DIGITAL ENTREPRENEURSHIP ECOSYSTEM INDEX

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Digital Entrepreneurship Ecosystem Index Report: The Danube Region

An expert look into the Digital Entrepreneurship Ecosystem and Digitalization Dynamics

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Prof. Dr. Zoltán Ács
Director of the Vienna Institute for Global Studies (VIGS)

Welcome

At the Vienna Institute for Global Studies (VIGS), our vision is to be a leading force in solving the most complex global challenges of the 21st century. We are committed to fostering a multidisciplinary approach to research that integrates science, entrepreneurship, and policy expertise. By creating a hub for innovation and collaboration, we aim to shape a future where knowledge transcends borders and contributes to sustainable, inclusive growth across Central Europe and beyond.

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The importance of the Digital Entrepreneurship Ecosystem (DEE) Index

Prof. Dr. László Szerb
Director of VIGS Entrepreneurship Department

Digitalization is rewriting the rules of entrepreneurship. We designed the Digital Entrepreneurship Ecosystem (DEE) Index to capture not only technology adoption but the systemic interaction of users, platforms, institutions, and entrepreneurial agents. Covering 170 countries (2017–2022), the Index organizes evidence into four sub-indices and twelve pillars and applies the penalty-for-bottlenecks method, so one weak area cannot hide behind averages.

For the Danube Region, the picture is clear: strong improvement in digital infrastructure and user citizenship, but gaps persist in platform orchestration, finance, and scaleup capacity. This report is an invitation to utilize the DEE as both map and mirror, a shared language for prioritizing reforms, aligning capital and talent across borders, but also turning digital foundations into entrepreneurial outcomes.

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Executive Summary

At the Vienna Institute for Global Studies (VIGS), we seek to understand how digitalization transforms economies, societies, and the very nature of entrepreneurship. To this end, we have developed the Digital Entrepreneurship Ecosystem (DEE) Index, a comprehensive framework that captures the interplay of infrastructure, users, platforms, institutions, and entrepreneurial actors. Applied to the Danube Region, home to more than 115 million people across 14 countries, the DEE Index provides a detailed picture of progress, persistent bottlenecks, and opportunities for inclusive growth.

Our analysis shows that the region has achieved remarkable progress in building digital infrastructure and fostering user citizenship between 2017 and 2022. Broadband expansion, mobile access, cybersecurity regulations, and digital literacy have all improved substantially, creating a stronger foundation for participation. At the same time, however, entrepreneurial activation remains limited. The capacity of startups to scale, of firms to absorb new technologies, and of platforms to orchestrate innovation lags behind both Western and Northern Europe. The gap is especially visible in finance, matchmaking, and cross-border integration, where systemic weaknesses continue to constrain outcomes.

Austria emerges as a regional benchmark, consistently outperforming the Danube average across all dimensions of the DEE Index. Its relative maturity highlights the importance of institutional coherence, trust in regulation, and investment in both infrastructure and entrepreneurship. Austria's experience demonstrates that strong digital foundations can be successfully translated into entrepreneurial dynamism, and it offers a model for policy learning and collaborative initiatives across the wider region.

The Danube Region now stands at a turning point. With the infrastructure largely in place, the policy focus must shift from building foundations to enabling entrepreneurship. Future progress depends on coordinated regional strategies to expand access to venture finance, strengthen platform ecosystems, and foster inclusive participation. Establishing cross-border innovation hubs and shared digital labs can help translate digital readiness into digital dynamism.

If pursued collectively, these steps would allow the Danube Region to unlock its digital potential, reduce dependence on external platforms, and position itself as a globally competitive, innovation-driven ecosystem. The foundations for this transformation have been laid, however the challenge ahead lies in turning them into sustainable entrepreneurial outcomes.

Prof. Dr. Zoltán Ács
Director of the Vienna Institute for Global Studies (VIGS)

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1. The Digital Entrepreneurship Ecosystem

1.1 Emerging trends in digitalization and ecosystems

Digitalization has become one of the most transformative forces of the 21st century, reshaping the way people live, interact, and do business.This process is driven by rapid advances in connectivity, cloud computing, data analytics, and artificial intelligence.This technological shift, commonly referred to as the Fourth Industrial Revolution has affected virtually every sector, disrupting traditional industries and creating new forms of economic activity (Lasi et al., 2014; Dwivedi et al., 2021). At the organizational level, digital transformation is no longer about simply adopting new tools; it involves reconfiguring internal processes, products, and strategies to leverage digital affordances for innovation, agility, and competitiveness (Matt et al., 2015; Vial, 2021).

As digital technologies have lowered barriers to entry and expanded entrepreneurial opportunity beyond geographical constraints, a new form of ecosystem has emerged: the Digital Entrepreneurship Ecosystem (DEE). Unlike traditional ecosystems, which often emphasize spatial proximity and physical infrastructure, DEEs are defined by the interplay between users, digital platforms, institutions, and entrepreneurial agents operating in globally networked environments (Sussan and Acs, 2017; Autio et al., 2018). In DEEs, digital users are not passive consumers but active participants and co-creators in platform-mediated innovation processes (Nambisan, 2017).

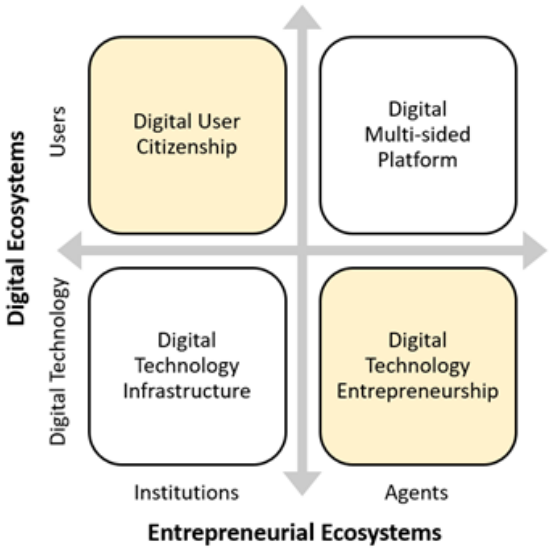
The importance of DEEs lies in their systemic nature and transformative potential. Research has shown that they contribute not only to startup formation and business growth, but also to broader outcomes such as digital inclusion, sustainability, and individual well-being (Elia et al., 2021; van Dijk, 2017). The rise of digital platforms, open APIs, and modular technologies has enabled new business models and collaborative ventures that transcend traditional firm boundaries, redistributing agency across networks of actors including developers, investors, accelerators, and even the technologies themselves.

To better understand and assess the performance of these ecosystems, the Digital Entrepreneurship Ecosystem Index (DEE Index) was developed. Covering 170 countries, it captures key pillars of digital infrastructure, user citizenship, platform functionality, and entrepreneurial dynamics. Unlike other composite indices, it incorporates the “penalty for bottleneck” approach, acknowledging that one weak link (such as digital skills or regulatory quality) can hinder the overall ecosystem’s functionality (Szerb et al., 2022). Studying DEEs is especially relevant in regions undergoing digital transition, such as the Danube area, where diverse economic and institutional conditions present both opportunities and challenges. A focus on digital entrepreneurship can provide the foundation for inclusive, resilient, and innovation-driven regional development.

1.2 The structure of the Digital Entrepreneurship Ecosystem

The new Digital Entrepreneurship Ecosystem (DEE) Index is a successor of the previous Digital Platform Economy (DPE) Index. The DEE, similarly to DPE, is based on Sussan and Acs’s (2017) foundational theory and Song’s (2019) conceptual refinement. This approach situates the DEE at the intersection of two broader systems: the digital ecosystem, comprising users and digital infrastructure on one side, and the entrepreneurial ecosystem, which includes agents and enabling institutions on the other side. As visualized in Figure 1, the interaction of these systems gives rise to four key constituents of the DEE: Digital User Citizenship (DUC), Digital Technology Entrepreneurship (DTE), Digital Multi-sided Platforms (DMSP), and Digital Technology Infrastructure (DTI).

Figure 1.The Digital Entrepreneurship Ecosystem (DEE) framework



Notes: This figure conceptualizes the components of the DEE, integrating digital and entrepreneurial domains.
Source: *Adapted from Song (2019).*

The Digital User Citizenship (DUC) reflects the evolving role of users, who are no longer passive recipients but co-creators in the digital space. It captures digital inclusion, literacy, rights, and privacy, and highlights the interplay between individuals and institutions in shaping participatory and secure digital environments (van Dijk, 2017; Tikkinen-Piri et al., 2018). This sub-index recognizes that user agency and equitable access are foundational to a robust digital ecosystem.

The Digital Technology Entrepreneurship (DTE) represents a broader scope of entrepreneurial activity that includes the development and integration of digital technologies into business models and innovation processes. It is structured around three pillars: digital absorption (how incumbents adopt digital tools), digital startup (creation of new digital ventures), and digital scaleup (support for high-growth, tech-enabled firms). This sub-index acknowledges that entrepreneurial agency is distributed, meaning it is not limited to founders, but also encompasses financiers, developers, employees, and support organizations (Baierl et al., 2019; Elia et al., 2021).

The Digital Multi-sided Platforms (DMSP) function as the core architecture of the DEE. These platforms orchestrate economic, social, and informational interactions among heterogeneous actors by facilitating matchmaking, network effects, and digital finance mechanisms. Platforms are not merely tools but dynamic infrastructures that enable scalable business models, user engagement, and modular innovation (Nambisan, 2017; Gawer, 2014). The DMSP sub-index is composed of three pillars (Networking, Matchmaking, and Financial Facilitation) each addressing a distinct element of platform functionality.

The Digital Technology Infrastructure (DTI) refers to the foundational layer enabling all digital activities. It encompasses broadband access, cloud computing, mobile connectivity, and institutional arrangements such as cybersecurity regulations and open data policies. DTI is not simply an enabler but a core component of value creation in digital ecosystems, particularly when assessed through dimensions of openness, competition, and security (Autio et al., 2018; World Bank, 2021). The DEE Index uniquely incorporates institutional and technical aspects of infrastructure, acknowledging the regulatory environment's role in shaping trust and innovation.

Detailed structures, along with descriptions of the 12 pillars, are provided in Annex A.

1.3 A systemic, multi-actor and non-linear model

The Digital Entrepreneurship Ecosystem (DEE) model distinguishes itself by adopting a systemic, multi-actor, and non-linear perspective on entrepreneurial activity. At its core, this approach acknowledges that digital entrepreneurship does not arise in isolation but emerges from the dynamic interplay between heterogeneous agents, institutions, infrastructures, and digital technologies (Autio et al., 2018; Sussan and Acs, 2017).

Unlike earlier entrepreneurship frameworks that emphasized linear cause-effect relationships or isolated agents (e.g., individual entrepreneurs), the DEE framework builds on systems theory, particularly the idea that one weak component can constrain overall ecosystem performance, a concept formalized through the "penalty for bottleneck" (PFB) methodology (Acs et al., 2014). This methodology ensures that ecosystems are not merely evaluated by aggregate performance but by their internal coherence and the interdependencies between domains. For example, high digital infrastructure alone is insufficient if digital skills or institutional support are lacking.

The model also diverges from the classical agency theory, which viewed agents as bounded individuals acting on behalf of principals in hierarchical structures (Jensen and Meckling, 1976). Instead, DEEs adopt a networked and distributed view of agency. Drawing from Garud and Karnøe (2001), Nambisan and Zahra (2016), and Autio et al. (2018), the DEE recognizes that entrepreneurial action is co-constructed through interactions between multiple actors, including users, developers, platform intermediaries, investors, policymakers, and even digital technologies such as AI.

In this view, agency is not a fixed attribute but an emergent, relational phenomenon. It is embedded in social and technological networks where actors mutually influence each other through feedback loops, adaptive learning, and iterative coordination (Roundy et al., 2018). These complex interactions enable experimentation, modular innovation, and rapid scaling, hallmarks of digitally mediated entrepreneurship. For instance, platforms allow users to co-create products, act as testbeds for new services, or serve as early-stage funders via crowdfunding mechanisms, thus collapsing traditional boundaries between producers, consumers, and financiers (Sussan and Acs, 2017; Song, 2019).

Importantly, DEEs are conceptualized as complex adaptive systems (CAS), a notion emphasized by Roundy et al. (2018). CAS are characterized by non-

linearity, feedback loops, self-organization, and path dependency. This means that DEEs do not evolve through centralized planning or linear progression but through decentralized experimentation and emergent behavior. Local interactions among agents, which are shaped by cultural, regulatory, and infrastructural contexts, give rise to macro-level patterns such as the formation of unicorns, the diffusion of digital skills, or the digital transformation of incumbent firms (Acs et al., 2017; Elia et al., 2020).

This framework also supports a multi-scalar understanding of entrepreneurship. Value creation and impact in DEEs are not confined to startups alone but include scaleups, transformed incumbents, and social enterprises. These actors collectively contribute to outcomes such as inclusion, sustainability, and wellbeing, not just firm formation or GDP growth (Theodoraki et al., 2022; Mursalzade et al., 2023).

The DEE model reframes entrepreneurship as a distributed, system-level phenomenon shaped by a diverse array of actors embedded in evolving technological and institutional contexts. It provides a lens that is better suited to analyzing entrepreneurial ecosystems in the digital age, where the boundaries of firms, markets, and innovation processes are increasingly blurred, and where resilience and adaptability depend not on individual excellence but on systemic coherence and inclusive participation.

