

THE ROLE OF ENTREPRENEURIAL INCUBATORS IN SLOVENIAN MUNICIPAL DEVELOPMENT: A MIXED-METHODS ASSESSMENT OF URBAN AND RURAL IMPACT

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Abstract: This paper explores the relationship between entrepreneurial incubators and local development in Slovenia by combining municipal-level statistical data with expert interviews. The analysis focuses on five key research questions concerning entrepreneurial activity, employment, productivity, regional disparities, and urban-rural dynamics. Using data from 212 municipalities, the study reveals that incubator presence correlates with higher company density, employment per firm, and average revenue. These findings are complemented by qualitative insights from two experts, a policy-maker and an incubator director, who highlight both structural challenges and success factors. The results suggest that incubators can play a significant role in fostering balanced regional development, especially in rural and less-developed areas. The paper contributes empirical evidence to the academic and policy discourse on innovation ecosystems and regional development in post-transition economies.

Keywords: Entrepreneurial incubators, Slovenia, regional development, start-ups, rural–urban divide, business ecosystems, cohesion policy, municipal analysis, productivity, territorial disparities.

1 Introduction

Start-ups are key players in the economy as they bring innovation, boost competitiveness, and create new jobs. Their development is often linked to the support of incubators, which provide them with access to essential resources and knowledge. A start-up is generally defined as a young, growth-oriented company that is often innovation-driven and operates in conditions of high uncertainty. One of the most influential methodologies for start-up development is the lean start-up model, which emphasizes iterative product development, customer validation, and the continuous elimination of wasteful practices (Letonja et al., 2019). According to Maurya (2014), lean entrepreneurship aims to 'do more with less' by prioritizing user feedback and quick iterations over long-term planning. The key principle is that many products fail not because entrepreneurs lack technical capacity, but because they build the wrong product for the wrong market.

Start-ups are supported by a wide network of stakeholders, including incubators, accelerators, mentors, universities, investors, and policy-makers. These actors form what is called the entrepreneurial ecosystem, a dynamic and interconnected environment that facilitates the creation and scaling of new ventures. Entrepreneurial incubators are specialized organizations or institutions designed to support young companies in their early development stages. They provide various forms of assistance, including office space, mentorship, financial resources, and connections with investors. Over the past decade, the Slovenian start-up ecosystem has experienced significant development, particularly after the economic crisis of 2008. During this period, start-up companies became an essential part of the national economy, introducing innovations, creating new jobs, and attracting foreign investment.

The Slovenian start-up scene significantly evolved after 2011, with increasing investor interest and media visibility. Between 2005 and 2020, a total of 258 Slovenian start-ups raised over €350 million, with many relying initially on personal or family funding before accessing external support mechanisms such as grants or investment. Slovenia is also notable for its early and successful adoption of blockchain technologies and Initial Coin Offerings

(ICOs) as a funding model, where capital is raised through the issuance and sale of digital tokens. On a per capita basis, Slovenian blockchain start-ups rank among the most successful globally (Kriptomat, 2018).

Mason and Brown (2014) define an entrepreneurial ecosystem as a network of interdependent actors, including:

- ✓ Entrepreneurs and start-up teams,
- ✓ Entrepreneurial organizations (e.g., incubators, accelerators, venture capital funds, business angels),
- ✓ Institutions (e.g., universities, research centers, government),
- ✓ Entrepreneurial processes (e.g., rate of new business creation, growth-oriented firms, entrepreneurial ambition).

A well-functioning ecosystem must ensure access to the three key resources:

- ✓ Human capital, skilled teams, mentors, and advisors,
- ✓ Financial capital – seed funding, equity investment, grants,
- ✓ Knowledge and network support – legal advice, market access, business networks.

According to Močnik and Rus (2016), external factors influencing the ecosystem include government policy, legal and tax frameworks, infrastructure, cultural attitudes, and financial markets, while internal factors include the characteristics of start-up teams and business models. The need for effective support for start-ups is particularly pronounced in regions lacking well-developed industries or experiencing high unemployment rates. Incubators, through their programs and support infrastructure, can help alleviate these challenges and foster a dynamic entrepreneurial environment.

This paper aims to provide a comprehensive assessment of the impact that entrepreneurial incubators have on the socio-economic development of Slovenian municipalities. Recognizing the increasing role of start-ups in driving innovation, employment, and regional competitiveness, the study explores how incubators, defined as structured support organizations for early-stage ventures, contribute to these processes at the local level. The research situates incubators within the broader entrepreneurial ecosystem and evaluates their role in addressing regional disparities, particularly between urban and rural areas, as well as between more and less developed cohesion regions in Slovenia. By mapping the spatial distribution of incubators and analyzing their correlation with key indicators such as company density, employment intensity, and firm revenue, the study seeks to clarify the extent to which incubators stimulate entrepreneurship, foster job creation, and enhance productivity. Furthermore, it aims to identify whether incubator presence mitigates structural challenges in underdeveloped municipalities and contributes to more balanced territorial development. Using a mixed-methods approach that combines statistical analysis with expert interviews, the study generates empirically grounded insights to inform regional policy design and improve the strategic deployment of entrepreneurial support structures across Slovenia's diverse municipal landscape.

This study addresses a critical gap in the Slovenian and broader Central European literature by combining municipal-level statistical data with expert insights to evaluate the territorial impact of entrepreneurial incubators. By explicitly comparing urban and rural dynamics and incorporating regional development perspectives, the research provides novel empirical evidence on the incubator's role in shaping local entrepreneurial ecosystems.

2 Methodology

This research adopts a mixed-methods approach, combining quantitative data analysis with qualitative field research. The core dataset will be obtained from the Statistical Office of the

Republic of Slovenia (SURs), covering all Slovenian municipalities. Key indicators include the number of registered companies, the number of employees, total revenue (in EUR), and the average number of employees per company for the year 2023. These indicators will allow us to assess entrepreneurial activity, employment intensity, and economic productivity at the municipal level. Additional datasets will be consulted to provide context, such as population size and regional classification (e.g., cohesion regions, urban vs. rural municipalities).

