootstrap estimation.

Hypothesis	Path	Beta	SE Bootstrap	t	p	CI 2.5%	CI 97.5%	R ² Endogenous Construct
H1	ECOF → INSF	0.538	0.056	9.599	<0.000	0.446	0.647	0.565
H2	ECOF → TECF	0.251	0.064	3.947	<0.000	0.119	0.369	0.530
H3	SOCF → INSF	0.249	0.055	4.493	<0.000	0.143	0.354	0.565
H4	SOCF → TECF	0.513	0.059	8.709	<0.000	0.399	0.638	0.530
H5	INSF → INO	0.478	0.058	8.184	<0.000	0.364	0.590	0.229
H6	TECF → RNPU	0.562	0.041	13.561	<0.000	0.485	0.643	0.315
H7	TECF → INKAP	0.636	0.037	16.997	0.000	0.566	0.708	0.404
H8	SOCF → PRED	0.790	0.030	26.205	<0.000	0.730	0.852	0.624
H9	SOCF → MSB	0.562	0.052	10.815	<0.000	0.463	0.657	0.316

The structural model results support all proposed direct pathways. Economic factors are more strongly associated with institutional factors than social factors are, while social factors are more strongly associated with technological factors than economic factors are. In the mechanism-based part of the model, institutional factors are positively associated with innovation development, technological factors are positively associated with new product and service development and innovation capacity, while social factors are positively associated with entrepreneurial activity and entrepreneurial motivation. These results support the proposed structural-mechanism logic, but they should be interpreted as association-based relationships rather than causal effects. The structural model results support all proposed direct pathways. Further, the explanatory and predictive properties of the model were assessed through R^2 , adjusted R^2 , and predictive relevance values for endogenous constructs (Table 8).

Table 8. Explained variance and predictive relevance.

Endogenous Construct	Predictors	R^2	Adjusted R^2	Q^2 Predict
INSF	ECOF, SOCF	0.565	0.562	0.559
TECF	ECOF, SOCF	0.530	0.528	0.524
INO	INSF	0.229	0.227	0.216
RNPU	TECF	0.315	0.314	0.310
INKAP	TECF	0.404	0.403	0.401
PRED	SOCF	0.624	0.623	0.621
MSB	SOCF	0.316	0.314	0.308

The R^2 values indicate that the model explains 56.5% of the variance in institutional factors and 53.0% of the variance in technological factors. Among the outcome constructs, explained variance is highest for entrepreneurial activity, followed by innovation capacity, motivation and readiness to start a business, new product and service development, and innovation development. The positive predictive relevance values indicate that the model has predictive relevance for all endogenous constructs. These values should be interpreted as supplementary evidence and not as a substitute for the theoretical justification of the model.

Effect sizes were examined to assess the relative contribution of individual predictors to endogenous constructs (Table 9).

Table 9. Effect sizes f^2 .

Endogenous Construct	Predictor	f^2
INSF	ECOF	0.245
INSF	SOCF	0.053
TECF	ECOF	0.049
TECF	SOCF	0.206
INO	INSF	0.297
RNPU	TECF	0.461
INKAP	TECF	0.679
PRED	SOCF	1.659
MSB	SOCF	0.462

The f^2 values show that the strongest individual effect size is observed for the association between social factors and entrepreneurial activity. Technological factors also show substantial effect sizes for innovation capacity and new product and service development. Within the structural layer, economic factors have a stronger effect size for institutional factors, while social factors have a stronger effect size for technological factors.

These results indicate that different ecosystem factors have different functions within the proposed model.

4.4. Indirect Effects and Mechanism-Based Pathways

Indirect effects were examined to assess whether the proposed mechanism-based pathways are supported by the data. The model assumes that economic and social factors are associated with innovation-related outcomes through institutional and technological factors. The indirect effects therefore provide a test of whether the proposed structural conditions are connected with outcomes through the expected mechanism-based pathways (Table 10).

Table 10. Indirect effects.

Indirect Path	Effect	SE Bootstrap	t	p	CI 2.5%	CI 97.5%
ECOF → INSF → INO	0.257	0.036	7.185	<0.000	0.191	0.327
SOCF → INSF → INO	0.119	0.032	3.785	<0.000	0.063	0.180
ECOF → TECF → RNPU	0.141	0.037	3.809	<0.000	0.066	0.209
SOCF → TECF → RNPU	0.288	0.040	7.241	<0.000	0.214	0.373
ECOF → TECF → INKAP	0.159	0.043	3.726	<0.000	0.072	0.241
SOCF → TECF → INKAP	0.326	0.037	8.706	<0.000	0.255	0.402

The results show statistically significant indirect associations from economic and social factors to innovation development through institutional factors. They also show statistically significant indirect associations from economic and social factors to new product and service development and innovation capacity through technological factors. These findings support the mechanism-based logic of the model. However, the indirect effects should be interpreted as indirect associations rather than causal mediation because the data are cross-sectional.

4.5. Regional Differences and Contextual Objective Indicators

After testing the measurement and structural models, regional differences were examined as a supplementary contextual analysis. This analysis was used to determine whether perceived ecosystem conditions differ across the four observed regions. Regional comparison is important because entrepreneurial ecosystems are expected to vary across subnational contexts (Table 11).

Table 11. Mean construct values by survey region.

