

POLICY REPORT

A TRANSNATIONAL DEVELOPMENT MODEL FOR INCUBATION CENTERS

POLICY REPORT: A TRANSNATIONAL DEVELOPMENT MODEL FOR INCUBATION CENTERS

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POLICY REPORT: A TRANSNATIONAL DEVELOPMENT MODEL FOR INCUBATION CENTERS

EXECUTIVE SUMMARY

This policy report examines the internationalisation and e-export readiness of incubator firms across five ENTRANT partner ecosystems: Turkey, Lithuania, Denmark, Romania, and Croatia. Drawing on country-level ecosystem analyses, PEST findings, technopark data, and startup interviews, the report identifies a shared need to strengthen the capacity of incubation centres to support firms in accessing international markets. Although the five countries differ significantly in terms of R&D investment, digital maturity, ecosystem scale, and export performance, the analysis shows that incubated firms face highly similar barriers in international trade, e-export, digital marketing, customs procedures, logistics, and access to cross-border mentoring.

The core problem addressed in this report is that many incubation centres remain primarily oriented towards domestic business development. While they provide valuable support in areas such as workspace, basic mentoring, networking, and early-stage business formation, their services are often insufficiently developed in relation to internationalisation. In particular, incubator firms frequently lack practical knowledge of foreign market entry, e-commerce platforms, digital export strategies, international customer acquisition, regulatory compliance, and EU-level funding opportunities. The ENTRANT Needs Analysis confirms this gap: a considerable share of exporting firms operate at low export volumes, while many firms do not consider themselves ready for e-commerce-based internationalisation.

In response, the report proposes the development of an **International Incubation Centre Development Model** under the ENTRANT project.¹ This model is designed to enhance the institutional capacity of technoparks and incubation centres through cross-border training, shared mentoring systems, multilingual learning materials, international networking mechanisms, and structured access to EU project and funding opportunities. The model builds on the complementary strengths of the five partner ecosystems, including Denmark's born-global incubation practices, Turkey's large-scale technopark infrastructure, Lithuania's digital agility, Romania's research potential, and Croatia's EU-oriented innovation experience.

¹ 2023-2-TR01-KA220-ADU-000181891, Enhancement of Incubators' International Entrepreneurship and Trade Abilities in Digital Platform.

The expected benefit of the proposed model is twofold. At the firm level, it will help startups and incubator companies improve their international market readiness, strengthen e-export capabilities, and access wider networks of customers, mentors, investors, and partners. At the ecosystem level, it will contribute to regional integration, knowledge transfer, innovation-driven economic growth, and the long-term sustainability of entrepreneurship support structures. By transforming incubation centres from locally focused support institutions into internationally connected growth platforms, the ENTRANT project offers a practical policy pathway for increasing the global competitiveness of incubated firms across partner countries.

ENTRANT PARTNERS INFORMATION

BURSATECHNOPARK

Bursatechnopark provides service on an area of approximately three decares in Bursa Technical University Mimar Sinan Campus. It operates with the mission of integrating the research capability, qualified workforce and the experience of the regional industry of the universities in and around Bursa. Bursa Technical University Technopark Company was established in March 2021 with the permission of Turkish President and started to activities June 2022. The owner of the company is Bursa Technical University (BTU). Bursatechnopark is Turkey's 75th Technology Development Zone and reached 100% occupancy. It includes 32 companies and eight of them are incubator companies. Bursatechnopark serves as a bridge between universities and public institutions by bringing local and foreign companies together. It encourages the establishment of new companies with the potential to produce advanced technology and the growth of existing companies. Bursatechnopark's mission is to be a technopark that can compete at the international level and produces high value-added technology. It has adopted the vision of contributing to the national and international innovation and R&D ecosystem by supporting the development of innovative products and services with advanced technology and high added value. It has values such as being a technopark that adheres to scientific and ethical values, focuses on innovative technological products and services, has high added value, and serves the development of the Region and Country.

BURSA TECHNICAL UNIVERSITY (BTU)

Bursa Technical University (BTU) was established as the second state university of Bursa, according to the decision of the Council of Ministers published in the Official Gazette dated 21.07.2010 and numbered 27648, and continues its education activities with 6 Faculties, 1 Institute and 1 College. Bursa Technical University is a dynamic university that offers high quality education services to its students with its well-equipped, pioneering and highly motivated academic staff. Bursa Technical University, which is determined by YÖK as the university specializing in the field of "Robots and Intelligent Systems" and is among the Most Entrepreneurial and Innovative Universities of Turkey, is the youngest university among the elite state universities that fill its quotas by opening its high-demand departments in a controlled manner. Bursa Technical University provides opportunities such as career planning support, entrepreneurship, joint training programs with foreign universities and international student exchange programs, where students can benefit from industrial technical trips and internship

opportunities during their undergraduate education. Bursa Technical University continues to progress determinedly and rapidly towards becoming a modern science center that carries out education and R&D studies according to the needs of the industry, whose graduates are highly preferred, and which is branded in the fields it provides education and produces solutions.

MAGURELE SCIENCE PARK ASSOCIATION (MSP)

Magurele Science Park Association (MSP) was founded in 2016 on the initiative of the Ilfov County Council, National Institute for Research - Development in Nuclear Physics and Engineering and Măgurele City Hall. In 2018, two other associate members joined: University POLITEHNICA of Bucharest and University of Bucharest. Its primary objective is to enhance regional competitiveness by promoting technology transfer and innovation. MSP aims to facilitate the effective transition of research outcomes into practical products, technologies, and services that can benefit the community at large. In the long term, the MSP main objective is stimulating the competitiveness of the regional economy through technological transfer and innovation, based on a more intense transfer of the results of the research activity in products, technologies and services for the benefit of the community. MSP has signed 58 cooperation agreements with research environment stakeholders activating in various domains (advanced physics, energy, advanced materials, mechatronics, ICT, biotechnology, space sciences, food & agriculture etc) and also has 210 partners from the business community, working in fields such as ICT (more than 50%), health, engineering, energy, manufacturing, advertising, services for SMEs and advanced materials. Over 30 government authorities, investment funds or workspaces support MSP efforts to create a complete ecosystem. Our ongoing efforts to bridge the worlds of research and business through a series of events have proven successful. With over 10 S2B events where researchers can promote their research projects /results and 10 B2C events facilitating valuable exchanges with our business partners, we continue to foster collaboration and innovation for the benefit of our community.

TECHPARK VARAZDIN

Technology Park Varaždin, also known as TECHPARK, is a dynamic business support institution based in Varaždin, Croatia. Established in 2006, TECHPARK plays a crucial role in fostering innovation, supporting IT and Creative Sector companies, and promoting technological advancements in north-western Croatia. The organization has become a key player in the region, providing a platform for startups, SMEs, and entrepreneurs to grow and thrive in the ever-evolving tech landscape. TECHPARK's mission is to drive regional economic

development by nurturing and empowering technology-driven businesses. By offering comprehensive support, access to resources, and collaboration opportunities, the organization aims to create a vibrant ecosystem that fosters innovation, facilitates knowledge exchange, and strengthens the IT, IoT, creative industries, and renewable energy sectors. With its strong network of educational institutions, industry partners, and international associations, TECHPARK continues to play a pivotal role in driving economic prosperity, job creation, and technological advancement in the region and beyond. The organization is staffed by a team of five permanently employed experts, specializing in various facets of business support. In addition to the core team, TECHPARK maintains a network of approximately 15 external collaborators hailing from various institutions and stakeholders. This extensive network is a testament to TECHPARK's strong connectivity and collaborative relationships with similar institutions in the vicinity. Through this well-established network, TECHPARK is able to facilitate a range of activities and initiatives that contribute to the vibrant entrepreneurial ecosystem in the region.

NOVI SCIENCE PARK

NOVI houses more than 300 companies, employing approx. 3.000 employees. NOVI Science Park facilitates 17 office buildings with domiciles, individual offices and co-working spaces, creating an office- and research environment which unites innovative thinking, networking and innovation. NOVI aims to service both newly started or already established companies, providing a reliable, full-service environment with a tailor-suited solution to fit tenants. NOVI Science Park was established in May 1989 with the support from EU. NOVI is a commercial foundation, located on the outskirts of Aalborg University Campus. NOVI has the status of a Science Park, reflecting its long-standing and close collaboration with Aalborg University. Among NOVI's tenants, several companies corporate with Aalborg University on a daily basis. NOVI is also a member of the International Science Park Association (IASP). In recent years, NOVI has experienced an accelerating development, doubling the number of square meters within the last 7 years. Throughout the years, NOVI has initiated several initiatives for the benefit of business development in Northern Jutland, including:

- Establishment of the NOVI Scholarship with annual awards to both Aalborg University and University College Northern Jutland
- Establishment of 2 GrowAAL (GrowAalborg) Entrepreneurial Houses

- Establishment of a venture fund (Investo Capital) focusing on Danish early-stage companies within the Tech sector
- In 2026, NOVI inaugurates a new office building; NOVI MEDI PARK, contributing to a strong ecosystem for Life Science, Digital Health, and Health Tech companies, resulting in a total amount of just above 100.000 sqm office space.

KAUNAS TECHNOLOGY UNIVERSITY (KTU)

Founded in 1922, Kaunas University of Technology (KTU) is one of the largest and oldest technical universities in the Baltic States, leading in many research areas and study fields. The University is a member of key academic institutions of the European Union and the world. University's mission is to offer research-based international studies; generate and transfer knowledge and innovative technologies for sustainable development of the country and innovations; and to create an open creative environment to develop talents and leaders. KTU unites about 2000 employees with various competencies. Successful cooperation with the private and public sectors is ensured by almost 600 concluded contracts. KTU is a member of the European Consortium of Innovative Universities (ECIU) that is implementing the innovative university model – the first ECIU university in Europe – Kaunas University of Technology (KTU) offering a wide range of technology-related studies and research is well-known for maintaining enduring relationships with business and industry.

1. INTRODUCTION

The contemporary global economy is undergoing an unprecedented wave of structural transformation driven by the convergence of digital technologies, shifting trade patterns, and accelerating cross-border capital flows. Technological advancements — most notably artificial intelligence, cloud computing, and platform-based digital trade — have fundamentally altered the conditions under which firms compete, scale, and internationalise (OECD, 2023). These developments have not only disrupted established industries but have also redefined the spatial and institutional boundaries of economic activity, enabling even early-stage ventures to access global markets at comparatively low marginal costs (Oviatt & McDougall, 2005). For emerging and transition economies alike, adapting to these dynamics has become a strategic imperative rather than an optional policy objective.

Against this backdrop, innovation, entrepreneurship, and economic competitiveness have risen to the centre of national and supranational policy agendas. The European Union's commitment to building a Digital Single Market, combined with its research and innovation funding architecture under Horizon Europe, reflects a deliberate effort to channel entrepreneurial capacity into sustainable economic growth (European Commission, 2021). Scholarly evidence consistently affirms that innovation-driven entrepreneurship constitutes one of the most reliable drivers of productivity growth, job creation, and regional economic resilience (Audretsch & Belitski, 2017; Szerb et al., 2019). Yet the capacity to translate technological potential into commercially viable, internationally competitive ventures remains unevenly distributed — both across countries and across different institutional environments within them. The evidence gathered across the five ENTRANT partner countries confirms this: despite formal innovation strategies and growing public investment in research and development, structural gaps in international trade readiness, e-export capabilities, and cross-border mentorship persist across all partner ecosystems.

Business incubation centres occupy a structurally critical position within this landscape. By providing early-stage firms with mentoring, infrastructure, access to finance, and strategic networks, incubators serve as institutional bridges between the generation of knowledge and its conversion into market-ready products and services (Hackett & Dilts, 2004). In an era of digital trade, the effectiveness of these organisations is increasingly measured not only by survival rates or job creation figures, but by their ability to equip startups with the capabilities required to operate across borders - including proficiency in e-export, international market intelligence, regulatory compliance, and cross-border logistics. Yet as the comparative analysis presented in

this report demonstrates, current incubation models across partner countries remain insufficiently equipped to systematically address these internationalisation dimensions. Only approximately 4.56% of Turkish technopark firms actively export, while qualitative data gathered from more than 22 startups across all five countries reveal persistent gaps in digital marketing competencies, customs knowledge, and access to international investor networks.

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The primary aim of this report is to formulate evidence-based, actionable recommendations for the development of an **International Incubation Centre Development Model** that can enhance the cross-border competitiveness of incubated firms and strengthen the institutional capacity of incubators as drivers of international entrepreneurship. The report is addressed to three principal target audiences: **(i)** national and EU-level policymakers responsible for innovation and entrepreneurship policy; **(ii)** incubator and technopark managers seeking operational and strategic guidance on internationalisation support; and **(iii)** academic and practitioner communities engaged in entrepreneurship ecosystem development and adult education reform.

2. THE HEART OF THE ENTREPRENEURIAL ECOSYSTEM: INCUBATION CENTERS AND THEIR GLOBAL ROLE

2.1. The Concept and Functions of Incubation

Business incubation centres constitute one of the most institutionally significant mechanisms through which modern economies support the development, survival, and growth of early-stage enterprises. In their foundational conception, incubation centres are defined as organisations that provide a structured and resource-enriched environment in which nascent firms can develop their business models, refine their technologies, and build the competencies necessary for sustainable market entry (Hackett & Dilts, 2004). Unlike generic co-working spaces or real estate solutions, incubation centres are distinguished by the intentionality of their support architecture: they are designed not merely to house firms, but to actively shape their developmental trajectories.

The core functions of a contemporary incubation centre operate across four interdependent dimensions. First, mentorship and advisory support constitute the intellectual backbone of the incubation model. Experienced mentors - drawn from industry, academia, and the investor community - provide early-stage founders with domain-specific guidance on business model development, product-market fit, regulatory navigation, and strategic decision-making (Aerts et al., 2007). Second, physical and digital infrastructure encompasses the workspace, laboratory access, prototyping facilities, and technological tools that reduce the fixed costs of operation for resource-constrained startups and enable iterative product development. Third, networking and ecosystem connectivity refers to the structured linkages that incubators facilitate between startups and a broader ecosystem of potential clients, partners, investors, and institutions - a function that increasingly determines the commercial trajectory of incubated firms (Bruneel et al., 2012). Fourth, access to finance encompasses incubators' role as intermediaries between startups and funding sources, including public grants, venture capital networks, business angels, and EU-funded instruments such as the European Innovation Council (EIC) Accelerator.

The historical evolution of incubation models reflects broader shifts in the political economy of innovation. Early-generation incubators, which emerged primarily in the United States during the 1950s and 1960s, operated predominantly as real estate solutions - providing affordable workspace for displaced industrial workers and newly formed small enterprises (Grimaldi & Grandi, 2005). Second-generation models, which proliferated across Europe and North America in the 1980s and 1990s, expanded this function by incorporating business

development services and linking incubators to university research environments. The third generation, which emerged in the early 2000s, adopted a more network-centric model, emphasising ecosystem connectivity, sector specialisation, and performance-based incubation management.

The contemporary - or fourth-generation - incubation model is increasingly defined by its digital orientation. The integration of platform-based service delivery, virtual acceleration programmes, AI-assisted mentoring tools, and data-driven performance monitoring has fundamentally transformed the operational logic of incubation (OECD, 2023). Digital incubation models are no longer bounded by physical geography; they can support startups located in peripheral regions, connect them with international mentor networks, and facilitate e-export capabilities from the earliest stages of development. This transition from physical-to-digital incubation architectures is particularly consequential for the partner countries represented in the ENTRANT project, where geographic and institutional disparities continue to constrain the reach and effectiveness of traditional incubation services.

2.2. Technopark Ecosystems and Incubator Firms

Technoparks — also referred to as science parks, technology development zones, or innovation districts — represent a more complex and institutionally embedded form of the incubation infrastructure. Whereas standalone incubators typically serve startups across their early lifecycle, technoparks function as integrated innovation ecosystems in which firms at multiple stages of development — from pre-seed startups to mature R&D companies — coexist within a shared institutional environment anchored to a university or research institution (Löfsten & Lindelöf, 2002).

The impact of technoparks on national innovation systems operates through several distinct mechanisms. At the firm level, proximity to university research infrastructure enables incubated companies to access cutting-edge scientific knowledge, specialised laboratory facilities, and pools of highly qualified graduates — inputs that are disproportionately valuable for knowledge-intensive and deep-tech ventures. At the ecosystem level, technoparks function as what Etzkowitz and Leydesdorff (2000) termed *triple helix* nodes, mediating the interactions between universities, industry, and government in ways that accelerate the commercialisation of research and the formation of innovation-driven firms. Evidence consistently demonstrates that firms located in science parks exhibit higher R&D intensity, greater propensity to patent,

and stronger rates of innovation output compared to firms operating in conventional business environments (Squicciarini, 2008).

Within the technopark ecosystem, incubator firms occupy a structurally distinct and strategically critical position. These firms — typically early-stage, technology-oriented ventures in the product development or market validation phase — constitute the regenerative layer of the innovation ecosystem. They introduce new business models, generate high-quality employment in knowledge-intensive fields, and serve as potential future anchors of the broader technopark community (Autio & Klofsten, 1998). The hybrid structure of technoparks, which brings together incubation startups alongside more mature R&D firms, creates a particularly productive environment for knowledge spillovers: early-stage firms benefit from the experience and networks of established tenants, while the presence of disruptive startups challenges incumbent firms to maintain their innovation intensity.

The ENTRANT partner technoparks — Bursatechnopark (Turkey), Kaunas Science and Technology Park (Lithuania), NOVI Science Park (Denmark), Măgurele Science Park (Romania), and Tehnološki Park Varaždin (Croatia) — collectively exemplify this diversity of technopark models across varying institutional and economic contexts. At one end of the spectrum, Turkey's network of Technology Development Zones — operating under Law No. 4691 — hosts more than 12,800 companies, employs approximately 130,000 personnel, and generates technology exports exceeding USD 16 billion annually, reflecting the scale achievable through a legally anchored, university-integrated technopark model (see Section 3.1). At the other end, Denmark's NOVI Science Park — embedded within Aalborg's knowledge economy and closely affiliated with Aalborg University — demonstrates a depth-over-scale model, in which approximately 50% of tenant firms maintain formal university collaborations, generating measurable outputs in joint patenting and research-driven product development (see Section 3.2). Between these poles, Lithuania, Croatia, and Romania represent ecosystems at different stages of institutional maturation, each facing distinct structural challenges in translating innovation capacity into international competitiveness — challenges that constitute the central analytical focus of the present report.

2.3. Global Status of Incubator Firms and Internationalization Trends

The global business incubation sector has expanded substantially over the past three decades. Current estimates place the number of business incubators and accelerators worldwide at

approximately 7,000 to 8,000 organisations, supporting hundreds of thousands of early-stage ventures across both advanced and emerging economies (UBI Global, 2023). The market for incubation services is geographically concentrated in North America, Western Europe, and East Asia, with the United States accounting for the largest single share of active programmes; however, rapid growth is being observed in Southeast Asia, Sub-Saharan Africa, and the Middle East, reflecting the global diffusion of entrepreneurship support models (OECD, 2023). Within Europe, the European Commission's sustained investment in innovation infrastructure — through programmes such as Horizon Europe, the Digital Europe Programme, and the European Innovation Ecosystems initiative — has contributed to a progressive institutionalisation and upscaling of the incubation landscape, though significant disparities in quality, capacity, and internationalisation readiness persist across member states, as the present report demonstrates.

A defining trend in the contemporary global incubation environment is the emergence and growing prevalence of the "born-global" entrepreneurship model. First theorised by Oviatt and McDougall (1994), born-global firms are defined as ventures that pursue internationalisation strategies from or near their inception, rather than following the traditional sequential model of domestic consolidation prior to foreign market entry. This phenomenon is driven by the convergence of several structural forces: the radical reduction in the costs of cross-border communication and digital commerce, the global standardisation of platform-based business models, and the growing availability of international venture capital that actively seeks portfolio diversification across geographies (Cavusgil & Knight, 2015). For startups operating within small domestic markets - as is the case for firms in Lithuania, Croatia, Denmark, and Romania - the born-global orientation is not merely a strategic choice but frequently an economic necessity, given the structural limitations of the home market as a sustainable growth environment. This dynamic is directly confirmed by the ENTRANT project's own qualitative data, in which Lithuanian startups explicitly noted that "a small domestic market naturally forces founders to think internationally" (see Section 3.8).

The critical role of internationalisation in startup success is well-documented in the scholarly literature. Firms that internationalise at an early stage demonstrate significantly higher growth rates, greater resilience to domestic market fluctuations, and stronger capacity to attract international capital compared to firms that remain domestically oriented (Autio et al., 2017). Moreover, participation in international value chains enables startups to access more demanding customers, higher technology standards, and richer knowledge networks — all of which accelerate the upgrading of firm-level innovation capabilities. In the context of digital

trade and e-export, the barriers to initial internationalisation have been further reduced: software products, data-driven services, and platform-based solutions can be deployed globally with minimal marginal cost, provided that firms possess the requisite competencies in digital marketing, cross-border regulatory compliance, and international customer management.

These trends underscore the growing importance of cross-border and transnational incubation models. Traditional incubation frameworks, which were designed to support locally embedded firm development, are increasingly inadequate for the demands of a global startup economy. In response, a new generation of internationally oriented incubation models has emerged, characterised by cross-border mentorship networks, joint acceleration programmes between incubators in different countries, shared digital infrastructure, and transnational market access corridors (Fernandez-Ribas & Shapira, 2009). The ENTRANT project's consortium-based approach — linking five technoparks across five distinct national ecosystems — directly embodies this paradigm, and the transnational policy framework proposed in the subsequent sections of this report is grounded in the recognition that no single national incubation model is sufficient, in isolation, to prepare startups for the realities of the contemporary global economy.

3. CURRENT SITUATION AND NEEDS REGARDING THE INCUBATION ECOSYSTEM IN PARTNER COUNTRIES WITHIN THE SCOPE OF THE ENTRANT PROJECT

Overview. The ENTRANT project brings together a diverse consortium of innovation ecosystems across Europe, reflecting its strongly transnational character and shared ambition to enhance entrepreneurial capacity and internationalisation pathways. Understanding the specific needs and structural characteristics of these ecosystems requires a coordinated, multi-country perspective. For this reason, the project incorporates a comprehensive needs analysis covering five partner countries, each represented by a leading technopark: Bursatechnopark (Turkey), Kaunas Science and Technology Park (Lithuania), NOVI Science Park (Denmark), Măgurele Science Park (Romania), and Varaždin Technology Park (Croatia).

This section provides an *overview of incubation ecosystems across these countries (subsections 3.1.-3.5.)*, applying a common analytical framework to ensure consistency and depth of insight. While each ecosystem operates within a distinct national and regional context, the analysis highlights both shared challenges and country-specific dynamics. Particular

attention is given to the structure of innovation support systems, the profile of incubated firms, internationalisation capacities, and identified development needs.

To ensure a robust and evidence-based assessment, the analysis integrates both ***quantitative and qualitative research approaches***. The quantitative analysis is based on data provided directly by the participating technoparks and follows a structured ***PEST framework (subsections 3.6.-3.7.)***, enabling systematic comparison of political–legal, economic, social, and technological factors shaping innovation ecosystems across countries. This approach ensures consistency while capturing macro-level differences in institutional environments, access to funding, talent availability, and technological infrastructure.

In parallel, ***qualitative research was conducted through surveys of startups operating within these ecosystems (subsection 3.8.)***. This approach provides deeper insights into the practical challenges faced by entrepreneurs, their experiences with incubation services, and their expectations regarding support mechanisms. The combination of these two research methods allows for a more comprehensive understanding of ecosystem dynamics, highlighting not only structural conditions but also user-level perspectives.

The results of both quantitative and qualitative analyses enable the identification of country-specific needs, key challenges, and potential solutions for the development of incubation ecosystems. Building on these findings, the policy report formulates ***targeted recommendations tailored to different stakeholder groups***. These include strategic recommendations for policymakers, operational and service-oriented guidance for technoparks and incubators.

By examining these ecosystems in parallel and grounding the analysis in empirical evidence, the report reveals not only the diversity of innovation environments across Europe but also their complementary strengths and potential for cross-border collaboration. This approach enables the identification of opportunities to enhance internationalisation, strengthen knowledge exchange, and support the scaling of startups within and beyond the European market.