A key component of the analysis involves mapping the presence of entrepreneurial incubators across Slovenian municipalities. This will be accomplished through:

- ✓ Desk research using official sources (e.g., SPIRIT Slovenia, Slovene Enterprise Fund, regional development agencies, Municipality's web pages),
- ✓ Direct contact with each municipality (telephone/email inquiry), to verify whether an incubator exists in the area,
- ✓ Compilation of a binary variable indicating incubator presence (Yes/No) per municipality.

To complement the quantitative analysis, two semi-structured expert interviews will be conducted:

- ✓ With Ms Saša Lavrič, a long-standing director of the Savinjska Region Entrepreneurial Incubator, to gather insights into the practical challenges, achievements, and regional role of incubators;
- ✓ With Mr. Robert Drobnič, Director General for regional development at the Ministry for cohesion and regional development, to explore national policies, support mechanisms, and strategic priorities related to start-up development.

The interviews will be transcribed and thematically analyzed to extract key patterns and qualitative insights that inform the interpretation of the statistical findings. Together, these methods will provide a comprehensive view of the role and impact of entrepreneurial incubators in shaping local and regional economic development in Slovenia.

This study seeks to answer the following five research questions, along with specific measurement approaches:

1. Is there a correlation between the presence of an entrepreneurial incubator and entrepreneurial activity in a municipality? Measurement: number of companies per 1,000 residents, compared between municipalities with and without incubators.
2. Do incubators contribute to higher employment and productivity levels? Measurement: average number of employees per company and total revenue per company, compared between municipalities with and without incubators.
3. Are there regional disparities in entrepreneurship, and can they be explained by the presence of incubators? Measurement: regional analysis of entrepreneurial activity (e.g., by cohesion region), cross-referenced with incubator presence.
4. Are incubators more effective in rural municipalities than in urban ones? Measurement: comparative analysis of company growth in municipalities classified as rural versus urban (urban municipalities), with and without incubators.
5. What is the relationship between company density and average firm size? Measurement: correlation analysis between number of companies per 1,000 residents and average number of employees per company.

3 Theoretical Background and Literature Review

Entrepreneurial incubators are organizational structures that provide targeted support to startups and early-stage ventures, helping them to develop into viable businesses. This support typically includes physical infrastructure (offices, coworking spaces), mentoring,

administrative assistance, business development services, access to finance, and networking opportunities. The origin of the entrepreneurial incubator model dates back to the Batavia Industrial Center in New York (1959), with significant global expansion in the 1980s and 1990s due to favorable policies like the Bayh-Dole Act and increasing interest in innovation-led economic development (Hackett & Dilts, 2004; Al-Mubarak & Busler, 2010).

Over time, the incubator model evolved to include academic incubators, accelerators, and hybrid support structures. Incubators serve several economic and social objectives, such as:

- ✓ Commercializing research and technology,
- ✓ Reducing startup failure rates,
- ✓ Supporting job creation and regional economic diversification.

In their typology, Hackett and Dilts (2004) distinguish incubators based on services offered, governance, funding sources, and intended outcomes, noting that performance outcomes are highly context-dependent. Incubators contribute not only to the success of individual startups but also to broader local and regional development objectives. They act as intermediaries between innovation, entrepreneurship, and territorial competitiveness. According to Madaleno et al. (2021), incubators can catalyze urban economic development, especially in post-industrial or transitioning regions.

In Slovenia, incubators often serve as anchor institutions in regional innovation ecosystems, offering essential support for entrepreneurship in both urban and rural municipalities. The analysis by Matko (2020) shows that although the Slovenian incubator landscape is relatively diverse, it is unevenly distributed: some regions are saturated with services, while others remain underserved. Moreover, the GEM Slovenia 2022 report emphasizes the important role of entrepreneurial support organizations, including incubators, in fostering a dynamic startup ecosystem and reducing the regional innovation gap. However, the same report highlights a critical challenge: a heavy reliance on public funding, which affects incubator autonomy and long-term sustainability.

Academic incubators represent a newer and increasingly vital dimension of the incubator model. According to Budac & Ilie (2024), universities are becoming not only knowledge producers but also entrepreneurial actors, supporting students and researchers in commercializing innovations. These incubators support early-stage ideas by:

- ✓ Offering access to laboratories and maker spaces,
- ✓ Facilitating university–industry collaborations,
- ✓ Attracting entrepreneurial talent,
- ✓ Supporting spin-offs and socially driven startups.

This integration of research, education, and enterprise reflects the "third mission" of universities and can significantly enhance local development by retaining talent and stimulating high-tech entrepreneurship. A growing body of empirical research has explored what makes incubators effective. Awonuga et al. (2024) identify several success factors:

- ✓ Structured mentorship from experienced entrepreneurs,
- ✓ Access to funding channels (e.g., seed capital, angel investors),
- ✓ Collaborative environments promoting peer learning and innovation,
- ✓ Networking with stakeholders such as investors, customers, and researchers.

Roundy (2021) adds that leadership within incubators plays a pivotal role in shaping regional entrepreneurial ecosystems. Effective incubator leaders build coalitions, adapt services to regional strengths and weaknesses, and cultivate long-term stakeholder relationships. In the Slovenian case, Friskovec (2021) and Matko (2020) both stress that many incubators still lack specialization, with some providing generic services that are not tailored to the needs of

startups. Furthermore, despite a high number of incubators (e.g., LUI, SAŠA inkubator, MPIK), many fail to systematically measure their impact or provide sustained post-incubation support. Slovenia's entrepreneurial ecosystem has seen major shifts over the past two decades. According to the GEM 2022 report, entrepreneurial intention remains high, especially among the younger population, but actual startup creation is often limited by administrative burdens and risk aversion.