Region	INSF	ECOF	TECF	SOCF	INO	RNPU	INKAP	PRED	MSB
Belgrade	3.268	3.298	3.018	3.095	3.118	3.003	3.627	3.006	3.645
Central Serbia	3.321	3.228	2.806	2.918	2.730	2.992	3.628	2.558	3.718
Southern Serbia	2.951	2.828	2.406	2.658	2.575	2.840	3.154	2.468	3.166
Vojvodina	3.128	3.328	3.136	3.196	3.397	3.465	3.860	3.044	3.877

The regional mean values indicate that perceived ecosystem conditions differ across the four observed regions. Vojvodina records the highest values for several innovation-related and entrepreneurial constructs, while Southern Serbia records the lowest values for institutional, economic, technological, social, innovation, entrepreneurial activity, and motivation-related indicators. The largest visible regional difference appears in technological factors, where Southern Serbia has a substantially lower mean than the other regions. These patterns support the need for regional rather than only national-level analysis of

entrepreneurial ecosystems. Although the total sample size is adequate for the main PLS-SEM analysis, the regional subsamples are not fully balanced. Southern Serbia and Central Serbia have smaller subsamples than Vojvodina and Belgrade. Therefore, the regional comparison should be interpreted as supplementary contextual evidence rather than as a separate regional model test. The smaller subsamples may reduce statistical power for some regional comparisons and may limit the precision of estimates for less represented regions. Future research should use larger and more balanced regional subsamples, especially for Southern Serbia and Central Serbia.

Next, Welch's ANOVA was used to test whether the observed regional differences in the main structural ecosystem factors are statistically significant (Table 12).

Table 12. Welch ANOVA results for structural ecosystem factors.

Construct	Welch F	<i>p</i>	Eta Squared
INSF	7.457	<0.000	0.041
ECOF	13.137	<0.000	0.078
TECF	21.720	<0.000	0.114
SOCF	10.846	<0.000	0.071

Welch's ANOVA results show statistically significant regional differences in all four structural ecosystem factors. The largest regional difference is observed for technological factors, followed by economic, social, and institutional factors. This indicates that regional ecosystem configurations differ not only in outcomes but also in perceived structural conditions. These findings support the regional interpretation of entrepreneurial ecosystems, while the PLS-SEM results remain the main test of the structural-mechanism model. To provide a contextual benchmark for the survey-based findings, official regional GDP indicators were included. These indicators do not replace the latent perceptual constructs used in the PLS-SEM model. Instead, they provide macro-regional background for interpreting differences in perceived ecosystem conditions (Table 13).

Table 13. Objective regional GDP indicators for contextual validation.

Official NSTJ Region	Regional GDP 2024, Million RSD	Share of National GDP 2024 (%)
Belgrade region	4,208,949	43.200
Region of Vojvodina	2,351,631	24.100
West Serbia region	1,693,262	17.400
South and East Serbia region	1,491,062	15.300

The objective indicators show a strong concentration of economic activity in the Belgrade region, followed by the region of Vojvodina, and Western Serbia, and Southern and Eastern Serbia. This macro-regional pattern is broadly consistent with the need to analyze entrepreneurial ecosystems below the national level. However, the survey categories and official NSTJ categories are not fully identical, so these indicators should be interpreted as contextual benchmarks rather than direct explanatory variables.

5. Discussion

5.1. Interpretation of the Structural Layer of the Model

The results provide empirical support for the proposed structural-mechanism model of regional entrepreneurial ecosystems. The PLS-SEM findings indicate that economic and social factors are positively associated with institutional and technological conditions. This supports the first layer of the model, where economic and social factors are conceptualized as structural ecosystem conditions. The results therefore suggest that regional

entrepreneurial ecosystems should not be understood only as collections of separate elements, but as systems in which basic economic and social conditions are connected with the development of institutional and technological subsystems.

The structural layer of the model is supported through H1–H4. Economic factors show a stronger association with institutional factors than social factors do, while social factors show a stronger association with technological factors than economic factors do. This finding indicates that different structural conditions may have different systemic functions. Economic factors appear more closely linked with the institutional environment, which is consistent with the view that market development, access to resources, financial capacity, and economic stability provide a material foundation for institutional support and governance. At the same time, social factors appear more closely linked with technological factors, which suggests that trust, networks, entrepreneurial culture, and social openness may support technology diffusion and adoption. These findings are consistent with the systemic view of entrepreneurial ecosystems, where institutional, economic, technological, and social dimensions are interdependent. However, the results should not be interpreted as proof of causal direction. The cross-sectional and perception-based design allows the identification of statistically supported structural associations, but it does not allow definitive conclusions about temporal causality. Therefore, the structural layer of the model should be interpreted as theoretically grounded evidence that economic and social conditions are connected with institutional and technological ecosystem dimensions.

5.2. Interpretation of the Mechanism-Based Layer of the Model

The second layer of the model refers to mechanism-based pathways through which institutional, technological, and social factors are associated with innovation-related and entrepreneurial outcomes. The results support H5–H9, indicating that institutional factors are positively associated with innovation development, technological factors are positively associated with new product and service development and innovation capacity, and social factors are positively associated with entrepreneurial activity and entrepreneurial motivation. The association between institutional factors and innovation development supports the assumption that institutional conditions represent an important mechanism for innovation. Supportive regulation, institutional support, and lower uncertainty can create a more favorable environment for innovative activities. In the context of regional entrepreneurial ecosystems, this suggests that innovation development depends not only on enterprise-level capabilities, but also on the perceived quality of the institutional environment in which enterprises operate. Technological factors show positive associations with both new product and service development and innovation capacity. This confirms the central position of the technological subsystem in the mechanism-based part of the model. Technology-related conditions are linked with the ability of enterprises to develop new offerings and strengthen their capacity to absorb and apply knowledge. The f^2 values further indicate that technological factors have substantial relevance for these innovation-related outcomes. This finding supports the argument that technological infrastructure, research and development capacity, digital resources, and technical knowledge are important elements of entrepreneurial ecosystem functioning.