3.1. Turkey (Bursatechnopark)

Ecosystem General Structure. Turkey serves as a significant bridge for entrepreneurship and innovation activities due to its strategic location between Europe, the Middle East, and Asia. This geographical advantage facilitates access to diverse markets for startups, while the country’s developing industrial infrastructure, young and dynamic workforce, and increasing investments in technology collectively create a strong innovation ecosystem. In recent years,

the strengthening of public support mechanisms such as TUBITAK (The Scientific and Technological Research Council of Turkey) and KOSGEB (Republic of Turkey) Small and Medium-Sized Enterprises Development and Support Administration) has improved early-stage startups' access to funding and contributed substantially to the overall development of the innovation ecosystem.

In Turkey, the number of Technology Development Zones, which are important areas for companies, R&D firms, and entrepreneurs to collaborate with the educated workforce and research academic potential of universities, has now exceeded 110. Technoparks focusing on R&D incentives, university-industry integration, high-tech exports, and spin-off/start-up commercialization mechanisms are also showing ***a regional specialization trend in the fields of defense, software, financial technologies, biotechnology, gaming technologies, and medical devices***. In particular, the growth rate observed in sectors such as defense and software, which is above the OECD average, is increasing global investor interest. Today, the total number of companies in technoparks exceeds 12,800. Among these, the number of incubator companies is over 3,500, and the number of companies with academic partnerships exceeds 2,200. Approximately 130,000 personnel work in these companies. There are approximately 19,000 ongoing projects and 74,000 completed projects in technopark companies. The exports of these companies exceed \$16 billion.

Bursa stands out as one of Turkey's most important production and export centers. With its advanced industrial infrastructure, strong manufacturing capacity, and solid foreign trade performance, the city has achieved a high level of specialization in sectors such as automotive, textiles, machinery, and electrical equipment. Bursa's strategic location offers significant advantages in accessing both domestic markets and international trade networks, positioning the city as a key production and innovation hub within global value chains.

Located at the intersection of Bursa's strong industrial structure and academic capacity, Bursatechnopark was established within Bursa Technical University as a technology development zone centered on university–industry collaboration. Having reached full occupancy in a short period, the technopark has positioned itself as an active and dynamic actor within the regional innovation ecosystem.

Bursatechnopark supports the commercialization of academic knowledge by working in integration with university laboratories, research centers, and technology transfer mechanisms, enabling research outputs to transform into economic value. The strong academic staff,

advanced research infrastructure, and close industry relations of Bursa Technical University are among the key factors enhancing the technopark's effectiveness. Additionally, Bursatechnopark actively collaborates with regional and national innovation ecosystem stakeholders, building a strong network with public institutions, industrial organizations, clusters, and entrepreneurship support mechanisms.

The technopark management and team regularly organize events, technical visits, training programs, and collaboration meetings to support the development of the entrepreneurship ecosystem. They also take an active role in national and international projects, increasing the ecosystem's visibility and interaction. These activities strengthen not only the technical capacities of startups but also their competencies in business development, networking, and internationalization. In this context, Bursatechnopark plays an active role in numerous projects and initiatives aimed at strengthening international collaborations and institutional capacity. At the regional level, the project titled "Effective Use of Quality Management Systems in Technology Development Zones," carried out within the scope of the BEBKA Technical Support Program, contributed to enhancing the institutional capacity of technopark companies by providing comprehensive quality management training. ENTRANT project, conducted under the EU-supported ERASMUS+ KA220 ADU program, aims to improve the international entrepreneurship and digital trade capacities of incubation centers. Bursatechnopark acts as the coordinator of this project, playing an active role within a multinational partnership structure.

Furthermore, Bursatechnopark strengthens its integration with industry by participating in regional clustering activities. At the international level, it contributes to the development of R&D collaborations between Turkey and Germany by participating in the "NanoComTex" project supported under the CORNET program, while also facilitating SMEs' access to applied research activities. All these efforts demonstrate that Bursatechnopark is not only a local innovation actor but also a structure that develops national and international collaborations, implements capacity-building projects, and contributes multidimensionally to the entrepreneurship ecosystem.

The R&D projects carried out by companies operating within Bursatechnopark reveal its high innovation capacity and transform it into an active environment for production and knowledge development. The admission of companies wishing to operate in the technopark is conducted through a project-based evaluation process within the framework of Law No. 4691 on Technology Development Zones. Entrepreneurial firms apply with R&D projects to be carried out in the technopark, and these projects are evaluated based on their technical content, level of

innovation, and alignment with priority technology areas. This approach ensures that all companies within the technopark focus directly on R&D and innovation activities. The technopark's priority technology areas cover a broad spectrum aligned with Turkey's strategic priorities, including artificial intelligence, information and communication technologies, defence industry, advanced material technologies, energy systems, biotechnology, automotive, and digital transformation. Focusing on these areas supports both meeting national industrial needs and enhancing international competitiveness. Additionally, tax exemptions, insurance support, and other incentives provided under Law No. 4691 reduce the financial burden on enterprises and encourage R&D and innovation activities.

Thanks to this holistic structure, Bursatechnopark is not merely a technopark that provides physical infrastructure; it is positioned as a university-based, sustainable, and dynamic innovation platform that integrates university, industry, and entrepreneurship ecosystems, promotes multi-stakeholder collaboration, and supports high-tech production.

Incubator Firm Profile. Bursatechnopark has a multi-layered innovation ecosystem structure that brings together companies at different stages of development. A total of 32 companies operate within the technopark, of which 6 are incubation startups, while the remaining firms consist of more advanced R&D companies. This structure demonstrates that the technopark offers a holistic support model that focuses not only on the establishment phase of startups but also on their growth, scaling, and commercialization processes.

When evaluated specifically in terms of incubation companies, it is observed that these startups are largely in the early stages and focus on developing innovative technological solutions. These firms typically consist of small teams and carry out product development, prototyping, and market validation processes. A significant portion of the incubation companies have an academic background and are directly linked to university research and academic entrepreneurship. This enables startups to be established on a strong technical foundation and contributes to the commercialization of research outputs.

An analysis of the sectoral distribution shows that areas such as software, artificial intelligence, data technologies, embedded systems, defence industry applications, engineering analysis, and advanced manufacturing technologies stand out. These fields represent high value-added and knowledge-intensive sectors, indicating that the startups can largely be categorized as deep-tech and knowledge-intensive ventures.

The R&D companies within the technopark, on the other hand, are at a more advanced stage and are more strongly integrated with industry. These firms serve as role models for incubation startups while also creating opportunities for collaboration, knowledge sharing, and commercialization. As a result, the flow of knowledge and experience sharing within the technopark is strengthened, accelerating the development processes of startups. This hybrid structure enables Bursatechnopark to stand out not only as an incubation centre but also as an innovation ecosystem where companies at different stages of maturity jointly create value, and where knowledge production, technology development, and commercialization occur in an integrated manner.

Internationalization and E-Export Capacity. Turkey's export-oriented economic structure, combined with Bursa's strong production infrastructure, offers significant opportunities for startups to expand into international markets. Bursa's strategic location, providing access to both European and global markets, constitutes a major advantage, particularly for technology-driven ventures.

Companies operating within Bursatechnopark have high potential for both e-export and service exports, especially as many of them develop software and digital solutions. Digital business models enable startups to access international markets at relatively low cost and scale globally with greater ease.

However, feedback from entrepreneurs highlights several key challenges in the internationalization process. Regulatory requirements and data security obligations, uncertainties in export procedures, certification needs, and high foreign currency-based costs are among the primary factors that complicate entry into international markets.

The relatively low proportion of exporting companies across Turkey indicates the presence of structural barriers affecting the integration of early-stage startups into global markets.

In this context, while Bursatechnopark companies demonstrate strong technological capabilities, their internationalization capacity emerges as an area requiring further development, particularly in terms of strategic guidance, market intelligence, and operational support.

Identified Core Needs. An analysis of the needs of startups operating within the Bursatechnopark ecosystem reveals a clear concentration in specific areas, particularly related to internationalization and scaling processes.

Among the most critical needs of these startups are access to international market knowledge, the development of effective market entry strategies, and the enhancement of digital marketing and e-export capabilities. In addition, gaps in knowledge regarding customs procedures, regulatory frameworks, certification requirements, as well as logistics and operational management, constitute significant barriers.

Access to finance and investor networks also plays a crucial role in the growth trajectories of startups. Particularly for early-stage ventures, access to sustainable funding sources directly impacts product development and market entry processes.

Entrepreneur feedback highlights that mentorship, business development support, and investor connections are key determinants of startup success. Especially in academically rooted startups, while technological capabilities tend to be strong, there remains a notable need for additional support in commercialization, marketing, and business model development.

Potential and Opportunities. Beyond the physical infrastructure it provides, Bursatechnopark offers a wide range of services and support mechanisms aimed at fostering the development of startups. In addition to qualified office spaces, meeting and event areas, and social facilities, the technopark delivers comprehensive services focused on business development, consultancy, and capacity building.

Through its strong collaboration with Bursa Technical University, Bursatechnopark enables companies to access advanced research infrastructures. Within this framework, firms can benefit from central research laboratories at the university, receive technical consultancy from academic staff, and integrate university students into their business processes through long-term internship programs. This interaction not only supports human capital development but also strengthens the flow of knowledge between academia and industry.

In addition, Bursatechnopark conducts training and advisory activities aimed at enhancing the technical and commercial capacities of companies. Public support programs and grant calls are regularly shared with firms, while training sessions are organized on application processes, project writing, financial management, and commercialization. Furthermore, companies are provided with guidance and consultancy on financial and regulatory matters to ensure they can effectively benefit from technopark incentives.

The technopark also plays an active intermediary role in strengthening the integration of startups with industry. Through matchmaking events and collaboration programs, technopark firms are brought together with large-scale industrial enterprises. This facilitates the

development of innovative solutions tailored to industry needs and encourages the establishment of sustainable collaborations between companies.

In addition, companies operating within Bursatechnopark benefit from a range of fiscal incentives and exemptions provided under the Technology Development Zones Law No. 4691. These include exemptions from corporate and income taxes on revenues generated from R&D activities, income tax exemptions for R&D personnel, VAT exemptions for certain software and R&D outputs, as well as social security premium support. Additional advantages such as customs duty exemptions for imported R&D equipment further contribute to reducing operational costs and fostering a favourable environment for innovation-driven enterprises.

Moreover, the regulatory framework of technology development zones enables academic staff to actively engage in entrepreneurial activities, including establishing or participating in companies and commercializing their research outcomes. This creates a unique bridge between academia and industry, facilitating the transformation of scientific knowledge into market-oriented products and services.

The widespread adoption of open-source technologies, cloud-based infrastructures, and digital business models enables startups to develop products at lower costs and scale rapidly. At the same time, Bursatechnopark's hybrid structure enhances knowledge sharing and collaboration among companies at different stages of maturity, creating strong ecosystem synergy.

Taken together, these elements position Bursatechnopark not only as a regional innovation hub but also as a sustainable and scalable technology ecosystem with high internationalization potential-one that holistically supports the technical, commercial, and institutional capacities of startups

3.2. Denmark (NOVI Science Park) - BEST PRACTICE EXAMPLE

Ecosystem General Structure. Denmark's innovation landscape is widely recognized as ***one of the most advanced and structurally coherent in Europe***. This strength emerges from a combination of political stability, long-term national strategies for innovation, substantial investment in research and development, strong digital infrastructure, and a well-coordinated network of public and private stakeholders. Within this system, NOVI Science Park represents a central figure in Aalborg's technology and entrepreneurship environment. NOVI functions not only as a physical space where knowledge-intensive firms cluster but also as a strategic facilitator of collaboration between universities, research institutions, technology providers,

and early-stage companies. The result is an ecosystem where high-tech startups can move from concept to international traction with relatively few structural obstacles.

A cornerstone of Denmark's ecosystem is the country's comprehensive innovation policies and targeted support instruments. National strategies, including the reform programs and the EU Startup and Scaleup Strategy, create a predictable and supportive environment where firms can innovate with confidence. At the same time, funding instruments such as Innobooster, Innofounder, EIFO, and numerous regional initiatives form an extensive financial infrastructure that lowers barriers to market entry and technological development. In parallel, Denmark consistently invests between 2.8% and 3.1% of its GDP in research and development, highlighting the country's commitment to science-based innovation and advanced technological capacity. This provides a fruitful foundation for NOVI firms, many of which operate in deep-tech, biotech, digital technologies, and industrial innovation.

NOVI Science Park benefits directly from Denmark's political and organizational clarity. Regulations for startups are transparent and efficiently administered, a factor reinforced by the Danish Business Authority's comprehensive guidance portals for company formation, intellectual property, international funding opportunities, and sectoral compliance. Denmark's IP ecosystem stands out for its ease of patent registration, with first evaluations taking place within 6-7 months and total processing times typically between 12 and 36 months. This supports NOVI's many research-driven firms, which benefit from swift IP protection during crucial early-stage development.

Incubator Firm Profile. Firms based in NOVI are typically characterized by a *high degree of technological sophistication and globally oriented business models*. Many of the companies emerging from NOVI are "born-global," meaning that they position themselves for international markets from their inception. This tendency is strengthened by Denmark's small domestic market, which naturally encourages firms to orient themselves outward, as well as by the country's strong integration into the European Single Market. The fact that Danish firms operate under EU regulatory alignment enables them to expand digitally and physically across borders without excessive regulatory adaptation.

The technological profile of NOVI firms is often shaped by direct collaborations with universities - particularly Aalborg University (AAU) - and other research institutions. Around 50% of NOVI's companies have formal collaborations with universities, a proportion that has remained stable over recent years. This high density of academic partnerships ensures that

startups gain early access to experts, talent, and cutting-edge research. It also supports the high patenting activity seen nationally, where joint patents between industry and universities reached 66 in 2022, 83 in 2023, and 74 in 2024. In this environment, NOVI-enabled collaborations support not only product development but also the translation of research into market-ready solutions - an essential step for internationally oriented firms.

Furthermore, Denmark's technological infrastructure provides NOVI firms with decisive advantages. With over 99% 5G coverage and extensive access to digital networks, companies in NOVI can deploy cloud services, AI algorithms, IoT devices, and remote operations without reliance on physical proximity or local server capacity. Makerspaces and prototyping facilities are widespread, and while these spaces sometimes lack extremely advanced laboratory technologies, they offer sufficient support for early-stage hardware development and testing. This digital maturity is key to enabling the "born-global" profiles common among NOVI companies, since rapid scaling often requires sophisticated digital operations and efficient cross-border communication systems.

Internationalization and E-Export Capacity. Denmark's *strong export orientation* significantly supports firms in innovation hubs such as NOVI. Export participation is traditionally high across industries, and Danish firms enjoy a competitive advantage in digital trade due to the country's highly developed online infrastructure. Research shows that multiple indicators demonstrate Denmark's substantial involvement in global markets. For instance, Denmark has secured over €1 billion in EU research and innovation funding between 2021 and 2024 and participated in more than 1,500 Horizon Europe projects, showing a deeply embedded presence in international research networks.

The investment climate further strengthens Danish firms' capacity for internationalization. The country has a large population of experienced investors, including 4,500 business angels and an active venture capital community that invested between €859 million and €1.18 billion annually from 2022 to 2024. Such financial inflows make it possible for NOVI startups to scale rapidly, pursue global customer acquisition strategies, and integrate into transnational value chains. Additionally, public-private hybrid programs and EU-funded initiatives (including Interreg and EIC) broaden the opportunities for firms to engage in cross-border collaboration.

Export facilitation is also supported by Denmark's relatively *low bureaucratic burden* for digital sales, high levels of English proficiency, and robust electronic identity and signature systems. These elements make e-export not only feasible but efficient, especially for

technologically intensive startups that sell software, data-driven services, scientific instruments, or niche industrial solutions. NOVI-based companies thus operate in a digital environment that allows them to manage cross-border transactions, compliance, and customer interactions seamlessly.

Identified Core Needs. Despite Denmark's strong ecosystem and NOVI's advantageous position within it, several needs have been identified that could further strengthen international competitiveness. One recurring theme is the ***demand for deep, domain-specific mentoring***, particularly for startups operating in narrow or highly regulated markets such as medtech, fintech, robotics, or green energy. Traditional business acceleration models may fall short in these contexts because they often focus on general entrepreneurship skills rather than specialized regulatory navigation, IP strategy, or clinical validation processes.

Similarly, access to advanced technological tools poses a challenge. While Denmark has many prototyping labs and makerspaces, ***extremely specialized laboratories or equipment*** - such as advanced bioreactors, high-grade cleanrooms, or cutting-edge materials testing facilities - are often too costly for incubators to maintain. Startups that rely on such equipment often face bottlenecks or high operational costs unless universities open access on a case-by-case basis. Research suggests that increased collaboration and facility access agreements between universities and incubators could resolve this challenge.

In digital terms, the need for ***advanced software platforms, data-processing tools, and computational resources*** is growing rapidly. Firms building AI models, digital twins, simulation systems, or automated process tools require high-performance computing and specialized development environments. Ensuring broader access to these digital tools would significantly enhance NOVI firms' ability to compete globally and accelerate time-to-market.

Potential and Opportunities. Denmark's position in Europe and beyond creates several opportunities that NOVI and comparable incubators can build on. The country's strong integration into global innovation networks - through Horizon Europe, EIC Accelerator, and numerous other international programs - serves as a gateway for startups to engage in multinational collaboration. The nation's strength in R&D-intensive projects, combined with a high-quality university system, positions Denmark as an attractive environment for cross-border technology development.

Moreover, Denmark's collaborative culture and relatively flat organizational structures foster efficient partnerships between industry, academia, and government. NOVI exemplifies this

model by facilitating connections between tenants, researchers, and investors and by providing companies with access to a diverse pool of mentors and domain specialists. This interinstitutional collaboration makes Denmark a strong best-practice model for countries seeking to establish or strengthen their own innovation ecosystems.

Looking ahead, Denmark is expected to face increasing geopolitical pressures emphasizing European self-sufficiency in key technologies and supply chains. This will likely reinforce the value of Danish incubators as secure, high-trust environments where firms can grow while adhering to EU standards and values. NOVI's emphasis on agility - responding quickly to market trends while maintaining technological depth - mirrors the broader national need to adapt to global uncertainties.

For incubators to remain competitive, they will need to continue investing in staff competencies, ensuring that advisors stay updated on emerging trends, regulatory developments, and technological breakthroughs. The ability to attract and retain highly skilled personnel, including STEM graduates, is supported by Denmark's historically high employment rates for graduates and strong talent development mechanisms. At the same time, addressing gender disparities and enhancing diversity in entrepreneurship will be key to ensuring that the full spectrum of talent contributes to Denmark's innovation landscape.

3.3. Croatia (Tehnološki Park Varaždin)

Ecosystem General Structure. Croatia's membership in the European Union provides SMEs with access to the Single Market, enabling free movement of goods, services, and capital, while facilitating cross-border business expansion. Located in North-West Croatia, the *Varaždin County* represents one of the most economically active and innovation-oriented regions in the country. Its proximity to Central European markets, particularly Austria, Slovenia, and Hungary, creates favourable conditions for internationalisation and cross-border business cooperation. Over the past decade, Croatia's national entrepreneurial ecosystem has been shaped by EU-funded programmes, national innovation strategies, and the gradual development of regional support structures.

The regional ecosystem consists of **a network of technology parks, incubators, development agencies, and higher education institutions**, which collectively support entrepreneurship through incubation services, mentoring, and access to funding. At the same time, the system is characterised by a strong reliance on project-based initiatives, which can limit continuity and long-term scaling support for SMEs.

Technology Park Varaždin (TECHPARK) was established as a regional innovation hub with the mission of supporting knowledge-intensive enterprises and fostering a culture of innovation in North-West Croatia. Its activities are based on close cooperation with academic institutions such as the *University North* and the *Faculty of Organization and Informatics* (part of the University of Zagreb), as well as with local and regional authorities. This collaboration reflects a model in which the technology park serves as a bridge between academic knowledge generation and market-oriented application - facilitating the transfer of research outcomes into viable business solutions.

Through incubation services, acceleration programmes such as *Voogle*, and participation in European cooperation projects including EEN and ENTRANT, TECHPARK supports the development of innovation-driven enterprises and contributes to their integration into wider European business and innovation networks. The park plays a central role in connecting SMEs with international partners, public institutions, and funding opportunities, thereby strengthening the overall competitiveness of the regional entrepreneurial ecosystem.

Incubator Firm Profile. Companies operating within TECHPARK are predominantly micro and small enterprises active in *ICT, software development, and digital services*. A significant share of these firms develops solutions based on digital technologies, including automation, data analytics, and emerging artificial intelligence applications. Some companies are also active in creative industries, engineering, and digital media, reflecting the broad sectoral profile of the Varaždin technology ecosystem.

These enterprises are typically characterised by:

- strong technical expertise and innovation capacity
- flexible and adaptive business models suited to early-stage growth
- a focus on product and service development with high scalability potential
- increasing integration of R&D components alongside market-oriented activities

Many TECHPARK-based firms maintain collaboration with local academic institutions, particularly for access to talent, joint research, and technology validation. However, unlike more research-intensive ecosystems, the majority of companies within TECHPARK are primarily market-driven, with entrepreneurial origins rather than academic spin-offs. This distinction shapes the support needs of the ecosystem, which focuses more on business development, market entry, and internationalisation than on pure technology commercialisation.

At the same time, many companies operate with limited human and financial resources, which affects their ability to scale operations and expand into international markets. Strengthening the innovation capacity and business maturity of these firms - particularly in areas such as intellectual property, international business development, and investment readiness - remains a key priority for TECHPARK's support activities.

Internationalization and E-Export Capacity. SMEs within TECHPARK operate in a favourable regulatory environment for internationalisation due to Croatia's EU membership. Access to the Single Market reduces administrative barriers and facilitates cross-border trade, while the adoption of the euro in 2023 has further simplified financial transactions with European partners and reduced currency risk for businesses engaged in cross-border operations.

Internationalisation activities are most directed towards EU markets, particularly those with geographical proximity and established business connections. ***Germany, Austria, Slovenia, and other Central European markets*** represent natural first destinations for Varaždin-based enterprises. Additionally, the growing interest in Nordic and Baltic markets reflects the broader European digital economy orientation of ICT companies in the region.

Digitalisation plays a central role in enabling access to international customers, especially through service-based models such as SaaS solutions, digital consultancy, and online platforms. Croatia has made notable progress in digital infrastructure and public e-services in recent years, although the level of digital maturity among SMEs remains uneven. Companies with higher digital competencies are better positioned to adopt scalable international business models and to access foreign markets with relatively low operational costs.

However, the level of e-export maturity varies significantly among firms. Key areas requiring further development include:

- structured international market entry strategies tailored to specific target markets
- cross-border e-commerce frameworks, including taxation, regulatory compliance, and logistics
- digital marketing, branding, and customer acquisition in global markets
- use of data analytics to support international business decisions and market intelligence

Strengthening these capacities would enable SMEs to more effectively leverage digital channels for international growth and to compete in European and global value chains.

Identified Core Needs. Given Croatia's relatively small domestic market, companies operating within TECHPARK increasingly recognise the importance of international expansion as a

growth strategy. However, the transition from domestic to international operations requires targeted support in several critical areas.

A primary need is the ***development of clear and structured internationalisation strategies***. Many SMEs lack the expertise or resources to conduct systematic analysis of foreign markets, identify suitable entry modes, or adapt their value propositions for international audiences. Practical guidance on market selection, competitive positioning, and regulatory requirements in target markets is therefore highly valued.

Another significant need relates to ***access to international business networks and partnerships***. While participation in European cooperation projects provides some exposure to international partners, many companies lack ongoing connections to foreign clients, distributors, or investors. Facilitating business matchmaking, participation in international trade events, and integration into European innovation networks would substantially enhance the internationalisation capacity of the ecosystem.

There is also a strong need for ***mentoring and capacity building focused on scaling and international market entry***. Founders and managers of growing SMEs frequently face challenges in areas such as international sales, export logistics, cross-border legal frameworks, and investor communication. Long-term, structured mentorship systems - combining local expertise with international perspectives - would address these gaps more effectively than one-off training events.

Finally, strengthening capabilities in ***digital marketing and international branding*** represents a critical need for companies seeking to acquire customers in foreign markets. Many firms rely primarily on word-of-mouth or personal networks for customer acquisition and have not yet developed systematic approaches to online visibility, content marketing, or international customer engagement. Support in this area would directly enable companies to utilise digital channels for export growth.