The SAŠA Incubator's "Startup Generator" program demonstrates how intensive pre-incubation initiatives can equip young entrepreneurs with skills, confidence, and market-readiness. Empirical findings show that such programs improve participants' competence and motivation, even in less developed regions. However, many incubators in Slovenia still depend heavily on EU and national funds, and few generate significant revenue from private sources or successful alumni (Matko, 2020; Friskovec, 2021). This may hinder their ability to scale or diversify services and limits the sustainability of regional entrepreneurial development.

Despite the growing body of international literature on the role of incubators in supporting entrepreneurial ecosystems, most studies focus on urban environments or technologically advanced innovation hubs. There is a noticeable lack of empirical research that investigates how incubators function across a diverse municipal landscape, especially in smaller or rural contexts. In the case of Slovenia, although policy documents and regional strategies emphasize the importance of entrepreneurial infrastructure, systematic evidence on the local developmental impact of incubators remains limited. This study addresses this gap by combining quantitative municipal-level data with expert insights to evaluate the influence of incubator presence across urban, rural, and regional contexts, offering a more nuanced understanding of how incubators contribute to balanced territorial development.

4 Incubators and Entrepreneurial Ecosystems in Rural vs. Urban Contexts

Understanding the spatial dimensions of entrepreneurial ecosystems is essential for evaluating the role of incubators in local development. Urban areas typically offer a denser concentration of knowledge institutions, capital sources, and market opportunities, which can foster rapid growth of start-ups. In contrast, rural regions often face structural disadvantages such as weaker infrastructure, limited access to finance, and lower population density, which can hinder entrepreneurial activity (North & Smallbone, 2006).

Recent literature challenges the urban-centric view of entrepreneurship by emphasizing the potential of rural entrepreneurial ecosystems. Roundy et al. (2018) argue that rural ecosystems, while less dense, are often sustained by informal networks, strong social cohesion, and local identity. Spigel (2017) suggests that entrepreneurial success in such settings emerges when support systems are embedded in local social capital and adapted to the unique attributes of place. Similarly, Mack & Mayer (2016) emphasize that entrepreneurial ecosystems are not "one-size-fits-all" but context-dependent structures.

In Slovenia, rural municipalities often struggle with youth outmigration, limited infrastructure, and the decline of traditional industries. In this context, incubators can function as both economic stimulators and social anchors. While urban incubators may specialize in scalable tech ventures, rural incubators may prioritize SMEs linked to agriculture, tourism, or creative industries (Brezovnik et al., 2015).

The presence of incubators in rural areas can counterbalance regional disparities by fostering local business networks, enabling knowledge spillovers, and encouraging entrepreneurial retention. However, as Lafuente et al. (2020) note, the sustainability of rural incubation

depends on tailored services, long-term financing strategies, and embeddedness in local governance frameworks.

Public policy is therefore critical. Decentralized innovation policies, EU cohesion funding, and support for inclusive entrepreneurship (e.g., youth, women, elderly entrepreneurs) can significantly amplify the effects of incubators outside urban cores (OECD, 2023). Recognizing and addressing these spatial differences is essential for designing incubator strategies aligned with local and regional development goals.

5 Measuring Incubator Impact: Frameworks and Indicators

Evaluating the effectiveness of entrepreneurial incubators is a complex task that requires distinguishing between various outputs, outcomes, and long-term impacts. Scholars have debated which indicators best capture the value incubators create, with some focusing on immediate outputs such as the number of supported firms, while others emphasize outcomes like firm survival rates or job creation.

Mian, Lamine, and Fayolle (2016) provide an extensive overview of incubation models and impact assessment practices. They argue that robust evaluation frameworks should encompass both quantitative and qualitative indicators, tailored to the specific mission of the incubator (e.g., commercialization, social impact, regional development). Hackett and Dilts (2004) identify five dimensions of incubator performance:

- ✓ The number of start-ups that graduate (i.e., complete the incubation program),
- ✓ The survival rate of incubated firms,
- ✓ The employment growth in supported firms,
- ✓ Revenue growth,
- ✓ The innovativeness and market reach of incubated businesses.
- ✓

Indicators frequently used in empirical studies include:

- ✓ Firm survival rate over a defined post-incubation period (usually 3–5 years),
- ✓ Number of jobs created per firm,
- ✓ Revenue growth or profitability,
- ✓ Access to external funding (e.g., seed capital, VC),
- ✓ Intellectual property outputs (e.g., patents, trademarks).

However, several limitations and biases must be considered. Survivorship bias is common, studies often only track successful firms, overlooking those that failed early. Furthermore, attributing success directly to incubation is methodologically difficult due to confounding factors like founder experience, market conditions, or external mentorship (Löfsten & Lindelöf, 2002).

In the Slovenian context, performance tracking remains fragmented. According to Friskovec (2021), many incubators lack clear metrics and longitudinal data collection. This impedes both strategic planning and funding justification. A comprehensive evaluation approach should therefore combine statistical indicators with stakeholder interviews, case studies, and contextual data from municipalities.

In this study, we operationalize impact measurement using a combination of proxy indicators:

- Company density (firms per 1,000 residents),
- Employment intensity (average employees per firm),
- Productivity (average revenue per firm),

- Spatial distribution (urban/rural and regional classification),
- Binary presence of incubators (Yes/No).

These indicators are intended to serve as starting points for a broader conversation on how to assess the territorial contribution of incubators in national innovation ecosystems.

6 Regional and Municipal Development in Slovenia

Slovenia is administratively divided into 212 municipalities (občine), which vary widely in size, population, economic structure, and development capacity. While some municipalities, such as Ljubljana or Maribor, function as regional urban centers with strong institutional infrastructure and economic activity, the majority of Slovenian municipalities are small and rural, often facing demographic and economic challenges. Understanding this territorial diversity is essential for contextualizing the impact of incubators, which are not equally distributed across the country.

