



Research

Innovation ecosystems in Black Sea Countries

Black Sea
Bulletin

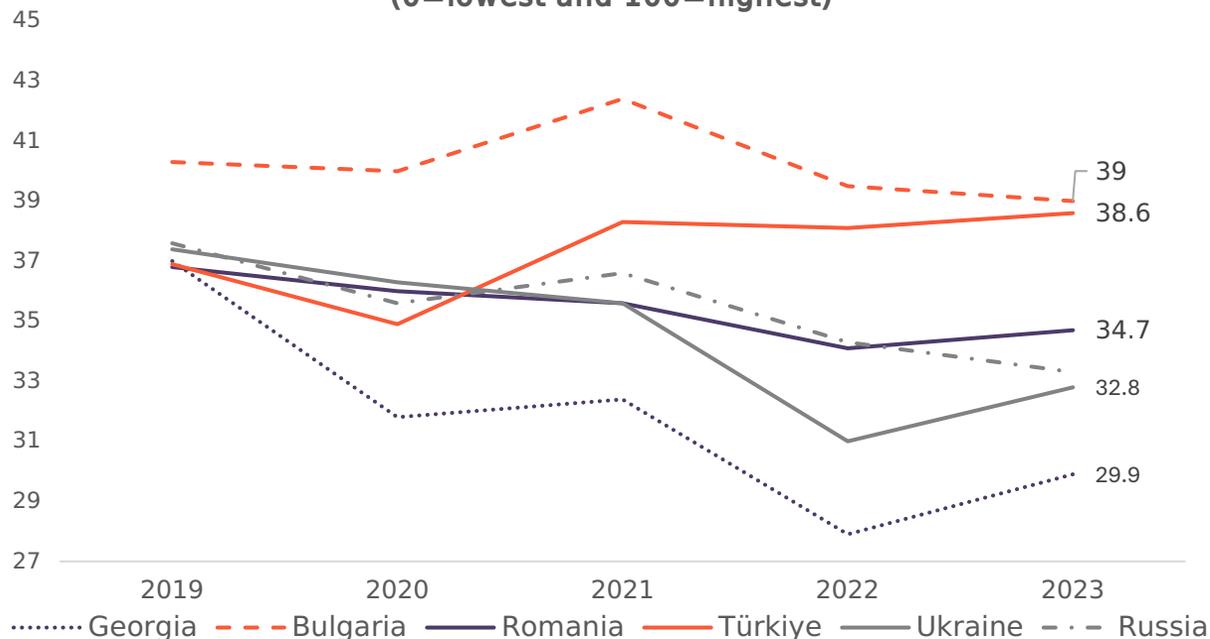
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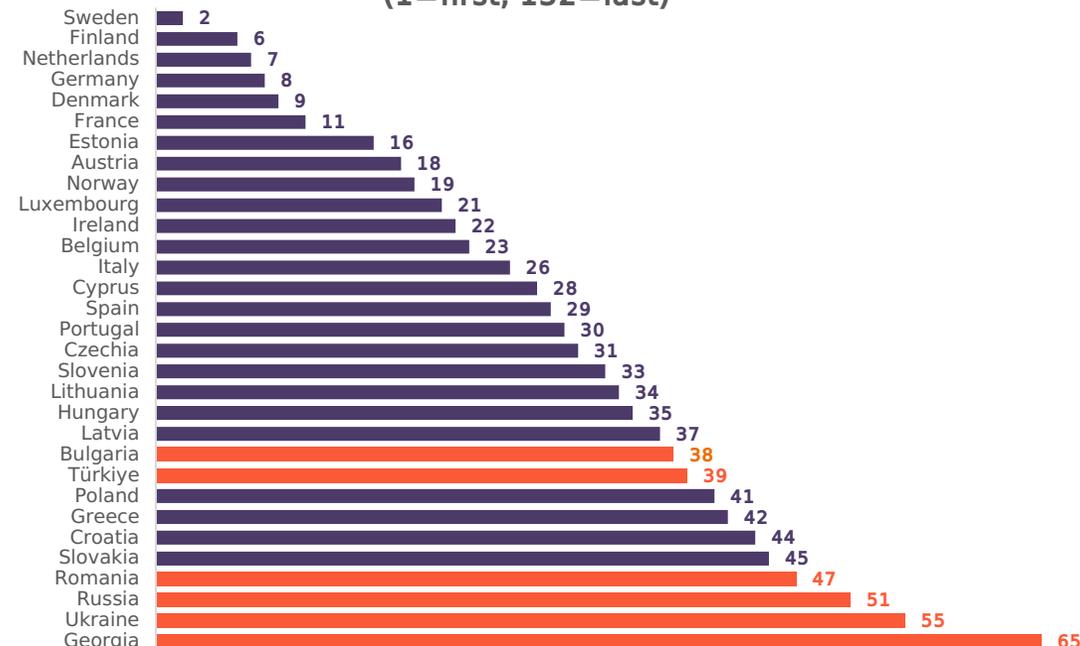
- ❑ Amid rapid technological advancements and the widespread development of AI (specifically, the democratization of generative AI), coupled with the fraught geopolitical situation in the region, largely stemming from Russia's ongoing war on Ukraine, it is imperative to understand the nuances of the innovation ecosystems of Black Sea countries.
- ❑ **Global Innovation Index (GII):** Overall, Bulgaria and Türkiye demonstrate the strongest performance, with Türkiye showing the most improvement over the years. Georgia ranks the lowest among the discussed countries and has experienced the greatest decline from 2019 to 2023.
- ❑ **European Innovation Scoreboard (EIS):** All four Black Sea countries assessed in the EIS (Bulgaria, Romania, Türkiye, Ukraine) significantly lag behind EU scores. As in the GII, Türkiye and Bulgaria show the best performance in the EIS, while Ukraine ranks the lowest among the four.
- ❑ **Global Startup Ecosystem Index (GSEI):** Though Russia, along with Ukraine, has experienced substantial decline due to the war, Russia is still ranked the highest in the Black Sea region. Meanwhile, Georgia is ranked the lowest in the region but has gradually improved its position in recent years.
- ❑ **Startup Supporting Programs:** All Black Sea countries offer startup-supporting programs that provide essential resources such as mentorship, funding, and networking. However, there is a need to strengthen and scale up these initiatives. Skolkovo Foundation in Russia leads the region with 4,000 funded startups, followed by Türkiye's BIGG program, which has supported 2,351 startups.