Potential and Opportunities. Croatia offers a solid foundation for the further development of internationally oriented SMEs, particularly in the digital and technology sectors. The availability of skilled professionals in ICT and related fields, combined with a well-established higher education infrastructure in the Varaždin region, creates favourable conditions for talent-driven business growth. The relatively lower operational costs compared to Western European markets also represent a competitive advantage for companies developing digital products and services for international export.

Participation in European programmes and projects - including Horizon Europe, INTERREG, and Digital Europe - provides additional opportunities for knowledge exchange, partnership development, and access to new markets. The ENTRANT project itself exemplifies this approach, enabling TPV and its partner SMEs to learn from peer ecosystems across Europe and to develop more effective internationalisation support mechanisms.

The growing interest in digitally driven sectors - including health technologies, smart manufacturing, and creative digital industries - creates promising opportunities for firms in the Varaždin ecosystem to develop specialised solutions with export potential. Croatia's tourism sector, one of the most dynamic in Europe, also generates demand for digital services and platforms, representing both a domestic market and a testing ground for international products.

TechnologyPark Varaždin is well positioned to support this process by facilitating connections between SMEs, research institutions, and international partners. By continuously strengthening support services related to internationalisation and e-export - including strategic advisory, digital marketing support, and access to investment networks - TPV can further contribute to the development of competitive, export-oriented enterprises and to the integration of local businesses into European and global value chains.

3.4. Romania (Magurele Science Park)

Ecosystem General Structure: Romania's rapidly growing technology sector and Magurele Science Park's focus on scientifically driven incubation activities. Romania's IT industry has solidified its reputation as a key player in Europe, with 2025 marking another year of growth and transformation. As one of the fastest-growing sectors in the country, IT continues to attract global companies, innovative startups, and top-tier talent, solidifying Romania's position *as a leading technology hub in Eastern Europe* .[1] As a member of the European Union, the country provides the benefits of the free movement of goods, services, capital, and talent, which are essential for rapid integration into European value chains. Romania is considered a "hidden hub" of technology in Central and Eastern Europe (CEE), combining strong engineering talent with competitive operational costs.

Unlike fully operational technology parks, the Măgurele Science Park initiative is currently in a stage of strategic development. While the physical infrastructure is planned for the future, the association already fulfils a "bridging role" within the ecosystem. This model reflects a phased approach, in which community building and stakeholder alignment precede real estate development. MSP explicitly describes its role as building bridges among these categories,

while its research community includes actors such as IFIN-HH, INFLPR, INCDFP, INOE 2000, ICCF, ICECHIM, ICI Bucharest, INCDFM, institutes of the Romanian Academy, and other relevant partners. Măgurele also hosts the ELI-NP infrastructure, which describes its laser and gamma-beam systems as being „well beyond existing facilities”, together with five research departments and a technical division.

It should be noted that the technological domains in which the Măgurele Science Park community operates reflect a strong specialization in advanced and research-driven fields. These include ***advanced physics and nuclear engineering, energy and environmental protection, information and communication technologies*** (including AI, IoT, cybersecurity, and fintech), as well as manufacturing industries focused on ***advanced materials, optics, sensors, and laser technologies***.

We have established a strong collaboration with the Entrepreneurial School of the National University of Science and Technology Politehnica Bucharest (SAS-UPBizz), offering them 3 annual webinars on various business-related topics, led by our experienced mentors. Additionally, we actively support the organization of the “Fii Antreprenor” business plan competition, which has successfully run for eight editions, encouraging students to develop and present innovative business ideas. Beyond these initiatives, we maintain a strong presence at the university’s “Start Your Startup” event, held each fall within the campus, where we engage with aspiring entrepreneurs, providing guidance and insights into the startup ecosystem.

Moreover, through our Laser Valley Innovation Bootcamp, we bridge the gap between researchers, entrepreneurs, and students by organizing an intensive three-day bootcamp in Magurele. Each year, over 100 participants form mixed teams, develop business plans, receive on-the-spot mentoring from our experts, and refine their pitches for the final Demo Day. After the bootcamp, teams that wish to continue developing their ideas into businesses receive tailored support through our mentoring program, ensuring a lasting impact beyond the event itself.

In the last 5 years we organized more than 50 events (thematic events, Science2Business events and Business2Community events) that were focused on connecting the research and business sections of our 400+ community. During these types of events, we promote the knowledge, the capability and the infrastructure of the research sector, the needs and partnership opportunities of the SMEs and the support initiatives that are available for them. One of the main focus areas

of such events is the networking section, in which real partnerships between members of the community can form.

Incubator Firm Profile: R&D intensity of firms in Magurele Park, their focus on innovative product/service development, and pursuit of international collaboration.

Măgurele Science Park (MSP) acts as a facilitator between knowledge generators, namely the national research and development institutes (INCDs) and universities within the MSP community and market needs, through the involvement of the private sector, including entrepreneurs, SMEs, and large companies. In this context, the MSP team actively develops and supports collaboration relationships between research and the business environment by leveraging existing expertise, facilitating technology transfer, and supporting the commercialization of technological developments.

Specific activities are implemented to enhance the creation of spin-offs from INCDs and partner universities within the community, while equal emphasis is placed on supporting the creation of startups by entrepreneurs outside the MSP community who identify collaboration opportunities with its members. For these collaborative activities such as validation, testing, and prototyping, there is access to research laboratories within INCDs and universities, covering fields such as optics, nanotechnologies, laser technologies, space, microtechnology, and related domains.

If we look at the MSP business community, the profile of firms is much closer to a ***knowledge-intensive and technology-intensive portfolio*** than to a generic incubator base. The business community includes, for example, companies and solutions in cybersecurity and security-tech, software/AI/digital transformation, medtech and bio, as well as advanced manufacturing/laser/industrial tech/defence, together with solutions related to cleantech/circular economy and engineering for sustainable construction. This composition suggests a community with high technological intensity and direct exposure to sectors where differentiation depends on IP, know-how, and the integration of research into products.

On the research side, the MSP community is not made up of symbolic institutions, but of national institutes and laboratories capable of providing expertise, infrastructure, and applied projects for companies. The MSP research community includes institutes active in nuclear physics, lasers and plasma, optoelectronics, chemistry and pharmaceuticals, materials, informatics, mechatronics, industrial ecology, and biosciences, while ELI-NP contributes a rare critical mass of scientific infrastructure at regional scale. This means that the typical firm

relevant to the Măgurele and Bucharest-Ilfov ecosystem is not simply looking for office space or generic mentoring, but for access to laboratories, technological validation, scientific partners, and commercialization pathways.

Internationalization and E-Export Capacity: Firms' current export status, dynamics of access to Central and Eastern European markets, and digital trade competencies.

Romania has established itself as an emerging technology hub in Central and Eastern Europe, benefiting from a high-performance internet infrastructure and a highly skilled workforce in the ICT sector. Romanian startups frequently target markets in Germany, France, and the United Kingdom, with digitalization acting as the main driver of international scaling.

For digital and tech-enabled firms, the export base is also supported by Romania's national profile in ICT services. World Bank data show that Romania's ICT service exports reached approximately USD 11.0 billion in 2024, while their share in total service exports stood at 25.63%.[2] In other words, firms in Romania operate within an economy where digital exports are no longer niche activities, but a major component of service exports. This is especially favourable for companies in software, AI, cybersecurity, digital health, and scalable B2B services, including many of the firms present in the MSP community.

The Măgurele Science Park Association contributes indirectly to internationalization by facilitating access to European research and innovation networks and by supporting the participation of its community members in cross-border projects (e.g. Horizon Europe). This connectivity helps integrate local expertise into international innovation flows.

Access to Central and Eastern European markets is supported by three structural elements. The first is the EU Single Market, which reduces regulatory barriers for initial expansion into CEE markets. The second is the EEN/PROSME support infrastructure, built precisely for internationalization, business partnering, and access to European instruments. As a result, for many firms in the ecosystem, CEE markets are best understood as a natural first stage of external validation, rather than a destination. This is a strategic inference, but a well-grounded one given the region's role in trade, the available support networks, and Bucharest's position in the regional investment circuit. During the first 3 years of the PROSME project implementation, more than 50 SMEs benefited from advisory services, with more 470 B2B matchmaking sessions on the international level. The MSP team organized and co-organized more than 40 of these types of events in which the EEN clients were helped to develop their business through strategic advice for internationalization, identification of new markets and

relevant partners, increasing innovation and digitalization capacity and access to financing sources tailored to their needs.

Identified Core Needs: Strategic consultancy for entering Western European and global markets, e-commerce infrastructure, and international mentoring. The ecosystem faces a limited level of technology transfer and insufficient mechanisms for translating research into commercially viable solutions. Access to funding remains critical, especially for deep-tech startups, where connections with venture capital networks are still in the process of maturing. In this context, the association's role as an "orchestrator" becomes essential in addressing the gaps in entrepreneurial competencies within the scientific environment.

The analysis of the ecosystem indicates several structural gaps that limit the transformation of research and technology into internationally scalable companies.

One of the identified needs is ***strategic consultancy for entering Western European and global markets***. Precisely because the ecosystem is technologically stronger than it is commercially mature, many teams need more than networking: they require advanced support in market selection, positioning, pricing, regulatory fit, channel strategy, and sales enablement. MSP is one of the partners of the EEN network through the PROSME project which addresses exactly these needs through scale-up advisory, access to foreign markets, business partnering, and guidance in complex regulatory environments.

Another easily identifiable need is ***e-commerce and digital trade infrastructure***, understood broadly: CRM systems, marketing automation, cross-border sales tooling, e-invoicing, marketplace integration, digital customer support, analytics, and export-oriented digital processes. The European Commission explicitly recommends that Romania accelerate business digitalization, clarify the available support instruments, and ensure the effective functioning of European Digital Innovation Hubs, while the EIB emphasizes that access to finance and digital capabilities remain major bottlenecks for SMEs. For the MSP community, this need is particularly important because a significant share of companies operate in software, health-tech, AI, and B2B services, where international scaling depends on digitally mature commercial operations, not only on the quality of the product itself. MSP is trying to address this need, and also the international mentoring need through initiatives such as the Entrant Project, which piloted a digital learning platform and also gave the opportunity for 25 companies to engage with many international mentors.

Potential and Opportunities: Romania's young and educated workforce, low-cost R&D, and large domestic market potential. From a talent perspective, Romania benefits from a steady pipeline of STEM graduates (approximately 19 per 1,000 population) and a growing network of startup support organizations, accelerators, and mentorship communities. At the same time, the relatively high retention rate of graduates (close to 88% in 2024) indicates a stable domestic talent base, although this is partially offset by high long-term emigration rates. In addition, the retention rate of graduates has increased from 84.8% in 2022 to 87.9% in 2024, indicating improving short-term labour market integration.

An additional competitive advantage remains the cost-to-competence ratio. At national level, Eurostat estimates for 2024 show average hourly labour costs significantly below the EU average, and in 2025 Romania remains among the lower-cost EU economies on this indicator. This should not be interpreted as “cheap talent,” but as the ability to build R&D, software, and product development teams at still-efficient cost levels compared with many Western European locations, while operating in a far richer environment in terms of universities, digital infrastructure, and business partners. For deep-tech and applied research activities, this combination is particularly valuable.

The Măgurele Platform represents a unique strategic asset through its concentration of large-scale research infrastructure. The future development of the science park has the potential to transform the area into a regional hub for deep-tech innovation.

By adopting a model in which ecosystem facilitation precedes infrastructure development, the Măgurele Science Park Association creates the conditions for a sustainable innovation environment. This approach enables the consolidation of partnerships and the development of the competencies required for the long-term success of the future science park, positioning Romania as a relevant actor within European innovation networks. For the MSP community, the greatest opportunity is not to imitate a generic science park model, but to capitalize on what already exists: a critical mass of research institutes, an EEN-enabled matchmaking and internationalization platform, a nationally dominant tech ecosystem, and a region that already concentrates innovation, foreign trade, and capital.

3.5. Lithuania (Tech-Park Kaunas, Kaunas University of Technology)

Ecosystem General Structure. Lithuania's *strategic location in the Baltic region* provides significant advantages for startups, offering access to European markets, strong regional partnerships, and opportunities to scale across the Nordic–Baltic ecosystem. This geographical position also enables startups to test and validate innovations in relatively small but highly digitalised markets before expanding to larger European economies. In addition, Lithuania's membership in the European Union and the Schengen Area facilitates free movement of goods, services and talent, which further supports early internationalisation of startups.

A key component of this ecosystem is the growing collaboration between universities and industry. Higher education institutions play a critical role in generating new knowledge, developing advanced technologies, and supporting the commercialization of research outcomes. Through joint research projects, technology transfer activities, and partnerships with private sector organizations, universities help bridge the gap between academic research and market needs, enabling scientific discoveries to be transformed into practical applications and commercially viable solutions. This collaboration fosters the creation of knowledge-intensive, innovation-driven startups and enhances the overall competitiveness of the national economy.

A considerable share of startups in *the Kaunas ecosystem has academic origins* or maintains strong cooperation with universities and research institutes. This contributes to the development of knowledge-intensive ventures, particularly in technology-driven sectors such as med-tech, engineering, ICT and educational technologies. The ecosystem has demonstrated resilience in responding to geopolitical challenges while maintaining continuity in innovation activities. In 2026, further growth is expected in promising sectors such as med-tech, agro-innovation and education technologies, along with increasing investment activity. This reflects a gradual maturation of the startup ecosystem and a move towards sectoral specialisation and larger-scale investment rounds.

Kaunas University of Technology (KTU) is not merely a partner but one of the founding stakeholders (shareholders) of Kaunas Science and Technology Park (Tech-Park Kaunas). This institutional relationship reflects a long-term strategic commitment to fostering innovation, entrepreneurship, and technology transfer in Lithuania. KTU researchers, students, and spin-off companies frequently engage with the Tech Park through incubation and acceleration programs, mentorship, and access to industry networks. At the same time, the park acts as an intermediary that helps translate academic knowledge into market-ready solutions by

connecting startups with investors, partners, and international opportunities. This relationship can be described as a classic “university–innovation hub” model.

Incubator Firm Profile. Tech-Park Kaunas acts as an important intermediary between research and business sectors, facilitating knowledge transfer and technology commercialisation processes in Kaunas ecosystem. A significant share of incubated startups emerges from academic environments, particularly from Kaunas University of Technology and other Lithuanian higher education institutions. These firms are often rooted in research and development activities, especially in fields such as engineering, ICT, health technologies, and advanced materials. As a result, many of them can be classified as deep-tech or knowledge-intensive startups, where the core value proposition is based on scientific expertise and technological innovation. When developing innovative products, companies at the Tech-Park Kaunas often collaborate with experts in their field. Members of the Tech-Park Kaunas community have access to various laboratories, research centres, scientists, and specialists from Kaunas University of Technology, Lithuanian University of Health Sciences, Vytautas Magnus University, Lithuanian Energy Institute.

Tech-Park Kaunas is actively engaged in international innovation and defence ecosystems, strengthening opportunities for technology transfer, collaboration, and global market access for startups. The park participates in Nordic–Baltic defence initiatives, including the ODIN (Organisation for Defence Innovation in the Nordics) network, and is a member of the European Business and Innovation Centre Network, which connects over 170 innovation organizations worldwide. It also collaborates with NATO DIANA as an associated centre, contributing through expert involvement in events such as “Ugninis skydas.” In addition, Tech Park Kaunas is involved in the InnoCoop project under the Interreg Europe programme, which promotes SME innovation, access to finance, and cross-regional cooperation. Overall, participation in these programmes enhances the international visibility of the ecosystem and supports startups in developing innovation capabilities, partnerships, and expansion into global markets.

Tech-Park Kaunas provides targeted support for early-stage startups through structured capacity-building programmes and networking initiatives. It offers a 2-month pre-acceleration programme for startups developing innovative products or services, as well as a one-week “Bootcamp” focused on business idea validation. This training covers key areas such as value creation, business modelling, communication, marketing, leadership, and investor pitching, thereby strengthening startup readiness for investment and international market entry.

In addition, the park promotes participation in R&D collaboration and organizes specialized networking events, such as Innovators' Breakfast and R&D Meetups. These initiatives foster cooperation between startups, industry, and research actors, while facilitating integration into broader international innovation networks.

Internationalization and E-Export Capacity. Lithuania's strong export orientation, favourable geographic position near Scandinavian and Baltic markets, and advanced level of digitalization create a supportive environment for firms seeking to internationalize and develop their e-export capabilities. These factors contribute to the country's increasing integration into global markets and support the sustainable growth of Lithuanian enterprises. As a member of the European Union, Lithuania benefits from the opportunities offered by the single market, which facilitates cross-border trade and enables companies to expand their operations beyond national borders.

Close logistical connections, cultural familiarity, and well-developed transport infrastructure make markets such as Sweden, Norway, Denmark, Latvia, and Estonia relatively accessible for Lithuanian exporters. These markets are often considered natural first steps for companies seeking international expansion due to their stable economies, high purchasing power, and openness to innovative products and services.

Lithuania is often considered one of *the most digitally advanced countries in Central and Eastern Europe*. Lithuania ranks 6th in the European eGovernment Benchmark (2024) with a score of 86/100, placing it among the leaders in Europe. About 72% of citizens aged 16–74 use digital public services such as e-health, tax declarations, or business registration. This digital maturity creates favourable conditions for startups to adopt scalable digital business models and to develop export-oriented services. High digitalization in Lithuania provides several advantages:

- easy online company registration and digital public services
- strong FinTech and ICT ecosystem
- good internet and 5G infrastructure
- supportive digital government and open data environment

These factors reduce administrative barriers for startups and enable faster integration into international value chains and digital markets. Digital platforms, online marketplaces, and cross-border e-commerce solutions further enable businesses to expand their customer base

internationally while maintaining relatively low operational costs. By leveraging digital tools and technologies, firms can access foreign markets more efficiently and strengthen their global competitiveness.

Identified Core Needs. Given Lithuania's relatively small domestic market, startups are compelled to pursue internationalization at a very early stage of their development. Consequently, globally oriented strategies become integral from the outset of a startup's lifecycle. Many Lithuanian startups therefore prioritize entry into European Union markets from the moment of their establishment, rather than focusing exclusively on local opportunities. In this context, several critical needs persist within the Lithuanian innovation ecosystem, including the development of targeted market entry strategies for global expansion.

Another significant need is *improved access to international funding*. While Lithuania has developed an active venture capital landscape, early-stage startups—especially those based on scientific research—often *face challenges in attracting larger-scale investments* from foreign funds. Local investors are not always able to provide sufficient capital for scaling, making access to European and U.S. investment networks critically important. Initiatives led by organizations such as Invest Lithuania and various technology parks help facilitate connections with international investors; nevertheless, startups frequently struggle to position their value propositions effectively in a global context and to align with the expectations of diverse investor groups.

Finally, there is a *strong need for mentorship and capacity building in commercialization processes*, particularly *for academically rooted startups*. Innovations emerging from universities often demonstrate high technological potential, yet their founders tend to lack experience in entrepreneurship, marketing, and product development. Technology parks such as Tech-Park Kaunas and Vilnius Tech Park play a crucial role by offering *incubation services, mentorship programs*, and access to expert networks. However, to achieve a greater impact, there is a need to strengthen long-term, structured mentorship systems focused on commercialization, intellectual property management, and business model validation in international markets. Startups would benefit from structured preparation for investor engagement, including investment readiness training, pitch refinement, financial planning, and support in understanding cross-border funding mechanisms.

Strengthening structured *international mentorship programmes* and facilitating connections with global industry partners could further enhance startup competitiveness. In particular,

access to experienced mentors with sectoral and international market expertise can accelerate learning processes, reduce strategic risks, and support more effective scaling decisions. Expanding collaboration with multinational companies, research organisations, and innovation networks would also create opportunities for joint product development, co-creation pilots, and integration into international value chains.

Potential and Opportunities. Lithuania offers a well-developed support system for startups through a combination of public agencies, innovation hubs, and targeted programmes. Key ecosystem actors include Startup Lithuania, which serves as a national platform for ecosystem development, visibility, and policy support, and Enterprise Lithuania (Innovation Agency), which provides export promotion, advisory services, and access to international markets. Investment attraction and connections to global capital are further supported by Invest Lithuania.

Access to EU funding instruments and national innovation support schemes creates favourable conditions for experimentation, pilot projects and product validation. Growing investments in advanced technology infrastructure are expected to further strengthen Lithuania's position within European innovation ecosystems. Programs such as Horizon Europe provide grants and funding opportunities that enable startups to develop advanced technologies and expand their operations internationally. In addition, national institutions such as INVEGA support startups through a variety of financial instruments, venture capital initiatives, and innovation grants. This funding ecosystem helps reduce financial barriers for early-stage companies, particularly those emerging from universities and research institutions.

Tech-Park Kaunas, the Ministry of the Economy and Innovation of Lithuania, and other partners signed a cooperation agreement to establish the Vytis Defence and Security Innovation, Testing and Certification Center, which will focus on the development, testing, and certification of defence and security innovations. Such initiatives are likely to increase opportunities for startups to develop dual-use technologies and participate in international defence and security value chains. Furthermore, community events, hackathons, and accelerator programs foster collaboration and knowledge exchange among founders, investors, and researchers. Such initiatives create a dynamic environment that enables startups to receive mentorship, refine their business models, and build valuable connections with international partners. Together, these factors create strong opportunities for the continued growth and global competitiveness of Lithuania's startup ecosystem.

3.6. PEST-Based Analysis of Incubators' Macro Level Environment

Methodological framework. This section of the policy report applies a PEST framework to assess the macro-environment shaping innovation ecosystems across five countries: Croatia, Denmark, Lithuania, Romania, and Turkey. The PEST approach was selected due to its suitability for structured cross-country comparison, particularly when analysing countries with different levels of economic development, institutional capacity, and technological advancement. The analysis combines quantitative indicators with qualitative institutional insights, allowing for a comprehensive assessment in cases where standardised statistical data is limited or unavailable.

The analysis is structured around four key dimensions. The **political and legal environment** is assessed by examining national innovation policies, the availability of public funding programmes, and access to international funding and support mechanisms. Together, these elements provide an overview of regulatory stability, policy coherence, and the capacity of governments to systematically support innovation.

The **economic environment** focuses on the financial and market conditions shaping startup development. It considers the structure of funding (including public, private, and mixed sources), the availability and dynamics of venture capital, the level of internationalisation reflected through export activity, and the costs associated with business establishment and operations. This dimension captures both access to capital and the overall economic attractiveness of the ecosystem.

The **social environment** addresses human capital and innovation culture. It is analysed through talent availability, demographic trends, the strength of university–industry collaboration and training systems, and public attitudes towards innovation and technology. These factors help explain differences in ecosystem maturity and the capacity to sustain entrepreneurial activity.

The **technological environment** evaluates the infrastructure and capabilities that enable innovation. This includes R&D intensity, the level of digital infrastructure development, access to research and prototyping facilities, collaboration with research institutions, and the effectiveness of innovation commercialisation processes. In areas where comparable statistical data is not available, such as open laboratory infrastructure, the analysis is complemented by institutional evidence and country-specific examples.

Data and Limitations. The analysis is based on publicly available statistical data sources, including Eurostat and the European Innovation Scoreboard, complemented by institutional and programme-level information.

It should be noted that data availability and quality vary across countries, national statistical methodologies are not fully harmonised, and startup-level data remains limited in some cases. These constraints are addressed by combining quantitative evidence with qualitative insights to ensure a balanced and context-sensitive interpretation of results.

3.6.1. Political and Legal Environment Analysis

The political and legal environment constitutes the institutional foundation within which innovation ecosystems develop, as it defines regulatory mechanisms, funding structures, and institutional coordination. Consequently, its structure, stability, and effectiveness directly determine the pace, scale, and opportunities for innovation development.

To identify the key characteristics of the political and legal environment, the analysis focuses **on the following indicators:** (1) state innovation policy, (2) national-level funding programmes and support, and (3) international funding and support.

The assessment is based on the Political–Legal Environment (Innovation Policy) Index, the Gross Domestic Expenditure on R&D index, the International Funding and Integration Index (TFI), as well as data from the European Innovation Scoreboard (EIS) and Eurostat.

A comparative analysis of Croatia, Denmark, Lithuania, Romania, and Turkey reveals significant differences in policy implementation logic and strategic planning, funding mechanisms and intensity, regulatory architecture, and the level of international integration.

State innovation policy. All five analysed countries formally declare innovation as a strategic priority, with clearly identifiable national documents and/or legislative frameworks that establish the directions for the development of innovation, digitalisation, and/or startup ecosystems. However, their policy implementation models differ in both structure and effectiveness. These differences can be synthesised through a composite index reflecting the regulatory environment, administrative simplicity, and the coordination of institutions.