For EU funding and strategic planning purposes, Slovenia is divided into two NUTS-2 cohesion regions:

- ✓ Eastern Slovenia (Vzhodna Slovenija), encompassing 12 statistical regions and a majority of rural municipalities. It is home to around 1.07 million residents and is characterized by below-average GDP per capita, lower innovation activity, and weaker infrastructure.
- ✓ Western Slovenia (Zahodna Slovenija), including the capital region and economically more advanced areas such as Gorenjska and the Coastal–Karst region. It has approximately 1.06 million residents and consistently performs better on socio-economic indicators such as productivity, education levels, and research intensity.

Data from the Statistical Office of the Republic of Slovenia (SURS) and the European Commission show that GDP per capita in Western Slovenia exceeds the EU average, while Eastern Slovenia lags behind. This gap reflects differences in industrial structure, access to infrastructure, and availability of knowledge-based institutions.

A further important distinction is between urban and rural municipalities. Slovenia has only a few large urban centers, most notably Ljubljana, Maribor, Celje, Kranj, and Koper, while a majority of municipalities have fewer than 10,000 inhabitants and exhibit characteristics typical of rural or semi-rural areas. Urban municipalities tend to:

- ✓ Host universities and R&D institutions,
- ✓ Attract foreign direct investment (FDI),
- ✓ Offer better transportation and digital infrastructure,
- ✓ Have more diversified economies.

Rural municipalities, by contrast, often rely on a narrow set of industries (e.g., agriculture, forestry, or tourism), and face:

- ✓ Limited entrepreneurial infrastructure,
- ✓ Population decline and brain drain,
- ✓ Reduced access to financial and advisory services.

These conditions influence not only the emergence of new enterprises but also the functionality and potential impact of incubators operating in those areas. Slovenia's regional development policy is coordinated by the Ministry of Cohesion and Regional Development, in line with EU structural and investment policy. The key goals include reducing regional

disparities, strengthening innovation capacity in less developed areas, and promoting balanced territorial development.

Municipalities are supported by:

- ✓ Regional Development Agencies (RDAs),
- ✓ Development Councils,
- ✓ Inter-municipal cooperation mechanisms, and
- ✓ EU-funded instruments, such as the European Regional Development Fund (ERDF) and the Just Transition Fund (JTF).

The Smart Specialisation Strategy (S4) further guides innovation investment at the regional level, with an emphasis on priority domains such as mobility, circular economy, health, and smart manufacturing. However, implementation remains uneven, with stronger uptake in the west and in urban centers. Against this backdrop, entrepreneurial incubators can be seen as intermediary institutions that mediate between national innovation strategies and local economic realities. Their presence in a municipality can help:

- ✓ Enhance business survival and competitiveness,
- ✓ Build human capital and retain local talent,
- ✓ Facilitate access to regional and national funding schemes,
- ✓ Strengthen local innovation systems.

However, as noted in previous sections, incubators are unevenly distributed, with many concentrated in urban regions (e.g., Ljubljana, Celje, Kranj), while smaller municipalities often lack such support structures. This unevenness reflects differences in municipal capacity to co-finance, host, or manage incubation infrastructure.

In rural and less-developed regions, incubators may face difficulties attracting high-growth ventures or specialized staff. Nonetheless, they can play an outsized role in enabling place-based development by focusing on:

- ✓ Local SMEs rather than scalable start-ups,
- ✓ Traditional sectors with innovation potential (e.g., agri-tech, rural tourism),
- ✓ Social enterprises and community-based entrepreneurship.

The regional and municipal diversity in Slovenia requires context-sensitive impact evaluation frameworks. Indicators of incubator performance must be interpreted not only against national benchmarks but also in relation to the local development stage, industrial profile, and institutional capacity of each municipality. This study therefore situates its analysis within Slovenia's territorial landscape, recognizing that incubators may play different roles in different municipal contexts. The spatial distribution of incubators, and their alignment with regional development goals, will be critical in assessing their true contribution to local socio-economic outcomes.

7 Analytical Framework and Operationalization of Research Questions

This study seeks to empirically assess the socio-economic effects of entrepreneurial incubators across Slovenian municipalities by answering five interrelated research questions. Each question is addressed through a specific analytical approach, combining quantitative indicators with contextual interpretation. Below, we outline the methodology for each question, along with the rationale behind the selected metrics.

7.1 Mapping Incubator Presence: Data Collection and Interpretation Caveats

In order to map the presence of entrepreneurial incubators across Slovenian municipalities, we applied a three-step methodology:

- ✓ Desk research based on official sources, such as SPIRIT Slovenia, the Slovene Enterprise Fund, regional development agencies, and official municipal websites;
- ✓ Direct contact with municipal administrations via telephone and/or email, to verify the actual existence and operational status of incubators;
- ✓ Compilation of a binary variable (Yes/No), indicating whether a given municipality hosts or significantly supports an entrepreneurial incubator.

The resulting binary classification forms the basis for the comparative analyses that follow. In total, the presence of incubators was confirmed in a number of municipalities as shown in the list below. However, several interpretative caveats should be noted. In some cases, multiple neighboring municipalities co-finance or jointly operate a single incubator, meaning that support for entrepreneurship is not always confined within administrative boundaries. In such instances, we attributed incubator presence to all municipalities that actively participate in governance or funding, even if the incubator's physical location lies in only one of them. Similarly, smaller municipalities often gravitate toward nearby urban centers, where incubators serve broader functional regions rather than individual localities.