- ❑ **R&D Investment:** In the Black Sea countries, R&D investment (as a % of GDP) is weak compared to the EU average (three times higher than the average of Black Sea countries) and other global leaders in innovation.
- ❑ **Attracting foreign startups:**
 - ❑ Black Sea countries routinely host **international startup conferences**, promoting innovation and networking to attract global startups and investments. However, there is a need to actively pursue partnerships and scale up existing conferences.
 - ❑ **Entrepreneur and startup migration policies** represent a significant barrier hindering startup mobility. Bulgaria and Türkiye are the only countries in the region offering startup visas.
- ❑ **Patent Activity:** Russia leads in absolute numbers of patent applications, whereas Georgia has the fewest among Black Sea countries. Ukraine stands out with a high rate of granting patent rights to applicants suggesting rigorous selection process. On the other hand, Türkiye demonstrates robust patenting activity, but a low grant rate.
- ❑ **SCImago Institutions Rankings (SIR):** In the ranking of academic and research institutions, among the Black Sea countries, Russia stands out with the highest number of institutions which are large enough to be ranked in SIR. Georgia, on the other hand, has the worst performance among Black Sea countries, with only five institutions ranked.
- ❑ The analysis of the innovation ecosystems in the Black Sea region conducted through reference to rankings in global indices, reveals a complex yet promising landscape. Despite facing various economic and geopolitical challenges, these countries have made notable progress in fostering innovation and entrepreneurship. However, there are still many challenges and much room for improvement.