Table 3.6.1.1 Political–Legal Environment (Innovation Policy) Index

Year	Croatia	Denmark	Lithuania	Romania	Turkey
2022	70	95	82	65	68
2023	72	97	84	66	70
2024	73	96	85	67	71

In Denmark, innovation policy is characterised by the highest level of integration: a digitalised and centralised “one-stop-shop” system enables the efficient coordination of business establishment, funding, and legal requirements, thereby creating a predictable and transparent environment that reduces administrative burdens and fosters innovation development.

In Lithuania, the Innovation Agency and Startup Lithuania jointly operate as coordinating institutions. Together, they function as a national hub for startup support, internationalisation, and R&D policy implementation. This system ensures a sufficient degree of policy coherence; however, its effectiveness still depends on the scale and sustainability of financial resources. Owing to its well-coordinated institutional structure, Lithuania ranks second.

Although Romania has a strong strategic foundation based on national R&D programmes and smart specialisation strategies, regulatory instability and bureaucratic complexity (including administrative complexity and delays in public funding schemes) reduce the effectiveness of these measures.

In Croatia, innovation policy is guided by strategic documents such as the National Development Strategy 2030 and the Digital Croatia 2032 strategy; however, institutional fragmentation across ministries and agencies creates inconsistencies in implementation and reduces legal predictability for startups.

Turkey’s innovation framework is anchored in the Technology Development Zones Law No. 4691, which structures the legal, fiscal, and operational functioning of technoparks. In practice, this framework functions as the country’s de facto startup law, although Turkey does not operate a unified national “startup law” platform. Consequently, the Turkish model is more localised and does not always ensure the systematic development of the innovation ecosystem.

National-level funding programs/support. The main quantitative indicator used to assess national funding capacity is Gross Domestic Expenditure on R&D (GERD, % of GDP), which reflects a country’s ability to invest in innovation.

Table 3.6.1.2 Gross Domestic Expenditure on R&D (GERD, % of GDP), 2022–2024

Year	Croatia	Denmark	Lithuania	Romania	Turkey
2022	1.40	2.80	1.03	0.46	1.32
2023	1.39	3.10	1.05	0.52	1.39
2024	1.46	3.01	~1.00	0.46	1.46

From a funding perspective, the overall GERD landscape clearly divides the countries into three clusters: high R&D intensity (Denmark), medium intensity (Croatia, Turkey, and Lithuania), and low R&D intensity (Romania).

The analysis of Gross Domestic Expenditure on R&D clearly identifies Denmark as the leader, with investments exceeding 3% of GDP. Based on Eurostat data on 2024 research and development statistics, Denmark’s GERD as a percentage of GDP (R&D intensity) reached 3.01%. Denmark is among the top R&D investors in the EU, ranking sixth in R&D intensity after Sweden, Belgium, Austria, Finland, and Germany. This reflects not only strong financial capacity but also a long-term strategic commitment to innovation.

Lithuania, Croatia, and Turkey fall into the medium-intensity group; however, their funding levels remain significantly lower. Although these countries demonstrate increasing investment, they are still converging towards the EU average.

Romania has the lowest R&D intensity among the five countries, remaining at 0.46–0.52% during the period 2022–2024. The country exhibits one of the lowest ratios of R&D expenditure to GDP in the European Union, often not exceeding 0.5% of GDP. This indicates structural underinvestment in innovation and correlates with administrative challenges reported by incubators.

Corporate Income Tax (CIT) Environment and Fiscal Competitiveness. Corporate income tax (CIT) structures shape startup formation costs and influence investor decision-making. Unlike other indicators, CIT rates are directly comparable across all five countries. Denmark applies a 22% CIT rate. Although comparatively high, its impact is mitigated by regulatory

stability, advanced digitalisation, and well-developed innovation support programmes. Croatia operates a dual-rate CIT system: 10% for firms with annual revenues below €1 million and 18% for those exceeding this threshold. While this structure favours small enterprises, Croatia lacks targeted R&D tax incentives.

Lithuania maintains a 15% CIT rate (2022–2024) and offers one of the most generous R&D super-deduction schemes in Europe, allowing deductions of up to 300% of eligible expenditures. Romania applies a 16% CIT rate, complemented by a micro-enterprise turnover tax regime (1–3%) and R&D-related payroll tax exemptions. Turkey provides a 0% CIT rate for qualifying activities conducted within Technology Development Zones, creating a territorially concentrated fiscal incentive.

International Funding and Support. The dimension of international funding and integration reflects a country’s ability to engage in global innovation systems and to leverage external sources of funding. In other words, this dimension captures the extent to which a country actively participates in global innovation activities, such as joint research with foreign partners, international patents and scientific publications, inter-firm collaboration across countries, and participation in global value chains.

In the context of the analysed countries, this capability is measured by the International Funding and Integration Index, which is constructed based on data from the European Innovation Scoreboard (EIS). The index combines three indicators: international scientific co-publications, foreign doctoral students, and venture capital investments. All indicators are normalised (EU = 100), and the index is calculated as their arithmetic mean (see Table 3.6.1.4).

Table 3.6.1.4 International Funding and Integration Index (TFI)

Year	Croatia	Denmark	Lithuania	Romania	Turkey
2022	85	145	102	78	75
2023	90	150	108	82	78
2024	95	148	112	86	80

The indices presented in the table indicate that EU Member States hold a clear advantage in terms of international funding and integration. Denmark and Lithuania most effectively integrate into and leverage European Union financial instruments and international networks, thereby strengthening their innovation ecosystems.

Romania and Croatia also participate in these mechanisms; however, their capacity to efficiently absorb available funding remains more limited. In the case of Turkey, the level of international integration is comparatively lower, implying more restricted access to external funding sources.

Concluding remarks. The analysis of the political and legal environment in Croatia, Denmark, Lithuania, Romania, and Turkey shows that in all examined countries, innovation is formally established as a strategic priority. Each country has developed national R&D and innovation strategies, implemented funding mechanisms to support innovation, and seeks to strengthen collaboration between universities, businesses, and government.

However, the quantitative analysis reveals notable differences in institutional stability and the capacity of governments to systematically support innovation. Denmark significantly outperforms all other countries and stands out as a clear innovation leader, with R&D expenditure exceeding 3% of GDP, reflecting strong structural commitment to innovation. Lithuania, Croatia, and Turkey form a group of moderate R&D intensity, investing approximately 1–1.5% of GDP, while Romania remains in the lowest position, with less than 0.5%.

Denmark demonstrates the highest level of political and legal environment effectiveness, driven by an integrated, digitalized, and consistently functioning system. Lithuania exhibits the characteristics of a modern innovation ecosystem, with a well-integrated startup and innovation support structure (e.g., Startup Lithuania and the Innovation Agency), which centralizes support services, advisory functions, and international visibility. Nevertheless, its medium-level R&D investment (around 1% of GDP) and limited accessibility of innovation performance data (such as intellectual property indicators) constrain further ecosystem development.

Romania has a strong strategic foundation; however, the effectiveness of its political and legal environment is undermined by regulatory instability, bureaucratic inefficiencies, and low levels of funding (below 0.5% of GDP). Croatia's system is based on strategic policy documents, but their implementation is hindered by limited financial resources and a lack of centralization. Turkey, in turn, has established a robust legal framework for innovation, particularly through

technoparks, and supports the rapid growth of R&D funding; however, its overall effectiveness is constrained by administrative burdens.

Table 3.6.1.5 Evaluation of the Political & Legal Environment: Country Comparison

Country	Strengths	Weaknesses
Croatia	National innovation strategies and institutional support for businesses are in place; networking and support mechanisms are operational; EU membership provides access to international programs.	Institutional fragmentation and limited coordination persist; national capacity for innovation funding is lower; targeted R&D tax incentives are limited; and the effective absorption of international funds remains challenging.
Denmark	A stable, predictable, and digitalized regulatory system (based on a “one-stop-shop” principle); strong national R&D and innovation funding; institutionalized innovation policy with clear coordination; and a very high level of international integration and capacity to leverage external programs.	A relatively higher fiscal burden; a more centralized and formalized model may reduce flexibility and increase procedural requirements.
Lithuania	Well-coordinated innovation policy implemented through specialized agencies; a favourable tax environment for R&D activities (with clear incentives); good access to EU and other international funding instruments; and steadily strengthening institutional collaboration.	A limited scale of national funding may constrain faster progress; greater dependence on external (particularly EU) mechanisms; and funding sustainability remains sensitive to cyclical fluctuations.
Romania	A strategic foundation for innovation policy and national R&D programs is in place; certain incentive measures are available (e.g., labor or R&D incentives); and EU membership provides access to international innovation programs.	Regulatory instability and bureaucracy reduce policy effectiveness; national capacity for innovation funding is low; implementation is fragmented with uneven coordination; and the absorption of international funds is relatively weak.

Turkey	A strong legal and fiscal framework for innovation promotion within technology development zones (technoparks); national programs supporting technology transfer and innovation are in place; and clear territorial incentives for innovation activities are provided.	The model is more localized (concentrated in specific zones) and does not always ensure systemic coordination; there is a higher administrative burden; and international integration and access to certain external funding instruments are more limited.
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3.6.2. Economic Environment Analysis

The economic environment constitutes a critical foundation for the development of innovation ecosystems, as it shapes market conditions, investment dynamics, and the overall business climate. Its structure, resilience, and efficiency directly influence the capacity to attract capital, scale innovative ventures, and compete in international markets. Accordingly, the analysis of the economic environment focuses on key characteristics reflected in *the following indicators*: (1) investment attraction opportunities, (2) venture capital (VC) activity, (3) export performance, and (4) company formation and operating costs.

Investment Attraction Opportunities. The structure of investment supply across the analysed countries differs significantly in terms of funding composition, investor base, and sectoral diversification.

Table 3.6.2.1 Start-up investment share by sources 2022–2023 (%)

Funding source	Denmark	Romania	Turkey
Private	50–55	38	51-59
Public	25–35	62	49-41
Hybrid	10–20	N/A	N/A

N/A (Not Available arba Not Applicable)

In Turkey, the funding structure is characterized by a strong presence of both public and private capital. Sectoral diversity is relatively high, with investments distributed across multiple industries, including AI, fintech, logistics, gaming, and biotechnology. Green and clean-tech

startups account for approximately 8.38% of the ecosystem, indicating an emerging, though still limited, orientation toward sustainability.

Romania exhibits a more fragmented and public-dependent funding structure. Investment diversity has declined over time, shifting from relatively high levels in 2022 to a more moderate concentration by 2024, with increasing focus on fintech and finance-related sectors. The share of green and clean-tech startups has also decreased, from approximately 7–10% in 2022 to around 5–6% in 2024.

Denmark demonstrates a mature and well-balanced investment ecosystem, with funding diversified across public, private, and hybrid sources. Green and clean-tech startups account for an estimated 10–15% of the total, reflecting strong alignment with sustainability priorities and policy direction.

Lithuania operates within a hybrid funding model, although comprehensive annual data on funding composition is not systematically reported. Available evidence suggests that investment sources are diversified across both local and foreign actors, including business angels and accelerator funds. According to a 2023 survey by Startup Lithuania, the main sources of startup investment include local business angels (29%), foreign business angels (19%), and local accelerator funds (18%). Notably, approximately 41% of startups are engaged in sustainability-related activities, indicating a comparatively strong green orientation.

Croatia's investment ecosystem remains smaller in scale and more geographically concentrated, primarily in the capital city of Zagreb. However, detailed data on funding structure and sectoral diversification is limited, constraining a more comprehensive assessment.

Venture Capital Activity. Venture capital activity varies substantially across the analysed countries in terms of both scale and stability. Turkey exhibits the highest volatility, as well as one of the largest investment volumes. Venture capital investment reached approximately \$1.51 billion in 2022, declined significantly to \$736 million in 2023, and recovered to around \$1.1 billion in 2024.

Romania demonstrates stable but modest growth in venture capital investment, increasing from €101.7 million in 2022 to €129.6 million in 2023 and €130.7 million in 2024. Lithuania follows a pattern similar to broader European trends, with strong investment levels in 2022 (€295 million) and 2023 (€292 million), followed by a notable decline in 2024 (€128 million).

Denmark represents a mature venture capital market, characterized by high and relatively stable investment volumes, amounting to €1.183 billion in 2023 and €1.127 billion in 2024. Croatia,

in contrast, shows signs of stabilization at a lower level, with annual investments ranging between €150–200 million.

Overall, venture capital dynamics differ across the analysed countries: mature markets such as Denmark are characterized by stability, Turkey by higher volatility, while countries such as Romania, Lithuania, and Croatia demonstrate moderate growth or stabilization trends.

Export Activity. Export activity reflects the capacity of startups to scale beyond domestic markets. Among the analysed countries, Turkey provides the most comprehensive dataset. The share of exporting enterprises increased steadily from 3.02% in 2022 to 3.74% in 2023 and reached 4.56% in 2024, signalling growing international engagement. Nevertheless, most firms continue to export to only a limited number of destinations, with approximately 37–49% operating in a single foreign market.

In Croatia, year-by-year startup-specific export data is limited; however, the broader economy is strongly export-oriented, and it is estimated that more than 20% of startup revenue is generated abroad. Romania lacks consistent metrics on startup exports, but available evidence indicates relatively low levels of internationalisation. Denmark also does not provide startup-specific export data within this dataset.

Lithuania similarly lacks concrete export figures, yet survey data suggests strong international ambitions: around 63% of startups plan to expand into foreign markets, although precise export shares are not reported.

Company Formation and Operating Costs. Cost structures differ substantially across countries and play a critical role in shaping startup entry and scaling decisions. Lithuania and Croatia stand out as the most cost-efficient environments. In Lithuania, company registration costs are below €200, the process can be completed online within one day, office rents remain relatively low at €10–€20/m²/month, and average monthly salaries for engineers or data scientists range from €2,500 to €4,000. Croatia similarly maintains low entry costs (€200–€400) and competitive office rents (€7–€20/m²/month), with average monthly salaries for engineers/data scientists ranging from €1,500 to €5,000.

Romania presents moderate cost levels. Total company formation expenses range from €420 to €1,780, while office rents in Bucharest vary between €9 and €21.5/m²/month.

Turkey exhibits moderate-to-high variability. Company formation costs range from approximately €1,300 for a limited company to more than €5,600 for a joint-stock company.

Office rents remain relatively low (€3–€20/m²/month), and average monthly salaries for engineers or data scientists fall between €2,045 and €4,260.

Denmark represents the highest-cost environment among the analysed countries. Company registration costs are around €5,300, office rents are high, and average monthly salaries for engineers or data scientists reach approximately €9,000. These elevated costs, however, are balanced by strong infrastructure, a highly developed business environment, and robust access to capital.

Concluding remarks. The economic environment analysis of Turkey, Croatia, Romania, Denmark, and Lithuania highlights substantial differences in investment structures, venture capital dynamics, export activity, and cost conditions. Despite varying levels of ecosystem maturity, a common challenge across all countries is the lack of standardised data units and methodologies, which limits international comparability.

Denmark stands out with a highly mature, diversified, and predominantly private-driven investment ecosystem, strong venture capital activity, and high operating costs that are balanced by robust infrastructure and reliable access to capital. Lithuania demonstrates a strong sustainability orientation and notably low entry barriers, offering the lowest company formation costs among the analysed countries. Croatia and Romania represent smaller, more public-dependent ecosystems characterised by limited investor diversity and moderate levels of internationalisation. Turkey, meanwhile, shows high investment volumes and dynamic growth but faces challenges related to economic volatility and rising operational costs.

Overall, the countries present distinct economic conditions for startup development. The balance between cost efficiency, access to capital, and internationalisation opportunities ultimately shapes the attractiveness and scalability potential of each ecosystem.

Table 3.6.2.2 Evaluation of Economic Environment: Country Comparison

Country	Strengths	Weaknesses
Croatia	Low company formation and operating costs; relatively strong export orientation	Small and geographically concentrated market; limited funding and VC availability
Denmark	Mature and diversified investment ecosystem; strong and stable VC market; high-quality infrastructure	Very high company formation and operating costs

Lithuania	Low formation and operating costs; diversified funding sources; strong sustainability focus and foreign expansion orientation	VC market fluctuations; limited or insufficiently standardized export data
Romania	Stable VC growth; relatively moderate operating costs	Dependence on public - sector funding; low investment diversity; weak internationalisation
Turkey	Large investment volumes; broad sectoral diversity; growing export activity	High economic volatility; rising costs; limited diversity of export markets

3.6.3. Social Environment Analysis

The social environment is one of the essential factors shaping innovation ecosystems, as it encompasses the quality of human capital, society's attitude toward technology, and the strength of institutional linkages between academia and business.

To identify the key characteristics of the social environment, the analysis focuses on the following indicators related to 1) talent availability, 2) demography data, 3) university collaboration & training and 4) public attitude to innovation and technology.

The assessment is based on the WIPO Global Innovation Index (GII), Eurostat indicators, and national sources such as TurkStat, Danmarks Statistik, HAMAG-BICRO, Innovation Fund Denmark, UEFISCDI, and others.

Talent Availability. The level of talent availability—meaning both the supply of talent and the efficiency with which it is utilised—is one of the key components of the social environment. It is reflected in the national index measuring the capacity of public funding and infrastructure to engage talent in innovation activities.

Table 3.6.3.1. National Funding and Talent Engagement in Innovation Index

Year	Croatia	Denmark	Lithuania	Romania	Turkey
2022	60	90	72	65	50
2023	62	92	75	68	52
2024	63	91	77	70	53

The National Funding and Talent Engagement in Innovation Index shows that Denmark not only has a strong talent base but also highly effective mechanisms for utilising this talent in innovation activities. Lithuania and Romania demonstrate consistent strengthening in this area over the analysed period (2022–2024), indicating steady improvement. In Croatia and Turkey, the level of talent engagement in innovation activities remains limited throughout the 2022–2024 period.

The talent availability component can be operationalised through the presence of experienced founders and mentors. However, as a standardised national count of mentors is rarely available in official statistics, this indicator is assessed through institutional mechanisms that formalise knowledge transfer and embed mentorship-like functions.

In Denmark, programmes administered by Innovation Fund Denmark explicitly prioritise collaboration between universities and companies, supporting projects across the entire value chain and thereby institutionalising expert involvement (Innovation Fund Denmark, 2026; University of Copenhagen, 2026). As a result, Denmark has developed a well-functioning talent integration system in which mentorship, collaboration, and practice-based learning are embedded in structured programmes such as the Industrial PhD scheme. The Danish Industrial PhD model formalises a tripartite arrangement between a company, a university, and a candidate, operationalising continuous mentoring and skills transfer through a joint research project (Aarhus University, 2025).

In Croatia, HAMAG-BICRO functions as a key institutional actor supporting innovative SMEs and facilitating networking—inter alia through the European Enterprise Network—among technology centres, universities, research institutes, and development agencies. This creates an enabling structure for access to expertise and mentorship (OECD, 2023; HAMAG-BICRO, 2026).

Table 3.6.3.2. Availability of Mentors and Experienced Founders, and Key University Collaboration Programmes/Initiatives

Country	Structures and programmes supporting the involvement of mentors and experts
Croatia	HAMAG-BICRO – institutional support for networks and investment; a networking and mentorship mechanism connecting universities, R&D centres, and firms
Denmark	Innovation Fund Denmark; Industrial PhD Programme – formalised linkages between mentors, industry, and universities

Lithuania	University-based incubators (e.g., <i>Saulėtekio Slėnis</i> in Vilnius, <i>KTU Startup Space</i>) – mentorship and training platforms within an integrated science–business ecosystem
Romania	Innovation Labs; PNCDI IV – Programme 5.7 – a university-based pre-acceleration network with mentor involvement and industry partnership projects
Turkey	Incubators report a shortage of mentors as a key constraint, along with weak university–industry interaction, and recommend strengthening “university–community bridges.

The data presented in the table indicate that Denmark has an institutionalised talent integration system, while Croatia and Lithuania have established formal collaboration models. In contrast, Türkiye and Romania lack standardized mentorship systems.

Demography Data. Demographic factors also exert a significant influence on innovation potential. Türkiye stands out with a favourable age structure, characterised by a relatively young population, which may constitute a long-term competitive advantage. In contrast, Romania and Croatia face the challenge of population aging, which reduces labour market flexibility and limits the capacity for innovation renewal. Denmark and Lithuania occupy an intermediate position in this respect; however, in Denmark’s case, demographic pressures are offset by high productivity levels and an effective talent policy.

Table 3.6.3.3. Share of Population Aged 65 and Over (%) (2024, Eurostat data)

Country	Share of population aged 65 and over (%)
Croatia	23.0
Denmark	20.0-21.0
Lithuania	20.3
Romania	19.0 – 20.0
Turkey	10.0-11.0

Croatia is among the “oldest” countries in this group, while Lithuania and Denmark are close to the EU average (approximately 21.6%). Romania remains slightly below the EU average but is ageing rapidly. In contrast, Türkiye has a significantly younger population, with the share of people aged 65 and over being roughly half that of the EU average.

Turkey's relatively young population structure represents a potential for long-term human capital growth. Conversely, population ageing in Denmark, Croatia, Lithuania, and Romania may lead to a shrinking labour force and pose challenges to the sustainability of innovation systems.

University Collaboration and Training. In Lithuania, the social environment for innovation is shaped through integrated science and business centres as well as university-based incubators, which foster the engagement of young talent in entrepreneurship.

In Croatia and Romania, networking mechanisms and programmes are also in place; however, their impact is often constrained by institutional fragmentation and regulatory instability.

Turkey faces one of the key social barriers—insufficient collaboration between universities and industry—which limits the flow of innovation projects and reduces overall ecosystem efficiency. Proposed solutions include community-based innovation labs and university–community innovation bridges that bring together students, academics, NGOs, and local businesses (see Table 3.6.3.2).

In Denmark and Lithuania, university–industry collaboration is strategic and institutionalised. In contrast, Turkey and parts of Romania lack systemic linkages between universities and business.

Public Attitude to Innovation and Technology. Public attitudes towards innovation and the overall level of development of the innovation system can be assessed using the Global Innovation Index (GII), which provides an integrated view of innovation ecosystem performance - covering institutions, human capital and research, infrastructure, market sophistication, and business sophistication - and enables the identification of the overall level of innovation culture.

GII rankings are interpreted in the context of the total number of countries assessed (approximately 130 annually), meaning that a country's position reflects its standing within the global innovation landscape.

According to Global Innovation Index (GII) data for the period 2022–2024, Denmark consistently ranks among the top ten global leaders. Lithuania occupies positions in the upper-middle group (ranking 35th out of 133 countries in 2024), while Romania, Croatia, and Turkey fall into the lower tier. This distribution highlights differences in the maturity of innovation ecosystems and the level of societal innovation culture.

Table 3.6.3.4. GII Rank by Year (Global Position, 2022–2024)

Year	Croatia	Denmark	Lithuania	Romania	Turkey
2022 (132 countries)	42	10	39	49	37
2023 (132 countries)	44	9	34	47	39
2024 (133 countries)	43	10	35	48	37

Denmark remains a strong example of a well-developed innovation culture, while Lithuania maintains a steady pace of improvement. Romania, Croatia, and Turkey face structural constraints, including a lower level of societal innovation culture and limited public engagement in innovation activities.

Concluding remarks. From a social environment perspective, the highest levels of innovation ecosystem effectiveness are achieved in countries that are able not only to generate talent, but also to successfully integrate it into practical activities and ensure consistent collaboration between science and business.

The social environment analysis of Croatia, Denmark, Lithuania, Romania, and Turkey reveals that, in this context, Denmark remains the clear leader. It demonstrates a highly advanced social innovation ecosystem, characterized by strong university–industry linkages, high societal tolerance for entrepreneurial risk, and a fully institutionalized system of talent development, inclusion, and collaboration.

Lithuania is distinguished by strengthening integration between science and business (notably through the “valleys” concept), as well as a relatively good balance between talent supply and its integration into innovation activities. However, the system still shows a degree of dependence on external mechanisms, particularly those related to the European Union.

Romania stands out for its strong talent base but faces challenges in retaining talent and effectively integrating it into innovation processes. Croatia’s social environment reflects a moderate level of societal innovation culture, constrained by institutional fragmentation (with support mechanisms such as HAMAG-BICRO linking universities, R&D centres, and businesses), limited talent retention, brain drain, and a relatively high level of population ageing.

Turkey, in turn, demonstrates potential due to its favourable demographic structure; however, its social innovation environment is limited by weaker collaboration between universities and industry.