2. The Danube Region

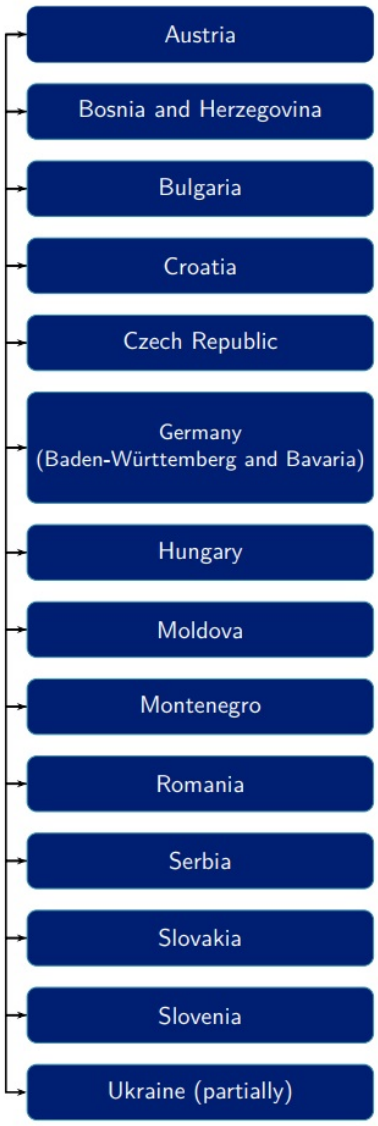
2.1 The importance of the region

Connected by geography, a shared history, and cultural richness, the Danube Region is a strategically significant area within Europe. Encompassing 14 countries and home to over 115 million people, it is shaped by ethnic, linguistic, and religious diversity, as well as deep economic interdependencies. Despite historical divisions and past barriers, the 21st century has seen a growing commitment to cooperation and joint capacity-building efforts.

The region comprises nine EU member states, such as Austria, Bulgaria, Croatia, Czech Republic, Germany (specifically the regions of Baden-Württemberg and Bavaria), Hungary, Romania, Slovakia, and Slovenia, as well as five EU candidate countries: Bosnia and Herzegovina, Moldova, Montenegro, Serbia, and Ukraine (partially). These are presented in the following chart. A shared set of values and the widespread use of the English language offer a common foundation for dialogue and collaboration. Since 2010, the strategic importance of this macro-region has been formally recognized through the European Union Strategy for the Danube Region (EUSDR), which provides a structured governance framework focused on key priority areas (European Commission, 2025). However, despite ongoing cooperation, full normative synergies across the region have yet to be realized due to existing national and institutional boundaries.

According to the EUSDR categorization, Germany and Ukraine are considered to be partially part of the Danube Region. Due to the ongoing war in Ukraine, which, while accelerating digital transformation, also affects the consistency and availability of reliable data this report does not include Ukraine in the current analysis. A more comprehensive examination of the country's digital development is recommended in the context of future reconstruction efforts.

The Danube region countries

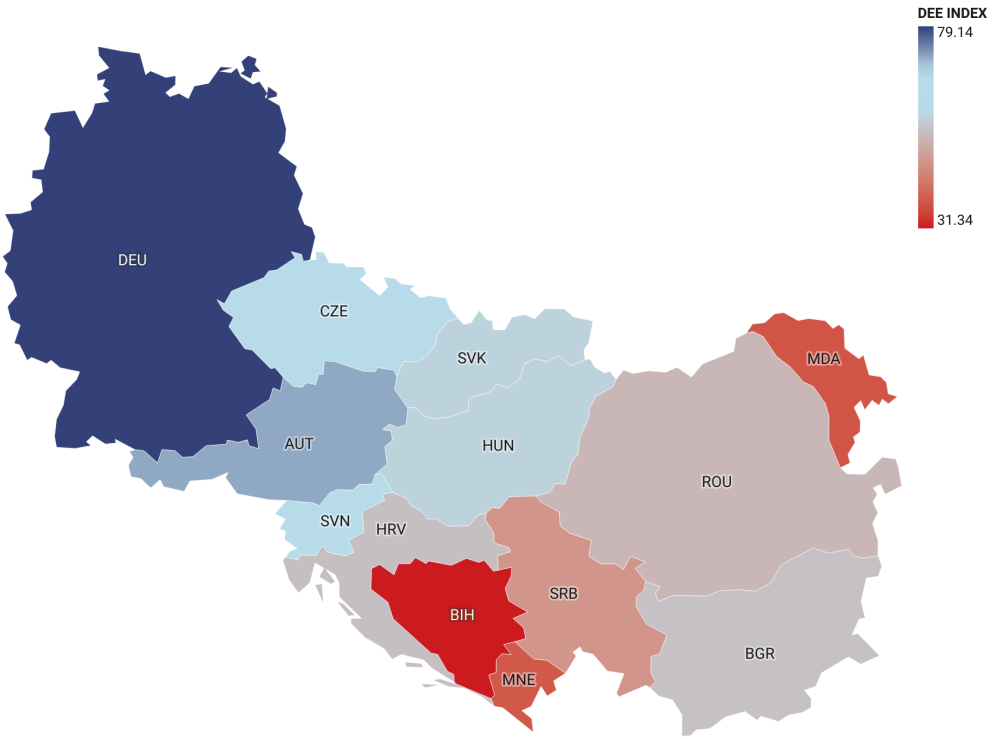


Similarly, Germany's digital entrepreneurial ecosystem is significantly more advanced than that of the broader region. To ensure analytical balance and avoid potential distortion of regional trends, Germany is not included in the core comparative assessment unless specifically indicated. Instead, its performance is referenced as a benchmark for contextual understanding.

2.2 Mapping the Danube Region DEE Index

Figure 2 illustrates the variation in Digital Entrepreneurship Ecosystem (DEE) Index scores across the Danube region, revealing significant regional disparities in digital entrepreneurial capacity. Countries such as Germany (DEU) and Austria (AUT) are leading performers, as indicated by the dark blue shading and high index values close to 79. These countries benefit from robust digital infrastructure, mature regulatory frameworks, and dynamic platform ecosystems. Importantly, both Austria and Germany also have above-EU-average shares of Information and Communication Technology (ICT) specialists in their labor markets. This suggests that while these countries are regional leaders, the ICT sector in the broader Danube Region remains in relatively early stages of development, highlighting the existence of a persistent "digital divide" (Zavarská, 2024). This divide is also visible in the DEE comparison. The lower-performing countries such as Bosnia and Herzegovina (BIH) and Moldova (MDA), shaded in red, reflect systemic weaknesses in areas like digital user engagement, institutional support, and entrepreneurial activity. This is confirmed by Zavarská's (2024) report on the Danube region, revealing that these two, among other lower-income countries, fall significantly behind in digital skills, ICT adoption, and institutional support, aligning with their lower DEE scores. Meanwhile, mid-range countries including Hungary (HUN), Romania (ROU), and Bulgaria (BGR) exhibit moderate scores, indicating partial progress and structural bottlenecks that still hinder the full realization of their ecosystem potential.

Figure 2. Danube Region DEE Index scores by country (2022)



Note: *Index values reflect national-level performance in the Digital Entrepreneurship Ecosystem Index. The map encompasses 13 countries in the Danube region. Ukraine is excluded due to concerns about data reliability, given the ongoing war. Germany is included in the Figure, but to avoid distortion, it will be used as a benchmark in the report, unless otherwise specified. Country codes apply as: DEU = Germany, CZE = Czechia, AUT = Austria, SVK = Slovakia, SVN = Slovenia, HRV = Croatia, HUN = Hungary, BIH = Bosnia and Herzegovina, MNE = Montenegro, SRB = Serbia, ROU = Romania, MDA = Moldova, BGR = Bulgaria.*
Source: *VIGS Institute, 2025.*

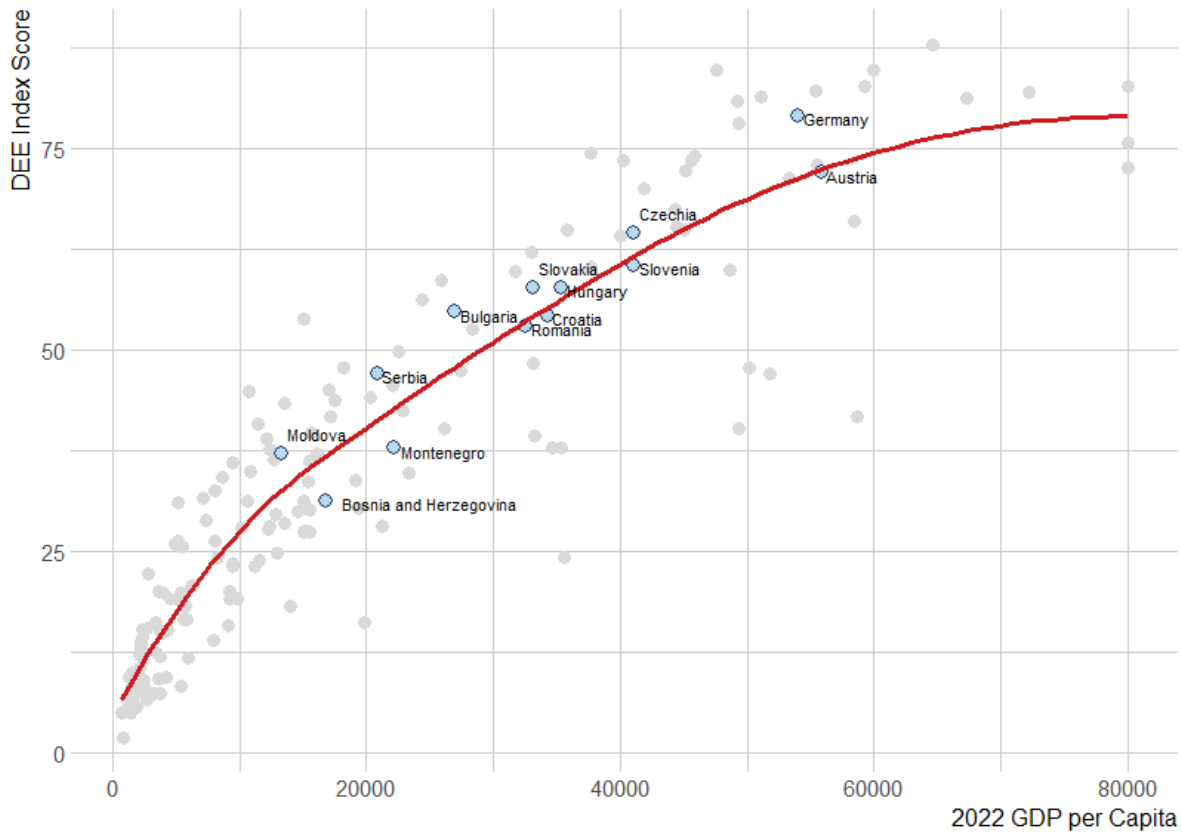
3. Danube Region DEE Index Analysis

Most of the countries in the region have experienced notable economic growth over the past few years, however, significant differences in income levels persist, with the GDP per capita of the most developed countries in the Danube region being more than five times that of the least developed (Zavarská, 2024). Figure 3 shows the relationship between the DEE Index score and the economic performance (using GDP per capita) of the Danube countries, with a capped horizontal axis at $80,000 to avoid distortion by outliers. The red trendline illustrates a clear non-linear, upward-sloping relationship: as GDP per capita increases, DEE Index scores generally rise, though at a decreasing rate. This diminishing return suggests that beyond a certain income level, further economic wealth contributes less proportionally to digital entrepreneurship performance.

As expected, countries like Germany and Austria are situated at the upper end of both GDP and DEE scores. Mid-income countries such as Czechia, Slovakia, and Bulgaria, as well as lower-income countries like Moldova and Serbia, fall slightly above the trendline, reflecting a balanced relationship between economic capacity and the development of their digital entrepreneurship ecosystems, or targeted digital development strategies. This means that these countries perform better in digital entrepreneurship ecosystem than the average country at their income level. It also suggests a more efficient use of available resources, stronger institutional support, or greater digital readiness relative to their economic capacity.

However, several lower-income countries, including Bosnia and Herzegovina and Montenegro, and to a lesser extent Romania and Croatia, fall below the trendline. Their position indicates underperformance in digital entrepreneurship ecosystem relative to their economic means.