GII Scores of Black Sea Countries (2019-2023) (0=lowest and 100=highest)



- Looking at global trends, the 2021 GII Report emphasized that the COVID-19 pandemic had weakened the innovation ecosystems of numerous emerging and poorer economies
- Between 2019 and 2023, **Georgia's** ranking in GII dropped by 17 places, **Ukraine's** by 8, and **Russia's** by 5. During the same period, **Bulgaria's** ranking improved by 2 places, **Romania's** by 3 places, and **Türkiye's** by 10 places.
- Türkiye** was the only country that managed to surpass its 2019 GII score. This remarkable progress can be attributed to actions taken under Global Innovation Index Türkiye Action Plan and Strategy (2021-2023).

GII Ranks of EU and Black Sea countries, 2023 (1=first, 132=last)



- Georgia's** significant drop in the GII score can be linked partly to the COVID-19 pandemic but can primarily be attributed to declines in the Infrastructure, Institutions, Market Sophistication, and Creative Outputs pillars.
- The performances of both **Russia** and **Ukraine** in the GII have been impacted by the war launched in 2022. Remarkably, Ukraine saw a notable increase between 2021 and 2022 in Information and Communication Technologies (ICTs) sub-pillar, particularly in ICT access and use, possibly influenced by the heightened role of ICT in Ukraine's war effort.
- The performances of **Bulgaria** and **Romania** have been relatively steady over the discussed period.