Social factors show the strongest individual association with entrepreneurial activity, as indicated by the path coefficient and f^2 value. This result suggests that social conditions have a particularly important function in supporting entrepreneurial behavior. A social environment that values entrepreneurship, provides networks, and supports entrepreneurial aspirations can be associated with higher levels of entrepreneurial activity. Social factors are also positively associated with motivation and readiness to start a business, although this relationship is weaker than the association with entrepreneurial activity. This dif-

ference is theoretically meaningful because motivation may depend not only on social context, but also on individual characteristics, perceived risk, financial conditions, and personal readiness.

5.3. Indirect Effects and the Mechanism Logic of the Model

The results indicate that the ecosystem operates through chains of associations rather than through isolated relationships alone. Economic and social factors are linked with institutional and technological conditions, and these conditions are then linked with innovation-related and entrepreneurial outcomes. This supports the view that entrepreneurial ecosystems should be analyzed as connected systems. The regional results may partly reflect the Serbian context, but they also suggest that national-level analysis can hide relevant subnational differences in other transition economies.

The indirect effects provide additional support for the mechanism-based logic of the model. The results show statistically significant indirect associations from economic and social factors to innovation development through institutional factors. They also show statistically significant indirect associations from economic and social factors to new product and service development and innovation capacity through technological factors. These findings are important because they show that the proposed model is not only a set of isolated direct relationships. Instead, the model includes theoretically meaningful pathways through which structural ecosystem conditions are connected with innovation-related outcomes. The indirect path from economic factors to innovation development through institutional factors suggests that economic conditions may be associated with innovation partly through the institutional environment. Similarly, the indirect path from social factors to innovation development through institutional factors suggests that social conditions may be linked with innovation through institutional support, legitimacy, and perceived regulatory quality. These results support the idea that institutions can function as a mechanism that connects broader ecosystem conditions with innovation-related outcomes.

The indirect paths through technological factors show that both economic and social factors are associated with new product and service development and innovation capacity through the technological subsystem. This finding supports the role of technology as an operational mechanism in the entrepreneurial ecosystem. Economic conditions may provide resources for technological development, while social conditions may support technology adoption and diffusion. Through these pathways, technological factors are linked with the development of new products, services, and innovation capacity. However, these findings should be interpreted as indirect associations rather than causal mediation because the data are cross-sectional.

5.4. Regional Differences and Contextual Interpretation

The regional analysis provides additional support for the argument that entrepreneurial ecosystems should be examined at the subnational level. The regional mean values show visible differences across Vojvodina, Belgrade, Central Serbia, and Southern Serbia. Southern Serbia records the lowest values for several ecosystem dimensions, especially technological factors, while Vojvodina records higher values for several innovation-related and entrepreneurial constructs. These differences indicate that entrepreneurial ecosystem conditions are not evenly distributed across the observed regions. Welch's ANOVA confirms statistically significant regional differences in all four structural ecosystem factors: institutional, economic, technological, and social factors. The largest regional difference is observed for technological factors, followed by economic, social, and institutional factors. This finding suggests that regional ecosystem configurations differ not only in entrepreneurial outcomes, but also in the structural conditions that support ecosystem functioning. The

regional results therefore strengthen the argument that national-level analysis may hide important subnational differences.

The objective regional GDP indicators provide an additional contextual benchmark. They show a strong concentration of economic activity in the Belgrade region, followed by Vojvodina, and Western Serbia, and Southern and Eastern Serbia. This pattern is broadly consistent with the need to interpret entrepreneurial ecosystems in relation to regional economic structures. However, these indicators should be interpreted cautiously because the survey regions and official NSTJ regions are not fully identical. Therefore, the objective indicators are not treated as direct explanatory variables in the structural model, but as contextual support for interpreting regional differences.

The model relates to public policy through the institutional and technological sub-systems. Institutional factors include the perceived quality of regulations, public support, administrative procedures, and institutional programs, while technological factors include infrastructure, technology transfer, and research and development conditions. Public policy is therefore present in the model as part of the ecosystem context, but it is not measured as a separate latent variable. Future research should add public policy as a distinct construct and examine temporal dynamics through longitudinal data. This would make it possible to assess how policy changes, institutional reforms, and technology investments affect ecosystem conditions over time.

5.5. Contribution

The study offers three main contributions. The conceptual contribution is the interpretation of the entrepreneurial ecosystem as a system of layers and mechanisms rather than as a list of separate factors. The methodological contribution is the integration of reliability and validity testing, direct effects, indirect effects, explained variance, predictive relevance, effect sizes, and regional comparisons within one analytical design. The empirical contribution is the analysis of enterprise-level survey data from Serbia, which adds evidence from a transition economy and shows that regional ecosystem conditions differ within the same national setting. This study contributes to entrepreneurial ecosystem research by proposing and testing a structural-mechanism model at the regional level. The theoretical contribution lies in the distinction between structural ecosystem conditions and mechanism-based pathways. Economic and social factors are positioned as structural conditions, while institutional, technological, and social factors are interpreted as mechanisms associated with innovation-related and entrepreneurial outcomes. This structure moves the analysis beyond descriptive lists of ecosystem components and provides a clearer explanation of how different ecosystem dimensions are connected. The methodological contribution lies in the use of PLS-SEM to test an integrated model with reflective constructs, structural pathways, indirect effects, explained variance, predictive relevance, and effect sizes. This is important because the previous analytical logic based only on correlations, separate regressions, and ANOVA would not be sufficient to test an integrated structural-mechanism model. The revised approach provides stronger evidence for construct reliability, convergent validity, discriminant validity, and structural relationships among latent constructs. At the same time, the inclusion of common method bias diagnostics and objective regional indicators strengthens the methodological transparency of the study. The empirical contribution lies in the analysis of regional entrepreneurial ecosystems in Serbia as a transition economy. The findings provide enterprise-level evidence on perceived ecosystem conditions across four regions and show that Southern Serbia records less favorable ecosystem conditions in several dimensions. This contributes to the literature on entrepreneurial ecosystems in transition economies and provides a basis for future comparative research in the Western Balkans and similar contexts.