Figure 3. Danube Region countries: DEE Index scores and GDP per capita (2022)



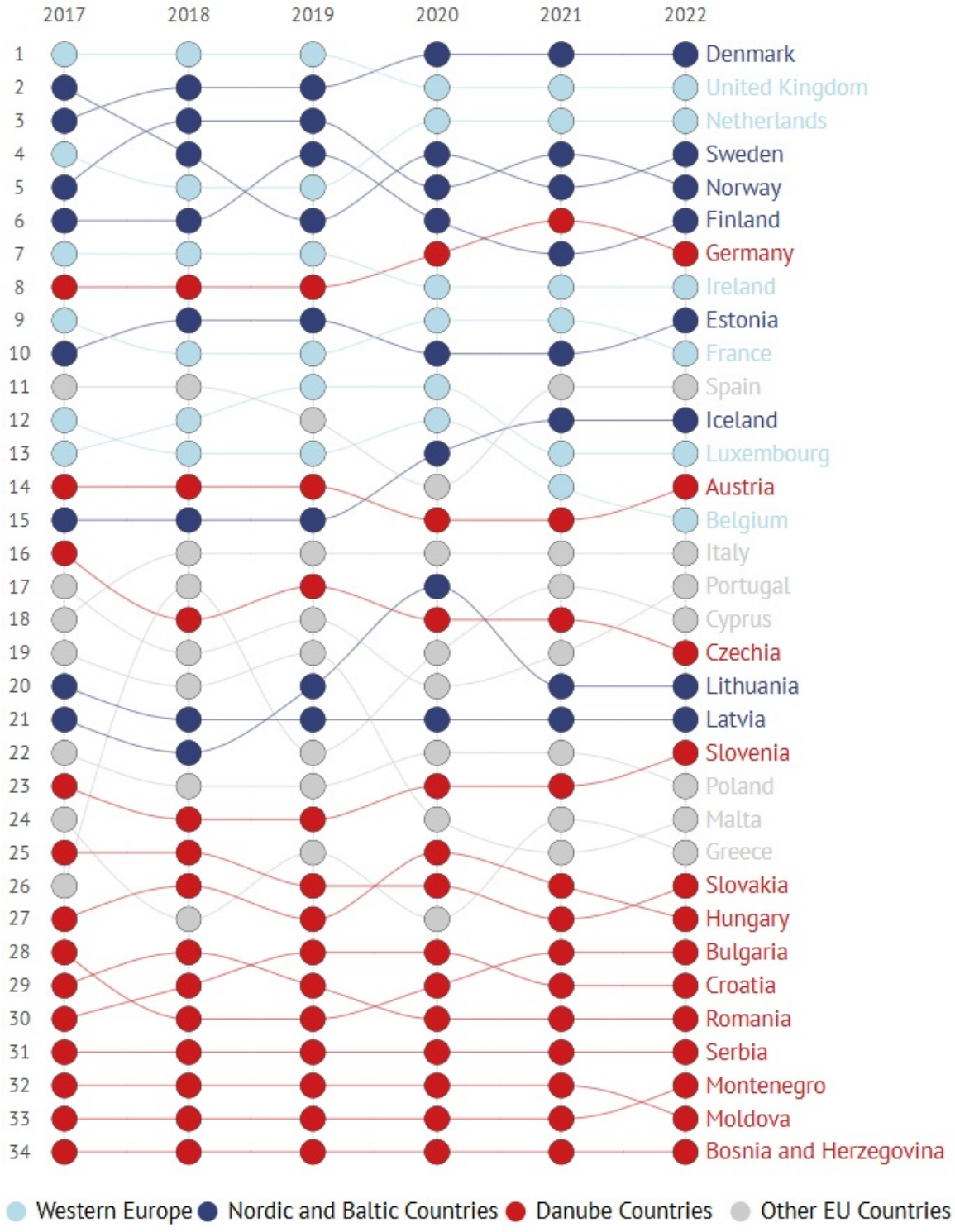
Note: *Each dot represents a country. The chart shows national DEE Index scores on the vertical axis, relative to GDP per capita (in thousand $) on the horizontal axis. The red line indicates the trend across all countries.*

Source: *VIGS Institute, 2025.*

The overall curve underlines the importance of not just economic prosperity but systemic coherence across the DEE pillars (DUC, DTE, DMSP, DTI) in fostering strong digital entrepreneurship ecosystems.

Figure 4. Danube countries' ranking within Europe (2017–2022)

Annual relative position of countries based on DEE Index scores



Note: *The ranking reflects each country's annual relative position in the DEE Index among European nations. Colors distinguish regional groupings.*
Source: *VIGS Institute, 2025.*

The report follows the digital entrepreneurial ecosystem ranking of these countries over time, providing a relative understanding of the performance change. Figure 4 presents the annual relative ranking of European countries by DEE Index scores from 2017 to 2022, with Danube countries highlighted in red. The visual reveals a consistent gap between Danube countries and top-performing Western and Nordic states such as Denmark, Sweden, and the Netherlands. Notably, throughout the period, Germany and Austria have been the only Danube nations ranking within the top 20 throughout the period, reflecting their mature digital entrepreneurial ecosystems. A similar trend was observed in the Digital Economy and Society Index (DESI) reports for 2022, where Austria ranked 10th and Germany ranked 13th (European Commission, 2022).These two countries have also mobilized substantial national investments in advanced technologies such as quantum computing, with Germany allocating 2 billion euros and Austria launching dedicated R&D programmes (European Commission, 2023). In contrast, countries like Bosnia and Herzegovina, Moldova, and Montenegro occupy the lowest rankings across all years, showing little upward mobility and persistent structural barriers in developing their digital entrepreneurship ecosystem.

Despite that several EU countries (not from the Danube region) are progressing at a faster pace than the rest, indicating an overall convergence in digital development within the EU. The Danube countries (including Czechia, Slovenia, and Slovakia) maintain mid-level rankings with modest fluctuations, suggesting relative stability but limited convergence with the top tier. Hungary and Bulgaria exhibit some rank deterioration over time, which indicate institutional stagnation or inefficiencies in translating digital investments into entrepreneurial outcomes. Importantly, the visualization also underscores a broader regional pattern: the Danube countries predominantly cluster in the lower third of the presented DEE rankings, signaling systemic challenges in digital inclusion, infrastructure, and platform development compared to their European counterparts.

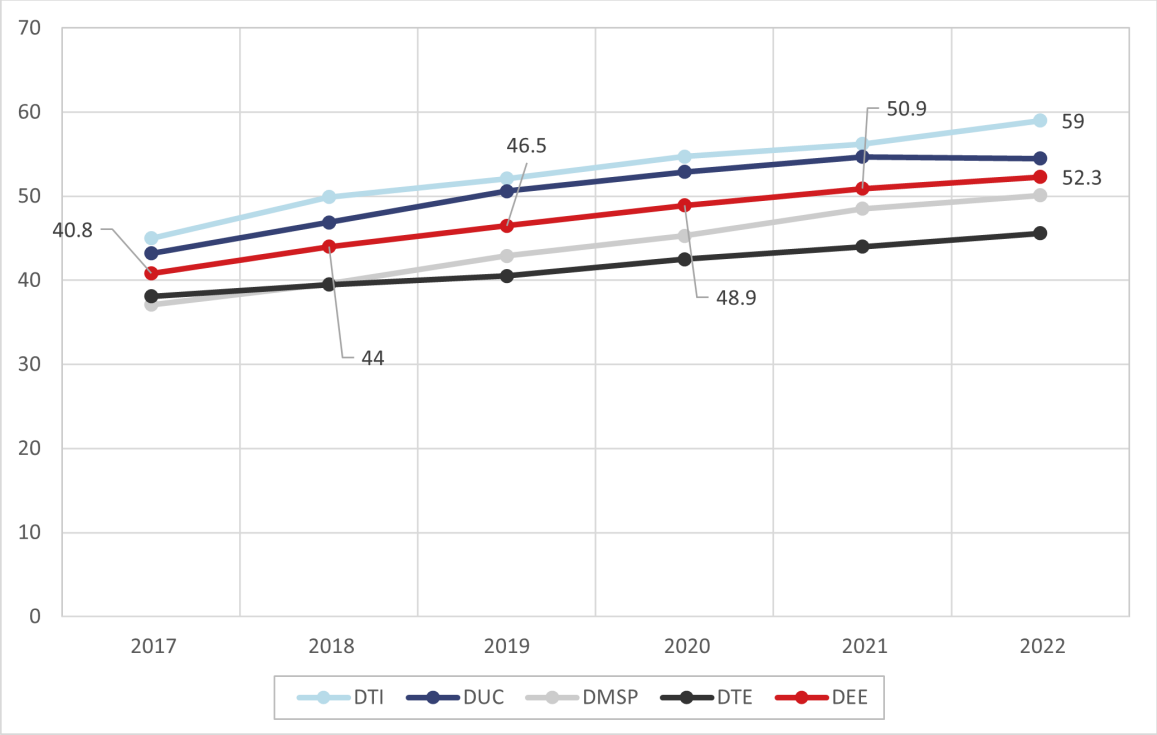
The longitudinal format reinforces that digital entrepreneurial ecosystems are path-dependent and slow to transform. It highlights the need for sustained policy focus on ecosystem-wide coordination, rather than isolated investments, if the Danube region is to close the gap with more advanced digital economies.

The aggregated data of the countries' overall and pillar-level performance can help to understand the Danube region's trends as a whole. Figure 5 illustrates the trajectory of the overall DEE Index and its four core pillars — Digital User Citizenship (DUC), Digital Technology Infrastructure (DTI), Digital Multisided Platforms (DMSP), and Digital Technology Entrepreneurship (DTE) — in the region from 2017 to 2022. The results show a steady and incremental improvement across all components, although the growth trajectories vary in intensity and implication.

The Digital Technology Infrastructure (DTI) consistently ranks as the most developed pillar, increasing from a baseline score of 44 in 2017 to 59 by 2022. This indicates significant investment in broadband connectivity, mobile access, and regulatory frameworks, making it a foundational strength of the region's ecosystem. The Digital User Citizenship (DUC) also shows substantial progress, reaching 52.3 in 2022. This reflects improved digital literacy, rights awareness, and user engagement, which are essential factors for inclusive participation in digital economies.

Figure 5. Development of DEE Index and its pillars in the Danube region (2017–2022)

Trends in Digital User Citizenship (DUC), Technology Infrastructure (DTI), Multi-sided Platforms (DMSP), and Technology Entrepreneurship (DTE) sub-pillars and the DEE Index.



Note: *The chart displays the evolution of the DEE Index and its four sub-pillars across the Danube region over time.*
Source: *VIGS Institute, 2025.*

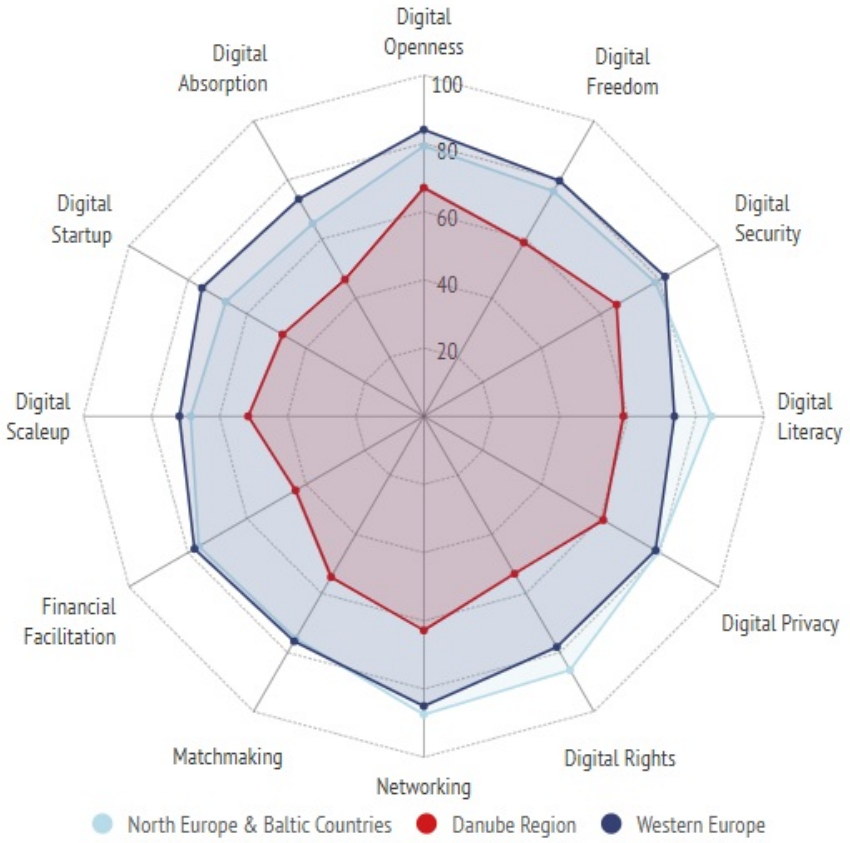
By contrast, the Digital Multi-sided Platforms (DMSP) and the Digital Technology Entrepreneurship (DTE) lag behind in both absolute performance and growth. While DMSP reached 50.9 in 2021, its slower acceleration suggests that platformization and matchmaking capacities remain underdeveloped relative to infrastructure components. DTE, the lowest-performing pillar, shows only marginal growth (from 40.8 in 2017 to 46.5 in 2022) indicating persistent challenges in scaling startups, fostering innovation, and enabling firm-level digital transformation.

The composite DEE Index increased from approximately 41 in 2017 to over 52 in 2022, confirming regional progress. However, the divergence between infrastructure gains and entrepreneurial outputs suggests a structural imbalance: while the foundations for digital ecosystems are being laid, the enabling conditions for entrepreneurial dynamism (especially platform orchestration and agent-based innovation) require further institutional attention and coordinated ecosystem development.