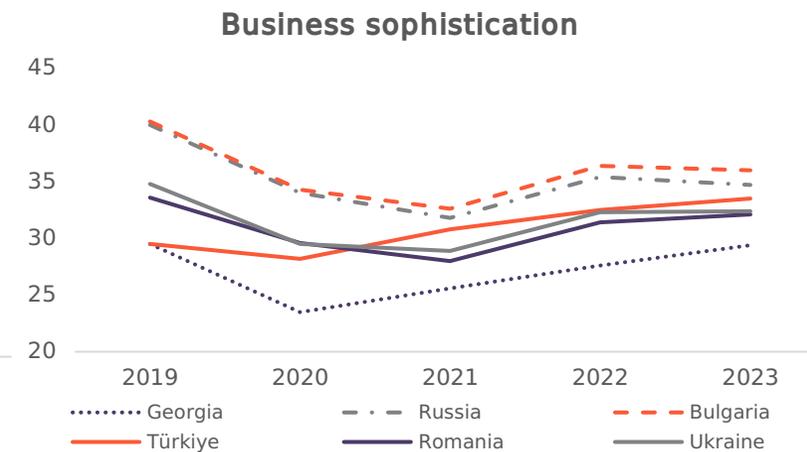
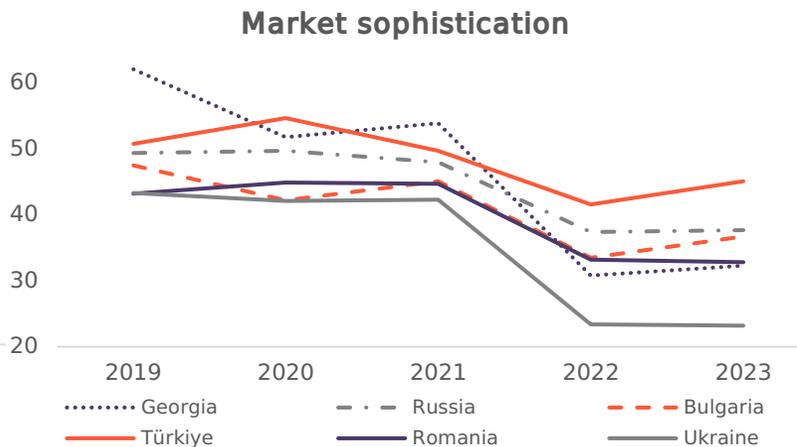
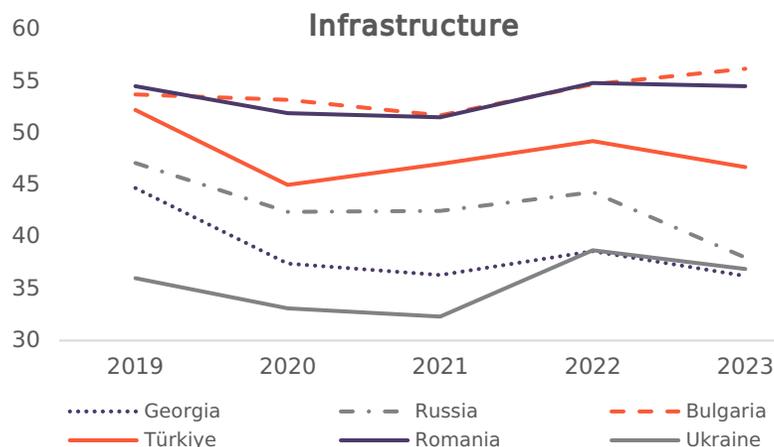
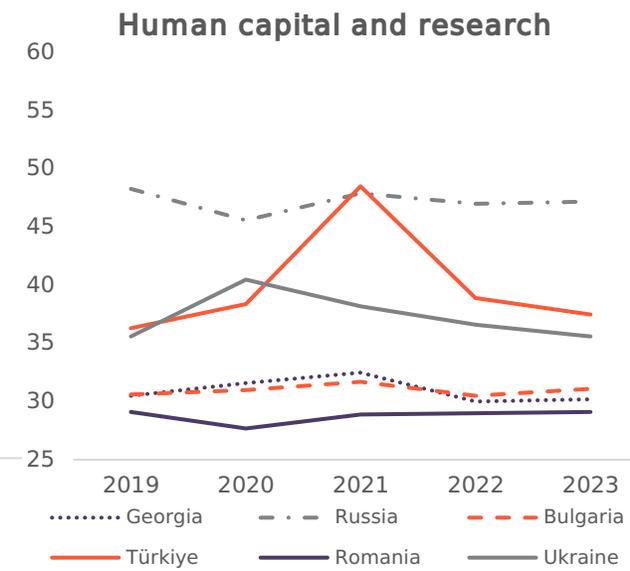
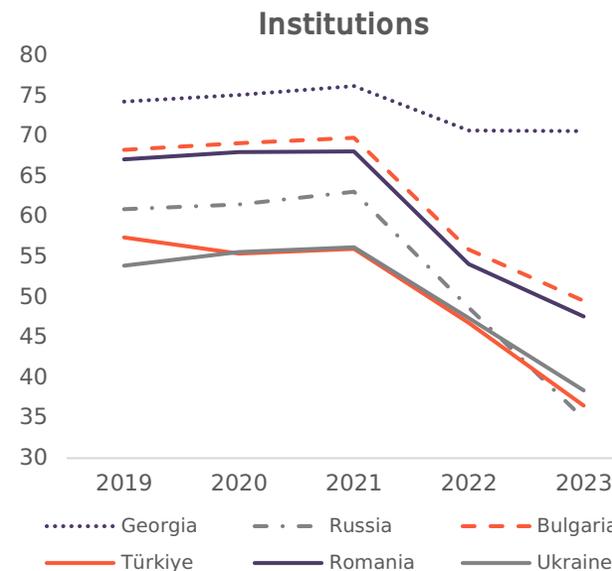
*The Global Innovation Index (GII), captures the innovation ecosystem performance of approximately 132 economies, providing a comprehensive overview of each

country's innovation landscape, covering various aspects such as the political environment, education, infrastructure, and knowledge creation. Source: GII