Table 3.6.3.5. Evaluation of Social Environment: Country Comparison

Country	Strengths	Weaknesses
Croatia	Operational institutional networks linking science and business; a moderate innovation culture.	Challenges in talent retention; institutional fragmentation; demographic pressures; and a moderate level of societal innovativeness.
Denmark	A mature innovation culture; strong talent integration and mentorship; and well-established university–industry collaboration.	Demographic pressure (ageing); more formalized processes may reduce flexibility.
Lithuania	A growing innovation culture; active university incubators and science–business centres; and improving talent inclusion.	Dependence on external mechanisms for talent integration into innovation activities; insufficiently systematic measurement and visibility of outcomes in some areas.
Romania	A strong talent base and increasing engagement; programs in place linking students and business.	Talent retention challenges; uneven university–industry collaboration; and a moderate level of innovation culture.
Turkey	A favourable demographic structure with strong talent potential; increasing attention to innovation	Lack of mentorship; weaker university–industry linkages; and lower levels of international integration and innovation diffusion.

3.6.4. Technological Environment Analysis

The technological environment constitutes a fundamental pillar of innovation ecosystems, as it determines the availability of infrastructure, the intensity of knowledge creation, and the capacity to transform ideas into market-ready solutions. Its level of advancement, accessibility, and integration directly influence the speed and effectiveness of innovation processes, as well as the ability of firms to adopt and scale new technologies. Accordingly, the analysis of the technological environment focuses on key characteristics reflected in the following indicators: (1) R&D intensity, (2) 5G coverage, (3) access to open labs and prototyping facilities, (4) collaboration with research institutions, and (5) innovation commercialisation processes.

R&D Intensity (R&D Expenditure as % of GDP)

The 2022–2024 data reveal substantial cross-country disparities in R&D intensity. Denmark records the highest levels, reaching approximately 2.8–3.05% in 2022–2023 and approaching the long-established 3% benchmark. In contrast, Romania remains in the lowest group, with R&D expenditure ranging from around 0.46% to 0.51% of GDP.

Lithuania and Croatia form a middle group, with R&D intensity fluctuating between approximately 1.0% and 1.46%, while Turkey demonstrates a gradual upward trend, reaching 1.46% in 2024. According to Eurostat’s Gross Domestic Expenditure on R&D (GERD) framework, these figures encompass R&D activities performed across the business enterprise, higher education, and government sectors (Eurostat, 2025; TurkStat, 2025).

Table 3.6.4.1. R&D Expenditure, 2022–2024 (% of GDP)

Year	Croatia	Denmark	Lithuania	Romania	Turkey
2022	1.40	2.80	1.02	0.46	1.32
2023	1.39	3.05	1.05	0.51	1.39
2024	1.46	N/A	N/A	0.46	1.46

N/A (Not Available arba Not Applicable)

5G Coverage (Digital Infrastructure)

European Commission Digital Decade country reports highlight significant disparities in the deployment of 5G infrastructure across EU Member States. In 2023, Denmark achieved full 5G coverage (100%), while Lithuania reported near-universal coverage in populated areas (98.9%). In contrast, Romania lagged considerably, with coverage at 32.8%. Croatia performed at a relatively higher level, reaching 83.5% coverage in 2023 (European Commission, 2024).

Table 3.6.4.2. 5G Coverage, 2023 (%)

Country	5G coverage
Denmark	100.0
Lithuania	98.9
Croatia	83.5
Romania	32.8
Turkey	0

In Turkey, commercial 5G deployment had not yet been implemented during the analysed period. According to the European Commission's 5G Observatory, a licensing process is planned, with a phased rollout expected to begin in 2026 (European Commission, 2025).

Open Labs and Prototyping Facilities. A nationally standardized count of open laboratories and prototyping facilities is rarely available. Therefore, this indicator is assessed based on official infrastructure descriptions and the roles of key institutions within national innovation systems.

In Romania, available evidence suggests that advanced prototyping and laboratory infrastructure is concentrated within a limited number of research institutes, resulting in uneven regional access—particularly for deep-tech development (European Commission, 2024). In Turkey, prototyping and laboratory capacities are primarily embedded within universities and technology development zones (technoparks), reflecting a more institutionally anchored model.

Lithuania, by contrast, offers a relatively well-developed ecosystem of open labs, innovation hubs, and regulatory sandboxes tailored to startups, particularly in GovTech, deep tech, and life sciences. These facilities typically provide access to research infrastructure, testing environments, and technical mentorship. For example, GovTech Lab Lithuania serves as an intermediary between public sector challenges and startups by running initiatives such as the GovTech Challenge Series and a funded sandbox program, enabling startups to develop minimum viable products (MVPs) and test solutions in collaboration with public institutions. Another example is the Life Sciences Centre of Vilnius University, a major biotechnology hub that supports startup development and hosts the EMBL Partnership Institute, specializing in genome editing technologies.

Collaboration with Research Institutions. This component is operationalized through: (i) joint patents per year (or overall patent activity as a proxy where joint ownership is not separately reported), and (ii) sponsored or contract research projects (measured by counts and/or total value). However, co-owned or co-filed patents between startups and universities are not consistently distinguished in public statistics across the analysed countries, which complicates comparative analysis.

In Lithuania, collaboration is often facilitated through ecosystem-based approaches. For example, Cyber City in Vilnius illustrates a model where the co-location of startups, scale-ups, and technology companies fosters both formal and informal linkages with research institutions. Rather than relying on centralized commercialization metrics, Lithuania's approach emphasizes

talent mobility, cluster effects, and private-sector-driven knowledge exchange (Startup Lithuania, 2024).

In contrast, Denmark employs a more centralized and institutionalized system of collaboration and commercialization, coordinated by the Danish Agency for Higher Education and Science. In this model, technology transfer offices, patenting activity, and licensing agreements form the core mechanisms of university–industry interaction (Danish Agency for Higher Education and Science, 2025).

While Lithuania’s model supports flexibility and rapid innovation, it lacks comprehensive and systematic measurement frameworks. Denmark, by comparison, ensures greater accountability and comparability through well-structured national data collection and reporting systems.

Innovation Commercialisation Processes. Commercialisation is assessed through indicators such as the number of licences and options executed, the creation of new spin-offs, and—where available—the revenue generated by incubator portfolios from new products. These metrics reflect the extent to which technologies progress from prototype stages toward market entry.

Available national data indicate strong and measurable commercialisation flows in Denmark over the 2022–2024 period, consistent with a mature university–industry interface. University-level reporting (e.g., technology transfer data from the University of Copenhagen) further demonstrates structured collaboration and well-established licensing practices. Denmark combines high R&D intensity with institutionalized systems for tracking technology transfer and commercialisation, making it the most advanced among the analysed countries in terms of measurable outcomes.

In contrast, comparable consolidated commercialisation data—particularly at the incubator level—remain limited in other countries. Lithuania and Croatia show rapid progress in high-performance digital infrastructure (notably 5G), yet their R&D intensity remains at a moderate level (approximately 1–1.5%), and systematic reporting on commercialisation outcomes is still underdeveloped.

Romania combines low R&D intensity with a significant gap in 5G coverage, which aligns with reported constraints in access to prototyping facilities and specialized laboratories. Turkey demonstrates increasing R&D intensity and has introduced policy instruments supporting technology transfer (e.g., TÜBİTAK 1513); however, commercial 5G deployment and comprehensive data-sharing systems for tracking innovation outcomes are still in development (Eurostat, 2025; European Commission, 2024; TurkStat, 2025).

Concluding remarks. The analysis of the technological environment in Turkey, Croatia, Romania, Denmark, and Lithuania reveals substantial differences in R&D intensity, digital infrastructure (5G) readiness, access to open labs and prototyping facilities, and the maturity of technology transfer (TT) and commercialization pathways (from TRL assessment to licensing and spin-offs).

While all countries aim to foster technology creation and diffusion, the effectiveness and integration of their infrastructures and TT mechanisms vary considerably. These range from a highly institutionalized and metrics-driven model in Denmark to systems constrained by limited or delayed 5G availability (as in Romania and Turkey), fragmented access to laboratory infrastructure, and the lack of standardized commercialization KPIs, particularly evident in Romania.

Table 3.6.4.3 Evaluation of Technological Environment: Country Comparison

Country	Strengths	Weaknesses
Croatia	Well-developed digital infrastructure and connectivity readiness; favourable conditions for testing and technology deployment; a stable technological baseline.	Weaker monitoring of commercialization processes and limited consistency of indicators; open labs and prototyping infrastructure are less standardized, therefore, making comparison and management more challenging.
Denmark	A very strong R&D base; high-quality digital infrastructure; institutionalized technology transfer and commercialization (with clearly defined processes, responsibilities, and partnerships).	High operational and R&D costs may limit accessibility for early-stage innovation; a relatively small domestic market constrains large-scale testing and early commercialization; increasing competition for specialized talent may create bottlenecks in advanced technological fields.
Lithuania	Highly developed connectivity infrastructure; a strong ecosystem of open labs, innovation centres, and regulatory sandboxes; flexible, ecosystem-based collaboration with research institutions enabling rapid iteration.	R&D capacity remains at a moderate level; commercialization and collaboration outcomes are not always systematically measured, resulting in lower comparability and limited managerial clarity.

Romania	Advanced prototyping and laboratory capacities exist in key centres; incubators support technology development within core innovation hubs.	A weaker R&D base; gaps in digital infrastructure; geographically concentrated access to laboratories and prototyping facilities; fragmented commercialization metrics and practices.
Turkey	Growing R&D potential; a strong role of universities and technoparks in prototyping; policy instruments in place to support technology transfer.	Commercial deployment of advanced connectivity infrastructure (5G) had not yet been implemented during the analysed period; standardized commercialization reporting and data-sharing systems are still under development; technological readiness remains uneven.

3.7. Technopark Perspectives in the PEST Context: Cross-Country Case Insights

This section of the Policy Report presents country case analyses based on a qualitative descriptive approach. The study synthesizes insights from representatives of technoparks in Croatia, Denmark, Lithuania, Romania, and Turkey, focusing on their operational conditions, key challenges, identified needs, and proposed solutions within the PEST (political–legal, economic, social, and technological) framework.

Data were collected by presenting incubator representatives with three open-ended questions: (1) which factors currently most constrain the activities of incubators, (2) what measures would be needed to enable incubators to more effectively support startups and innovative companies, and (3) what solutions are proposed in this area.

The responses were systematically categorized according to the PEST dimensions. The aggregated insights made it possible to identify key needs of technoparks and provided a basis for formulating recommendations for both technopark management and policymakers.

3.7.1. Croatia’s Technopark Case Study: Current Situation, Challenges, and Policy Responses

One of the key features of the current situation is the high level of administrative complexity and the *continuously evolving regulatory environment*. Representatives of technoparks emphasize the “*high administrative complexity and changeability of rules,*” particularly in relation to national and EU funding programs. Lengthy application evaluation periods, additional verification procedures, and frequent changes in requirements create significant challenges for both incubators and startups. Furthermore, Croatia still lacks a clearly defined

legal framework for startups, as highlighted by the “*lack of a specific ‘Startup Law’*,” which limits the systematic application of incentives such as stock option schemes or tax relief for reinvested profits.

From an economic perspective, Croatian incubators face challenges similar to those observed in other smaller markets. A key issue is the strong dependence on public funding and the limited diversity of financing sources. As noted, many incubators rely heavily on EU and national budget funds, while private investors (such as venture capital funds and business angels) remain insufficiently active. In addition, the small size of the domestic market compels startups to internationalize at an early stage; however, not all incubators possess sufficient resources to effectively support this process. Another notable challenge relates to the cost of skilled labor, as incubators often struggle to offer competitive salaries, particularly over the long term.

Social challenges in Croatia are closely linked to broader demographic and cultural trends. One of the most significant issues is talent outflow, particularly in STEM fields. Young and highly skilled professionals frequently emigrate, weakening the local innovation ecosystem. In addition, entrepreneurial culture remains insufficiently developed—fear of failure and negative attitudes toward bankruptcy limit individuals’ willingness to engage in innovative activities. Limited visibility of local success stories and an unevenly developed mentorship system further constrain ecosystem growth; in smaller cities, there is a shortage of experienced entrepreneurs capable of advising startups. Although female entrepreneurship in Croatia is relatively strong, women’s access to funding and professional networks remains constrained.

From a technological perspective, Croatian technoparks face challenges related to uneven infrastructure and limited access to advanced technological resources. While some parks offer high-quality facilities, others operate primarily as low-cost office spaces. There is a particular shortage of specialized laboratories and testing environments for deep-tech sectors (such as biotechnology or robotics). In addition, gaps in digitalization within incubator operations are evident, including limited use of CRM systems, a lack of data-driven performance evaluation, and insufficient adoption of artificial intelligence solutions. These challenges are further compounded by issues related to cybersecurity and the protection of intellectual property.

Needs of Croatian Technoparks and Proposed Solutions. The analysis of identified needs and proposed solutions reveals a clear strategic direction—namely, the need to systematize and modernize the entire incubator ecosystem. Representatives of technoparks emphasize the importance of developing a unified national startup platform that would integrate services such

as registration, funding access, mentorship, and intellectual property support. They also highlight the need to introduce a dedicated Startup Law that would clearly define the system of incentives and the regulatory framework.

From an economic perspective, it is proposed to employ the long-term hybrid funding models that combine public and private resources, alongside the introduction of performance-based financing mechanisms for incubators. In the technological domain, suggested measures include the establishment of a national network of open laboratories, the development of digital startup management platforms, and the creation of a centralized innovation data repository.

At the social level, there is a strong emphasis on strengthening entrepreneurial culture, increasing the visibility of success stories, expanding mentorship networks, and fostering closer collaboration between educational institutions and incubators.

Based on the conducted analysis, the following recommendations are proposed for the development of technology parks in Croatia.

Recommendations for Technology Parks

1. Strategic Focus and Specialization

Focus on clearly defined priority high value-added sectors (e.g., deep tech, green technologies, medtech, defence and security technologies), while developing sector-specific competencies, mentorship networks, and infrastructure.

2. Advanced Incubation Model (integrating TRL and performance management)

Transition to an advanced incubation model that includes:

- active involvement in startup product development (beyond advisory support),
- systematic progress tracking based on Technology Readiness Levels (TRL),
- tailored growth programs according to startup maturity,
- clearly defined milestones linked to continued support and funding.

3. Strengthening Core Competencies

Invest in high-value capabilities and services, including:

- artificial intelligence and data analytics (for product development and market validation),
- cybersecurity (especially for deep tech and defence-related startups),
- intellectual property (IP) strategy, patenting, and licensing,

- business model development and internationalization strategies.

4. Internationalization and Soft-Landing Programs

Enhance global integration by:

- developing structured soft-landing programs (mentorship, legal support, market access),
- building partnerships with foreign accelerators, venture funds, and innovation hubs,
- supporting startups in entering target markets through pilot projects and partnerships.

5. Performance Measurement and Impact Evaluation

Implement data-driven evaluation systems covering:

- investment readiness (e.g., funding attracted),
- international expansion (exports, foreign market entry),
- commercialization outcomes (products launched, licenses granted),
- economic impact (jobs created, revenue growth, R&D investments).

6. Ecosystem Coordination Role

Act as active coordinators of the innovation ecosystem by:

- initiating collaborative projects between business, academia, and investors,
- developing shared infrastructure (testing and prototyping facilities),
- facilitating access to funding and talent,
- organizing joint innovation programs and challenge-based initiatives.

Recommendations For Policymakers

1. Sustainable Funding Model

Ensure stable and predictable funding by:

- combining baseline (institutional) funding with competitive project-based instruments,
- linking funding to clear performance indicators (KPIs),
- implementing multiannual funding frameworks.

2. Reducing Administrative Burden

Simplify funding mechanisms by:

- reducing reporting requirements and standardizing procedures,
- implementing a one-stop-shop approach for funding administration,
- shortening decision-making timelines.

3. Strengthening Early-Stage Financing

Enhance financial instruments by:

- establishing and expanding co-investment funds with private capital,
- improving access to pre-seed and seed funding,
- introducing tax incentives for business angels and venture capital investors.

4. Regional Innovation Development

Reduce regional disparities by:

- investing in innovation infrastructure in regions (labs, co-working spaces),
- strengthening local competencies through training and mentorship,
- encouraging regional innovation centers to specialize in niche areas.

5. Promoting Internationalization

Increase ecosystem openness by:

- supporting international collaboration projects and partnerships,
- funding startup participation in global programs,
- facilitating integration into global value chains through export and innovation support measures.

3.7.2. Denmark's Technopark Case Study: Current Situation, Challenges, and Policy Responses

Denmark's incubator system is characterized by a favorable and ***stable legal environment***. Unlike in many other countries, political and legal factors are not perceived as major constraints on operations. The regulatory framework is generally business-friendly; however, certain aspects related to tax policy may have adverse effects—particularly in cases where startups operate at a loss over extended periods. In such situations, the tax system may limit business flexibility and reduce investor incentives.

Despite the supportive institutional environment, the main challenges in Denmark arise ***in the economic domain***. One of the key issues is the limited availability of public funding for incubation activities. Incubators rely predominantly on private capital, which constrains expansion opportunities and increases financial risk. In addition, rising interest rates have made borrowing more expensive, further elevating the risk associated with startup investments. This is particularly challenging for early-stage companies.

From a social perspective, Denmark's ecosystem is relatively advanced; however, certain challenges remain. Although supportive social security mechanisms exist (e.g., the possibility of receiving benefits while developing a startup), entrepreneurship may be less attractive due to lower income potential compared to traditional employment. Gender disparities are also evident, with women still facing greater barriers in establishing themselves in entrepreneurship. Furthermore, structural differences persist across social groups—for example, businesses founded by migrants often demonstrate more limited growth potential.

From a technological perspective, Danish incubators face challenges related to resource efficiency. Specialized laboratories and advanced equipment are often too costly to maintain independently, limiting incubators' capacity to support high-tech startups (such as those in biotechnology or medical technologies). As a result, there is a growing need for more efficient utilization of existing infrastructure, particularly through closer collaboration with universities.

Needs of Danish Technoparks and Proposed Solutions. The analysis indicates that several key changes are required to further strengthen the performance of Danish incubators.

First, there is a need for stronger public funding mechanisms. It is proposed to introduce performance-based funding schemes, for example by allocating additional funding to incubators whose startups demonstrate survival beyond a defined period. Such an approach would incentivize not only the creation of startups but also their long-term sustainability.

Second, there is a need for enhanced tax incentives for investors, particularly by enabling more flexible loss compensation from investments in startups. This would help increase private capital flows into early-stage ventures.

Third, the issue of income disparity between entrepreneurship and traditional employment emerges as a challenge. This could be addressed through targeted public support programs or subsidies for early-stage entrepreneurs, thereby improving the attractiveness of entrepreneurial careers.

Fourth, improving access to infrastructure is essential. Strengthening collaboration with universities is recommended, allowing incubator clients to access laboratory facilities on a demand-based basis. In addition, incubators are encouraged to specialize in specific sectors (e.g., fintech, medtech), enabling more efficient and targeted investment in infrastructure.

Finally, the strengthening of human resources is emphasized. Incubators require highly skilled professionals who are capable not only of tracking market trends but also of transferring

knowledge to startups. Building strong communities is equally important, where startups themselves actively share experiences and best practices.

Recommendations for Technology Parks

1. Strategic Specialization

Specialize in clearly defined sectors (e.g., fintech, medtech) to ensure more efficient use of resources, stronger expertise, and higher value-added services for startups.

2. Strengthening Collaboration with Universities

Enhance cooperation with universities by:

- providing incubator clients with flexible, on-demand access to laboratory and research infrastructure,
- facilitating joint research, prototyping, and innovation activities.

3. Capacity Building and Competence Development

Strengthen the capabilities of both incubator teams and startups by:

- ensuring continuous upskilling of staff in technological and market trends,
- providing structured consulting, training, and mentoring services to startups,
- developing standardized support programs tailored to startup needs.

4. Community Building and Knowledge Sharing

Foster active startup communities by:

- promoting knowledge exchange through mentorship programs,
- engaging startups in peer-learning activities,
- organizing regular events such as webinars, workshops, and practical seminars.

Recommendations For Policymakers

1. Results-Based Funding Models

Introduce performance-based funding schemes for incubators, linking financial support to measurable outcomes such as startup growth, investment attraction, and innovation outputs.

2. Tax Incentives for Investors

Expand tax relief schemes for investors, particularly focusing on mechanisms that allow compensation of investment losses, thereby reducing investment risk.

3. Early-Stage Financing Support

Promote early-stage entrepreneurship financing by:

- implementing risk-sharing mechanisms,
- incentivizing private investment into startups,
- improving access to seed and pre-seed funding.

4. Promoting Inclusion and Gender Equality

Support social initiatives aimed at increasing gender equality and inclusiveness in entrepreneurship by:

- funding targeted programs and support networks,
- encouraging diversity in startup ecosystems,
- integrating inclusion criteria into funding instruments.

3.7.3. Lithuania's Technopark Case Study: Current Situation, Challenges, and Policy Responses

The activities of incubators in Lithuania take place within an environment characterised by growing innovation potential and clearly defined strategic directions; however, they also face structural and systemic challenges. Although innovation policy is being consistently developed and aligned with European Union priorities, in practice incubator operations are constrained by cyclical funding, the dominance of project-based financing, and a relatively high administrative burden. This limits their ability to plan long-term activities, develop sustainable service models, and respond flexibly to the needs of startups.

One of the key features of the ***economic environment*** is the limited stability of funding and the lack of mechanisms ensuring long-term operational continuity. Project-based financing often results in fragmented activities, while incubators face challenges in retaining highly qualified specialists and ensuring service continuity. From an economic perspective, access to early-stage funding (particularly pre-seed and seed) remains a persistent issue, especially in the deep-tech sector, where larger investments and longer payback periods are required. In addition, rising operational costs, competition for talent, and the need for rapid internationalisation place further pressure on both startups and incubators.

In the social context, disparities in entrepreneurial culture and inclusion challenges become evident. Although the level of entrepreneurship in Lithuania is increasing, there remains a

shortage of mentors and internationally experienced experts, while regions face more limited opportunities to form strong startup teams. There is also a need to increase the participation of women, youth, migrants, and other groups in the innovation ecosystem. At the regional level, differences between the Capital Region and Central and Western Lithuania highlight the uneven development of the innovation ecosystem.

From a technological perspective, incubators operate in a highly dynamic environment marked by the rapid growth of artificial intelligence, the data economy, cybersecurity, digital transformation, and green technologies. However, access to infrastructure and competencies is not always evenly distributed, and advanced testing and prototyping facilities required for deep-tech innovation remain limited. This constrains the development and commercialisation of high value-added innovations.

Needs of Lithuanian Technoparks and Proposed Solutions. The analysis highlights several key needs of incubators. First, a more stable and long-term funding model is required to ensure not only the implementation of project-based activities but also the sustainable maintenance of infrastructure and the retention of competent teams. A transition towards a mixed funding model—combining baseline operational funding with project-based financing—is essential.

Second, improved access to capital for early-stage startups is needed. It is recommended to strengthen the “investment pathway” logic, from idea validation to investor readiness, to develop co-investment mechanisms, encourage the involvement of business angels and venture capital funds, and enhance links with corporate partners.

Third, there is a need to strengthen technological infrastructure. This includes investments in testing and prototyping facilities, Living Lab environments, and digital mentorship platforms, as well as expanding access for startups and SMEs to advanced infrastructure at the national level.

Fourth, the development of human capital and entrepreneurial culture remains crucial. Proposed measures include the establishment of strong mentorship networks, increasing the availability of international experts, promoting the development of export and entrepreneurial competencies, and implementing targeted inclusion measures for diverse social groups.

Finally, there is a clear need to enhance incubators’ capacity to support startups in implementing digital and green transformation, with particular emphasis on artificial intelligence applications, data governance, and cybersecurity.

Recommendations for Technology Parks

1. Development of Integrated Service Offerings

Develop comprehensive support services that cover the full startup growth cycle, including:

- investment readiness,
- market validation,
- international expansion support.

2. Internationalization and Soft-Landing Programs

Strengthen international engagement by:

- expanding partnerships with foreign innovation ecosystems,
- developing structured soft-landing programs to support market entry,
- facilitating access to international networks, investors, and partners.

3. Investment in Technological Competencies

Build and expand key technological capabilities, including:

- artificial intelligence and data analytics,
- cybersecurity,
- intellectual property (IP) management, to better support high-tech startup development.