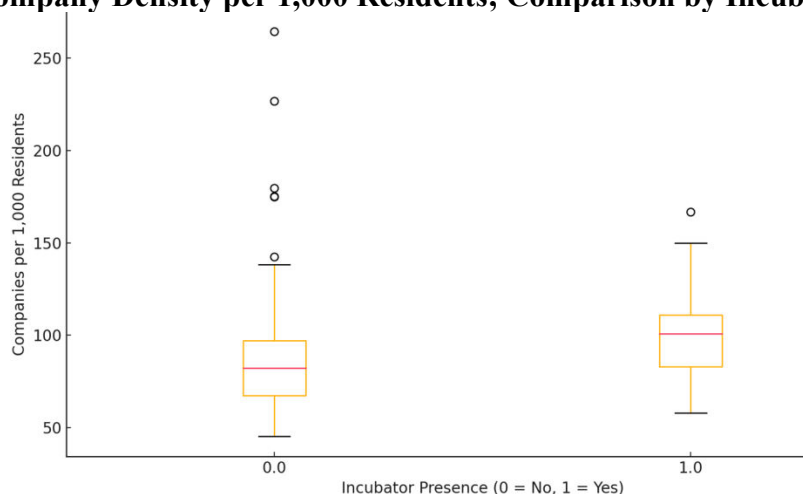
Based on the combined desk research and direct municipal verification, we identified 43 municipalities in Slovenia that host or actively support an entrepreneurial incubator. These include: Ajdovščina, Brežice, Celje, Črnomelj, Hrastnik, Idrija, Ilirska Bistrica, Izola/Isola, Kamnik, Kočevje, Koper/Capodistria, Kranj, Krško, Ljubljana, Logatec, Majšperk, Maribor, Mengeš, Metlika, Murska Sobota, Naklo, Nazarje, Nova Gorica, Novo mesto, Piran/Pirano, Podčetrtek, Postojna, Ptuj, Ravne na Koroškem, Rogaška Slatina, Sežana, Slovenj Gradec, Slovenske Konjice, Šentjur, Škofja Loka, Šoštanj, Trbovlje, Velenje, Vrhnika, Zagorje ob Savi, and Žalec. These municipalities either host a physical incubator or co-finance/support one within a broader regional innovation ecosystem.

This list reflects both direct incubation services and broader entrepreneurial support structures funded or governed by the respective municipalities. In several instances, incubators serve multiple municipalities, underscoring the importance of inter-municipal cooperation in supporting start-up ecosystems. This shared governance and functional reach were considered when coding incubator presence, even if the physical infrastructure is located in only one municipality. Consequently, the binary indicator does not strictly represent geographic location but rather reflects the existence of active incubator support accessible to local entrepreneurs. This pragmatic classification was necessary to approximate the support environment at the municipal level but should be regarded as a methodological limitation. It is possible that some municipalities were either over- or underrepresented in terms of actual incubator access.

7.2 Correlation Between Incubator Presence and Entrepreneurial Activity

The analysis of municipal-level data in Slovenia reveals a notable relationship between the presence of an entrepreneurial incubator and entrepreneurial activity, as measured by the number of companies per 1,000 residents. Municipalities with incubators report, on average, 101.5 companies per 1,000 residents, while those without incubators average only 87.2. This indicates a difference of over 14%, suggesting that the presence of an incubator may positively influence the rate of entrepreneurship.

Figure 1: Company Density per 1,000 Residents; Comparison by Incubator presence



Source: Own calculations

To assess whether this observed difference is statistically significant, an independent t-test was conducted. The test produced a t-statistic of 3.46 and a p-value of 0.00086. The p-value being well below the standard threshold of 0.05 confirms that the difference in entrepreneurial density between the two groups is statistically significant and unlikely to be due to random variation. In practical terms, this strengthens the argument that incubators are not merely correlated with but may play an active role in fostering entrepreneurial ecosystems within municipalities.

Several mechanisms may explain this relationship. Entrepreneurial incubators typically provide support services such as mentoring, infrastructure, networking opportunities, and sometimes access to financing. These resources can lower the barriers to entry for new ventures and support their early-stage growth, thus encouraging more individuals to pursue entrepreneurship. Moreover, the presence of an incubator may signal a municipality's commitment to economic development, attracting both talent and investment.

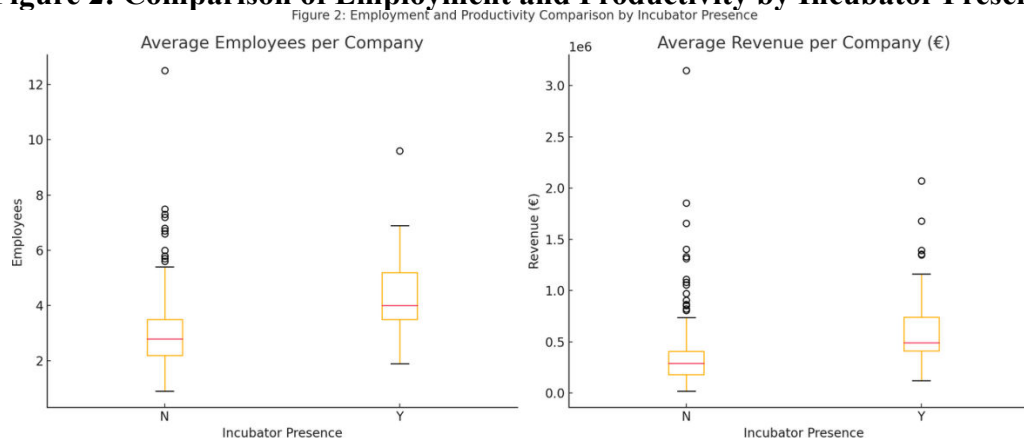
However, while the data show a strong association, causality cannot be definitively established from this cross-sectional analysis. It's also possible that more entrepreneurial municipalities are more likely to establish or attract incubators. Future longitudinal studies could help disentangle these dynamics further. Nevertheless, the findings offer robust empirical support for policies promoting incubator development as a tool to stimulate local entrepreneurship.