5.6. Practical Implications

The results have practical implications for policymakers, regional development agencies, universities, incubators, and business support organizations. Since economic and social factors are associated with institutional and technological conditions, regional policy should not focus only on isolated support measures. Instead, policy interventions should address the broader ecosystem structure, including economic resources, institutional support, technological infrastructure, social networks, and entrepreneurial culture. The practical implications should be interpreted in direct relation to the measured constructs and empirical findings. Since the results show that technological factors are associated with new product and service development and innovation capacity, regional support should focus on those technology-related conditions that correspond to the measurement model, such as digital infrastructure, research and development infrastructure, technological knowledge, technology adoption, and technology transfer.

Social factors are associated with entrepreneurial activity and motivation, regional support should also address social mechanisms measured in the study, such as entrepreneurial culture, networks, education, attitudes toward risk, and community support. The findings do not provide direct evidence on enterprise-level business strategies or business performance. Therefore, recommendations are limited to ecosystem-level support and should not be interpreted as evidence about which enterprise strategies produce better performance.

Practical actions can follow three directions. Institutional development should focus on clearer administrative procedures, more visible business support programs, stronger protection of business rights, and better coordination among local and regional support bodies. Then technology-related support should focus on digital infrastructure, access to technological knowledge, research and development cooperation, technology transfer, and enterprise access to technical support services. Finally, social mechanisms should be strengthened through entrepreneurship education, mentoring, regional networking, public promotion of entrepreneurial role models, and programs that reduce negative attitudes toward business risk. These actions correspond to the institutional, technological, and social constructs measured in the study.

5.7. Limitations and Future Research Directions

The research design is cross-sectional, which means that the results capture perceptions at one point in time. Therefore, the findings should be interpreted as statistically supported associations rather than causal evidence. The terms “driver” and “mechanism” are used in a theoretical and model-based sense. They do not imply confirmed temporal causality. The cross-sectional design can support statistically significant associations that are consistent with the proposed theory, but it cannot prove that one ecosystem condition causes a later outcome. Stronger causal interpretation would require longitudinal research, repeated data collection, or panel data from the same identifiable enterprises and regions.

Future research should use longitudinal designs to examine how structural ecosystem conditions and mechanism-based pathways develop over time.

The study is based on perceptual survey data from enterprises. Although the measurement model shows acceptable reliability and validity, perceptual data may still be affected by respondent bias and common method bias. The diagnostic tests do not indicate a dominant common method factor, but this possibility cannot be fully excluded. Future studies should combine survey data with objective regional indicators such as research and development expenditure, patent applications, number of newly registered enterprises, employment in knowledge-intensive sectors, and regional innovation indicators.

The empirical findings are context-dependent and should not be directly generalized to all countries. Serbia has specific institutional, economic, regional, and social conditions

that may shape the observed relationships. However, the research concept is transferable because the structural-mechanism model can be tested in other transition economies and in countries with strong regional heterogeneity. Future comparative studies should examine whether the same paths appear in other national and regional contexts. The Western Balkan context may also influence the results. Institutional legacies, informal networks, uneven regional development, reform paths, and trust in public institutions may differ from other transition economies. Therefore, the Serbian case should be interpreted as a transition economy case with Balkan-specific features. Future research should compare Serbia with other Western Balkan countries and with transition economies outside the region to assess which findings are context-specific and which are more general.

6. Conclusions

This paper developed and empirically tested a structural-mechanism model of regional entrepreneurial ecosystems in Serbia. The study examined whether economic and social factors are associated with institutional and technological conditions, and whether institutional, technological, and social factors are associated with innovation-related and entrepreneurial outcomes. The model was tested using PLS-SEM on survey data from 401 enterprises across four Serbian regions. The results support all nine direct hypotheses, which indicates that the proposed structural and mechanism-based pathways are empirically supported. H1 is supported because economic factors are positively associated with institutional factors. H2 is supported because economic factors are positively associated with technological factors. H3 is supported because social factors are positively associated with institutional factors. H4 is supported because social factors are positively associated with technological factors. These four hypotheses support the structural layer of the model.

The mechanism-based layer of the model is also supported. H5 is supported because institutional factors are positively associated with innovation development. H6 is supported because technological factors are positively associated with the development of new products and services. H7 is supported because technological factors are positively associated with innovation capacity. H8 is supported because social factors are positively associated with entrepreneurial activity. H9 is supported because social factors are positively associated with motivation and readiness to start a business. The indirect effects further support the proposed mechanism logic. Economic and social factors are indirectly associated with innovation development through institutional factors, and they are indirectly associated with new product and service development and innovation capacity through technological factors. These findings suggest that regional entrepreneurial ecosystems operate through connected structural and mechanism-based pathways. However, these relationships should be interpreted as association-based pathways rather than causal mechanisms because the study is cross-sectional and based on perceptual data.

The regional analysis shows that perceived ecosystem conditions differ across Serbian regions. Southern Serbia records less favorable values across several ecosystem dimensions, especially technological factors. The inclusion of official regional GDP indicators provides additional contextual support for analyzing entrepreneurial ecosystems below the national level. However, these indicators should be interpreted as contextual benchmarks rather than direct explanatory variables. The regional analysis is also supplementary because the regional subsamples are not fully balanced. These findings indicate that uniform national-level policy may be insufficient and that regionally sensitive support measures are needed.