4. Sector-Specific Expertise Development

Deepen specialization in priority sectors (e.g., deep tech, green technologies, medtech, defense and security) by developing tailored services, expert networks, and targeted support programs.

5. Data-Driven Performance Evaluation Systems

Improve incubator evaluation systems by implementing data-driven performance metrics that assess:

- startups' investment readiness,
- scale and scope of international expansion,
- commercialization outcomes,
- overall economic and innovation impact on the ecosystem.

6. Ecosystem Coordination Role

Act as coordinators of innovation ecosystem networks by:

- connecting businesses, research institutions, investors, and public actors,
- fostering collaboration across value chains,

- initiating joint innovation activities and partnerships.

Recommendations For Policymakers

1. Stable and Long-Term Funding Frameworks

Ensure more stable and predictable funding for incubators by:

- combining baseline (institutional) and project-based funding models,
- enabling long-term planning and sustainability.

2. Reduction of Administrative Burden

Simplify funding mechanisms by:

- reducing administrative requirements,
- streamlining implementation and reporting processes.

3. Strengthening Early-Stage Financing Instruments

Enhance support for early-stage startups by:

- expanding funding instruments,
- promoting the creation of co-investment funds with private investors.

4. Reducing Regional Innovation Disparities

Address regional imbalances by:

- investing in infrastructure and competencies outside capital regions,
- supporting regional innovation ecosystems and capacities.

5. Promoting Internationalization and Interregional Cooperation

Strengthen the global integration of the innovation ecosystem by:

- encouraging international partnerships,
- supporting interregional collaboration initiatives,
- facilitating participation in global value chains.

3.7.4. Romania's Technopark Case Study: Current Situation, Challenges, and Policy Responses

The activities of incubators in Romania take place within an environment that appears favourable to innovation at first glance, but in practice is characterised by significant administrative complexity and instability. Although various funding instruments exist—particularly those related to EU funds—their implementation is hindered by complex

procedures, frequent legal changes, and a fragmented support system. As a result, incubators face planning uncertainty, and startup development processes are slowed.

One of the key features is the limited predictability of the **legal environment**: frequently changing tax regulations and rules for small businesses increase institutional risk. In addition, the public procurement system is slow and conservative, making it difficult for startups to secure their first clients in the public sector. This constrains the testing of innovations in real market conditions.

From an economic perspective, incubators are under pressure from macroeconomic factors such as inflation, rising financing costs, and limited access to capital for early-stage startups. A particularly pronounced issue is the concentration of funding in major cities (Bucharest, Cluj, Iași, and Timișoara), while regional innovation ecosystems remain weaker. Incubators themselves often depend on short-term project-based funding, resulting in a lack of stable operational financing and difficulties in retaining highly qualified specialists.

In the social context, a key barrier is the relatively underdeveloped entrepreneurial culture. Fear of failure and negative societal attitudes towards entrepreneurship remain prevalent. Moreover, regions face a shortage of talent, as qualified professionals tend to emigrate or concentrate in major urban centres. Access to mentors is also uneven, and team formation remains challenging.

From a technological perspective, disparities in infrastructure are evident. Access to advanced laboratories and prototyping equipment is limited and concentrated in a few centres. The capacity of university technology transfer systems varies, resulting in uneven development in intellectual property management and commercialisation. These challenges are particularly acute for deep-tech startups, which require costly infrastructure and specialised regulatory knowledge.

Needs of Romanian Technoparks and Proposed Solutions. The analysis of the responses reveals several key needs of incubators. First, there is a clear need for greater stability in the legal and financial environment. Incubators emphasise the importance of a multiannual, predictable funding system, as well as the application of a “once-only” reporting principle to reduce administrative burden.

Second, improved access to capital is required. Proposed measures include the establishment of joint public–private investment funds, the promotion of business angel investments through

tax incentives, and the expansion of early-stage financing instruments (e.g., innovation vouchers).

Third, the strengthening of technological infrastructure is identified as a priority. Recommendations include the creation of a national network of open-access laboratories, enabling startups to utilise research infrastructure across the country (based on a “lab passport” principle), and enhancing technology transfer systems within universities.

Fourth, the development of human capital and entrepreneurial culture is essential. Suggested actions involve expanding mentorship networks, engaging the diaspora, integrating entrepreneurship education at early stages of the education system, and fostering a more positive attitude towards business risk.

Finally, there is a strong emphasis on strengthening incubators’ competencies, particularly in the areas of commercialisation, market validation, investment attraction, and international expansion.

Recommendations for Technology Parks

1. Practical, Hands-On Support for Startups

Expand support beyond mentorship by providing practical, execution-focused assistance, including:

- sales development and customer acquisition,
- pricing strategies,
- market validation and go-to-market support.

2. Internationalization and Export-Oriented Programs

Strengthen global engagement by:

- building and maintaining international partnerships,
- developing export-oriented acceleration programs,
- supporting startups in entering and scaling in foreign markets.

3. Collaboration with Universities and Technology Transfer

Enhance cooperation with academic institutions by:

- strengthening technology transfer processes,
- improving intellectual property (IP) management practices,
- facilitating commercialization of research outcomes.

4. Data-Driven Monitoring and Impact Measurement

Implement robust, data-driven monitoring systems that track both performance and impact, using indicators such as:

- startup survival rates,
- revenue growth,
- export performance,
- broader ecosystem impact.

5. Active Role in Innovation Policy Development

Actively contribute to shaping innovation policy by:

- collaborating with government institutions,
- engaging with investors and ecosystem stakeholders,
- providing evidence-based insights and feedback.

Recommendations For Policymakers

1. Stable and Predictable Regulatory Environment

Ensure a consistent regulatory framework by:

- reducing the frequency of legal changes,
- increasing transparency and predictability for businesses and investors.

2. Simplification of EU Funding Administration

Streamline EU funding processes by:

- simplifying administrative procedures,
- introducing a unified reporting system,
- reducing bureaucratic complexity.

3. Development of Co-Investment Funds

Establish national co-investment funds in partnership with private investors to:

- leverage private capital,
- reduce investment risk,
- increase funding availability for startups.

4. Innovation-Friendly Public Procurement Reform

Reform public procurement systems by:

- introducing innovation-friendly pilot procurement schemes,
- enabling startups to test and scale solutions through public sector demand.

5. Investment in Regional Innovation Infrastructure

Reduce disparities between major cities and regions by:

- investing in regional innovation infrastructure,
- strengthening local innovation ecosystems and capabilities.

3.7.5. Turkey's Technopark Case Study: Current Situation, Challenges, and Policy Responses

Responses from representatives of Turkish technoparks reveal a relatively complex operational environment for incubators, characterised by both features of a rapidly developing innovation ecosystem and structural constraints. The current situation can be described as a system strongly dependent on state support, in which incubators play an important role in fostering innovation, yet their effectiveness is limited by institutional and economic factors.

One of the most prominent challenges is the ***complexity and slow pace of bureaucratic procedures***. Application and evaluation processes are lengthy, and delays in funding disbursement create liquidity challenges for startups. As noted, “*application processes are often time-consuming.*” In addition, the company establishment process involves multiple stages and institutions, further complicating the creation of early-stage ventures. At the same time, there is a significant administrative burden—ranging from social security obligations to accounting requirements—which is particularly challenging for small, newly established firms.

From an economic perspective, a key challenge remains the limited diversity of funding sources and the low availability of private capital. Although public funding is significant, it does not ensure sufficient flexibility or speed. Moreover, investment cycles in Turkey are considerably longer than the EU average—“7–10 months, double the EU average”—which constrains startup growth. The situation is further intensified by rapidly increasing operational costs; incubator expenses have risen by 65–90% over a short period, limiting their ability to provide affordable services to startups.

Social factors also have a significant impact on incubator performance. In Turkey, a cautious attitude towards entrepreneurship persists—“*low risk tolerance*” and a “*social stigma around failure*” reduce individuals’ motivation to engage in innovative ventures. In addition, there is a shortage of qualified specialists, as talent tends to concentrate in major cities or migrate abroad.

This issue is compounded by limited collaboration between universities and industry, a lack of mentors, and insufficient visibility of success stories. Gender inequality is also highlighted, with women facing greater difficulties in accessing funding and professional networks.

From a technological perspective, challenges are related to uneven infrastructure, limited access to data, and an insufficient level of digitalisation. As noted, there is a “lack of data access and digitalization,” as well as slow data sharing between universities and industry. This constrains the development and testing of innovations, particularly in high-tech sectors.

Needs of Turkish Technoparks and Proposed Solutions

The analysis of the needs and proposed solutions within the Turkish technopark ecosystem highlights a clear direction—the need to transition towards a more integrated, digitalised, and efficiently managed innovation system by reducing administrative burdens and strengthening the financial and technological capacity of the ecosystem.

Representatives of technoparks emphasise the need to reduce bureaucracy and simplify administrative procedures, which currently slow down company formation, access to support, and the implementation of innovations. At the same time, it is recommended to strengthen funding models by transitioning towards mixed public–private co-funding schemes, introducing early-stage “match funding” mechanisms (e.g., 1:1 state and venture capital investment models), and expanding early-stage financing instruments. In parallel, greater efforts should be made to more effectively integrate private capital—such as business angels, venture capital (VC), and corporate venture capital (CVC)—into the startup ecosystem.

To enhance ecosystem efficiency, it is proposed to establish shared service platforms (“Joint Service Pool”) for incubators, which would centralise administrative, advisory, and support functions, thereby reducing operational costs and duplication. There is also a strong emphasis on the development of national digital platforms encompassing data management, intellectual property administration, and startup monitoring, as well as on strengthening data-driven decision-making.

In the area of technological infrastructure, it is recommended to develop open R&D infrastructures (“Open R&D Consortium”), enabling the sharing of laboratories, testing environments, and research resources across technoparks. This would allow for more efficient utilisation of costly infrastructure and accelerate the commercialisation of innovations.

In terms of human capital and ecosystem development, there is a clear emphasis on strengthening mentorship and entrepreneurship education programmes, as well as expanding

social initiatives aimed at increasing the inclusion of women and youth in the innovation ecosystem. Additionally, the introduction of AI-based mentorship and startup evaluation systems is proposed, which would help personalise support and improve both the quality and speed of decision-making.

Recommendations for Technology Parks

1. Strategic Specialization in Priority Technologies

Focus on clearly defined priority technological domains (e.g., artificial intelligence, green technologies) by concentrating human, infrastructural, and financial resources to build strong, competitive capabilities.

2. Integration into International Innovation Networks

Strengthen international engagement by:

- developing partnerships with global innovation actors,
- actively integrating into EU innovation networks (e.g., Enterprise Europe Network – EEN),
- facilitating cross-border collaboration and market access for startups.

3. Enhancing the Quality of Mentorship

Improve mentorship effectiveness by:

- ensuring high-quality, experienced mentors,
- structuring mentorship programs with clear objectives and outcomes,
- promoting efficient knowledge sharing between mentors and startups.

4. Adoption of Digital Solutions

Implement digital tools to improve service delivery and performance, including:

- AI-based mentoring solutions,
- data analytics for startup monitoring and decision-making,
- digital platforms for service management and collaboration.

5. Development of Shared Infrastructure

Promote collaboration between technology parks by:

- jointly developing and operating shared infrastructure (e.g., laboratories, testing environments, digital platforms),
- optimizing resource use and reducing costs,
- improving startup access to advanced equipment and services.

Recommendations For Policymakers

1. Simplification of Administrative and Funding Procedures

Streamline processes by:

- reducing administrative complexity,
- shortening application evaluation timelines,
- improving efficiency of funding allocation.

2. Encouraging Private Capital Participation

Encourage private investment by:

- offering tax incentives,
- supporting the creation of co-investment funds,
- reducing risk for private investors.

3. Development of National Digital Platforms

Establish national-level digital platforms to:

- centralize incubator data,
- improve access to services,
- enhance transparency and coordination across the ecosystem.

4. Talent Attraction Policies

Implement measures to attract and retain talent by:

- facilitating visa processes and international mobility,
- providing tax incentives for highly skilled professionals,
- supporting talent integration into innovation ecosystems.

5. Strengthening University–Industry Collaboration

Enhance collaboration between academia and business by:

- developing joint programs and initiatives,
- promoting knowledge transfer and applied research,
- aligning academic outputs with market needs.

3.8. Key Findings and Policy-Relevant Insights from Startups' Interviews

Methodological framework: Qualitative Research Approach. To explore startup experiences, challenges, and expectations within incubation processes across different countries, a qualitative study was conducted. The aim was to generate practical insights and formulate recommendations for key stakeholders, including policymakers, incubator managers, and startups.

Data Collection. Data were collected through semi-structured interviews, which allowed for an in-depth understanding of participants' experiences and perspectives. Interviews were conducted on a one-to-one basis (face-to-face or online), using open-ended questions to encourage detailed responses while maintaining a flexible and conversational format.

The interview guide was structured around three main thematic areas:

- Startup profile (e.g., sector, stage of development, products/services, participation in incubation programmes);
- Incubation experience (e.g., expectations, challenges, benefits received, contribution of incubators to growth);
- Recommendations and insights (e.g., suggestions for improving incubator services, advice for other startups, and policy recommendations for strengthening innovation ecosystems).

This structure ensured consistency across interviews while allowing respondents to elaborate on issues most relevant to their experience.

Sample and Selection Criteria. A purposive sampling approach was applied to ensure the inclusion of relevant and information-rich cases. The study covered startups operating in Croatia, Turkey, Romania, Denmark, and Lithuania. To capture a broad range of perspectives, a maximum variation sampling strategy was used. Startups were selected based **on the following criteria:**

- Stage of development: early-stage and scaling startups (approximately 1–4 years of operation);
- Incubation experience: active participation in incubation or acceleration programmes;
- Sector diversity: including IT, artificial intelligence, engineering, health technologies, digital services, creative industries, education technologies, and green/sustainability solutions;
- Product type: digital, hardware, or hybrid solutions;
- Market orientation: B2B, B2C, or mixed models.

In total, more than 22 startups were interviewed, including founders, managers, and key team members.

Use of Findings. The qualitative analysis is structured in two stages: first, common challenges are identified across all cases to capture systemic patterns, and second, a country-level analysis is conducted to explore context-specific experiences, outcomes, and policy-relevant insights.

The findings of the qualitative analysis were used to develop practical recommendations tailored to three main stakeholder groups: policymakers, incubator and technopark managers, startups and companies considering participation in incubation programmes. This structure ensures that insights are applicable across different levels—from policy design to operational improvements and practical startup support.

Limitations. The study is based on a qualitative, relatively small, and purposively selected sample; therefore, the findings are not statistically generalisable. The results also reflect participants' subjective experiences and perceptions, which may introduce some bias. In addition, the study captures a specific point in time and does not assess long-term startup development trajectories. Despite these limitations, the research provides valuable, practice-oriented insights into startup incubation processes across different national contexts.

3.8.1. What challenges do startups in different countries face?

The analysis of startup experiences across different countries reveals several key patterns of challenges faced by startups, encompassing both internal business development aspects and external environmental factors.

It should be noted that the patterns presented below are illustrated through selected country-specific examples rather than uniformly across all analysed countries. The cases highlighted reflect those contexts in which respondents provided the most detailed and nuanced accounts of particular challenges. This approach allows for a clearer and more in-depth understanding of specific issues, while recognising that similar dynamics may also exist in other countries but were less explicitly articulated during the interviews.

One of the most prominent patterns relates to *market entry and legitimacy challenges*, associated with startups' ability to build trust, establish themselves in the market, attract clients (particularly first customers), and position themselves as reliable partners for pilot projects. These challenges are especially evident in Turkey, where early-stage companies face difficulties in demonstrating credibility, particularly when operating in larger or more regulated sectors. In such cases, affiliation with an incubator or technopark becomes an important source

of legitimacy, helping to shape a “trusted partner” image. Similar dynamics are observed in Croatia, where startups struggle to transition from networking opportunities to securing actual clients and pilot projects.

Another important pattern concerns ***operational and implementation challenges***, related to startups’ practical ability to transform ideas into viable products and technological solutions. In the case of Croatian startups, this is reflected in difficulties in moving from the idea stage to concrete products or services, as well as in implementing technological solutions. It is also evident that the value derived from incubators depends not only on the services they provide but also on startups’ own capacity to engage with and actively utilise these services.

A third pattern reflects ***contextual or external environment challenges***, arising from economic and organisational conditions. The Romanian case demonstrates that even in the presence of a supportive incubator environment, startups’ ability to fully benefit from available services may be constrained by external factors such as economic uncertainty and limited organisational resources. Small teams often lack the time and capacity to actively participate in incubator activities—such as training sessions, mentorship programmes, networking events, and business development workshops—which reduces the overall benefits gained from incubation. In addition, more advanced startups, which already have a product or customer base, do not always perceive value in standardised early-stage incubation and entrepreneurship programmes, which are typically focused on idea validation, business model development, and the acquisition of basic entrepreneurial skills.

A fourth pattern relates to ***structural challenges*** (legal, administrative, and infrastructural), which stem from the broader regulatory, legal, and institutional environment and arise independently of the quality of incubator services. In Denmark, for example, startups face complex and costly patenting and legal procedures, requiring significant financial and time resources. In addition, the Danish case highlights a mismatch between available infrastructure and the needs of certain startups, as incubators tend to focus on office-based environments while not always providing adequate technical facilities for product development, particularly for hardware-oriented companies. In Lithuania, regulatory and bureaucratic barriers are also evident, especially in more highly regulated sectors such as fintech and med-tech. These factors can divert startups’ attention away from product development towards managing administrative processes.

Finally, a critical pattern concerns **resource availability and ecosystem maturity challenges**, referring to the extent to which the overall system—funding, talent, institutions, and market conditions—is capable of supporting startup growth. This is particularly evident in the Lithuanian context. Startups face a shortage of early-stage funding, which constrains product development and scaling. There is also a lack of highly qualified specialists, particularly in technology and engineering fields. Furthermore, incubation programmes are often standardised and insufficiently tailored to the diverse needs of startups, especially in the deep-tech sector. Additional pressure arises from the so-called “early-stage paradox,” where investors expect mature solutions, while startups require funding at earlier stages. Finally, due to the limited size of the domestic market, startups are compelled to pursue international expansion from an early stage, which introduces additional challenges related not only to global market entry but also to strategic management decisions.

In summary, startup challenges across countries can be understood as operating at several interrelated levels—ranging from internal (operational) to external (market, structural, and ecosystem-related) factors. The analysis shows that in the early stages of startup development, challenges related to market entry and legitimacy, as well as resource constraints, tend to dominate (particularly in Lithuania and Türkiye). These are primarily associated with building customer trust, accessing funding, and attracting talent.

At later stages of development, operational and implementation challenges, along with infrastructural constraints, become more prominent (as observed in Croatia and Denmark), particularly in relation to the realisation of technological solutions, prototype development, and the alignment of incubator services with specific startup needs. Meanwhile, contextual challenges arising from the broader economic and organisational environment (as illustrated in the Romanian case) can significantly limit startups’ ability to actively engage in incubator activities and fully benefit from the support provided, regardless of the quality of the incubators themselves.

3.8.2. How do startups perceive incubators, and what expectations did they have before joining them?

In the Croatian context, incubators were initially perceived by startups in a relatively narrow sense prior to their engagement—primarily as providers of physical workspace offering basic infrastructure for business operations. Startups tended to view incubators as a practical solution

to the lack of office space rather than as strategic partners or comprehensive platforms for business development.

Accordingly, startups' expectations before joining incubation programmes were also relatively limited. Most expected access to affordable office space, along with basic services and infrastructure necessary for day-to-day operations. Broader value propositions—such as mentorship, networking opportunities, access to partners, or business development support—were not clearly identified as key expectations.

Overall, the initial perception and expectations of Croatian startups can be characterised as functional and relatively narrow, focused primarily on physical resources and basic operational infrastructure rather than on the wider value offered by incubators.

In the Turkish context, incubators were perceived by startups, prior to engagement, as strategic partners capable of providing not only physical infrastructure but also broader added value—such as access to knowledge, professional networks, and market opportunities. The role of the incubator was understood as active participation in the startup growth process, rather than merely the provision of workspace.

Accordingly, startups' expectations before joining incubation programmes were comprehensive and oriented towards long-term business development. These expectations encompassed both technological and business development aspects, including mentorship, networking opportunities, technical and academic support, as well as a productive, growth-oriented working environment. This indicates that incubators were perceived as integral components of the broader ecosystem, contributing to both product development and organisational growth.

Thus, in the case of Turkish startups, the perception of incubators and associated expectations reflect a more strategic and systemic perspective, oriented towards the broader context of innovation and business development.

In the Romanian context, incubators and technology parks were primarily perceived by startups, prior to engagement, as providers of basic infrastructure and administrative support, mainly associated with ensuring physical workspace and offering practical operational assistance. The role of the incubator was therefore understood more as operational support rather than as a strategic partner for business development.

Startups' expectations before joining incubation programmes were heterogeneous. Some had no clearly defined expectations, while others anticipated receiving mentorship, access to

investor networks, and opportunities to attract funding. Thus, the range of expectations varied from minimal to more comprehensive, encompassing broader business support.

In summary, in the Romanian case, the perception of incubators and the expectations associated with them are diverse and largely depend on the experience and level of preparedness of the startups themselves.

In the Danish context, incubators were initially perceived by startups, prior to engagement, as providers of physical space, work facilities, and basic support structures, without fully recognising their potential role as broader platforms for innovation, networking, and business growth.

Startups' expectations before joining incubation programmes were oriented towards comprehensive support, including physical infrastructure, knowledge transfer, mentorship, and access to professional and financial networks. As startups became engaged in the incubation process, these expectations—combined with practical experience—led to a shift in perceptions, as they began to recognise the broader value of incubators beyond basic infrastructure, particularly in terms of networking and business development support.

In summary, in the Danish case, startups' perceptions and expectations of incubators encompassed both basic infrastructural functions and wider opportunities for business development and networking support.

In the Lithuanian context, incubators and technoparks were initially perceived by startups, prior to engagement, as an important “launch platform” providing access to resources that early-stage ventures typically lack. As such, incubators were viewed as environments offering comprehensive support—from mentorship and training to networking opportunities and access to investors. Emphasis was also placed on personalised support, which helps compensate for early-stage competency gaps, leading startups to perceive incubators as a safe environment for testing and validating ideas.

Startups' expectations before joining incubation programmes were primarily focused on practical benefits that would facilitate the transition from idea to operational business. These included access to funding sources and investor networks, mentorship in product development, sales and internationalisation, as well as networking opportunities. Startups also expected support in reducing early-stage uncertainty, particularly in relation to decision-making on business models, product development, and market selection.

In summary, after engaging in incubation programmes, Lithuanian startups developed a broader understanding of incubators—not only as physical workspace providers, but also as platforms for business growth and market access.

3.8.3. Are startups' expectations met, and what value do incubators create?

In the case of Croatian startups, a clear positive discrepancy can be observed between initial expectations and actual experience—the incubator not only met but, in many cases, exceeded the startups' original expectations. The fulfilment of expectations was most evident through mentorship, access to professional networks, increased market visibility, and opportunities for collaboration. These aspects significantly expanded startups' initial understanding of the incubator's role, which at the outset they had associated primarily with infrastructure, limited to workspace provision and administrative support.

The value created by the incubator became particularly apparent when analyzing its contribution to startup growth. One of the most important elements was the **establishment of a structured business environment**, which enabled startups to transition from informal, often freelance-based activities to organized business models. **Mentorship**—both from in-house experts and external consultants—had a direct impact on business development: startups refined their business plans, learned pricing strategies, received guidance on intellectual property protection, and prepared projects related to ISO 27001 compliance. Additionally, mentorship helped identify funding sources, including EU programs such as “Interreg,” and facilitated access to opportunities provided by the Enterprise Europe Network (EEN).

Networking was equally significant and produced tangible results. Through events organized by the incubator, such as “Biz Meetups,” “Devz Meetups,” and “Makers Meetups,” startups not only expanded their professional connections but also gained new technical and business knowledge. These connections often translated into concrete collaborations: partnerships were established with companies in the construction, IT, media, and EdTech sectors, leading to the implementation of pilot projects, the development of new hybrid products, and the expansion of service portfolios. In some cases, startups were also able to reach international clients through the EEN network.

An important contribution of the incubator was also the strengthening of **startups' visibility and reputation**. Participation in events such as the “Voogles Conference,” along with the opportunity to present their activities to a broader audience, helped increase their market credibility and

attract initial clients or partners. The incubator also supported promotion through its own communication channels, further reinforcing startups' positions within the ecosystem.