7.3 Contribution to Employment and Productivity

To evaluate whether entrepreneurial incubators contribute to improved economic outcomes in Slovenian municipalities, the analysis compared two key indicators between municipalities with and without incubators: the average number of employees per company and the average revenue per company. The results indicate that municipalities hosting incubators exhibit a higher average number of employees per company, at 4.32, compared to only 3.14 in municipalities without incubators. This represents a relative increase of nearly 38 percent.

A similar pattern is observed when examining average revenue per company. Municipalities with incubators report an average revenue of €655,791 per company, while those without incubators reach only €383,282. This reflects a difference of approximately 71 percent, pointing to a substantial disparity in firm-level productivity favoring incubator-hosting locations.

Figure 2: Comparison of Employment and Productivity by Incubator Presence



Source: Own calculations

To assess the statistical significance of these observed differences, independent t-tests were conducted. For the number of employees per company, the test produced a t-statistic of 4.85 and a p-value of 0.0000077. For revenue per company, the t-statistic was 4.01 with a p-value of 0.00017. Both p-values fall well below the conventional threshold of 0.05, confirming that the differences are statistically significant and unlikely to be due to random variation.

These findings suggest that incubators may play an important role in enhancing not only the quantity of entrepreneurship, as demonstrated in the previous question, but also its quality. By providing access to infrastructure, mentoring, professional networks, and in some cases funding, incubators can improve the survival rate and growth potential of startups. This, in turn, results in firms that are better staffed and more productive.

However, while the evidence for a strong association is clear, causality cannot be inferred from this cross-sectional dataset. It remains possible that more dynamic or economically advanced municipalities are both more likely to establish incubators and to host firms with better performance outcomes. Longitudinal research would be necessary to confirm the direction of influence.

Nevertheless, the results provide compelling empirical support for public policies that encourage the development and expansion of entrepreneurial incubators as a tool for promoting sustainable economic development through enhanced employment and productivity.

7.4 Regional Disparities and Incubator Influence

To explore the geographical dynamics of entrepreneurship in Slovenia, the analysis examined company density, measured as the number of companies per 1,000 residents, across the country's two cohesion regions: East (Vzhodna Slovenija) and West (Zahodna Slovenija). Within each region, municipalities were further grouped based on the presence or absence of an entrepreneurial incubator. This allowed for a more nuanced view of whether regional entrepreneurial disparities could be partially attributed to differences in incubator availability. The results reveal a clear and persistent regional gap in entrepreneurial activity. Municipalities in the Western cohesion region demonstrate significantly higher company density, regardless of incubator presence. In municipalities without an incubator, the Western region averages 110.8 companies per 1,000 residents, compared to only 76.9 in the Eastern region. Where incubators are present, the West again outperforms the East, with 116.7 companies per 1,000 residents compared to 91.6. Thus, while the presence of an incubator is

associated with increased entrepreneurship in both regions, the baseline difference between East and West remains substantial.

Table 1: Regional Summary Statistics

Region	Avg. Company Density	Company Density (No Incubator)	Company Density (With Incubator)	Avg. Employees per Company	Avg. Revenue per Company (€1,000)	Number of Incubators
Eastern	79.61	76.9	91.6	3.33	407.88	26
Western	112.26	110.8	116.7	3.47	506.33	17

Source: Own calculations

These findings suggest that incubators may enhance entrepreneurial activity in both regions, but they do not fully eliminate existing territorial disparities. The Western region remains more entrepreneurially dynamic than the Eastern region, even when both host incubators. Several factors may account for this regional divergence, including differences in infrastructure, education levels, access to markets, availability of skilled labor, and historical economic development patterns.

The data also imply that incubator presence might be slightly more effective in relatively less entrepreneurial environments. In the Eastern region, incubators are associated with an increase of 14.7 companies per 1,000 residents (from 76.9 to 91.6), whereas in the West, the increment is smaller, about 5.9 (from 110.8 to 116.7). This could indicate that incubators help close part of the gap, though not entirely.

Interestingly, however, when examining average employees per company, both regions perform almost identically, with 3.33 in the East and 3.47 in the West. This indicates that while more businesses operate in the West, the size of individual firms, in terms of employment, is relatively consistent across regions.

In terms of revenue per company, Western Slovenia again leads. This gap suggests higher productivity or added value per firm in the Western region, potentially linked to more developed markets or stronger integration into global value chains.

Notably, incubator presence is higher in Eastern Slovenia (26 incubators vs. 17 in the West), reflecting national and EU efforts to stimulate economic development in structurally weaker regions. This suggests that while incubators are more numerous in the East, their impact may be constrained by broader regional economic conditions.

As with previous findings, caution is warranted in interpreting these associations as causal. Incubators may be more likely to be located in regions where local governments are already committed to entrepreneurship and development, or where there is already a critical mass of entrepreneurial talent. Further investigation using time-series or matched comparison methods could help to more definitively establish whether incubators reduce regional inequalities or simply reflect them.

Nonetheless, the evidence suggests that regional disparities in entrepreneurship are significant in Slovenia, and that incubators may play a role in partially mitigating, though not erasing, these imbalances. This insight has important implications for regional development strategies, especially in lagging areas of Eastern Slovenia where targeted incubator investment might yield proportionally greater returns.

In summary, Western Slovenia shows stronger overall entrepreneurial performance, while Eastern Slovenia hosts more incubators, possibly as a policy response to lagging

development. These insights underscore the importance of tailored regional strategies that combine infrastructure, support services, and broader economic incentives.

7.5 Incubator Effectiveness in Rural vs. Urban Municipalities

The fourth question investigates whether incubators are more effective in rural contexts compared to urban settings. This is based on the hypothesis that incubators in less developed areas may generate relatively higher marginal benefits by compensating for structural disadvantages. The analysis will:

- ✓ Segment municipalities into four groups:
 - Urban with incubator,
 - Urban without incubator,
 - Rural with incubator,
 - Rural without incubator,
- ✓ Compare company growth indicators (e.g., firm density, employment per firm) across these categories.