3.1 Digital Entrepreneurship Ecosystem Performance across key pillars and regional comparison

Figure 6. Digital Entrepreneurship Ecosystem performance across key pillars

Comparison of the Danube Region with North Europe, Baltic Countries and Western Europe



Note: *The radar chart compares performance across the pillars of the digital entrepreneurship ecosystem. North Europe and Baltic countries: Denmark, Estonia, Finland, Iceland, Latvia, Lithuania, Norway, Sweden. Western Europe: Belgium, France, Ireland, Luxembourg, the Netherlands, the United Kingdom.*

Source: *VIGS Institute, 2025.*

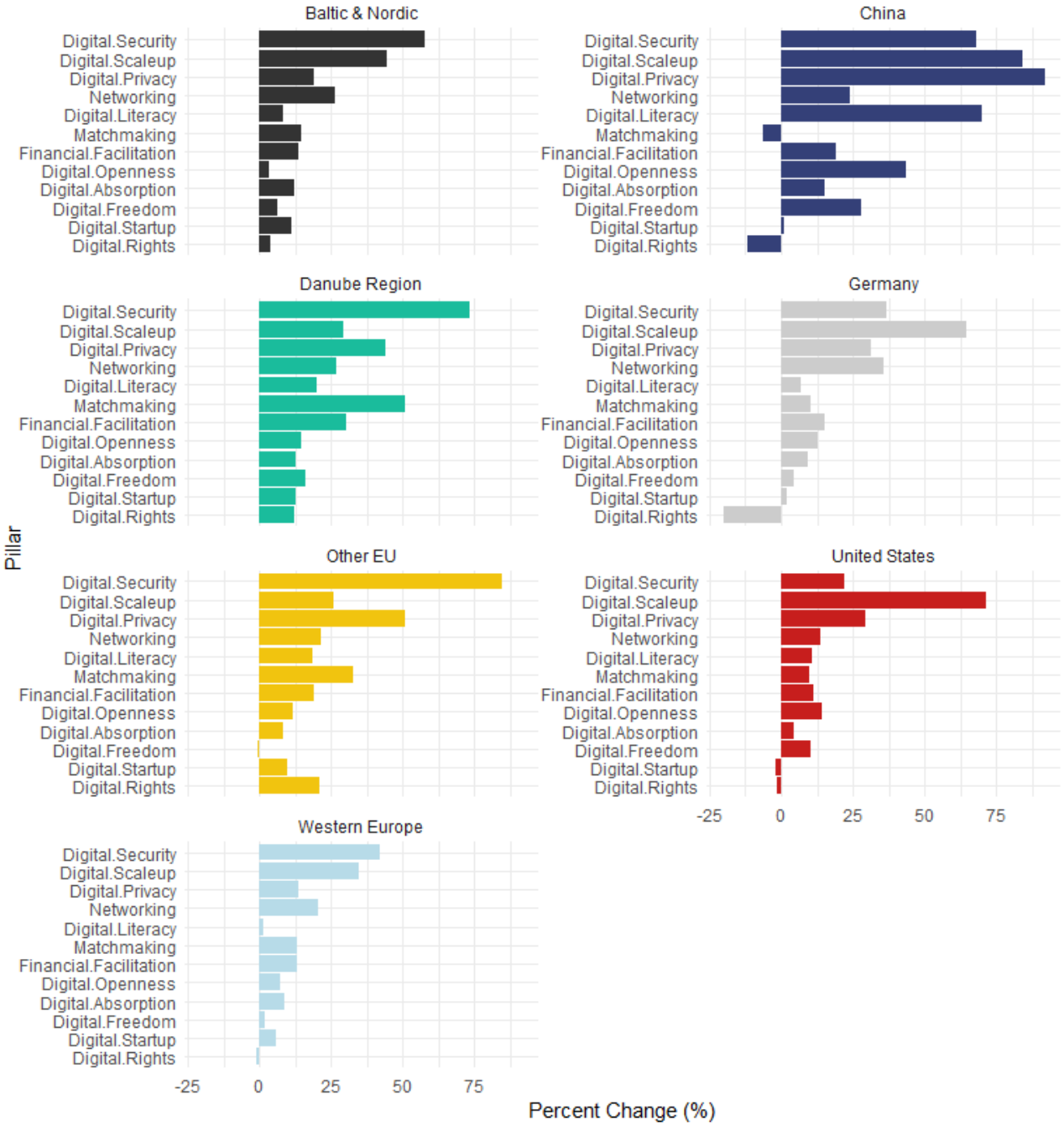
To put the Danube region's ecosystem into context, benchmarking regions within Europe and leading economies of the world can provide orientation, especially when strengths, weaknesses, and priorities are presented at a pillar level. Hence, Figure 6 provides a comparative radar chart showing the performance of the Danube region against Northern Europe and Baltic countries as well as Western Europe across the main digital entrepreneurship pillars. The chart clearly illustrates the structural gap between the Danube region (in red) and the more advanced European regions. Across all twelve indicators, the Danube countries consistently trail behind, with the largest performance deficits observed in Financial Facilitation, Matchmaking, Digital Absorbtion, and Digital Scaleup, components that directly impact the capacity to build and grow entrepreneurial ventures.

The Danube region performs relatively better in Digital Openness and Digital Freedom, reflecting basic internet access and regulatory progress, but it remains significantly behind in more advanced and ecosystem-critical components like Digital Absorption, Startup activity, and Financial Facilitation. These gaps indicate a digital entrepreneurship ecosystem that is still dependent on foundational infrastructure but struggles to activate and integrate dynamic, multi-actor platform interactions.

In contrast, Western Europe and Northern Europe consistently achieve high scores with above 80 in many categories, particularly in enabling user rights (Digital Privacy, Literacy, Security, and Freedom), but also in firm-oriented capacities like Startup and Scaleup but also Financial Facilitation. This stark contrast highlights the maturity and interconnectedness of their digital ecosystems, where innovation flows more efficiently between users, platforms, and institutions.

Overall, the radar chart underscores the need for Danube region policymakers to go beyond infrastructure development and invest more decisively in platform ecosystems, scaleup support mechanisms, and inclusive financial technologies. These areas appear to be the most critical levers for closing the performance gap with the leading European digital entrepreneurship ecosystems.

Figure 7. Pillar-level change (%) from 2017 to 2022 in digital entrepreneurship performance across regions, countries and pillars



Note: *Change is measured as the percent difference in pillar-level performance between 2017 and 2022. North Europe and Baltic countries: Denmark, Estonia, Finland, Iceland, Latvia, Lithuania, Norway, Sweden. Western Europe: Belgium, France, Ireland, Luxembourg, the Netherlands, the United Kingdom. Other EU: Cyprus, Italy, Greece, Malta, Poland, Portugal, Spain.*

Source: *VIGS Institute, 2025.*

Figure 7 compares the percent change in pillar-level digital entrepreneurship performance between 2017 and 2022 across global regions, with a particular emphasis on the Danube region. The data shows that the Danube countries achieved notable growth across multiple dimensions, especially in Digital Security, Digital Scaleup, and Digital Privacy, each increasing by over 20%. These gains suggest that the region is catching up in terms of foundational enablers of trust, data governance, and scaling capacity, elements crit-

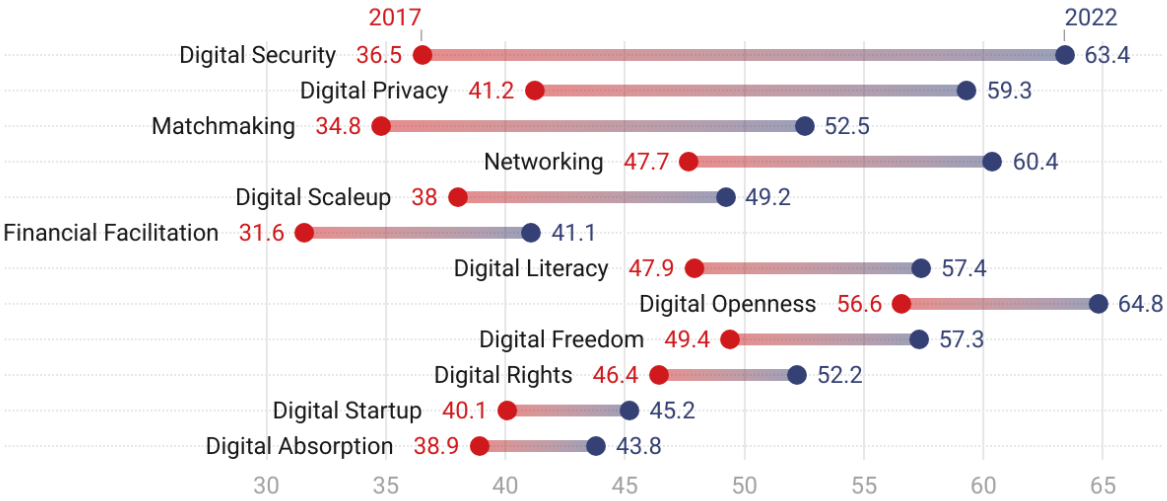
ical for building resilient digital ecosystems.

However, despite these improvements, the Danube region continues to trail behind peer regions like the Baltic & Nordic group and the United States in both growth rate and scope. In particular, the Danube region shows relatively limited progress in pillars such as Matchmaking, Financial Facilitation, and Digital Startup, areas essential for entrepreneurial activation and platform-based business development, but also for the connection between digital ecosystem and entrepreneurial ecosystem. These components remained stagnant or posted only modest single-digit gains, indicating that systemic bottlenecks persist in early-stage innovation and ecosystem financing.

Compared to Germany or Western Europe, where growth was more balanced yet modest, the Danube region's development appears to be driven more by security and inclusion gains than by entrepreneurial dynamism. In contrast, high-growth regions like the United States and China display strong advances across nearly all dimensions (especially Digital Scaleup, Networking, and Digital Privacy) suggesting a more integrated and innovation-driven ecosystem evolution.

Overall, the Danube region's performance reflects a phase of ecosystem consolidation rather than transformation. The strong progress in regulatory and foundational pillars is encouraging, but to converge with the leading innovation hubs, the region will need to accelerate progress in entrepreneurial activation and platform orchestration through targeted policy and institutional reforms.

Figure 8. Pillar-level change in the Danube Region (2017–2022)



Note: *The length of the horizontal bars indicates the change in the performance of the pillars from 2017 to 2022. The points (red and blue) represent values for each year, beginning and ending, respectively, for the DEE series.*
Source: *VIGS Institute, 2025.*

In a more granular view, Figure 8 shows how each digital entrepreneurship pillar evolved in the Danube region between 2017 and 2022. The horizontal bars reveal not only the magnitude of change but also the initial and final performance levels. The most striking improvements occurred in Digital Security, which rose from 36.5 to 63.4, and Digital Privacy, increasing from 41.2 to 59.3. These gains point to a regional policy emphasis on digital trust, regulatory frameworks, and data protection, enablers of user confidence and platform participation. The recent EU's Startup and Scaleup Strategy (2025) emphasized that regulatory uncertainty and fragmentation are obstacles to firm expansion (including platform business) across borders. Other substantial improvements include Matchmaking (from 34.8 to 52.5), Networking (from 47.7 to 60.4), and Digital Scaleup (from 38 to 49.2), indicating progress in ecosystem connectivity and support for scaling entrepreneurial ventures. However, foundational pillars such as Digital Absorption (from 38.9 to 43.8) and Digital Startup (from 40.1 to 45.2) showed only modest gains, reflecting ongoing barriers in technological uptake among incumbents and limited startup activation in the region.

Notably, pillars that were already relatively strong in 2017, such as Digital Literacy and Digital Openness, continued to improve steadily, with final scores sur-

passing 57 and 64 respectively. This signals a healthy baseline of digital inclusion and institutional openness, but also underscores that marginal improvements in well-established areas may yield diminishing returns without corresponding progress in weaker links such as financial facilitation and entrepreneurial agency.

In summary, while the Danube region has made impressive strides in digital trust, networking, and regulatory alignment, it must now address the structural lags in early-stage innovation and digital firm capability. Closing these remaining gaps will be essential to unlocking the full potential of its digital entrepreneurship ecosystem.

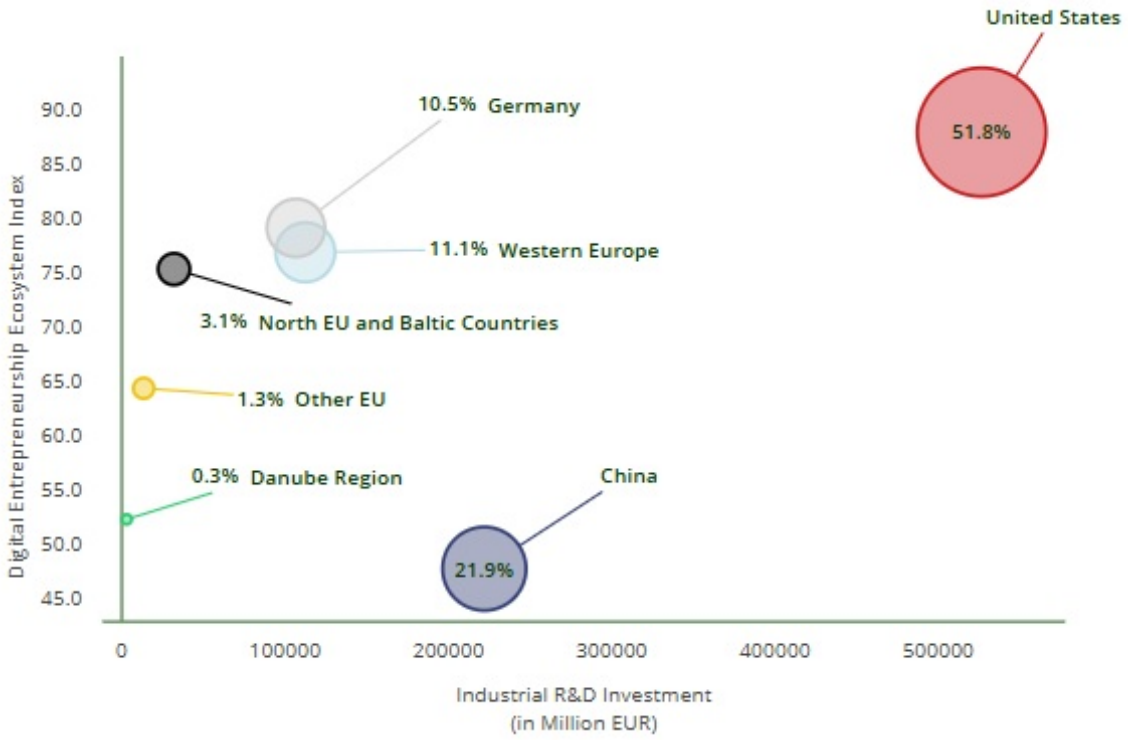
3.2 R&D Investment and Industry Specific Indicators

Although the DEE Index captures how digital entrepreneurship performs and its constraints (low financial facilitation in the Danube region) it does not by itself reveal the inputs and sectoral pathways that produce those outcomes. Mapping industrial R&D and industry-specific indicators alongside DEE scores helps us trace where ecosystem capacity is being built, detect industry-specific bottlenecks that aggregate indices can mask, and link foundational investment to entrepreneurial outputs in platforms, startups, and scaleups.

The following figure (Figure 9) presents a correlation between industrial R&D investment (horizontal axis) and DEE Index performance (vertical axis) across major global regions, using bubble size to denote each region's share of global R&D expenditure. The visualization highlights a positive relationship between R&D investment and digital entrepreneurship ecosystem strength, with the United States standing out as the dominant global leader. The U.S. contributes over 51.8% of global industrial R&D, and its corresponding DEE Index value is the highest among all regions, reaffirming its strong linkage between research intensity and entrepreneurial output.