The study contributes to entrepreneurial ecosystem research by offering an empirically tested structural-mechanism model in a transition economy context. It also provides methodological strengthening through PLS-SEM, construct validation, common method

bias diagnostics, indirect effects, predictive relevance assessment, and supplementary regional analysis. Future research should extend this model through longitudinal designs, objective regional indicators, multi-group PLS-SEM, and comparative studies across different national and regional contexts. Future studies should also consider public policy as a separate construct in order to examine how institutional reforms, support programs, and technology investments affect ecosystem conditions over time.

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Appendix A

The constructs, codes, number of items, literature sources, and items are presented in Table A1.

Table A1. Constructs, measurement items, and sources.

Construct	Code	Source	Items
Institutional factors	INSF	World Economic Forum (2013) ; Spigel (2017)	In my region, there is sufficient institutional support for entrepreneurs (subsidies, grants, tax breaks).
			Local development agencies efficiently provide entrepreneurship support services.
			The regulatory framework facilitates the establishment and operation of new companies.
			Higher education institutions actively cooperate with entrepreneurs and support startups.
			Infrastructure and administrative services are available and useful for my business.

Table A1. Cont.

Construct	Code	Source	Items
Economic factors	ECOF	Isenberg (2010); Pan et al. (2016)	Access to financial resources (loans, investments) is satisfactory for the development of my company.
			There is a sufficient number of non-financial resources (training, counseling) available to entrepreneurs.
			My business has a clear market orientation and competitiveness on the market.
			I participate in local or regional business networks and clusters.
Technological factors	TECF	Branstetter et al. (2018); Zahra et al. (2023)	The regional economy provides conditions for growth and employment in entrepreneurship.
			My company uses modern digital tools and technologies in business.
			Investments in research and development (R&D) are part of my company's strategy.
			Cooperation with technology parks and incubators is available and useful.
			New technological products and services are being developed in my environment.
Social factors	SOCF	Mahfud et al. (2020); Stam and Van de Ven (2021)	The digital literacy of employees in my company is at a satisfactory level.
			I have access to mentoring and counseling programs that support my development as an entrepreneur.
			I actively participate in networks and communities of entrepreneurs.
			My entrepreneurial environment supports and motivates new business initiatives.
			There is a high level of cooperation and trust among entrepreneurs and investors in my region.
Innovation development	INO	Kijek and Kijek (2019); Yuan et al. (2021)	The education system in my community provides quality entrepreneurship programs.
			Processes in my company are regularly improved using new technologies.
			We are open to experimentation and testing new ideas.
			We actively monitor market trends and innovations in our industry/sector.
			Innovations are an integral part of our company's strategy.
			We invest resources in the development of new ideas and concepts.

Table A1. Cont.

Construct	Code	Source	Items
Development of new products and services	RNPU	Long (2019); Radičić and Petković (2023)	In the last three years, we have developed new products or services.
			We actively research customer needs in order to develop new solutions.
			The development of new products is part of our growth strategy.
			Our new products reach users quickly.
			Customers participate in the process of developing new solutions.
Innovation capacity	INKAP	Triwahyono et al. (2023); Adomako and Nguyen (2024)	We have funds available for research and development.
			There is a clear procedure for evaluating and implementing new ideas.
			Technological infrastructure supports the development of innovations.
			We have internal mechanisms for improving employees' knowledge.
			Our team is trained to use innovative tools and methodologies.
Entrepreneurial activities	PRED	Peng et al. (2022); Gorgievski et al. (2024)	I participate in entrepreneurial events and conferences.
			I am actively working on business expansion.
			I make strategic decisions related to business growth.
			I follow the legal changes important for entrepreneurs.
			I participate in entrepreneurship support programs.
Entrepreneurial motivation and readiness to start a business	MSB	Martins et al. (2023); Maziriri et al. (2024)	I am interested in starting my own business.
			I believe that I have the knowledge needed for entrepreneurship.
			I am willing to take risks related to business.
			Starting a business seems like an achievable goal to me.
			The environment in which I live motivates me to start a business.

References

- Abdin, J., Sharma, A., Trivedi, R., & Wang, C. (2024). Financing constraints, intellectual property rights protection and incremental innovation: Evidence from transition economy firms. *Technological Forecasting and Social Change*, 198, 122982. [CrossRef]
- Aboobaker, N., Renjini, D., & Zakkariya, K. A. (2023). Fostering entrepreneurial mindsets: The impact of learning motivation, personal innovativeness, technological self-efficacy, and human capital on entrepreneurial intention. *Journal of International Education in Business*, 16(3), 312–333. [CrossRef]