This analysis uses a definition of urban municipalities, including Slovenia's officially recognized urban municipalities, which are in Slovenia only 12 (Ljubljana, Maribor, Celje, Kranj, Koper, Novo mesto, Nova Gorica, Murska Sobota, Ptuj, Velenje, Krško, Slovenj Gradec).

Table 2: Urban vs Rural Comparison with Incubator Presence

Group	Company Density	Employees per Company	Revenue per Company (€1,000)
Urban with Incubator	111.7	5.40	985.9
Rural with Incubator	98.1	3.95	542.3
Rural without Incubator	87.2	3.13	383.3

Source: Own calculations

The comparison again reveals clear performance differences based on both location and the presence of incubators. Among urban municipalities with incubators, entrepreneurial performance is the strongest across all indicators. These municipalities report the highest firm density (111.7 companies per 1,000 residents), the largest average firm size (5.4 employees per company), and the highest firm revenue (approximately €986,000 per company). These results confirm that incubators in dynamic urban environments are associated with substantial economic outputs and possibly benefit from broader support ecosystems and stronger market connectivity.

In contrast, rural municipalities with incubators still perform better than those without. They host more companies per capita (98.1 vs. 87.2), show larger firm sizes (3.95 vs. 3.13 employees per firm), and produce notably higher revenues (€542,300 vs. €383,300 per firm). This reinforces the hypothesis that incubators offer significant marginal benefits in structurally weaker rural areas, compensating for limited resources or remoteness.

While the absence of urban municipalities without incubators limits the ability to directly assess differential incubator effects between contexts, the findings suggest that incubators may be relatively more transformative in rural areas. In urban municipalities, entrepreneurial ecosystems are already more developed, and the marginal gains of an incubator may be less

pronounced. In contrast, rural municipalities appear to experience notable improvements in entrepreneurial activity when an incubator is present.

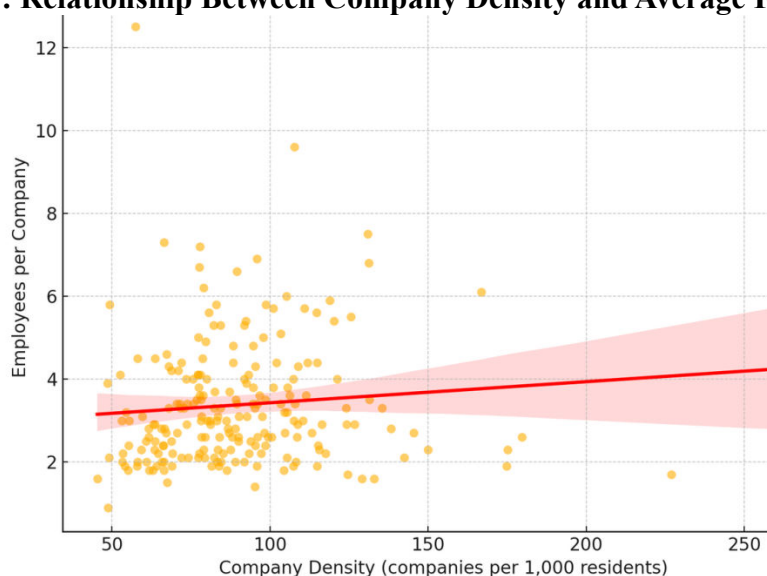
This implies that entrepreneurial incubators can act as equalizing instruments of economic development. By extending startup support, resources, and networking to areas that might otherwise lack them, incubators can help bridge the urban-rural divide. Policymakers focused on regional cohesion may therefore consider prioritizing incubator development in rural municipalities where the relative benefits appear more substantial. As with previous findings, the cross-sectional nature of the dataset precludes definitive causal conclusions. Still, the evidence is consistent with the hypothesis that incubators are particularly impactful in less developed settings.

7.6 Relationship Between Company Density and Firm Size

To explore whether a higher concentration of companies within a municipality is associated with larger average firm size, this analysis examines the relationship between company density (the number of companies per 1,000 residents) and the average number of employees per company. The underlying question is whether municipalities with more businesses per capita also tend to have larger firms, or whether denser entrepreneurial ecosystems are composed primarily of small-scale ventures. This question does not directly involve incubator presence but helps contextualize the dynamics of entrepreneurship at the municipal level and may uncover scaling patterns relevant to local development policy.

Using municipality-level data from across Slovenia, a Pearson correlation analysis was conducted between the two indicators. The results show a very weak positive correlation of 0.096, with a p-value of 0.163. This correlation is not statistically significant at the conventional 0.05 threshold, indicating that there is no strong linear relationship between company density and average firm size.

Figure 3: Relationship Between Company Density and Average Firm Size



Source: Own calculations

In practical terms, this suggests that a municipality having more companies per capita does not imply that those companies employ more people on average. In fact, it is possible that entrepreneurial density is driven by the proliferation of small or micro-enterprises rather than by the expansion of large firms. This aligns with the broader characteristics of Slovenia's

business landscape, where many municipalities are dominated by SMEs and sole proprietorships.

These findings indicate that no meaningful relationship exists between company density and firm size across Slovenian municipalities. In other words, having more companies per 1,000 residents does not imply that firms in those areas are larger or employ more people on average. This suggests that entrepreneurial quantity and firm scale are independent dynamics. Some municipalities may foster many small businesses, while others support fewer but larger enterprises. Therefore, policies aimed at increasing the number of firms should not assume a direct effect on employment per firm without complementary measures.

8 Analysis of empirical results with Interviews and discussion

This section combines quantitative data with expert insights to examine how entrepreneurial incubators influence entrepreneurship across Slovenian municipalities. The integration of perspectives from Ms. Saša Lavrič, former director of the Savinjska Region Entrepreneurial Incubator, and Mr. Robert Drobnič, Director General for Regional Development at the Ministry for Cohesion and Regional Development, enabled a richer, policy-relevant understanding of the findings.