Germany and Western Europe also display a balanced position, combining high levels of investment (10.5% and 11.1% respectively) with strong DEE performance, underscoring the importance of sustained industrial research funding for ecosystem maturity. Similarly, China, despite its substantial R&D share (21.9%), still lags in DEE performance, indicating that investment alone does not guarantee systemic digital entrepreneurship outcomes, especially when institutional or market constraints persist.

Figure 9. Correlation between industrial R&D investment and the DEE Index across selected regions and countries

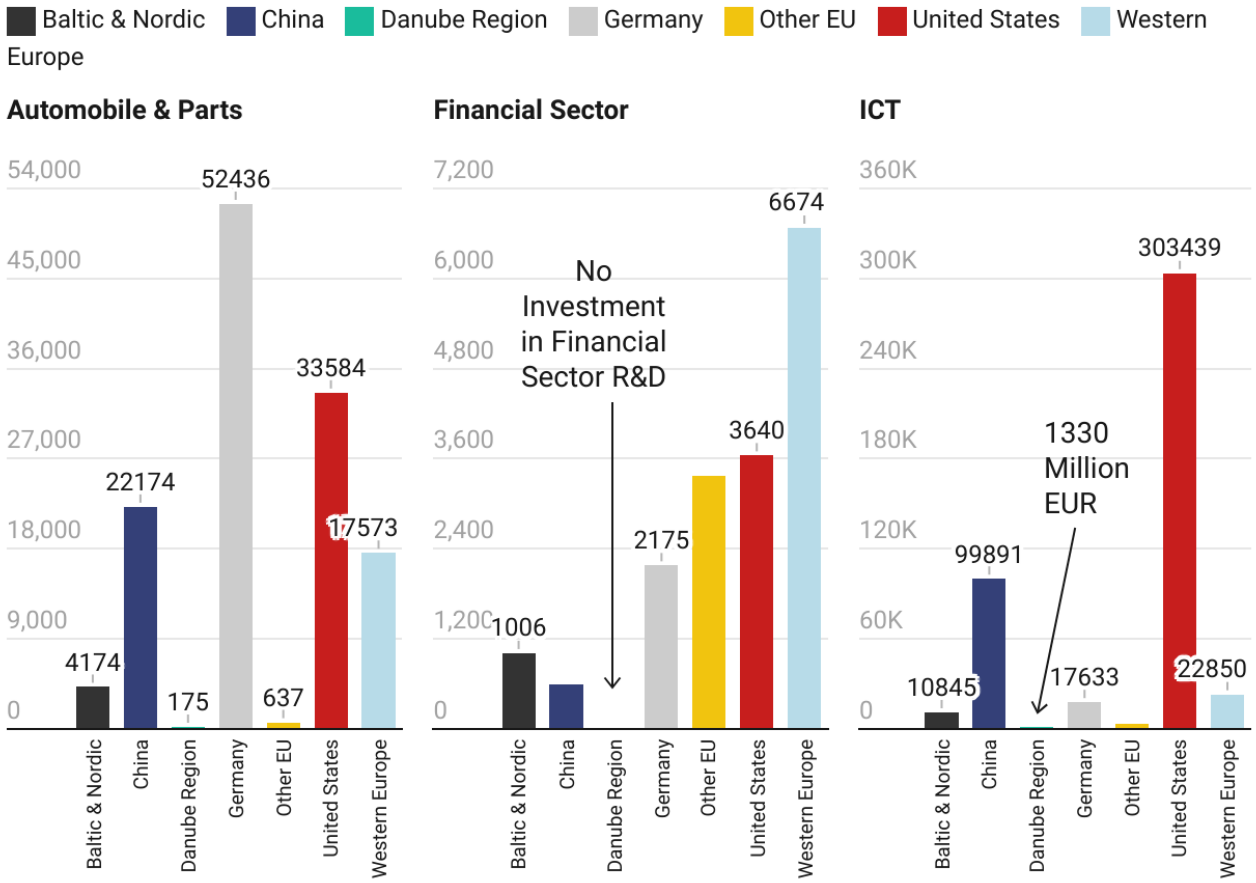


Note: *Bubble sizes represent each region's share of global industrial R&D investment (data from the EU Industrial R&D Investment Scoreboard (2023)). The DEE Index values are plotted on the vertical axis. North Europe and Baltic countries: Denmark, Estonia, Finland, Iceland, Latvia, Lithuania, Norway, Sweden. Western Europe: Belgium, France, Ireland, Luxembourg, the Netherlands, the United Kingdom. Other EU: Cyprus, Italy, Greece, Malta, Poland, Portugal, Spain.*
Source: *VIGS Institute, 2025.*

In stark contrast, the Danube region occupies the bottom-left quadrant: its DEE Index value is below 55, and it accounts for a mere 0.3% of global industrial R&D. This dual disadvantage suggests that the region not only lacks sufficient innovation capital but also struggles to translate existing resources into entrepreneurial dynamism. It reinforces the finding that the Danube ecosystem is underdeveloped in both input (R&D investment) and output (digital entrepreneurship ecosystem performance), and that catching up requires more than imitation and "assembler" type of economies, it demands institutional reform, better coordination across actors, and targeted innovation policy.

This chart supports the broader conclusion that effective digital entrepreneurship ecosystems are driven not only by funding levels but also by the systemic ability to absorb, apply, and scale innovation across infrastructure, users, and platforms.

Figure 10. Sectoral R&D investment across selected countries and regions in the automobile, financial and ICT sectors



Note: *The chart shows R&D investment (in million EUR) across three selected sectors. The data was collected from the EU Industrial R&D Investment Scoreboard (2023). The ICT sector dominates the overall investment. The Danube region reports no investment in Financial Sector R&D.*
Source: *VIGS Institute, 2025.*

Figure 10 compares industrial R&D investment across three strategic sectors such as Automobile & Parts, Financial Services, and Information and Communication Technology (ICT) for major global regions. According to the R&D investment Scoreboard (2023) four sectors (ICT hardware, ICT software, health, and automotive) continued to account for more than three quarters of Scoreboard R&D. The data exposes a sharp imbalance in sectoral innovation capacity, with the Danube region consistently underinvesting across all three domains.

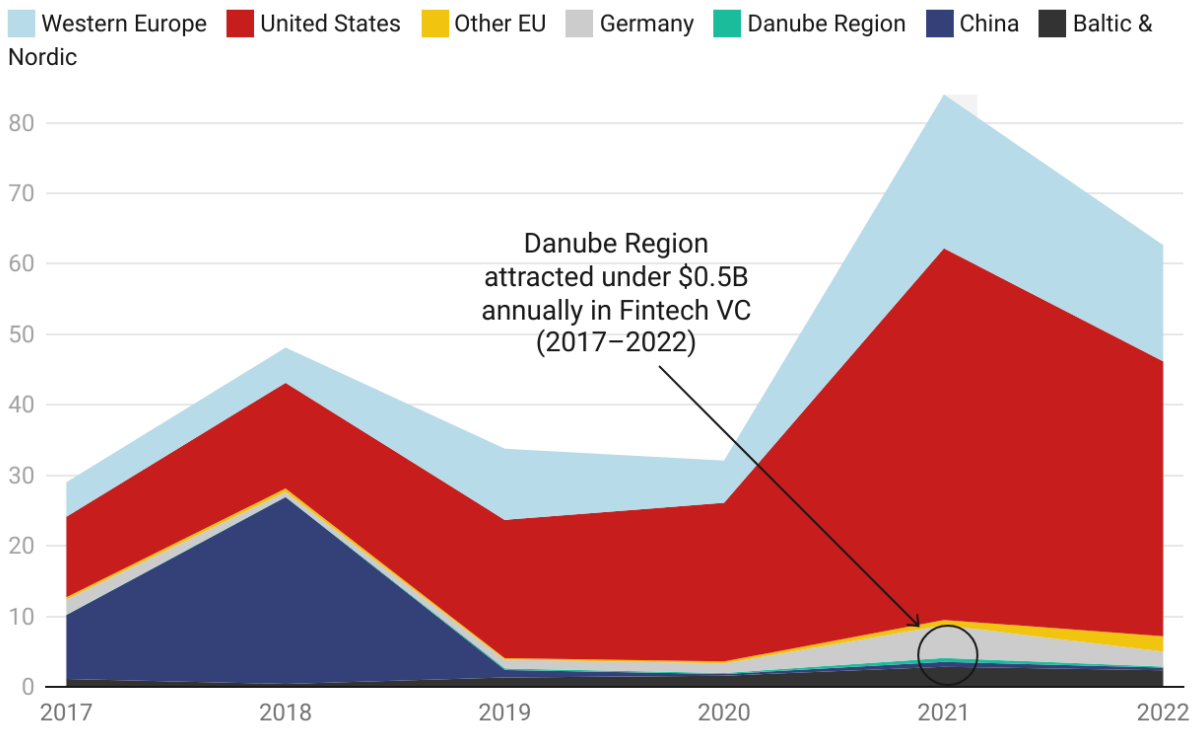
In the Automobile & Parts sector, the Danube region reports a negligible investment of just 175 million EUR, placing it far behind Germany (52,436 million EUR) and the United States (33,584 million EUR). This absence is particularly striking given the automotive industry's critical role in Central and Eastern European economies, revealing a disconnect between industrial presence, manufacturing and innovation funding.

The Financial Sector shows an even more pronounced gap: the Danube region records zero investment in financial R&D, highlighting a major blind spot in the development of fintech infrastructure, digital finance tools, and regulatory tech innovation. In contrast, Western Europe and the U.S. invest over 6,000 million EUR each, reinforcing their leadership in secure and scalable financial platforms.

For ICT, a sector central to digital entrepreneurship, the Danube region's R&D investment is limited to 1,330 million EUR. This figure pales in comparison to China's nearly 100,000 million EUR and the United States' 303,439 million EUR. Even Germany, a geographically and structurally proximate economy, invests over 17,600 million EUR, more than ten times the Danube region's outlay.

The figure underscores the Danube region's systemic underinvestment in the sectors most critical for driving digital transformation and entrepreneurship. Without meaningful R&D contributions in ICT and fintech, the region risks entrenching its dependency on foreign technology and platforms, and limiting the growth of its own innovation-driven enterprises. To close this structural innovation gap, targeted investment strategies and public–private R&D incentives will be essential.

Figure 11. Annual fintech VC investment by selected countries and regions (2017–2022)



Note: *Stacked area chart of annual fintech VC investment (USD billions). The Danube Region remains below $0.5B per year across 2017–2022, even during the 2021 global spike.*

Source: *Crunchbase VC funding data; VIGS Institute calculations, 2025.*

Because industrial R&D investment at times can be underrepresentative of actual capital investment in an industry, Figure 11 situates the Danube Region's fintech venture funding within the global context. Western Europe and the United States account for the overwhelming share of fintech VC, with a pronounced surge in 2021 followed by a normalization in 2022. In contrast, the Danube Region's slice remains thin throughout the period, attracting *under $0.5B annually* between 2017 and 2022—even in the peak year.

This pattern dovetails with Figure 10: limited financial R&D and weaker capital formation channels translate into modest fintech deal flow and fewer late-stage rounds. The result is a shallow pipeline from startup to scaleup, reinforcing our earlier finding that *Financial Facilitation*, *Matchmaking*, and *Digital Scaleup* are structural bottlenecks in the region's DEE.

Policy implications are clear: (i) deepen cross-border fund availability (e.g., regional fund-of-funds and co-investment schemes), (ii) expand fintech-friendly regulatory sandboxes and passporting to reduce fragmentation, and (iii) accelerate adoption of open-banking and instant-payments rails to boost market access and orchestrate platform effects. Strengthening these levers would help translate improving digital foundations into a more vibrant fintech entrepreneurial ecosystem.

Another interesting exercise is presented in Figure 12, which visualises the frequency of industry tag co-occurrence within startups classified in the Automotive (left) and Security (right) sectors, based on Crunchbase data. Each arc represents how often firms operating in these sectors are simultaneously tagged under additional industry labels, revealing the multidimensional nature of contemporary digital entrepreneurship.

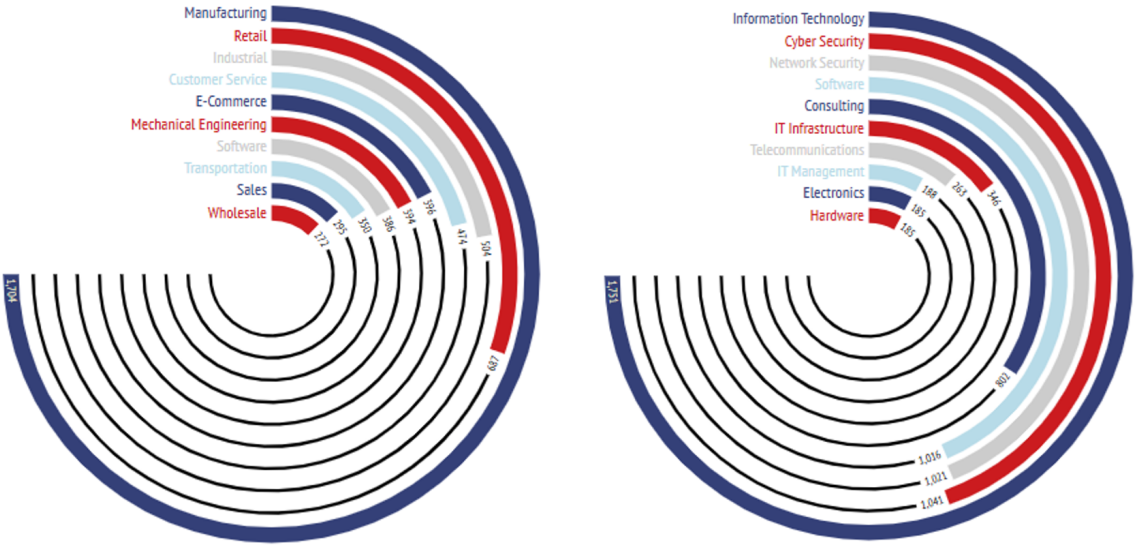
In the Automotive sector, firms frequently co-occur with tags such as Manufacturing, Industrial, and Mechanical Engineering, which were expected linkages given the sector's physical product orientation. However, the presence of E-Commerce, Customer Service, and Software as secondary tags suggests a growing convergence between traditional manufacturing and digital services. This reflects a shift toward connected vehicles, online sales channels, and customer experience platforms, hallmarks of digital transformation in mobility.