- Adomako, S., & Nguyen, N. P. (2024). Digitalization, inter-organizational collaboration, and technology transfer. *The Journal of Technology Transfer*, 49, 1176–1202. [CrossRef]
- Ahmad, H., Gulzar, M. M., Ahmed, I., & Khalid, M. (2025). Adoption of modern digital innovations: A systematic review of social impacts in online community forums. *Social Network Analysis and Mining*, 15, 29. [CrossRef]
- Ancona, A., & Ceci, G. (2025). Fostering regional entrepreneurial ecosystem development: The role of science and technology park networks. *The Journal of Technology Transfer*. [CrossRef]
- Ancona, A., Cinelli, M., Ferraro, G., & Iovanella, A. (2023). Network-based principles of entrepreneurial ecosystems: A case study of a start-up network. *Small Business Economics*, 61, 1497–1514. [CrossRef]
- 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, 313–325. [CrossRef] [PubMed]
- Audretsch, D. B., Mason, C., Miles, M. P., & O'Connor, A. (2018). The dynamics of entrepreneurial ecosystems. *Entrepreneurship & Regional Development*, 30(3–4), 471–474. [CrossRef]
- Autio, E., Nambisan, S., Thomas, L. D., & Wright, M. (2018). Digital affordances, spatial affordances, and the genesis of entrepreneurial ecosystems. *Strategic Entrepreneurship Journal*, 12(1), 72–95. [CrossRef]
- Badzinska, W. (2023). Exploring the drivers of a university-based entrepreneurial ecosystem—Examples of good practice. *Scientific Papers of Silesian University of Technology*, 177, 9–27. [CrossRef]
- Bakator, M., Čoćkalo, D., Kavalić, M., Terek Stojanović, E., & Gluvakov, V. (2023). An application of statistical methods in data mining techniques to predict ICT implementation of enterprises. *Applied Sciences*, 13(6), 4055. [CrossRef]
- Bosco, B. P., Bosco, C. F., & Maranzano, P. (2025). Labour responsiveness to income tax changes: Empirical evidence from a DID analysis of an income tax treatment in Italy. *Empirical Economics*, 69(2), 787–828. [CrossRef]
- Branstetter, L., Drev, M., & Kwon, N. (2018). Get with the program: Software-driven innovation in traditional manufacturing. *Management Science*, 65(2), 459–954. [CrossRef]
- Broekhuizen, T., Dekker, H., de Faria, P., Firk, S., Nguyen, D. K., & Sofka, W. (2023). AI for managing open innovation: Opportunities, challenges, and a research agenda. *Journal of Business Research*, 167, 114196. [CrossRef]
- Burdon, W. M., & Sorour, M. K. (2020). Institutional theory and evolution of ‘a legitimate’ compliance culture: The case of the UK financial service sector. *Journal of Business Ethics*, 162, 47–80. [CrossRef]
- Cavallo, A., Colombo, M. G., & Foss, N. J. (2026). Microfoundations of entrepreneurial ecosystems: A critical review and future research agenda. *Small Business Economics*, 66(4), 1991–2010. [CrossRef]
- Cavallo, A., Ghezzi, A., & Balocco, R. (2019). Entrepreneurial ecosystem research: Present debates and future directions. *International Entrepreneurship and Management Journal*, 15, 1291–1321. [CrossRef]
- Ceci, G., Ancona, A., Iovanella, A., & Veglianti, E. (2026). Entrepreneurial and innovation ecosystems: A scoping review on the complexity of nested configurations. *Journal of Innovation & Knowledge*, 14, 100973. [CrossRef]
- Chaudhary, S., Kaur, P., Ferraris, A., Bresciani, S., & Dhir, A. (2024). Connecting entrepreneurial ecosystem and innovation. Grasping at straws or hitting a home run? *Technovation*, 130, 102942. [CrossRef]
- Chen, J., Cai, L., Bruton, G. D., & Sheng, N. (2019). Entrepreneurial ecosystems: What we know and where we move as we build an understanding of China. *Entrepreneurship & Regional Development*, 32(5–6), 370–388. [CrossRef]
- Chen, R., Tao, K., Jin, C., Zhang, J., & Zhang, S. (2025). Navigating uncertainty: The impact of economic policy on corporate data asset allocation. *International Review of Economics & Finance*, 97, 103783. [CrossRef]
- Cochran, W. G. (1977). *Sampling techniques* (3rd ed.). John Wiley & Sons. Available online: <https://archive.org/details/cochran-1977-sampling-techniques/page/2/mode/2up> (accessed on 17 June 2026).
- Content, J., & Frenken, K. (2016). Related variety and economic development: A literature review. *European Planning Studies*, 24(12), 2097–2112. [CrossRef]
- Čoćkalo, D., Đorđević, D., Bogetić, S., & Bakator, M. (2020). Youth entrepreneurship development: A review of literature and ten-year research results. *Journal of Engineering Management and Competitiveness (JEMC)*, 10(2), 151–161. [CrossRef]
- Daraojimba, C., Abioye, K. M., Bakare, A. D., Mhlongo, N. Z., Onunka, O., & Daraojimba, D. O. (2023). Technology and innovation to growth of entrepreneurship and financial boost: A decade in review (2013–2023). *International Journal of Management & Entrepreneurship Research*, 5(10), 769–792. [CrossRef]
- Driouich, R., & Kallis, G. (2025). Sustaining power through economic growth: A regulation theory of growth dependence. *Ecological Economics*, 235, 108640. [CrossRef]
- Fahrati, E. (2023). The power of social norms: Exploring the influence of cultural factors on economic decision-making. *West Science Interdisciplinary Studies*, 1(6), 248–257. [CrossRef]
- Fuentes, N., Schmutzler, J., & Vargas, A. M. (2024). Unpacking the multilayered nature of entrepreneurial ecosystems: A conceptual complex adaptive system model. *International Journal of Innovation Studies*, 8(4), 335–350. [CrossRef]
- Gangi, Y. A., & Idris, A. T. (2023). Qatar’s path to a knowledge-based economy: A content analysis of entrepreneurship training initiatives. *Business and Economic Research*, 13(4), 22–38. [CrossRef]