The first research question investigated whether incubators are associated with higher entrepreneurial activity. The quantitative analysis showed that municipalities with incubators had a significantly higher company density, 101.5 companies per 1,000 residents compared to 87.2 in municipalities without incubators. Ms. Lavrič attributed this effect to workshops, networking, and a culture of mutual support that builds confidence and motivation among aspiring entrepreneurs. Mr. Drobnič, while agreeing with the observed correlation, highlighted a reverse causal possibility: that more dynamic and entrepreneurially inclined municipalities are also more likely to establish incubators. He emphasized that the presence of business zones and a municipality's broader strategic commitment to economic infrastructure often co-occur with incubator development. The example of Odranci, a small but business-oriented municipality, demonstrates how local policy and mindset can be as decisive as institutional tools like incubators.

The second research question addressed employment and productivity outcomes. Municipalities with incubators not only had more employees per company but also reported significantly higher revenue per firm. Ms. Lavrič linked this success to the social capital fostered within incubator communities, where targeted mentoring and support systems ensure that entrepreneurs receive help when it is most needed. Mr. Drobnič, meanwhile, emphasized that productivity is crucial in light of Slovenia's demographic decline, noting that each year the country loses a workforce equivalent to the population of Kočevje. He stressed the urgency of increasing productivity through jobs that offer high added value, a goal incubators are well-positioned to support.

The third question focused on regional disparities and whether incubators can help mitigate them. The findings confirmed that entrepreneurial density is higher in the West than in the East, but that incubators are associated with stronger gains in Eastern Slovenia. Lavrič explained that this reflects deliberate state policy, as Cohesion Fund support has prioritized incubator development in the East. However, she also pointed out that Western Slovenia hosts larger, more resource-rich technology parks closely linked to universities and multinational companies. Mr. Drobnič added a valuable institutional dimension to this regional story, noting that entrepreneurial incubators have repeatedly emerged as priority projects during regional development dialogues. Within the framework of the "Agreements for the Development of Regions," local stakeholders, including municipal mayors, business

representatives, and civil society actors, have identified incubators as strategic tools. He emphasized that these bottom-up initiatives reflect not only national priorities but also the self-defined needs of regions themselves.

The fourth question examined the differential effectiveness of incubators in rural versus urban areas. The data revealed that while urban municipalities (all of which host incubators) lead in company density, rural municipalities show greater relative gains when incubators are present. Lavrič stressed that in rural areas, incubators offer far more than physical space: they provide access to know-how, mentorship, and a supportive peer network, key factors that transform ideas into sustainable businesses. Mr. Drobnič echoed this view, highlighting that business support infrastructure in rural areas is often spatially and resource-constrained compared to national-level hubs. Still, he stressed that even small rural incubators, when supported by local and national policy instruments, from SPIRIT and SPS to the Regional Development Fund in Ribnica, can enable companies to think globally while acting locally.

The fifth and final research question investigated whether there is a relationship between company density and average firm size. The analysis showed no significant correlation, suggesting that a higher number of companies per capita does not necessarily indicate larger or more mature firms. Lavrič connected this finding to the structural absence of venture capital and investment mechanisms in Slovenia, pointing out that unlike in the United States, Slovenia lacks a tradition of “old money” investing in new ventures. As a result, high-potential startups often move abroad in search of growth funding. Mr. Drobnič added a systemic reflection, noting that while Slovenia excels at launching new ideas, scaling remains a challenge. He pointed to the importance of integrating incubators with regional specialization strategies (S5), digital and green transformation efforts, and global value chain positioning. These policy frameworks aim to ensure that incubators are not isolated facilities but key nodes in a broader innovation ecosystem.

Taken together, the findings provide robust empirical and practical evidence that incubators are effective tools for increasing entrepreneurial density, improving employment outcomes, and enhancing regional equity. Their role is particularly transformative in Eastern and rural regions, where they contribute to balancing uneven development. However, the expert insights remind us that incubators operate within complex local and national ecosystems. Their success depends on supportive policies, effective governance, and strategic integration with other development instruments such as business zones, investment platforms, and specialization strategies.

This study reaffirms the importance of viewing incubators not as isolated interventions, but as part of a larger system of entrepreneurial support and regional development. It also highlights the value of incorporating practitioner perspectives into policy research. Future studies should explore longitudinal trends, regional governance dynamics, and the role of capital markets in shaping the long-term impact of Slovenia’s entrepreneurial infrastructure.

9 Conclusion

The findings of this study confirm that entrepreneurial incubators are more than just support structures for startups; they are active agents in shaping local economic ecosystems. Municipalities with incubators consistently show stronger indicators of entrepreneurial activity, including a higher number of companies per capita, more employees per firm, and greater revenue per company. This pattern is especially visible in rural areas, where incubators provide not only physical infrastructure but also access to networks, mentoring, and community support.

Regional analysis further reveals that the impact of incubators is influenced by broader development policies and institutional coordination. While Western Slovenia hosts advanced technology parks, Eastern and rural municipalities benefit significantly from smaller-scale incubator initiatives. These facilities often fill critical gaps in entrepreneurial infrastructure and play a vital role in countering demographic and economic stagnation.

The expert interviews provide valuable nuance, suggesting that incubators are most effective when embedded in wider development frameworks. Factors such as cohesion funding, regional policy dialogue, and cross-sector partnerships enhance their long-term success. However, limitations such as access to investment capital and qualified labor continue to challenge the growth of startups, particularly in less urbanized regions.

Although the study is cross-sectional and does not establish causality, it offers a comprehensive snapshot of how incubators function within Slovenia's territorial and institutional landscape. Future research could build on this foundation by exploring longitudinal impacts or conducting comparative studies across regions or countries. As Slovenia continues to shape its innovation and regional development strategies, incubators remain a promising policy tool for fostering inclusive economic growth.

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