In contrast, the Security sector exhibits dense co-occurrences with Information Technology, Cybersecurity, Network Security, and SaaS (Software as a Service), highlighting a tightly integrated and digitally native ecosystem. These co-occurrences indicate strong platform logic and modular innovation, with many firms building interoperable solutions for cloud infrastructure, surveillance, and threat mitigation. The linkages with AI, IT Infrastructure, and even Hardware suggest the emergence of full-stack security firms that bridge software and device layers.

Together, these patterns illustrate how digital entrepreneurship transcends singular industry boundaries. The Security sector's highly digital and networked nature contrasts with the Automotive sector's hybrid character, where traditional and digital capabilities are increasingly fused. For regions like the Danube, where digital entrepreneurship ecosystems are still maturing, understanding and fostering such sectoral intersections will be key. Supporting firms that sit at the crossroads of engineering and software, or of hardware and cybersecurity, can amplify innovation spillovers and ecosystem depth.

Moreover, these co-occurrence patterns offer a strategic lens for identifying industry clusters, talent needs, and innovation adjacencies, crucial for policy makers aiming to prioritize sectoral support within limited resource environments.

Figure 12. Industry co-occurrences in automotive and security sectors



Note: *The chart presents the co-occurrence of Crunchbase firms industry labels in the Automotive (left) and Security (right) sectors. Each arc reflects the frequency of industry tag co-occurrence within firms classified under the respective primary sector.*
Source: *Based on Crunchbase data. VIGS institute, 2025.*

4. Insights from the Austrian Digital Entrepreneurial Ecosystem

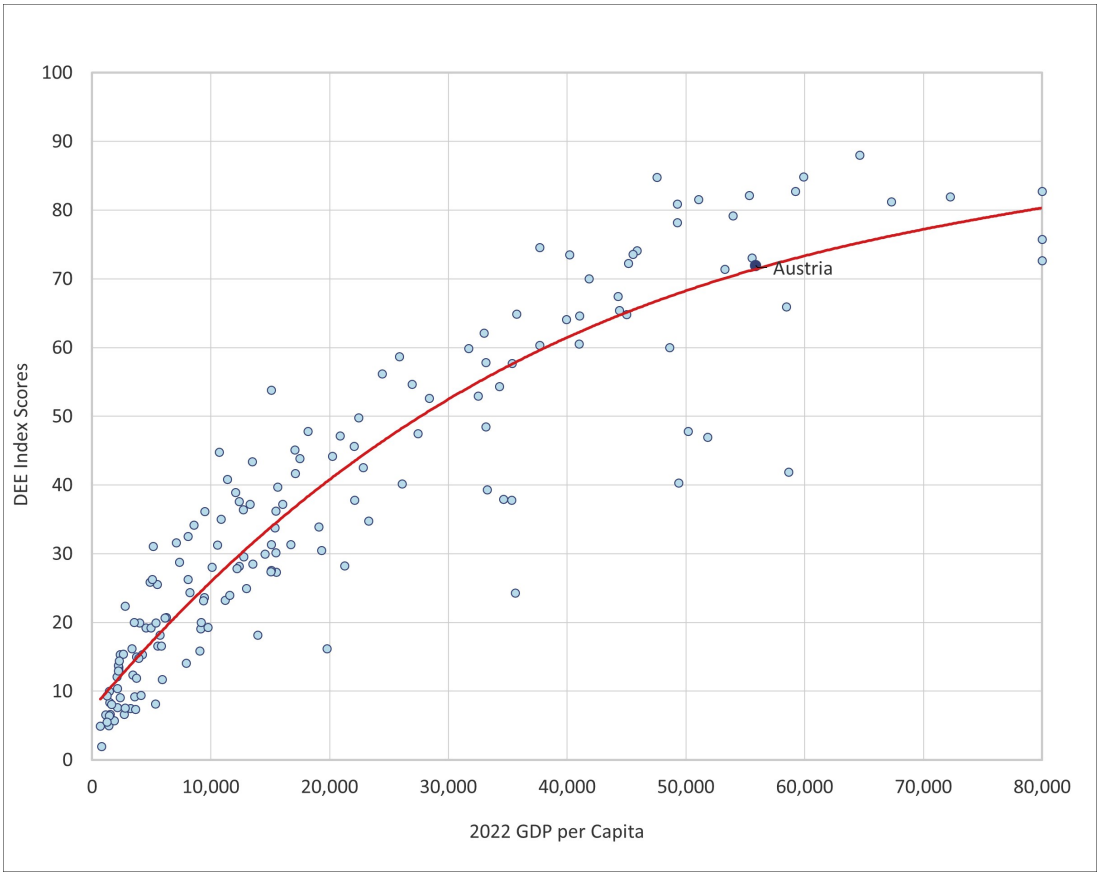
The Danube region has always been vitally important for Austria, and it occupies a special position in Austria's foreign policy agenda. While Austria's development always served as a "model" for the Danube countries.In this chapter, we present an in-depth analysis of Austria's performance within the Digital Entrepreneurship Ecosystem (DEE) Index, focusing on its structural strengths, policy environment, and comparative position within Europe. As one of the most digitally advanced countries in the Danube region, Austria offers valuable insights into how institutional maturity, technological infrastructure, and user engagement translate into systemic entrepreneurial outcomes. The analysis covers temporal trends, pillar-specific progress, and Austria's standing relative to EU averages, high-income economies, and regional peers such as Germany and Switzerland.

4.1 Austria's DEE Index performance

Figure 13 illustrates the correlation between GDP per capita and the Digital Entrepreneurship Ecosystem (DEE) Index scores across countries in 2022. Each dot represents a country observation, while the red curve shows a fitted trendline capturing the general relationship between economic prosperity and digital entrepreneurship ecosystem performance.

Austria is prominently positioned near the upper-middle part of the curve, signaling a relatively strong alignment between its GDP per capita and DEE score. With GDP per capita around $ 56,000 and a DEE score above 70, Austria stands out as a mature digital entrepreneurship ecosystem within the Danube region, far surpassing its regional peers in both economic capacity and digital ecosystem development.

Figure 13. Correlation between GDP per capita and DEE Index scores across countries in 2022 - Austria

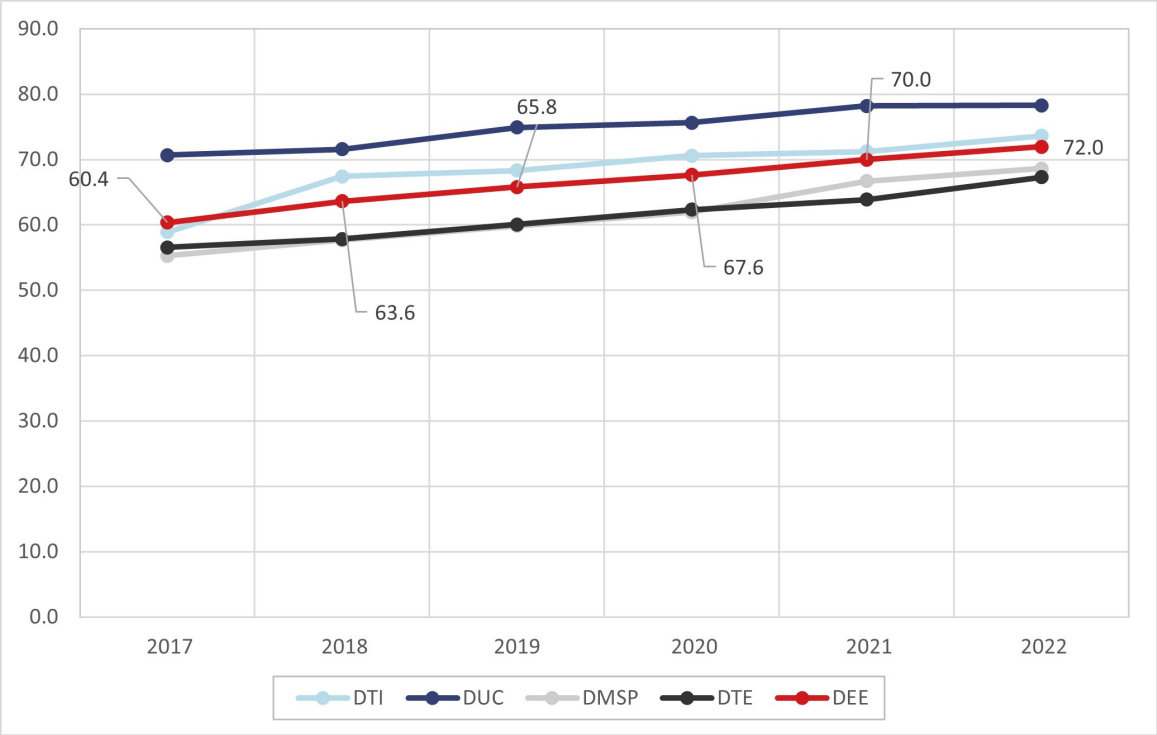


Note: *Each light-blue dot represents a country, except Austria, marked in dark-blue. The red curve is a fitted trendline showing the correlation between 2022 GDP per capita (in thousand $) and DEE Index scores.*
Source: *VIGS Institute, 2025.*

This placement suggests that Austria effectively leverages its economic resources to foster a balanced and functional digital ecosystem, an outcome not automatically guaranteed in other high-income regions. The country's performance tracks closely with the non-linear trendline, which indicates diminishing returns at higher levels of income: as GDP increases, DEE improvements continue, but at a slower rate. Austria is thus nearing the "plateau" of the curve, where further DEE gains may require qualitative shifts in innovation strategy, regulatory adaptation, and inclusion rather than simple economic expansion.

In policy terms, Austria's relative maturity in digital entrepreneurship presents both a model and a challenge. It sets a regional benchmark, particularly within the Danube group, but also implies that future gains must come from deeper ecosystem optimization (e.g., strengthening platform interoperability, scaling innovation across sectors, or enhancing user participation and rights). Furthermore, Austria's position confirms that institutional coherence and strategic investment are essential for transforming economic capacity into systemic entrepreneurial outcomes.

Figure 14. Longitudinal trends of the DEE Index and subindexes' performance in Austria (2017–2022)



Note: *The figure displays the evolution of DEE and its components (DTI, DUC, DMSP, DTE) for Austria from 2017 to 2022.*
Source: *VIGS Institute, 2025.*

Figure 14 illustrates Austria's Digital Entrepreneurship Ecosystem (DEE) performance between 2017 and 2022, tracking both the overall index and its four constituent pillars: Digital Technology Infrastructure (DTI), Digital User Citizenship (DUC), Digital Multi-sided Platforms (DMSP), and Digital Technology Entrepreneurship (DTE). Over this six-year period, Austria's composite DEE score improved steadily from 60.4 in 2017 to 72.0 in 2022, reflecting consistent system-wide strengthening across infrastructure, user engagement, platform development, and entrepreneurial innovation.

Among the four dimensions, Digital User Citizenship (DUC) consistently leads, starting at a high level of 70.0 in 2017 and increasing to 78.0 by 2022. This subindex captures Austria's robust digital inclusion, strong privacy and rights frameworks, and widespread digital literacy, which collectively ensure that users are not only digitally present but actively engaged in shaping the digital economy. Similarly, Austria's Digital Technology Infrastructure (DTI) demonstrates clear progress, rising from 60.4 in 2017 to 72.0 in 2022. This trajectory suggests successful investments in broadband, cybersecurity regulation, and open data systems that underpin digital activity.

Digital Multi-sided Platforms (DMSP) also follow an upward trend, increasing from 60.2 to 70.0. This reflects the growing importance of platforms as orchestrators of digital economic interaction and Austria's ability to foster scalable, modular platform environments that enable value creation across diverse actors. Meanwhile, Digital Technology Entrepreneurship (DTE), while starting as the weakest of the four pillars at 55.3 in 2017, shows notable and steady improvement, reaching 67.6 by 2022. This development points to expanding support for digital startups, better integration of digital tools into innovation strategies, and a broader entrepreneurial culture that increasingly leverages digital capabilities.

Overall, Austria's DEE evolution reveals a well-balanced and coherent ecosystem, with strong institutional and infrastructural foundations complemented by gradual but visible improvements in digital entrepreneurship dynamics. The most significant gains appear in areas historically less developed, particularly DTE, while high performance in user-related dimensions has been sustained. This pattern suggests that Austria is not only digitally mature but also increasingly capable of translating that maturity into entrepreneurial outcomes, positioning itself competitively within both the Danube region and the broader European digital economy.

To gain a deeper understanding of the ecosystem, Figure 15 provides a detailed breakdown of Austria's

performance across specific DEE subdimensions from 2020 to 2022. The chart reveals a largely positive trend, with most subdimensions showing improvement, underscoring Austria's ongoing efforts to strengthen its digital entrepreneurship ecosystem.

Among the most notable gains is Digital Openness, which improved by +11.5 points, suggesting significant progress in promoting accessible and transparent digital environments. This likely reflects policy reforms or increased support for open data and interoperable digital services. Networking also saw a substantial gain of +11.9 points, indicating enhanced connectivity among stakeholders such as startups, support organizations, and platform intermediaries, which is an essential feature for scaling entrepreneurial activity in digital contexts.