Global Innovation Index (GII): Innovation Input Sub-Index*

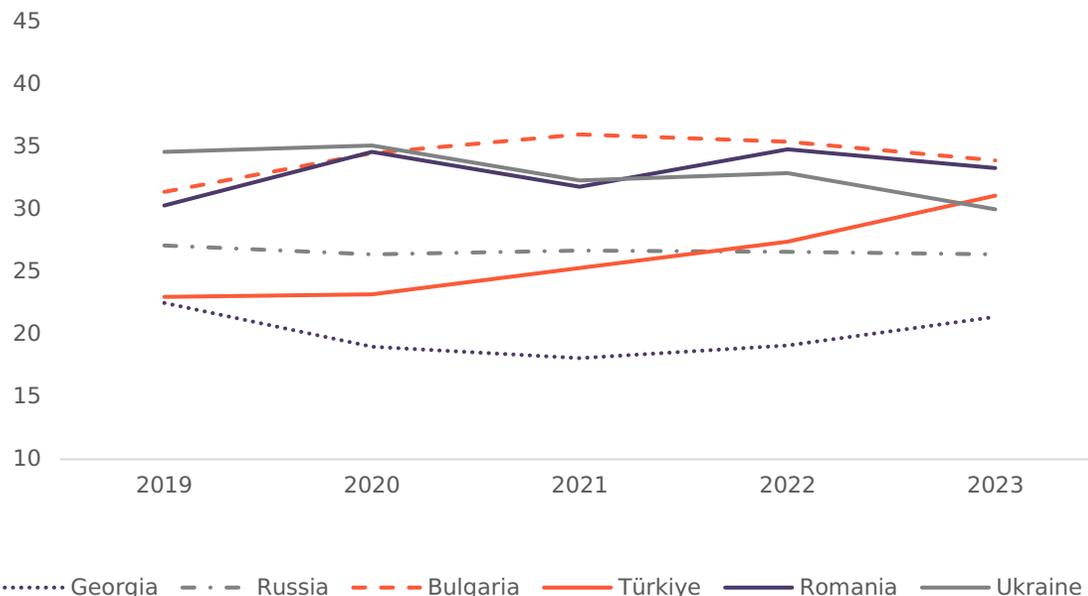


- ❑ Pillars of GII demonstrate more detailed outlook on strengths and weaknesses of Black Sea countries. For example, **Georgia**, even though having the worst results in overall GII ranks, achieved the highest score among Black Sea countries under the **Institutions pillar** consistently over the period of 2019-2023.
- ❑ **Russia** held the highest score compared to the other countries in the **Human Capital and Research** pillar in all years except 2021.
- ❑ Under the **Infrastructure** pillar, **Bulgaria** and **Romania** consistently showed the strongest performance. **Bulgaria** also showed the best performance in the **Business Sophistication** pillar from 2019 to 2023, with Russia closely following in second.
- ❑ Trends in **Market Sophistication** fluctuate markedly, making it difficult to identify any country as having a dominant position in this regard. Notably, all discussed countries experienced a decline in 2021-2022, with Georgia showing the most significant dip. This may be partly attributed to **methodological changes** in the indicators of the pillar, where "Ease of getting credit" was replaced with "Finance for startups and scaleups."