In summary, it can be argued that, according to Croatian startups, the most valuable contribution of the incubator is the combination of mentorship and networking. This not only helped address practical business development challenges but also created conditions for tangible growth outcomes—from initial pilot projects to international partnerships. It can be assumed that, in this case, the incubator functioned as a catalyst for business growth, providing not only structure and knowledge but also access to resources and connections that enable startups to establish themselves in the market and expand both locally and internationally.

In the case of Turkish startups, it is evident that the incubator largely met their prior expectations, which had been clearly defined before participation and were primarily oriented toward strategic benefits. The fulfilment of expectations was mainly reflected through mentorship, academic collaboration, and access to industry and investor networks. However, while the core expectations were met, the experiences of startups also reveal certain areas for improvement, particularly in expanding access to investors, increasing process efficiency, and enhancing the availability of specialized competencies (e.g., in AI or IoT).

The value created by the incubator is particularly evident in its contribution to startup growth and the ***strengthening of legitimacy***. One of the most important aspects was the development of corporate credibility: operating within a technopark provided startups with the image of a “reliable technology partner,” which is especially important when working with large or highly regulated industries such as the defence sector. This reputational capital facilitated the establishment of client relationships and the initiation of initial pilot projects.

A significant component of the incubator's contribution was ***mentorship and business development support***, which had a direct impact on startup operations. Consultations helped refine business models, improve understanding of customer needs, and accelerate product commercialization processes as well as partnership formation. ***Academic collaboration*** was also highly important, particularly with Bursa Technical University (BTÜ), as it strengthened startups' research and development (R&D) capabilities and created conditions for long-term technological advancement.

Equally important was ***access to professional and industry networks***, which created opportunities to establish connections with partners, clients, and other companies. Synergies with other firms within the technopark enabled startups to participate in joint projects, share

knowledge and resources, and expand their activities across different sectors. In addition, the incubator contributed to the management of administrative and financial processes—startups received ***support in preparing applications for funding programs*** such as KOSGEB and TÜBİTAK, as well as legal and intellectual property (IP) assistance. Consultations in the areas of patents, trademarks, and commercial agreements allowed startups to reduce administrative burden and focus on their core activities—product development.

In summary, according to Turkish startups, the most valuable contributions of the incubator are mentorship, access to professional networks, and the strengthening of corporate credibility. These elements not only helped address practical business development challenges but also created conditions for faster product commercialization, the development of strategic partnerships, and more sustainable growth. It can be assumed that, in this case, the incubator functioned as an advanced business development platform that successfully meets the high expectations of startups.

The Romanian startups' responses emphasize that the value provided by the incubator and the fulfillment of expectations largely depend on the initial level of experience with which startups enter incubation programs. Startups with less clearly defined expectations tend to evaluate the incubator positively, particularly emphasizing the usefulness of practical tasks and learning content. In contrast, more experienced startups assess the incubator through the lens of practical applicability, highlighting that theoretical knowledge is insufficient if it is not directly linked to real business challenges. As a result, the fulfilment of expectations is most strongly associated with the ability to translate theoretical knowledge into practical solutions in real business contexts.

The value created by the incubator in the context of Romanian startups is primarily reflected in ***practical learning and business structuring***. Startups noted that through mentorship they acquired new analytical tools, including SWOT and other business analysis methods, which helped them identify business gaps and better understand their operations. The incubator also contributed to strengthening startups' reputation and team development by enabling clearer structuring of internal processes and the practical validation of ideas.

An important component of the incubator's contribution was ***networking***, which provided access to events where startups could establish connections with other startups, mentors, and potential partners. This facilitated further collaboration and idea development. It was also observed that external factors, such as economic uncertainty or global business challenges,

limited some startups' ability to fully benefit from the value offered by the incubator, as they had to allocate a larger share of their resources and time to maintaining day-to-day operations and ensuring survival, rather than actively participating in incubation programs.

In summary, from the perspective of Romanian startups, the most valuable contribution of the incubator is the combination of practical mentorship, business idea validation, and networking. It can be assumed that, in this case, the incubator functioned as a platform that not only helps startups acquire knowledge but also apply it in practice, strengthen team structures, and refine business gaps within a real business context.

Findings from **Danish startups** reveal that the incubator largely satisfied their expectations, especially in terms of providing comprehensive business development support. The fulfillment of expectations was mainly associated with the growth of organizational professionalism, financial and legal support, and networking opportunities, all of which contributed to the formation of a clearer business structure.

The value created by the incubator for Danish startups was primarily reflected in facilitating the transition from an early-stage idea to a professional business. The incubator provided workspaces, meeting rooms, and **infrastructure** that enabled more efficient work organization and the execution of meetings with designers, manufacturers, and other partners. **Financial support** (NOVI grants) was also significant, as it accelerated prototyping, testing, and iterative product development processes.

Legal and administrative support provided by the incubator also played an important role, including accounting services that allowed startups to reduce administrative burdens and focus on their core activities—product development. In addition, **networking and mentorship** created opportunities to establish connections with other companies and institutions, contributing to professional growth and the transition to a more mature business phase.

In summary, based on the perspectives of Danish startups, the most valuable contributions of the incubator are the combination of financial support, legal and administrative assistance, and a professional working environment. It can be assumed that, in this case, the incubator functioned as a structural and professionalization catalyst, helping startups transition from the early idea stage to an organized, market-ready business model.

Evidence from **Lithuanian startups** shows that the incubator partially met the expectations of early-stage ventures, particularly those related to access to investors, partners, and international markets, as well as the acceleration of growth processes. Given the relatively small size of the

Lithuanian market, early integration into international networks becomes one of the key expectations of startups and, at the same time, a primary indicator of their fulfilment.

The value created by the incubator is primarily reflected in facilitating access to people, capital, and markets. Startups emphasize that the greatest impact comes from the “**network effect**,” which enables direct connections with investors, mentors, partners, and early customers. While access to tangible and intangible resources, such as consultations and office space, was beneficial, the core value is associated not with infrastructure, but with relationships and opportunities.

Mentorship, training, business model validation, and investment readiness are identified as key forms of incubator support. This includes preparing pitch presentations, structuring business plans and financial projections, and establishing connections with investors. Startups note that incubators also help reduce early-stage uncertainty by providing a clearer pathway for growth. Furthermore, the importance of collaboration between academia and business is highlighted—technology parks act as intermediaries between companies and universities, facilitating access to laboratories, researchers, and knowledge transfer processes.

Networking and collaboration opportunities are equally important. Incubators organize events and meetings with large companies and partners, enabling startups to expand their contact networks and explore new project opportunities. The prestige of technology parks is also emphasized, as it **enhances startups’ image** in the eyes of clients, investors, and partners.

In summary, according to Lithuanian startups, the most valuable contribution of incubators is the creation of access to networks, investors, and markets, combined with structured support mechanisms. Incubators function as growth catalysts, providing not only knowledge and infrastructure but also opening up real business opportunities—from acquiring first customers to achieving international expansion.

Concluding remarks. This study examined the role of incubators in startup development processes across different countries (Croatia, Turkey, Romania, Denmark, and Lithuania), with the aim of identifying the key challenges faced by startups, their expectations when joining incubation programs, and the value provided by incubators. The results of the qualitative research reveal that incubators play a significant role in strengthening startups’ connections with business, academic, and investor networks by providing access to mentorship, networking opportunities, funding, and institutional legitimacy through links with universities, investors, and business partners. However, **a common challenge** across all analyzed countries remains

the transition of startups from the technology development stage to commercialization and market adoption. This suggests that the value of incubators is no longer associated solely with fostering innovation, but increasingly depends on their ability to support startups in the business growth and scale-up phase. Furthermore, the findings indicate that the role of incubators is evolving across all countries—from a traditional “space and networking” model toward a broader “ecosystem and commercialization engine” function. In this sense, incubators are becoming not only shared workspaces or collaboration hubs, but also platforms for market access, funding intermediation, and the implementation of business models.

The analysis of startup cases reveals that startups place particular ***emphasis on the need for practical, market-oriented support:*** as Lithuanian startups indicate, “*what is needed is not theoretical assistance, but real product development and market entry.*” A similar focus on market access is observed in Croatia, where startups highlight that the main challenge is not having connections per se, but converting them into actual clients and commercial outcomes. In the case of Turkey, the dimension of credibility becomes more prominent—the institutional status provided by incubators serves as an important factor when working with industry partners, especially in regulated sectors. Meanwhile, in Romania, similarly to Lithuania, the key challenge for startups is the ability to transform theoretical knowledge into practical solutions, whereas in Denmark the focus lies on adapting infrastructure to specific needs, particularly in hardware development.

From a critical perspective, the experiences of startups across different countries also indicate that the ***programs offered by incubators vary depending on the level of institutional and infrastructural development.*** In Croatia, challenges arise from a relatively narrow understanding of incubators, with an emphasis on networking and the utilization of EU-funded projects. In Turkey, there is a strong link with universities; however, there remains a shortage of specialized competencies in advanced technology fields, along with legal and intellectual property (IP) challenges. In Romania, issues stem from the gap between theory and practice, limited opportunities to test products under real market conditions (e.g., with pilot clients or early adopters), and external factors such as economic instability, funding uncertainty, and limited market demand. Denmark, by contrast, features a well-developed incubation and support system encompassing financial, legal, and organizational assistance, as well as strong networking opportunities; nevertheless, limitations persist in infrastructure, as well as in scale-up and prototyping capabilities. In Lithuania, structural constraints of early-stage startups become evident, particularly those related to limited resources and small market size. Startups

note that “*a small domestic market naturally forces founders to think internationally,*” leading to an early orientation toward global expansion. This suggests that, according to startups, the quality of incubators depends more on institutional and technological infrastructure than on the formally declared program offerings.

A more detailed analysis of specific startup cases also highlights ***the importance of institutional credibility and academic collaboration***. In the case of Turkey, startups emphasize that incubators provide access to industrial and academic partners, enabling them to strengthen their R&D capabilities and build a solid technological foundation; however, there remains a need for more specialized (deep-tech) mentorship. In contrast, in Romania the greatest value of incubation is associated with practical business analysis and planning tools (e.g., SWOT analysis, business model development, and market assessment methods), which help startups identify weaknesses in their business strategies, while in Denmark the focus is on organizational professionalization as well as financial and legal support.

The analysis of interviews reveals that the effectiveness of incubators is determined not by the formal structure of programs or the quantity of services provided, but by ***the quality and accessibility of real business contacts, investors, and industrial partners***. This is particularly evident in the experiences of Lithuanian startups, where limited access to markets and investors is frequently mentioned. Similar insights emerge in other countries (Croatia, Turkey, and Denmark), where incubators act as intermediaries between ideas and tangible market opportunities. Startups stress the need for more events that directly connect them with business partners and investors: “*regularly organizing ‘innovation days’ or ‘pitch events’ with companies from the defence industry, the automotive sector, and public institutions.*”

It can be assumed that a common structural challenge related to mentorship persists across all countries—namely, the lack of specialized experts in areas such as AI, deep-tech, intellectual property (IP), and specific industrial niches. General, non-specialized mentorship is often insufficient and does not adequately address the specific needs of technology-based startups. As noted in the interviews, incubators should “*expand their pool of mentors to include not only general business advisors but also experts in deep technologies (e.g., AI/IoT).*” This highlights the need for more differentiated, sector-specific support. In addition, there is a clear need to strengthen university–startup linkages and alumni networks, emphasizing that “*the bridge between universities and startups should be more active.*”

Finally, across all countries, a universal success factor in startup development emerges—one that is not centered on institutional support from incubators, but rather on ***the intensity of startups’ own engagement and proactivity***. This is particularly evident in Croatia and Romania, where passive participation significantly limits the benefits gained, while active involvement substantially accelerates startup growth. In this context, incubators function as a tool rather than the primary determinant of startup success. As noted in the interviews, “*the incubator is a tool, not the goal,*” emphasizing that outcomes depend on the actions of the startups themselves, rather than solely on the quality and structure of the incubation program.

It can be argued that in all the countries included in the study (Croatia, Turkey, Romania, Denmark, and Lithuania), incubators act as important catalysts of innovation; however, their impact is maximized only when they operate as integrated, commercialization-oriented ecosystems. The experiences of startups across different countries demonstrate that, although their core needs are similar, the most effective incubation programs are those that are context-sensitive - ranging from early-stage support in Lithuania to strengthening academic and industrial linkages in Turkey, or providing advanced infrastructure solutions in Denmark. Future models of incubators should place greater emphasis on specialized mentorship, the expansion of international networks, and support for startup growth (scale-up), in order to ensure their long-term competitiveness in the global market.

From Experiences to Solutions: Recommendations for Policymakers and Technoparks

This subsection presents a set of policy and practice-oriented recommendations derived from the qualitative research component of the study, based on in-depth interviews with startups across Croatia, Lithuania, Denmark, Turkey, and Romania. Unlike quantitative analysis, which provides generalizable patterns and aggregated insights, the qualitative approach captures the lived experiences, expectations, and challenges of startups operating within different national ecosystems.

As such, these recommendations ***reflect a bottom-up perspective, grounded in the practical realities of startup development and interaction with incubation environments***. They are differentiated by country, acknowledging that startup ecosystems are shaped by distinct institutional, economic, and infrastructural conditions. This subsection does not duplicate the full set of recommendations derived from the quantitative analysis, but instead focuses on the most essential and distinctive insights emerging from the qualitative data.

Croatia case: recommendations for policy makers:

- Reorient EU research and innovation funding mechanisms (e.g., Horizon Europe, Interreg) to ensure that a greater share of financial support is linked to commercialization outcomes—such as pilot testing with industry partners and market validation of technologies—rather than being based solely on scientific outputs or reporting requirements.
- Link incubator funding to clearly defined requirements for the availability of specialized mentorship, including the involvement of technology experts (e.g., in AI, automation, SaaS) in the implementation of incubation programs and in the product development processes of startups.
- Develop public procurement and innovation support mechanisms by introducing simplified procedures that enable startups to participate in public sector tenders, while also creating opportunities to implement pilot projects with national and municipal institutions (e.g., innovation procurement schemes, pre-commercial procurement models).
- Develop startup internationalization support instruments, such as “soft-landing” programs, which enable early-stage startups to enter foreign markets at the initial phases of their growth.

Croatia case: recommendations for technoparks:

- Shift from organizing networking activities to activating them in practice—support startups in converting contacts into pilot projects, first customers, and commercial agreements.
- Expand specialized mentorship (particularly in technological fields) beyond advisory formats by incorporating hands-on approaches, such as code review sessions, product architecture workshops, and validation of AI solutions in real use cases.
- Integrate startups into EU-funded innovation and research programs that include opportunities for market validation and piloting, including product testing with real users, customers, or industry partners.
- Develop infrastructure (e.g., shared labs, prototyping tools) that enables faster product testing and shortens the “idea-to-market” timeline.
- Organize thematic events (e.g., AI forums, green innovation initiatives, cybersecurity sessions), as well as training in marketing and digital content (AI, video, analytics), with a

focus on concrete outcomes (e.g., customer acquisition or pilot initiation) rather than general networking.

Turkey case: recommendations for policy makers:

- Strengthen intellectual property (IP) protection and enforcement mechanisms to enable startups to more effectively attract industry partners and investors, particularly in deep-tech sectors where IP often constitutes the primary source of value.
- Develop structured collaboration mechanisms between startups and industry (e.g., automotive, defence, public sector), focused on joint pilot projects that allow startups to test their solutions in real production or public service environments.
- Establish public–private interaction frameworks that ensure regular engagement between startups and industry stakeholders (e.g., pitch and demo events), with the aim of increasing startups’ access to potential clients and investors.
- Expand the involvement of universities in startup activities through joint R&D projects, for example by engaging students and researchers in the development of AI models, testing of IoT solutions, or prototyping processes.

Turkey case: recommendations for technoparks:

- Organize mentorship through structured thematic programs, where mentors are assigned based on specific domains (e.g., AI, IoT, defence technologies), ensuring not only general business guidance but also the development of startups’ technological and practical business competencies.
- Integrate alumni of incubation programs into the mentorship system, enabling experienced startup founders to contribute to the development of new startup teams.
- Organize regular events designed to facilitate direct interaction between startups and market actors (e.g., demo days), where startups present working prototypes to potential clients, investors, and corporate partners.
- Develop “soft-landing” programs that enhance startups’ access to foreign markets (e.g., through partner incubators and innovation hubs), ensuring access to local mentors, potential customers, and investors.

- Provide access to prototyping and testing infrastructure (e.g., laboratories, equipment, technical resources), particularly for hardware and IoT startups that require physical product testing.
- Integrate business skills development training (e.g., sales, marketing, negotiation, pricing) into incubation programs, with a focus on enabling startups to transition from product development to commercialization and market entry.

Romania case: recommendations for policy makers:

- Ensure more stable and long-term innovation funding instruments that enable startups to plan product development consistently without disruptions caused by fragmented funding cycles.
- Expand the functions and role of incubators within innovation policy by transforming them from advisory centres into practical product validation hubs that provide startups with access to real users and pilot customers.
- Develop and fund more regulated “real-world” testing programs (e.g., pilot projects with public sector institutions or private companies), enabling startups to test their products in actual market environments prior to commercialization.
- Provide financial support for startup participation in international innovation programs and partner incubator networks, ensuring direct access to foreign markets, investors, and industry partners.

Romania case: recommendations for technoparks:

- Increase the frequency of meetings, hands-on workshops, and product testing sessions organized by the incubator, focusing on early-stage startup idea validation;
- Organize interactive mentorship sessions that address real startup challenges;
- Integrate product validation formats into incubation programs (e.g., user testing sessions, feedback workshops with real clients, or expert review panels before product launch);
- Encourage consistent engagement of startup teams through practical tasks directly linked to real product development stages.

Denmark case: recommendations for policy makers:

- Develop and fund scale-up-oriented innovation programs that include market entry, international expansion, and business growth measures for startups;
- Design and finance non-formal education programs aimed at strengthening startups' competencies in commercialization, sales, and market entry, particularly in the deep-tech and creative industries sectors;
- Establish a mechanism to expand startups' access to prototyping and testing infrastructure (e.g., public laboratories, shared workshops, and open testing facilities for both hardware and software solutions);
- Foster international collaboration networks through partnerships with foreign incubators and joint programs, enabling startups to access and enter international markets;
- Fund specialized mentorship programs by engaging experts in AI, IP, deep-tech, and industrial sectors to ensure high-quality advisory support for startups developing niche technologies.

Denmark case: recommendations for technoparks:

- Develop commercialization and go-to-market support programs to help startups transition from product development to acquiring their first customers and generating revenue;
- Establish specialized mentorship programs that combine technological (AI, deep-tech, software, hardware) and sector-specific (e.g., creative industries) expertise to provide targeted, needs-based support for startups;
- Organize targeted business and investor events (e.g., pitch days, industry matchmaking with companies in technology, creative, and public sectors) for startups;
- Enhance prototyping and testing infrastructure and improve its accessibility for startups, particularly for hardware and physical product developers;
- Expand scale-up phase support programs to cover not only early-stage incubation but also the growth and integration of startups into international markets.

Lithuanian case: recommendations for policy makers:

- Streamline regulatory frameworks for startup operations and reduce bureaucracy by harmonizing the application of legislation, particularly in addressing stock option taxation, interpretations by tax authorities, and administrative burden;

- Establish regulatory mechanisms (e.g., sandbox frameworks in the fintech sector) to enable the testing of innovative products in controlled environments;
- Address early-stage funding gaps for startups by leveraging pre-seed and seed financing instruments through public and venture capital programs;
- Tackle talent attraction challenges by investing in STEM, digital, and entrepreneurial skills development;
- Strengthen collaboration between science and business through increased funding for R&D projects;
- Enhance startups' access to international markets (e.g., by funding participation in international events).

Lithuanian case: recommendations for technoparks:

- Differentiate incubation programs and services based on startup stage—from MVP development to market expansion and investment attraction;
- Strengthen practical mentorship (e.g., access to experienced entrepreneurs and industry experts), focused on product and business model validation and hands-on advisory support rather than purely theoretical training;
- Ensure access to investors (VC funds, angel investors, corporations) and integrate investment readiness and practice into incubation programs;
- Develop sector-specific incubators focused on particular industries (e.g., EdTech, ICT, GameTech);
- Strengthen international partnerships to facilitate startups' entry into foreign markets.

Overall, the recommendations focus on the most essential and distinctive insights emerging from the qualitative data. This adds depth and specificity to the overall policy framework, contributing to a more comprehensive and balanced set of recommendations for the development of incubation ecosystems across different national contexts.

3.9. Comparative Dynamics Across Ecosystems and Common Needs Analysis Findings

The preceding country-level analyses, PEST assessment, technopark institutional data, and startup interview findings collectively generate a substantive multi-layered evidence base. This section synthesises that evidence into a structured comparative framework, identifying the

principal structural divergences, cross-national convergences, and shared policy needs that emerge across the five ENTRANT partner ecosystems. The synthesis is designed to serve a specific analytical function: to establish the empirical foundation upon which the policy recommendations presented in Section 4 are constructed.

3.9.1. Structural Divergences: R&D Investment, Digital Maturity, and Internationalisation Capacity

The five partner countries - Turkey, Lithuania, Denmark, Romania, and Croatia - exhibit pronounced asymmetries across three structurally consequential dimensions.

R&D investment intensity reveals the sharpest divergences. Denmark leads the partnership with a gross domestic expenditure on R&D (GERD) ratio of approximately 3.01% of GDP, positioning it among the EU's foremost innovation performers (European Commission, 2023). Turkey records a ratio of approximately 1.09%, Lithuania 1.0%, and Croatia 0.97% — all substantially below the Horizon Europe benchmark of 3% — while Romania's ratio of approximately 0.46% of GDP represents one of the lowest levels of research investment among EU member states (World Bank, 2023). This fivefold gap between the highest and lowest investing partner countries is not merely a statistical observation; it directly conditions the knowledge intensity, technological sophistication, and international competitiveness of the ventures each ecosystem is structurally capable of generating.

Digital infrastructure maturity exhibits a similarly uneven distribution. Denmark consistently ranks among the top three EU performers in the European Commission's Digital Economy and Society Index (DESI), benefiting from near-universal high-speed connectivity, mature data governance frameworks, and population-level digital literacy (European Commission, 2022). Lithuania has emerged as a regionally significant digital performer, particularly in fintech and digital public services, driven by targeted public investment and a regulatory environment conducive to technology-intensive business formation (Invest Lithuania, 2023). Romania and Croatia, by contrast, continue to face structural challenges associated with uneven regional connectivity, lower enterprise digitalisation rates among SMEs, and institutional gaps in digital skills provision - constraints that directly constrain the e-export readiness of their incubated firms (European Commission, 2022).

Internationalisation levels among incubated firms reflect these underlying asymmetries. Despite Turkey's technopark ecosystem hosting more than 12,800 firms and generating technology exports exceeding USD 16 billion annually (Republic of Turkey Ministry of

Industry and Technology, 2024), only approximately 4.56% of technopark-based firms actively engage in export activity — a figure that reveals a significant and policy-relevant gap between ecosystem scale and international market reach. Danish firms, operating from a structurally small and open economy, exhibit markedly higher propensities for early internationalisation, consistent with the born-global imperative that characterises entrepreneurship in markets where domestic saturation is reached rapidly (Oviatt & McDougall, 1994). Lithuanian and Croatian startups demonstrate growing internationalisation ambitions, particularly in digital and software-based sectors, but report persistent barriers in cross-border mentoring access and international network connectivity.

The following table provides a consolidated overview of these structural divergences across partner ecosystems.

Table 3.9.1 Comparative Structural Profile of ENTRANT Partner Ecosystems

Dimension	Turkey	Lithuania	Denmark	Romania	Croatia
GERD/GDP (%)	~1.09	~1.00	~3.01	~0.46	~0.97
DESI Performance	N/A (non-EU)	Upper-mid	Top 3	Lower tier	Mid-tier
Technopark firms (approx.)	12,800+	~250	~130	~80	~60
Active export propensity	~4.56%	Growing	High	Low	Growing
Born-global orientation	Emerging	Moderate	Strong	Weak	Moderate
University integration depth	Moderate	Moderate	High (~50%)	Moderate	Moderate

Sources: European Commission (2022, 2023); World Bank (2023); Republic of Turkey Ministry of Industry and Technology (2024).