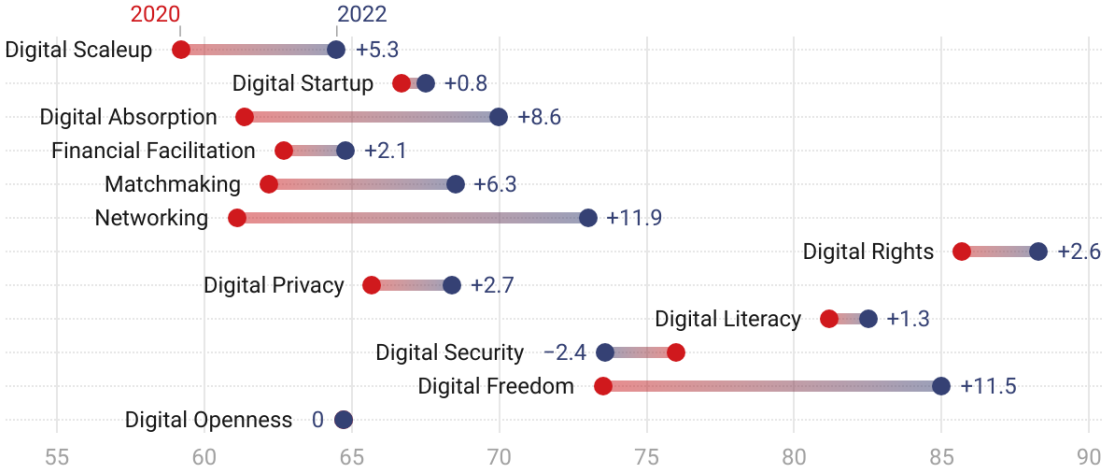
Digital Absorption rose by +8.6 points, pointing to improved adoption of digital technologies among incumbent firms, which is key to transforming traditional industries and fostering innovation. Improvements in Matchmaking (+6.3) and Digital Scaleup (+5.3) suggest better facilitation of market linkages and stronger support for high-growth ventures, reinforcing Austria's capabilities to translate entrepreneurial initiatives into scalable business models. However, according to an European Commission report, Austria's innovation activity and business dynamism are hindered by labour and skills shortages. This is particularly challenging in the context of increasing demand for new skills for the green and digital transitions (European Commission, 2024).

On the other hand, some domains exhibited more modest gains, such as Financial Facilitation (+2.1), Digital Privacy (+2.7), Digital Rights (+2.6), and Digital Literacy (+1.3), which, while moving in the right direction, indicate room for further development, especially as these areas underpin trust, inclusiveness, and participation in the digital economy.

Only one area saw a decline: Digital Security (-2.4), which may reflect growing vulnerabilities or lagging policy responses in cybersecurity. In contrast, Digital Freedom remained stagnant, suggesting a stable but potentially unchanging regulatory or civic landscape in terms of expression and digital autonomy.

This decomposition of Austria's DEE evolution demonstrates a generally robust and diversified digital entrepreneurship environment, while also highlighting specific domains such as security and digital civic freedoms, where sustained policy attention may be necessary.

Figure 15. Changes in score in the DEE Index pillars in Austria (2020–2022)



Note: *Bars indicate the score change in DEE Index pillars between 2020 and 2022. Red indicates the starting year (2020), while blue indicates the ending year (2022).*

Source: *VIGS Institute, 2025.*

Figure 16 provides a comparative overview of Austria's Digital Entrepreneurship Ecosystem (DEE) pillar scores in relation to both the European Union average and the average for high-income countries (World Bank classification). This radar chart highlights Austria's relative strengths and weaknesses across key digital entrepreneurship domains.

Austria generally outperforms the EU average in most categories, particularly in Digital Openness, Dig-

ital Rights, and Digital Absorption, indicating a well-developed institutional and infrastructural environment for digital entrepreneurship. This finding regarding Digital Absorption in Austria is also supported by the Digital Economy and Society Index (DESI) report, mentioning that 57.9% of enterprises have at least a basic level of digital intensity, in line with the EU average of 57.7%. This suggests that Austria benefits from policies and platforms that encourage inclusive access to digital services and ensure interoperability and user rights, factors that create fertile ground for both startups and scaleups.

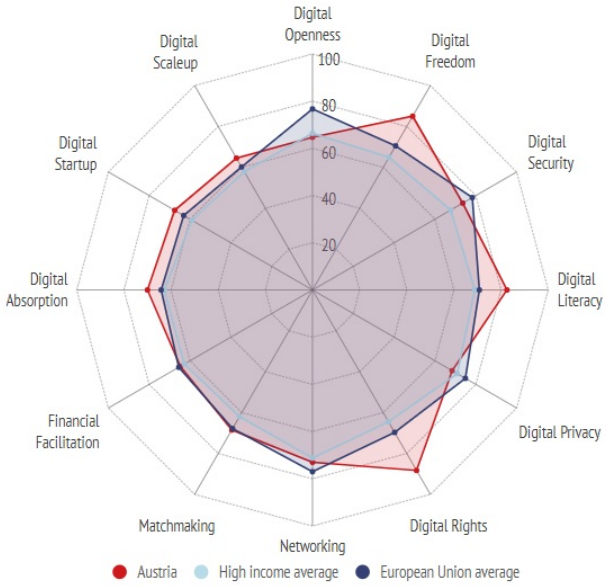
Compared to high-income countries, Austria remains largely competitive but does not consistently exceed the benchmark. For instance, it slightly lags behind the high-income average in Digital Privacy and Digital Security, pointing to potential areas for policy refinement or investment to ensure civic autonomy, privacy and robust protection against cyber threats. The high-income group also shows slightly stronger performance in Digital Openness, Networking and Financial Facilitation, hinting at areas where Austria may need to intensify efforts, especially if it aims to match the depth of digital skills and investment ecosystems found in leading innovation hubs.

In the same vein, the Special Eurobarometer *Digital Decade 2024* finds that 55% of Austrians believe the EU protects their digital rights (+8% compared to 2023 and above the EU average of 45%). Confidence levels are also higher than the EU average in several areas: freedom of assembly online (65%), digital public services (65%), and privacy-friendly technologies (67%). Nonetheless, notable concerns remain regarding control over personal data (38%) and children's online safety (47%), reinforcing the need to further strengthen digital rights protections at the national level. [1]

Interestingly, Austria performs very similarly to the high-income average in Digital Startup and Digital Scaleup, confirming the country's stable entrepreneurial output and growth potential. In categories like Matchmaking and Networking, Austria's scores align closely with both comparative groups, suggesting a solid base of connective infrastructure and market intermediation.

Overall, the chart reinforces Austria's position as a strong digital entrepreneurial performer in the European context, while simultaneously revealing specific gaps that must be addressed if the country aspires to lead on a global scale. The path forward lies in maintaining current strengths while strategically enhancing underperforming subdimensions to align more closely with the digital front-runners.

Figure 16. Austria's DEE Index pillars compared to EU and high-income country averages (2022)



Note: *The radar chart shows Austria's performance in DEE Index subdimensions in comparison with the EU and high-income country averages.*

Source: *VIGS Institute, 2025.*

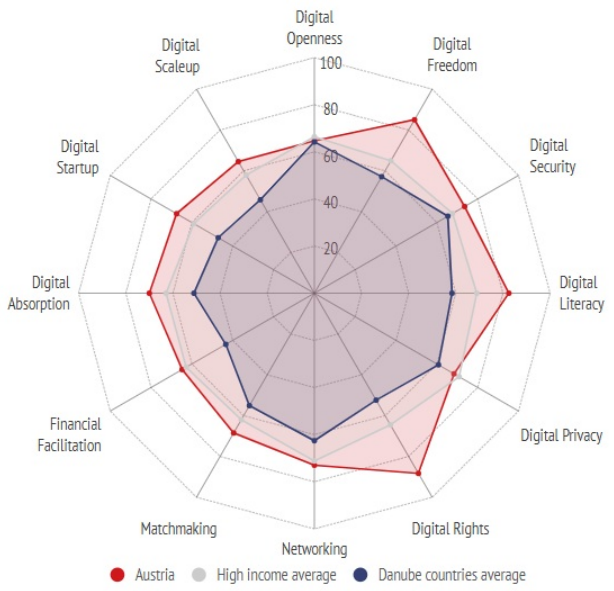
To provide an additional layer of comparison, Figure 17 compares Austria's performance in the DEE Index with the average scores of Danube region countries across all pillars, keeping the high-income countries as a reference. The chart reveals Austria's significant digital advantage over its regional peers, consistently scoring above the Danube average in every category.

This performance gap is most pronounced in dimensions such as Digital Rights, Digital Freedom, and Digital Security, where Austria aligns closely with high-income country standards, while the Danube region lags. These gaps point to Austria's stronger regulatory frameworks, civic digital protections, and cybersecurity measures, which together create a more trustworthy and enabling environment for digital entrepreneurial activity.

In Digital Openness, Digital Literacy, and Digital Absorption, Austria also outpaces the region, suggesting that it benefits from higher levels of digital skills in the population, better integration of digital tools across firms, and more open data practices or interoperable systems.

[1] Special Eurobarometer 551 on 'the Digital Decade' 2024: https://digital-strategy.ec.europa.eu/en/news-redirect/833351

Figure 17. Austria's DEE Index pillars compared to Danube region's averages (2022)



Note: *The radar chart shows Austria's DEE scores in comparison to average values for the Danube region countries.*
Source: *VIGS Institute, 2025.*

The gaps in Financial Facilitation, Matchmaking, and Networking, while narrower, they still indicate Austria's relatively more mature digital market infrastructure and ecosystem connectivity. These capabilities are critical for scaling ventures and connecting them with resources, talent, and partners, areas where Danube countries face fragmentation or institutional underdevelopment.

Even in entrepreneurship-specific areas like Digital Startup and Digital Scaleup, Austria's lead reflects stronger institutional support systems, better access to venture capital or accelerators, and a more conducive regulatory and infrastructural base for digital business growth.

Overall, the chart positions Austria not just as a regional leader but as an outlier within the Danube context. Its performance underscores a structural and strategic gap within the region, implying that Austria could serve as a reference point or regional innovation hub for policy learning, capability transfer, and cross-border collaboration within the Danube ecosystem.

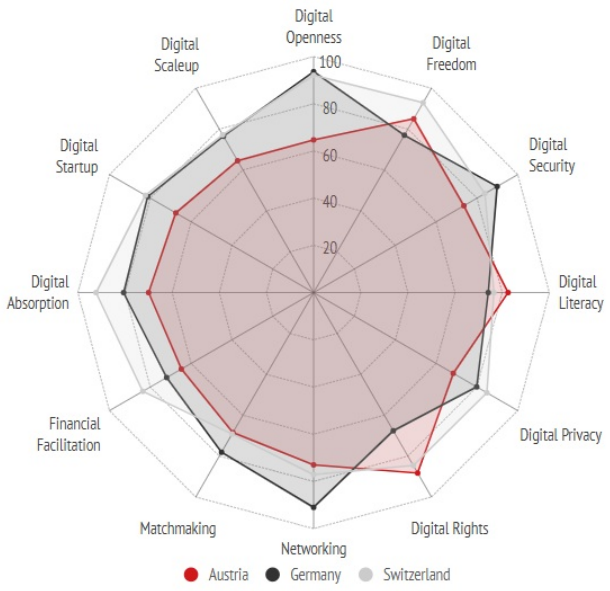
Meanwhile, the optics of the comparison change when the actors are changed. Figure 18 presents a comparative radar chart highlighting Austria's Digital Entrepreneurship Ecosystem (DEE) pillar scores against those of Germany and Switzerland. While Austria maintains a solid profile, the figure illustrates a clear performance gap between it and the two stronger digital economies (particularly Switzerland) which leads across nearly all pillars.

Switzerland outperforms Austria most notably in Digital Openness, Digital Rights, Digital Literacy, and Digital Security. These areas reflect strong institutional frameworks, advanced legal environments, and a digitally skilled population, all of which foster safe and accessible digital entrepreneurship. Germany, similarly, shows higher scores in key infrastructural and entrepreneurial support areas such as Matchmaking, Networking, and Digital Scaleup, signaling a more mature and interconnected digital business landscape.

Austria remains competitive in Digital Startup, Financial Facilitation, and Digital Privacy, suggesting that its ecosystem provides reasonably favorable conditions for launching digital ventures and safeguarding users' data rights. However, it lags in Networking (a crucial factor for entrepreneurial scalability and cross-sector collaboration) where both Germany and Switzerland exhibit significantly stronger connectivity.

The chart thus positions Austria as a mid-tier performer in a high-income context. It demonstrates a competent and balanced ecosystem, yet one that trails its more digitally advanced neighbors. To bridge this gap, Austria could target investment and policy initiatives in institutional openness, digital rights enforcement, and ecosystem connectivity, leveraging its existing strengths while adopting lessons from the digital strategies of Germany and Switzerland.

Figure 18. Austria, compared to Germany and Switzerland, among the DEE index pillars (2022)



Note: *The radar chart highlights Austria's DEE profile in contrast with Germany and Switzerland.*
Source: *VIGS Institute, 2025.*

4.2 Austria's structural and institutional dynamics as part of the DEE

The following table (Table 1) presents a detailed quantitative breakdown of Austria's performance across the Digital Entrepreneurship Ecosystem (DEE), including its four main sub-indices (Digital Technology Infrastructure (DTI), Digital User Citizenship (DUC), Digital Multi-sided Platform (DMSP), and Digital Technology Entrepreneurship (DTE)) as well as their corresponding pillars and contributions to the overall *Entrepreneurship Ecosystem Score* and *Digital Ecosystem Score*.

The overall DEE Index score for Austria is 72.0, reflecting a relatively high level of digital entrepreneurial readiness. When disaggregated:

Digital User Citizenship (78.3) stands out as Austria's strongest pillar, especially in *Digital Rights* (88.3) and *Digital Literacy* (82.5), indicating a digitally empowered and rights-aware population.

Digital Technology Infrastructure (73.6) also scores well, particularly in *Digital Freedom* (85.0) and *Digital Security* (73.6), supporting a secure and open digital environment.