- Giblin, M., Rodriguez, C., Buciuni, G., & Ryan, P. (2025). Creating an entrepreneurial ecosystem in a 'knowledge desert': The role of international connectivity and public institutional support. *Small Business Economics*, 65, 1465–1482. [\[CrossRef\]](#)
- Gomez-Jorge, F., Bermejo-Olivas, S., Diaz-Garrido, E., & Soriano-Pinar, I. (2025). Success in entrepreneurship: The impact of self-esteem and entrepreneurial orientation. *International Entrepreneurship and Management Journal*, 21, 21–62. [\[CrossRef\]](#)
- Gorgievski, M. J., Schmitt, A., Costa, S. F., & Batra, S. (2024). How do entrepreneurs influence their social environment? A bibliometric analysis and editorial. *Applied Psychology*, 73(4), 1419–1443. [\[CrossRef\]](#)
- Guerrero, M., & Siegel, D. S. (2024). Schumpeter meets Teece: Proposed metrics for assessing entrepreneurial innovation and dynamic capabilities in entrepreneurial ecosystems in an emerging economy. *Research Policy*, 53(5), 104984. [\[CrossRef\]](#)
- Harper-Anderson, E., & Lewis, D. A. (2018). What makes business incubation work? Measuring the influence of incubator quality and regional capacity on incubator outcomes. *Economic Development Quarterly*, 32(1), 60–77. [\[CrossRef\]](#)
- Hess, S., Wurth, B., Stam, E., Giones, F., Fini, R., Cavallo, A., Wah, A., Bosma, N., Theodorak, C., Chabaud, D., Brem, A., & Kuckertz, A. (2025). The future of entrepreneurial ecosystems research: Toward a policy-oriented research agenda. *Journal of Business Venturing Insights*, 23, e00538. [\[CrossRef\]](#)
- Hindarsah, I., Kania, T. N., Diawati, P., & Fahrudin, A. (2025). Strengthening the entrepreneurial ecosystem through innovation: A case study of Pasundan University. *International Journal of Innovative Research and Scientific Studies*, 8(1), 1760–1769. [\[CrossRef\]](#)
- Isenberg, D. J. (2010). How to start an entrepreneurial revolution. *Harvard Business Review*, 88(6), 40–50.
- Kansheba, J. M. P., & Wald, A. E. (2020). Entrepreneurial ecosystems: A systematic literature review and research agenda. *Journal of Small Business and Enterprise Development*, 27(6), 943–964. [\[CrossRef\]](#)
- Kijek, A., & Kijek, T. (2019). Knowledge spillovers: An evidence from the European regions. *Journal of Open Innovation: Technology, Market, and Complexity*, 5(3), 68–81. [\[CrossRef\]](#)
- Komlosi, E., Dejardin, M., Szerb, L., & Pager, B. (2024). Is a balanced entrepreneurial ecosystem essential for success? A configurational analysis of European regional entrepreneurial ecosystems. *The Journal of Technology Transfer*, 50(4), 1669–1708. [\[CrossRef\]](#)
- Leendertse, J., Schrijvers, M., & Stam, E. (2022). Measure twice, cut once: Entrepreneurial ecosystem metrics. *Research Policy*, 51(9), 104336. [\[CrossRef\]](#)
- Long, X. (2019). Scientific and technological innovation related to real economic growth. *China Political Economy*, 2(1), 108–122. [\[CrossRef\]](#)
- Mahfud, T., Triyono, M. B., Sudira, P., & Mulyani, Y. (2020). The influence of social capital and entrepreneurial attitude orientation on entrepreneurial intentions: The mediating role of psychological capital. *European Research on Management and Business Economics*, 30(1), 33–39. [\[CrossRef\]](#)
- Mai, K. N., & Nguyen, V. T. (2022). The influence of entrepreneurial ecosystems on entrepreneurs' perceptions and business success. *GadjahMada International Journal of Business*, 24(2), 198–222. [\[CrossRef\]](#)
- Martins, J. M., Shahzad, M. F., & Xu, S. (2023). Factors influencing entrepreneurial intention to initiate new ventures: Evidence from university students. *Journal of Innovation and Entrepreneurship*, 12(1), 63. [\[CrossRef\]](#)
- Maziriri, E. T., Nyagadza, B., & Maramura, T. C. (2024). Social entrepreneurial role models' influence on social entrepreneurial self-efficacy, social entrepreneurial intent, and social entrepreneurial action in South Africa: The moderating role of moral obligation. *Social Enterprise Journal*, 20(3), 278–317. [\[CrossRef\]](#)
- Milošev, V., Čočkaló, D., & Marić, D. (2025). Business incubators as part of the development model of entrepreneurial ecosystems: Literature and business practice review. *Industrija*, 53(1), 89–90. [\[CrossRef\]](#)
- Moustakas, L. (2023). Social cohesion: Definitions, causes and consequences. *Encyclopedia*, 3(3), 1028–1037. [\[CrossRef\]](#)
- Nalmpanti, A. D., Wong, C. Y., & Oghazi, P. (2024). Collaborating for innovation: The inhibiting role of constraints. *Journal of Innovation & Knowledge*, 9(3), 100504. [\[CrossRef\]](#)
- Neto, J. R., Figueiredo, C., Gabriel, B. C., & Valente, R. (2024). Factors for innovation ecosystem frameworks: Comprehensive organizational aspects for evolution. *Technological Forecasting and Social Change*, 203, 123383. [\[CrossRef\]](#)
- Pan, F., Zhao, S. X. B., & Dariusz, W. (2016). The rise of venture capital centres in China: A spatial and network analysis. *Geoforum*, 75, 148–158. [\[CrossRef\]](#)
- Paska, M., & Budnik, K. (2023). Trust as a participant in the adaptation of technological changes. *Scientific Papers of Silesian University of Technology Organization and Management Series*, 170, 383–391. [\[CrossRef\]](#)
- Peng, H., Li, B., & Liu, Y. (2022). How social network influences the growth of entrepreneurial enterprises: Perspective on organizational and personal network. *Sage Open*, 12(2), 1–16. [\[CrossRef\]](#)
- Radičić, D., & Petković, S. (2023). Impact of digitalization on technological innovations in small and medium-sized enterprises (SMEs). *Technological Forecasting and Social Change*, 191, 122474. [\[CrossRef\]](#)
- Rosario, C., Varum, C., & Botelho, A. (2024). The role of public incentives in promoting innovation: An analysis of recurrently supported companies. *Economics*, 12(6), 148. [\[CrossRef\]](#)
- Rossoni, A. L., de Vasconcellos, E. P. G., & de Castilho Rossoni, R. L. (2024). Barriers and facilitators of university-industry collaboration for research, development and innovation: A systematic review. *Management Review Quarterly*, 74, 1841–1877. [\[CrossRef\]](#)