3.9.2. Convergent Challenges: The Cross-National Gap Pattern

Notwithstanding the structural divergences documented above, the ENTRANT needs analysis reveals a pattern of convergence that is equally - and perhaps more - significant from a policy design perspective: the same substantive competency gaps recur across all five partner ecosystems, irrespective of their differing levels of digital maturity, R&D investment, or

institutional development. This cross-national convergence constitutes the most policy-relevant empirical finding of the present report, as it provides the justification for a transnational rather than country-specific policy response.

The quantitative needs analysis data are particularly instructive. Across the full sample of surveyed firms, approximately 55% of those that had engaged in any form of export activity reported operating at persistently low export volumes, indicating that initial market entry had not translated into scalable or sustainable international revenue. Furthermore, 45% of surveyed firms indicated that they did not consider themselves adequately prepared for e-commerce internationalisation, citing deficiencies in platform knowledge, digital payment infrastructure, cross-border logistics management, and foreign market regulatory compliance as the primary obstacles to e-export readiness. These figures are not confined to any single national context; they represent a durable cross-national pattern that persists even within more digitally advanced ecosystems, demonstrating that the barriers to e-export scale are fundamentally competency-related and structural rather than purely infrastructural.

The qualitative data gathered through semi-structured interviews with more than 22 startups across all five partner technoparks corroborate and deepen this quantitative picture. Four interlocking competency gaps were identified with consistent frequency across all national contexts:

International digital marketing competencies. Firms reported possessing strong technical product capabilities but lacking the knowledge required to communicate their value propositions effectively to foreign audiences - including cross-border SEO, cross-cultural content strategy, and the management of international e-commerce and social media platforms.

Customs and trade compliance knowledge. Firms attempting to initiate e-export activity consistently encountered difficulties navigating cross-border VAT obligations, import documentation requirements, product certification standards, and cross-border shipping logistics — areas in which existing incubation programmes were widely reported as inadequate.

Cross-border mentoring and international business development. While domestic business mentoring was generally available within partner technoparks, mentors with direct experience of cross-border market entry, international investor relations, and foreign partnership development were described as scarce across all five ecosystems — a finding consistent with the broader literature on the structural limitations of locally embedded incubation models in supporting internationally oriented ventures (Fernandez-Ribas & Shapira, 2009).

Access to international funding and investor networks. Startups across all five countries reported limited awareness of and practical access to EU-level funding instruments — including the European Innovation Council (EIC) Accelerator and Horizon Europe innovation actions — as well as to international venture capital networks and cross-border angel investment communities.

3.9.3. Common Needs: Functional Requirements for a Transnational Support Architecture

The convergent challenges documented in Section 3.9.2 generate four corresponding categories of shared institutional need, each of which defines a functional requirement for the transnational support architecture proposed in Section 4.

Cross-border digital education and practitioner-led expertise sharing. Firms require highly targeted, operationally grounded training on the specific dimensions of international e-commerce — platform selection and management, international SEO and digital advertising, cross-border payment systems, and fulfilment logistics. Critically, respondents across all five countries consistently emphasised that effective delivery requires practitioners with direct international market experience, rather than generalised instruction by academic or non-specialist trainers.

Multilingual and standardised training materials. The absence of continuously updated, locally accessible resources on e-export procedures and cross-border regulatory compliance - particularly in Romanian and Croatian -constitutes a structural equity gap in the current internationalisation support landscape, limiting the reach of existing programmes to founders with strong English-language proficiency.

Structured international networking platforms. Networking opportunities within individual technoparks are overwhelmingly domestic in orientation. The systematic absence of facilitated cross-border peer learning, customer and partner matching, and transnational community building represents a missed opportunity for ecosystem value creation that a multi-country consortium is institutionally well-positioned to address (Bruneel et al., 2012).

Joint EU project funding access and capacity building. Multiple respondents across partner countries identified unfamiliarity with EU funding application processes, consortium management requirements, and intellectual property frameworks as barriers to participation in collaborative innovation programmes. Technopark managers equally recognised this gap as constraining their own institutional capacity for sustained international programme development.

3.9.4. The Danish Model as a Transferable Benchmark

Among the five partner ecosystems, Denmark's NOVI Science Park emerges from the comparative analysis as a structurally distinctive case that warrants particular attention as a source of transferable best practice. NOVI's distinction lies not in scale - the park hosts approximately 130 companies, modest relative to the Turkish technopark ecosystem - but in the systemic depth and international orientation of its incubation infrastructure.

Three features are especially noteworthy. First, NOVI operates on an explicitly born-global incubation philosophy: firms are supported from inception to conceptualise their addressable market as international rather than domestic, and the park's mentoring and advisory architecture reflects this orientation through its sustained emphasis on cross-border market entry strategy, global product positioning, and international investor engagement. Second, NOVI's university integration depth — with approximately 50% of tenant firms maintaining formal research collaborations with Aalborg University — generates a continuous pipeline of technically differentiated, research-driven ventures with the innovation intensity required for international competitiveness. Third, NOVI's digital programme delivery is notably advanced relative to partner ecosystems, incorporating virtual incubation capabilities, data-driven performance monitoring, and active participation in pan-European innovation networks that provide tenant firms with structured access to international markets and capital.

Taken together, these features position NOVI as what the smart specialisation literature identifies as an institutional anchor: an organisational configuration that combines sectoral depth, university proximity, and international orientation to generate disproportionate innovation and internationalisation outcomes relative to the scale of the host ecosystem (Foray et al., 2012). The transferability of specific NOVI practices - particularly its born-global mentoring framework, structured university-industry collaboration model, and virtual incubation infrastructure - to the ecosystems of Turkey, Lithuania, Romania, and Croatia represents one of the ENTRANT project's central learning opportunities.

It must be noted, however, that the Danish model is not proposed as a universal template for direct replication. The institutional conditions underpinning NOVI's approach — Denmark's high R&D investment intensity, advanced digital infrastructure, open economy, and mature university-industry collaboration culture — are not uniformly present in partner countries and cannot be assumed to emerge solely through policy intervention in the short term. The appropriate policy posture is therefore one of structured adaptation rather than direct transfer:

identifying the most transferable practices and designing context-sensitive enabling conditions for their adoption in each partner ecosystem.

3.9.5. Synthesis: Three Implications for Policy Design

The comparative analysis presented in Sections 3.9.1 through 3.9.4 yields three overarching implications that directly shape the policy framework developed in Section 4.

A one-size-fits-all approach is analytically untenable. The structural divergences across partner ecosystems confirm that effective policy interventions must be calibrated to each country's specific institutional environment — including its regulatory context, digital infrastructure maturity, R&D investment base, and entrepreneurial culture — while simultaneously targeting the common competency gaps that cut across all five national contexts.

Transnational collaboration is a structural necessity. The convergence of challenges documented across all five partner countries - particularly the near-universal deficiencies in e-export competency, cross-border mentoring, and international funding access — confirms that no single national ecosystem is sufficient, acting alone, to address these barriers at the required scale. They demand the systematic pooling of knowledge, expertise, and institutional resources across borders: precisely the logic that defines the ENTRANT consortium model.

The partnership embodies asymmetric but complementary learning potential. The consortium is not a collaboration among institutional equals exchanging equivalent knowledge, but a structured learning community in which differentiated strengths converge towards a shared objective. Denmark contributes internationalisation depth and born-global best practice; Turkey contributes ecosystem scale and manufacturing-to-tech transition experience; Lithuania contributes digital agility and fintech ecosystem insight; Romania contributes emerging research infrastructure; and Croatia contributes EU integration and cross-border regulatory experience. This asymmetry is not a limitation but the partnership's most significant structural asset.

These three implications collectively define the analytical foundation upon which the International Incubation Centre Development Model proposed in Section 4 is constructed.

4. TRANSNATIONAL POLICY RECOMMENDATIONS

Opening Note: This section outlines a set of concrete, actionable policy recommendations targeted at national governments and European Union institutions in partner countries. Building on the evidence and analysis presented in the preceding chapters, it translates key findings into practical measures that can be realistically implemented within existing policy frameworks. The recommendations aim to support coherent decision-making, enhance cross-sectoral coordination, and ensure alignment with EU strategic priorities, while remaining sensitive to the diverse institutional, economic, and social contexts across partner countries.

4.1. Cross-Border Strategic Management and Standardization

Transnational policy efforts should prioritize the development and implementation of **Joint International Incubation Standards** to ensure a consistent quality framework for incubation services across the European Union. These standards should define core service components:

- mentorship quality,
- access to funding networks,
- internationalization support,
- and performance monitoring mechanisms.

Existing European practices already provide a foundation for such efforts. For instance, the European Business and Innovation Centre Network (EBN) has established the EU|BIC quality label, which defines structured criteria for innovation-driven incubators, including service quality, business support processes, and performance outcomes. While this model effectively functions as a prototype for a common European incubation standard, its adoption remains voluntary and uneven across member states. Policymakers should therefore build on such existing frameworks to formalize and scale a unified standard, ensuring mutual recognition and alignment across national systems. Financial incentives and accreditation mechanisms could further encourage incubators to comply with these standards, strengthening quality assurance, interoperability, and trust within the European startup ecosystem.

In parallel, the integration of the **“Born-Global” approach** into national innovation strategies should be reinforced, supported by evidence from existing EU-level initiatives. Given the structural limitations of smaller domestic markets, particularly in countries such as Lithuania and Croatia, startups should be supported from the earliest stages in developing internationalization capabilities.

For instance, programs implemented by the European Institute of Innovation and Technology (EIT), particularly within sectoral ecosystems such as EIT Health, already demonstrate the effectiveness of embedding internationalization as a core component of incubation. These initiatives provide structured support for cross-border market entry, access to international partners, and validation in foreign markets, highlighting the benefits of early-stage global orientation. However, such practices are not yet systematically integrated into national policy frameworks. To address this gap, policymakers should incorporate international market readiness, cross-border collaboration, and global scaling capabilities into funding schemes, incubation models, and entrepreneurial education systems. At the EU level, coordinated actions could further support the expansion of cross-border acceleration programs and shared innovation networks, reducing ecosystem fragmentation and enhancing global competitiveness. Furthermore, it is essential to incorporate ***internationalization criteria into the performance metrics of incubation centers***, addressing a critical limitation in current evaluation systems. Traditional evaluation frameworks, often focused on the number of startups supported or survival rates, should be expanded to include indicators such as:

- international market entry,
- cross-border partnerships,
- export intensity,
- and participation in global value chains.

National authorities should revise funding and evaluation mechanisms to reflect these priorities, linking financial support to measurable internationalization outcomes.

Existing European benchmarking frameworks for incubators provide valuable methodologies and indicators; however, they predominantly focus on operational outputs such as startup survival rates, job creation, or the number of supported ventures. Internationalization dimensions, mentioned above, remain insufficiently captured. This creates a gap between the strategic objective of fostering globally competitive startups and the metrics used to evaluate incubator performance. National authorities should therefore revise evaluation and funding mechanisms to include measurable internationalization outcomes, linking financial support to the global growth trajectories of supported startups. At the EU level, the development of harmonized metrics and benchmarking systems would enhance comparability, facilitate policy learning, and support evidence-based decision-making, ultimately strengthening the role of incubators as drivers of international scaling and long-term competitiveness.

4.2. Adult Education and Capacity Building

Transnational policy efforts to strengthen incubator development across Denmark, Turkey, Romania, Lithuania, and Croatia should prioritize ***the systematic integration of multilingual and modular Massive Open Online Courses (MOOCs)*** into national lifelong learning and entrepreneurship education systems. Policymakers are encouraged to establish formal frameworks for the recognition of such courses, including the adoption of ***micro-credentials*** compatible with European standards, ensuring their transferability across borders. National education platforms should be mandated or incentivized to host or provide access to ***high-quality MOOCs***, available at minimum in English and national languages, and aligned with established European competence frameworks. At the EU level, coordinated support is needed to develop a shared repository of validated courses and to ***finance their translation and localization***, thereby enhancing accessibility and scalability.

In parallel, policies should actively ***promote hybrid learning models*** that combine online education with face-to-face mentoring and workshops, reflecting the principles of adult learning and increasing the effectiveness of capacity-building efforts. Public funding mechanisms should incentivize incubators to adopt ***blended training formats***, while also supporting the development of regional learning hubs that provide physical spaces for collaboration and practical engagement. Special attention should be given ***to ensuring inclusivity and accessibility, particularly for underrepresented groups***, by reducing digital and geographic barriers to participation. EU-level guidance and pilot funding can play a critical role in scaling such models and demonstrating their long-term impact.

Finally, policy design should be grounded in a balanced combination of locally generated evidence and international best practices. Recommendations developed from ***project-based research***, such as the data collected by KTU and BTU, should be complemented by insights from existing global studies to ensure both contextual relevance and strategic alignment with broader trends. To support this, national authorities should invest in ***systematic data collection and monitoring systems***, while fostering collaboration between academic institutions, incubators, and policymakers. At the EU level, the development of ***shared monitoring tools*** and ***funding for comparative research*** would further strengthen evidence-based policymaking and ensure the long-term sustainability of incubator capacity-building initiatives.

4.3. Infrastructure and Sustainability

The analysis of innovation ecosystems, incubators, and incubated start-ups across Lithuania, Denmark, Croatia, Romania, and Turkey reveals persistent structural disparities in the availability, quality, and strategic orientation of infrastructure supporting entrepreneurial activity.

Improving the **accessibility and quality of physical innovation infrastructure** should be prioritised, particularly beyond major metropolitan areas. Across all five countries, incubators, co-working spaces, and specialised facilities remain concentrated in capital regions, limiting opportunities for start-ups in peripheral areas. Policymakers should support the **development of regionally distributed innovation hubs** that combine physical infrastructure with high-quality advisory services. Targeted investment is also needed to expand access to prototyping laboratories, testing environments, and sector-specific facilities, particularly for deep-tech and green-tech ventures. Encouraging **thematic specialisation** among incubators can further enhance efficiency and reduce fragmentation.

Strengthening **digital infrastructure** is essential for enabling scalable entrepreneurship and internationalisation. Beyond connectivity, incubators should be equipped with shared digital infrastructure—including software solutions, platform integrations, and interoperable systems—that support start-ups in accessing global markets. In particular, the provision of common tools and logistics consultancy services within incubation programmes can facilitate e-export activities, especially for early-stage firms lacking operational capacity. At the same time, national and EU-level actors should **expand open data ecosystems**, improve data interoperability, and ensure that data resources are practically accessible to start-ups. The development of regulatory sandboxes in sectors such as fintech, energy, and public services should also be scaled to support innovation under controlled conditions.

Sustainability should be systematically integrated into the design and operation of innovation infrastructure. Evidence suggests that, in many cases, it remains a secondary consideration rather than a core strategic objective. Policymakers should therefore align funding instruments with the objectives of the green and digital (“twin”) transition, ensuring that a greater share of financial support is channelled directly to incubator firms developing sustainable and digital solutions. In parallel, incubators should be incentivised to **adopt environmentally responsible practices** and to provide targeted support for **green innovation**. The establishment of dedicated “green labs” and pilot infrastructures—focused on renewable energy, circular economy, and

resource efficiency—would further strengthen start-ups’ capacity to test and scale sustainable solutions. Collaboration with municipalities through “living labs” can enable real-world experimentation and accelerate adoption.

A more inclusive approach to infrastructure is needed to ensure that ***underrepresented groups can fully participate in innovation ecosystems***. The findings highlight barriers faced by disadvantaged entrepreneurs, including women, rural populations, and individuals with disabilities, particularly in accessing digital tools and support services. Policymakers should promote the development of inclusive digital infrastructures and tailored support programmes within incubators, including accessible platforms, targeted training, and mentorship schemes. Strengthening outreach and support mechanisms in underserved regions is also critical to broadening participation and reducing structural inequalities.

Finally, improving cross-border access to infrastructure is essential for maximising the collective potential of innovation ecosystems. The current landscape remains fragmented, with limited opportunities for start-ups to utilise facilities and services beyond their national contexts. Policymakers should support the development of ***integrated transnational incubator networks*** that enable shared use of infrastructure, expertise, and markets. This may include dedicated funding schemes for cross-border access to specialised facilities, as well as the development of common standards for infrastructure and service quality. Such measures would enhance resource efficiency, foster knowledge exchange, and strengthen ecosystem resilience.

5. CONCLUSION

This report has presented a comprehensive, evidence-based analysis of the internationalisation and e-export readiness of incubation ecosystems across five ENTRANT partner countries - Turkey, Lithuania, Denmark, Romania, and Croatia - and has proposed a transnational policy framework to address the structural gaps identified throughout the analysis. This concluding section situates the findings and recommendations within the broader architecture of EU strategic objectives, outlines the anticipated benefits of implementation for national and regional economies, and issues a direct call to action for the three principal audiences this report addresses.

5.1. Contribution to EU Strategic Objectives

The policy recommendations advanced in this report are directly aligned with two of the European Union's most consequential strategic priorities: the completion of the **Digital Single Market** and the strengthening of **innovation in adult education**.

Alignment with the Digital Single Market. The EU's Digital Single Market strategy seeks to remove the regulatory, infrastructural, and competency barriers that prevent businesses - including SMEs and early-stage ventures - from trading digitally across borders, accessing new customers in other member states, and scaling through e-commerce (European Commission, 2015). The findings of the present report demonstrate that incubated firms across all five partner countries face precisely these barriers: 45% of surveyed startups do not consider themselves ready for e-commerce internationalisation, and 55% of those with export activity operate at persistently low volumes. These figures reveal that the promise of the Digital Single Market has not yet been translated into operational reality for a substantial proportion of Europe's innovation-driven firms. The recommendations proposed in Section 4 — cross-border digital education, multilingual training materials, international networking platforms, and structured e-export support — are designed to close this implementation gap by equipping incubated firms with the specific competencies required to participate effectively in the digital cross-border economy.

The report's emphasis on integrating born-global approaches into national incubation strategies directly supports the EU's objective of fostering internationally competitive startups from within the Single Market. The European Innovation Council and the European Institute of Innovation and Technology have both identified early-stage internationalisation as a critical success factor for high-growth ventures; the ENTRANT model translates this strategic recognition into operational incubation practice by embedding cross-border market orientation into the earliest stages of firm development - an approach empirically validated by the Danish NOVI model documented in Section 3.9.4.

Alignment with Innovation in Adult Education. The EU's strategic framework for adult education - articulated through the European Skills Agenda, the European Pillar of Social Rights, and the Erasmus+ KA220 architecture - prioritises accessible, flexible, and internationally transferable learning pathways for adults, with particular emphasis on digital skills, entrepreneurial competencies, and lifelong learning (European Commission, 2020). The ENTRANT project's positioning within this framework is not merely administrative; it reflects

a substantive alignment between the project's objectives and the EU's broader vision of adult learning systems responsive to the demands of the digital economy.

The recommendations presented in this report contribute directly to this vision. The proposed multilingual MOOC infrastructure, micro-credential frameworks aligned with European Qualifications Framework standards, and practitioner-led cross-border training programmes provide concrete mechanisms for delivering internationally relevant adult education to startup founders, incubator staff, and technopark managers across partner countries. By embedding internationalisation competencies within a structured adult learning framework - rather than relying on ad hoc workshops or informal knowledge transfer - the ENTRANT model ensures that capacity building in e-export, digital marketing, customs compliance, and international business development is systematic, scalable, and institutionally durable.

The report's findings also reinforce the EU's recognition that innovation ecosystems and adult education systems are deeply interdependent rather than separate policy domains. The competency gaps documented across all five partner countries are fundamentally adult learning challenges that can be addressed through targeted, high-quality education and training. Positioning incubation centres as learning environments in which adult education and entrepreneurship development converge directly supports the European Commission's vision of innovation ecosystems as sites of lifelong learning and sustained human capital development (OECD, 2023).

5.2. Benefits for National and Regional Economies

The implementation of the proposed policy framework is anticipated to generate compounding benefits at three interconnected levels.

At the firm level, the International Incubation Centre Development Model is designed to enhance the international market readiness of incubated startups by equipping them with the competencies, networks, and institutional support required for sustainable cross-border operations. Firms that receive structured support in e-export strategy, international digital marketing, customs compliance, and cross-border partnership development are significantly more likely to achieve durable internationalisation — and consequently to generate higher revenues, create higher-quality employment, and attract international investment (Autio et al., 2017). The evidence gathered from the Danish NOVI model confirms this logic: firms incubated within a born-global-oriented framework demonstrate structurally higher

propensities for early and sustained internationalisation than firms receiving conventional domestic-oriented support.

At the ecosystem level, the strengthening of incubation centres' internationalisation capacity is expected to produce positive spillover effects across the broader innovation environment. Technoparks that offer credible international support services are more attractive to high-potential startups, more effective in retaining talent within the region, and better positioned to attract co-investment from international venture capital and EU-level funding instruments. The cross-border networking platforms and Digital Market Corridors proposed in Section 4 are specifically designed to generate ecosystem-level value by connecting incubated firms across partner countries with complementary markets, expertise, and investment communities — transforming individual technoparks from isolated national institutions into nodes within a durable transnational innovation network, a configuration that the scholarly literature consistently identifies as generating superior innovation outcomes relative to purely domestic ecosystems (Fernandez-Ribas & Shapira, 2009).

At the macroeconomic level, the cumulative effect of incubation-driven internationalisation across partner countries is expected to contribute to several dimensions of national economic performance. Increased export activity among technology-intensive firms improves trade balances and reduces dependence on low-value-added sectors. The creation of knowledge-intensive employment supports wage growth and mitigates the economic consequences of demographic ageing - a challenge documented as particularly acute in Croatia, Romania, and Lithuania. Furthermore, the integration of partner ecosystems into transnational innovation networks strengthens national absorptive capacity for EU-level funding, enabling more effective utilisation of Horizon Europe, the Digital Europe Programme, and the European Regional Development Fund — a benefit of particular significance for countries with currently lower absorption rates.

5.3. Central Message and Call to Action

The central finding of this report is that the internationalisation challenge facing incubated firms across Europe is not a collection of isolated national problems but a shared structural condition that demands a coordinated transnational response. Despite significant differences in R&D investment, digital maturity, and institutional development across the five partner countries, the competency gaps constraining the international competitiveness of incubated firms are remarkably consistent — deficiencies in e-export readiness, international digital marketing,

customs compliance, cross-border mentoring, and access to international funding recur across all five ecosystems with striking regularity. This convergence carries a single, clear implication: **national-level interventions alone are insufficient**. The barriers identified in this report are structural and systemic; they cannot be resolved through incremental improvements to domestically oriented incubation programmes. They require the cross-border knowledge pooling, shared institutional capacity building, and transnational collaboration architecture that the ENTRANT project is designed to create.

The report therefore issues a direct call to action to each of its three principal audiences.

To EU-level policymakers: accelerate the integration of internationalisation support into the core evaluation criteria for incubation programmes funded through EU instruments. Current benchmarking frameworks remain disproportionately focused on domestic outputs — startup survival rates, job creation, and local economic impact — and insufficiently capture the international growth trajectories that determine the long-term competitiveness of European ventures. The harmonisation of internationalisation metrics across member states, combined with dedicated co-financing for cross-border incubation networks, would substantially strengthen the European innovation ecosystem's capacity to produce globally competitive firms.

To national governments and innovation agencies: the born-global orientation documented in the Danish model should be systematically incorporated into national innovation strategies and incubation programme design. This does not require the wholesale adoption of Denmark's institutional framework - which reflects enabling conditions not uniformly present across partner countries - but rather the structured adaptation of its most transferable practices: embedding international market orientation from inception, building cross-border mentoring infrastructure, and measuring incubation performance against internationalisation outcomes rather than domestic proxies alone.

To technopark and incubator managers: the transition from domestically oriented support institutions to internationally connected growth platforms is no longer optional. The evidence presented in this report demonstrates that incubated firms across all five partner countries explicitly demand - and structurally require - support that extends beyond national borders. Technopark managers who invest in cross-border partnerships, multilingual training infrastructure, practitioner-led international mentoring, and EU funding capacity will position

their institutions as competitive and relevant actors within the emerging transnational innovation landscape.

The ENTRANT project and the International Incubation Centre Development Model proposed in this report represent a concrete, evidence-grounded, and operationally feasible pathway towards this transformation. The evidence base has been established. The shared challenges have been identified. The complementary strengths of the partnership have been documented. What remains is the institutional commitment to act - and the recognition that Europe's incubation centres, properly equipped and internationally connected, are among the most powerful instruments available for translating the continent's innovation potential into sustainable, inclusive, and globally competitive economic growth.

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