Digital Multi-sided Platform (68.6) and Digital Technology Entrepreneurship (67.3) are somewhat weaker in comparison, especially in *Digital Scaleup* (64.5) and *Financial Facilitation* (64.8), suggesting room for improvement in scaling ventures and accessing capital.

The final two columns (*Entrepreneurship Ecosystem Score* and *Digital Ecosystem Score*) further highlight that Austria's digital framework is generally more developed (87.7) than its entrepreneurial one (79.2), underscoring a relatively favorable digital environment but potential constraints in fully translating this into entrepreneurial growth. This disparity suggests targeted interventions could enhance venture scaling, matchmaking, and funding channels to align Austria's entrepreneurship dynamics more closely with its digital maturity.

Table 1: Digital Entrepreneurship Ecosystem Scores by pillar and sub-index

PILLARS/SUB-INDICES	Pillar/Sub-Index Score	Entrepreneurship Ecosystem Score	Digital Ecosystem Score
DTI			
Digital Openness	64.7	81.2	77.2
Digital Freedom	85.0	82.1	94.6
Digital Security	73.6	89.2	81.7
Digital Technology Infrastructure	**73.6**		
DUC			
Digital Literacy	82.5	86.7	90.8
Digital Privacy	68.4	70.4	91.3
Digital Rights	88.3	89.4	94.1
Digital User Citizenship	**78.3**		
DMSP			
Networking	73.0	73.6	93.5
Matchmaking	68.5	74.5	88.0
Financial Facilitation	64.8	72.2	93.5
Digital Multi-sided Platform	**68.6**		
DTE			
Digital Absorption	70.0	79.8	79.4
Digital Startup	67.5	77.7	84.1
Digital Scaleup	64.5	73.2	84.1
Digital Technology Entrepreneurship	**67.3**		
Digital Entrepreneurship Ecosystem Index	**72.0**	**79.2**	**87.7**

Source: *VIGS Institute, 2025.*

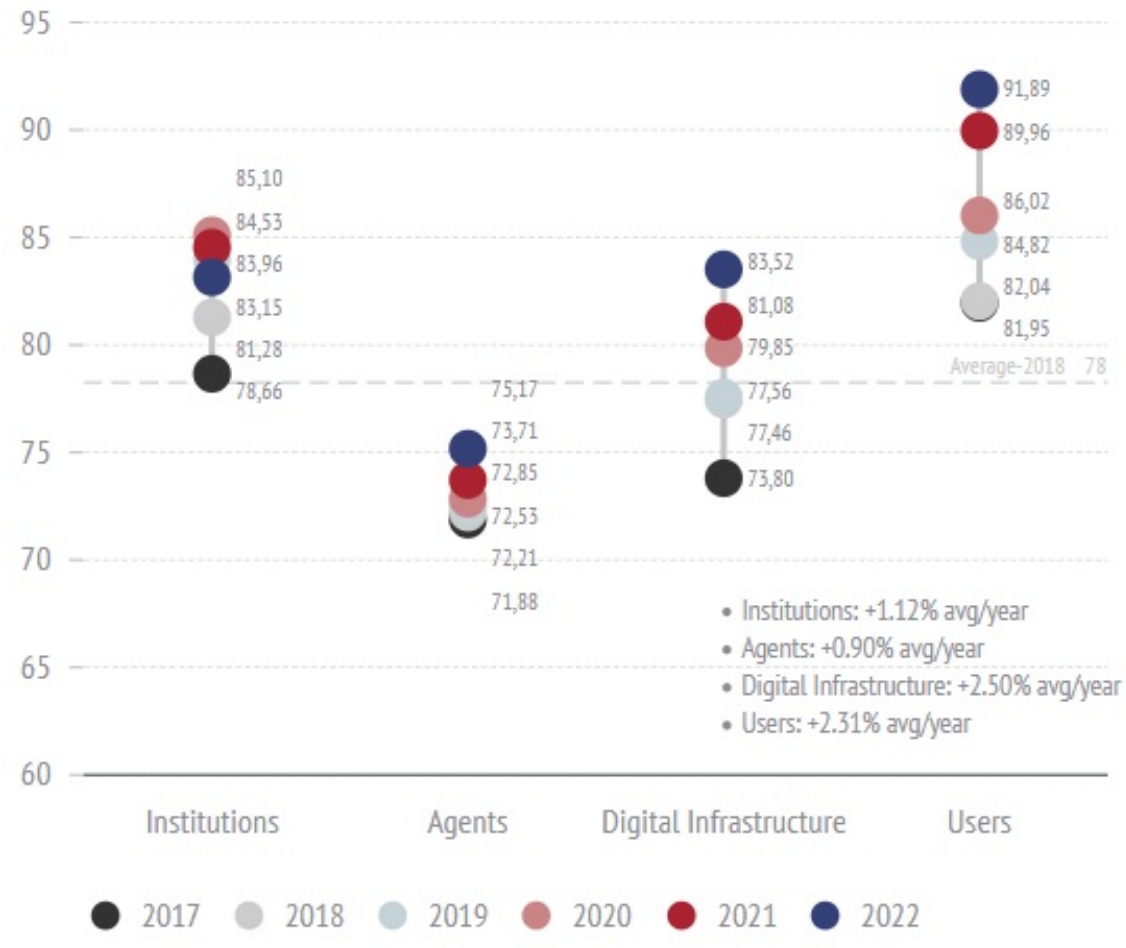
The following figure (Figure 19) visualizes the temporal progression of Austria's performance across four foundational components of the Digital Entrepreneurship Ecosystem (DEE): Institutions, Agents, Digital Infrastructure, and Users, covering the years 2017 to 2022. The scores show consistent year-on-year improvement in institutional performance, with a modest average annual increase of 1.12%. User-related indicators show the most dynamic growth, averaging a 2.31% increase per year, driven by a rapid uptake of digital services and engagement.These improvements in infrastructure and digitalisation of public

services is also reflected in the Austria 2024 Digital Decade country report.[2]

Digital infrastructure has also advanced significantly, with an average yearly gain of 2.50%, indicating sustained investment and expansion in connectivity and technology availability. In contrast, the "Agents" category displays a slight downward trend, declining at an average rate of 0.90% per year, suggesting potential challenges in mobilizing entrepreneurial actors or intermediaries within the Austrian ecosystem.

The horizontal dashed line at the 78-point level represents Austria's approximate 2018 average, serving as a comparative baseline. Overall, Austria's DEE structure appears digitally mature and increasingly robust, though actor-related participation may warrant targeted policy attention.

Figure 19. Austria's Institutional, Agent, Infrastructure, and User dynamics (2017–2022)



Note: *The chart presents the annual evolution of Austria's DEE pillar scores across four foundational dimensions: Institutions, Agents, Digital Infrastructure, and Users*
Source: *VIGS Institute, 2025.*

[2] Austria 2024 Digital Decade country report: https://digital-strategy.ec.europa.eu/en/factpages/austria-2024-digital-decade-country-report?

5. Conclusions and Policy Recommendations

The analysis of the Digital Entrepreneurship Ecosystem (DEE) across the Danube region reveals both encouraging progress and persistent asymmetries in digital readiness, infrastructure, and entrepreneurial outcomes. While Austria exemplifies a well-developed, inclusive, and high-performing DEE, many other countries in the region face structural constraints, lagging behind in critical dimensions such as digital platform development, institutional coordination, and user participation. The region as a whole exhibits fragmentation in policy ambition and technological capacity, which hampers the emergence of a truly interconnected and competitive digital entrepreneurship space.

At the same time, the findings of this report highlight a set of common opportunities. Most Danube countries have made tangible investments in digital infrastructure, and there is a strong foundation in user-level engagement and digital rights in several economies. However, these advances have not yet translated into high-performing ecosystems for digital entrepreneurship. In particular, the region's underdevelopment in platform economies is a strategic bottleneck. Platforms play an essential role in orchestrating innovation, data exchange, and business scalability. Without a concerted effort to foster homegrown platforms and ensure their interoperability across borders, the Danube region risks remaining dependent on external digital actors, limiting both its economic autonomy and its entrepreneurial dynamism.

From a policy perspective, there is an urgent need for a coordinated regional approach to foster convergence and leverage synergies. Governments should align their digital rights and governance frameworks with EU standards to facilitate trust, data security, and cross-border entrepreneurial activity. Equally, they must invest more consistently in digital entrepreneurship skills, particularly among youth, women, and underserved rural communities. Promoting inclusive participation in the digital economy is not just a matter of equity, it is a prerequisite for robust and resilient ecosystems. Moreover, regional institutions and donors should consider establishing joint digital labs and innovation hubs that facilitate cross-country collaboration, experimentation, and the diffusion of best practices. These initiatives would help close the performance gap within the Danube region while enhancing its overall competitiveness.

Austria, as the Danube region's top performer, plays a dual role. It not only serves as a benchmark but also carries the responsibility of contributing to regional digital cohesion. Its success across the DEE subdimensions (particularly in Digital User Citizenship and Technology Infrastructure) underscores the importance of coherent institutions, strategic investment, and civic trust. Yet Austria, too, is approaching the plateau of digital entrepreneurial maturity. To sustain its leadership, the country must focus on qualitative improvements: enhancing the interoperability of digital platforms across sectors, expanding civic participation in the digital domain, and investing in emerging innovation frontiers such as AI, quantum technologies, and sustainable digital solutions. Furthermore, Austria is well positioned to act as a bridge builder, supporting neighboring countries through bilateral partnerships, capacity-building efforts, and transnational entrepreneurship programs that align with EU cohesion policy and innovation agendas.

In conclusion, unlocking the full potential of the Danube region's digital entrepreneurship ecosystem will require a shift from fragmented national efforts to a more unified, cross-border strategy. Policymakers must look beyond infrastructure and technology to cultivate trust, inclusion, and systemic capability. With sustained political commitment and strategic investment, the region can become a model of digital entrepreneurial transformation. Austria's experience demonstrates that this path is not only possible but within reach, if pursued collectively and with a long-term vision.

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Appendices

A. The structure of the DEE Index (2017-2022 data version)

The DEE Index is structured around four sub-indices, each representing a critical dimension of the interaction between digital infrastructure and the entrepreneurial ecosystem. Together, these sub-indices encompass twelve pillars, which collectively assess the systemic enablers and constraints of digital entrepreneurship within a specific territorial context. Each pillar reflects a distinct but interconnected component of the digital entrepreneurial environment, ranging from foundational infrastructure and user engagement to entrepreneurial innovation, firm growth, and value generation. The following table offers an overview of the pillars and associated variables, underscoring the pillars as the core structural elements of the DEE Index.

Table 2: Digital Entrepreneurship Ecosystem Pillars, Roles, Variables and Content

Sub-index	Pillars	Role in the DEE	Variables	Variable content
DTI	Digital openness	Ensures institutional support for equitable access to and use of digital infrastructure, fostering broad-based participation.	*Digital openness institutions*, *Digital openness technology*	Capturing ICT and internet regulation, population use of G2-G5 networks, % of frequency coverage
	Digital competition	Promotes fair and innovation-friendly markets through regulation and rivalry, mitigating risks of digital monopolization.	*Digital competition institutions*, *Digital competition technology*	Business freedom, regulatory quality, mobile tariffs, handset prices
	Digital security	Provides legal and technological protections that build trust and safeguard users and systems from cyber threats.	*Digital security institutions*, *Digital security technology*	ICT competition, measuring law and regulations on cybercrime and cybersecurity, Secure Internet servers per million population
DUC	Digital literacy	Enables individuals to actively participate in, benefit from, and contribute to digitally enabled entrepreneurial processes through essential digital competencies.	*Digital literacy institutions*, *Digital literacy users*	Human capital, e-participation, digital skills among population
	Digital privacy	Ensures safe and trustworthy participation in digital world through the protection of personal data and user autonomy.	*Digital privacy institutions*, *Digital privacy users*	Laws and regulations on cybercrime and cybersecurity; government cybersecurity capacity, % of households with computer and internet access
	Digital rights	Guarantees users' freedom to access, express, and innovate in digital spaces through the enforcement of fundamental civil and digital liberties.	*Digital rights institutions*, *Digital rights users*	Personal rights, fundamental rights, internet and intellectual property rights, % of individuals using the internet, gender gap in mobile ownership

(Continued on next page)

Sub-index	Pillars	Role in the DEE	Variables	Variable content
DMSP	Networking	Leverages network effects to scale value co-creation between users and agents through platforms, social media, and virtual services.	*Networking agents*, *Networking users*	Locally developed apps, language support, social media use, e-government firms with website
	Matchmaking	Facilitates efficient connections between users and agents, enabling decentralized exchanges and interactive entrepreneurial collaboration.	*Matchmaking agents*, *Matchmaking users*	Number of developers and organizations, alternative financing, mobile ownership, % used mobile internet to buy something
	Financial Facilitation	Expands access to digital financial services, supporting inclusive and scalable digital entrepreneurial activity.	*Financial facilitation agents*, *Financial facilitation users*	Financial technology businesses, active mobile broadband, used credit/debit card, made or received digital payments
DTE	Digital Absorption	Measures the capacity of existing firms and actors to internalize and apply digital technologies, driving intrapreneurial innovation.	*Digital absorption agents*, *Digital absorption technology*	Access to finance, skills, technicians, computer education, mobile speed, access to electricity
	Digital Startup	Reflects the various agency support mechanisms that enable the emergence and early growth of ventures built around digital innovation.	*Digital startup agents*, *Digital startup technology*	Early phase VC, researchers, top-tier engineering education, incubators, accelerators, coworking, venture capital, startup regulation, support, R&D
	Digital Scaleup	Captures the agency support that enable digital ventures to scale rapidly into high-growth, high-impact firms.	*Digital scaleup agents*, *Digital scaleup technology*	Later phase VC, managers, top business education, supporting services, top city-level co domains, tech centers, mentoring network