- Ruggieri, R., Savastano, M., Scalingi, A., Bala, D., & D'Ascenzo, F. (2018). The impact of digital platforms on business models: An empirical investigation on innovative start-ups. *Management & Marketing*, 13(4), 1210–1225. [CrossRef]
- Santos, D. (2024). Regional innovation systems and entrepreneurial ecosystems: Their value added to rethinking regional development policies. *Innovation and Development*, 15(2), 473–487. [CrossRef]
- Saura, J. R., Skare, M., & Riberio-Navarrete, S. (2022). How does technology enable competitive advantage? Reviewing state of the art and outlining future directions. *Journal of Competitiveness*, 14(4), 172–188. [CrossRef]
- Singh, S., Dhir, S., Mukunda Das, V., & Sharma, A. (2024). Analyzing institutional factors influencing the national innovation system. *Journal of Science and Technology Policy Management*, 16(8), 1445–1466. [CrossRef]
- Song, L., & Wen, Y. (2023). Financial subsidies, tax incentives and technological innovation in China's integrated circuit industry. *Journal of Innovation & Knowledge*, 8(3), 100406. [CrossRef]
- Song, W., & Zhao, K. (2024). Navigating the innovation policy dilemma: How subnational governments balance expenditure competition pressures and long-term innovation goals. *Heliyon*, 10(15), e34787. [CrossRef] [PubMed]
- Spigel, B. (2017). The relational organization of entrepreneurial ecosystems. *Entrepreneurship Theory and Practice*, 41(1), 49–72. [CrossRef]
- Stam, E., & Spigel, B. (2016). *Entrepreneurial ecosystems* (Vol. 16). USE Discussion paper series. Utrecht University. Available online: https://www.uu.nl/sites/default/files/rebo_use_dp_2016_1613.pdf (accessed on 17 June 2026).
- Stam, E., & Van de Ven, A. (2021). Entrepreneurial ecosystem elements. *Small Business Economy*, 56, 809–832. [CrossRef]
- Surya, B., Menne, F., Sabhan, H., Suriani, S., Abubakar, H., & Idris, M. (2021). Economic growth, increasing productivity of SMEs, and open innovation. *Journal of Open Innovation: Technology, Market, and Complexity*, 7(1), 20–47. [CrossRef]
- Tekic, A., & Tekic, Z. (2025). Resource endowments as antecedents of high-impact entrepreneurship: Embracing the complexity of entrepreneurial ecosystems. *Journal of Business Research*, 197, 115444. [CrossRef]
- Terstriep, J., David, A., Zaghow, L., Vershinina, N., & Freiling, J. (2025). Power plays: Surfacing the hidden currents in entrepreneurial ecosystems. *Journal of Business Venturing Insights*, 24, e00584. [CrossRef]
- Thompson, T. A., Purdy, J. M., & Ventresca, M. J. (2018). How entrepreneurial ecosystems take form: Evidence from social impact initiatives in Seattle. *Strategic Entrepreneurship Journal*, 12(1), 96–116. [CrossRef]
- Toepler, F., & Velamuri, V. (2025). Legitimacy building in entrepreneurial ecosystems—A process perspective for sustainable entrepreneurs. *Managerial and Decision Economics*, 46(5), 3087–3105. [CrossRef]
- Tot, V. (2025). Strategies for creating a learning organization: Analysis and implementation in the context of Serbia. *International Journal of Management Trends: Key Concepts and Research*, 4(1), 34–46. [CrossRef]
- Triwahyono, B., Rahayu, T., & Kraugusteeliana, K. (2023). Analysing the role of technological innovation in improving the operational efficiency of MSMEs. *Jurnal Minfo Polgan*, 12(1), 1417–1426. [CrossRef]
- Vuković, B., Tica, T., & Jakšić, D. (2024). Firm value determinants: Panel evidence from European listed companies. *Strategic Management*, 29(1), 55–71. [CrossRef]
- Wibowo, G. A., Hanna, F., Ruhana, F. M., Arif, U., & Usmaedi, N. (2023). The influence of social-media on cultural integration: A perspective on digital sociology. *International Journal of Science and Society*, 5(4), 363–375. [CrossRef]
- World Economic Forum. (2013). *World Economic Forum annual meeting 2013: Resilient dynamism*. World Economic Forum. Available online: <https://www.weforum.org/publications/world-economic-forum-annual-meeting-2013/> (accessed on 17 June 2026).
- Yani, A., Suherlan, & Az Zaakiyyah, H. K. (2024). The importance of mentorship in stimulating the growth and success of entrepreneurial business entities. *Journal of Contemporary Administration and Management*, 2(1), 337–342. [CrossRef]
- Yuan, X., Hao, H., Guan, C. H., & Pentland, A. (2021). What are the key components of an entrepreneurial ecosystem in a developing economy? A longitudinal empirical study on technology business incubators in China. *arXiv*, arXiv:2103.0813. [CrossRef]
- Zahra, S. A., Liu, W., & Si, S. (2023). How digital technology promotes entrepreneurship in ecosystems. *Technovation*, 119, 102457. [CrossRef]

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