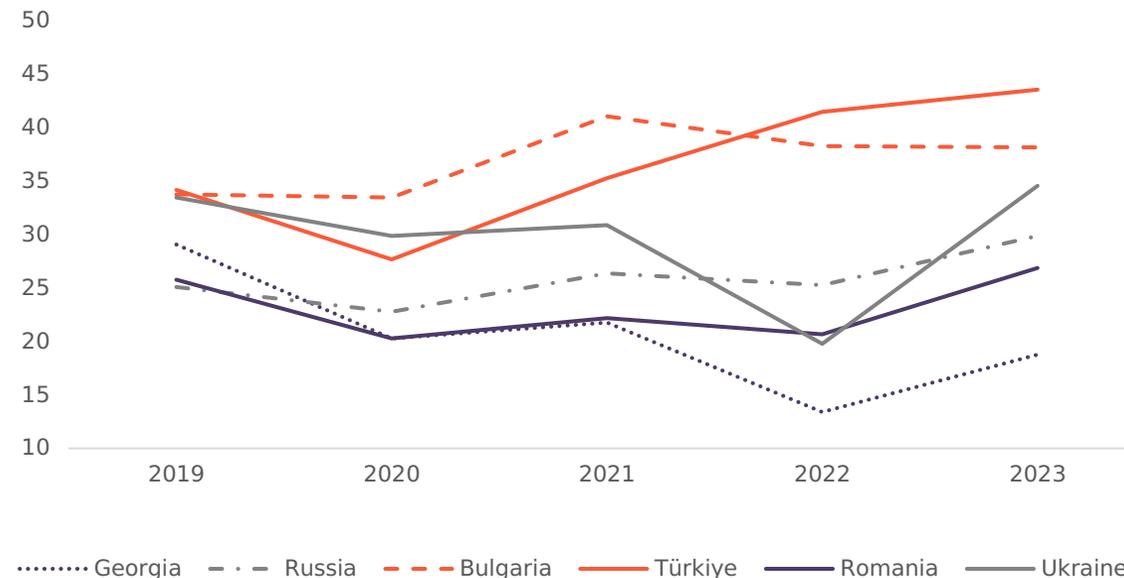
*The GII is calculated by averaging the scores of its two main sub-indices: the Innovation Input Sub-Index and the Innovation Output Sub-Index. The **Innovation In-put Sub-Index** consists of five pillars that capture aspects of the economy that enable and facilitate innovative activities. The five pillars are: **Institutions**, **Human capital and research**, **Infrastructure**, **Market sophistication** and **Business sophistication**.

Knowledge and technology outputs



□ **Bulgaria, Romania, and Ukraine** were the top performers in **Knowledge and Technology Outputs** pillar, although Ukraine experienced a decline between 2020 and 2023. Meanwhile, Georgia consistently performed worst in this pillar.

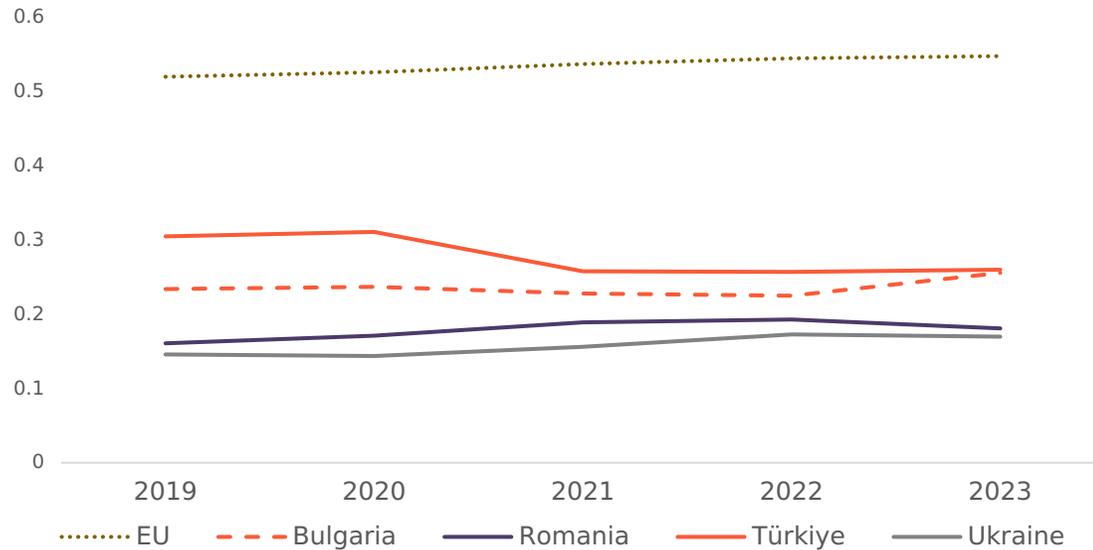
Creative outputs



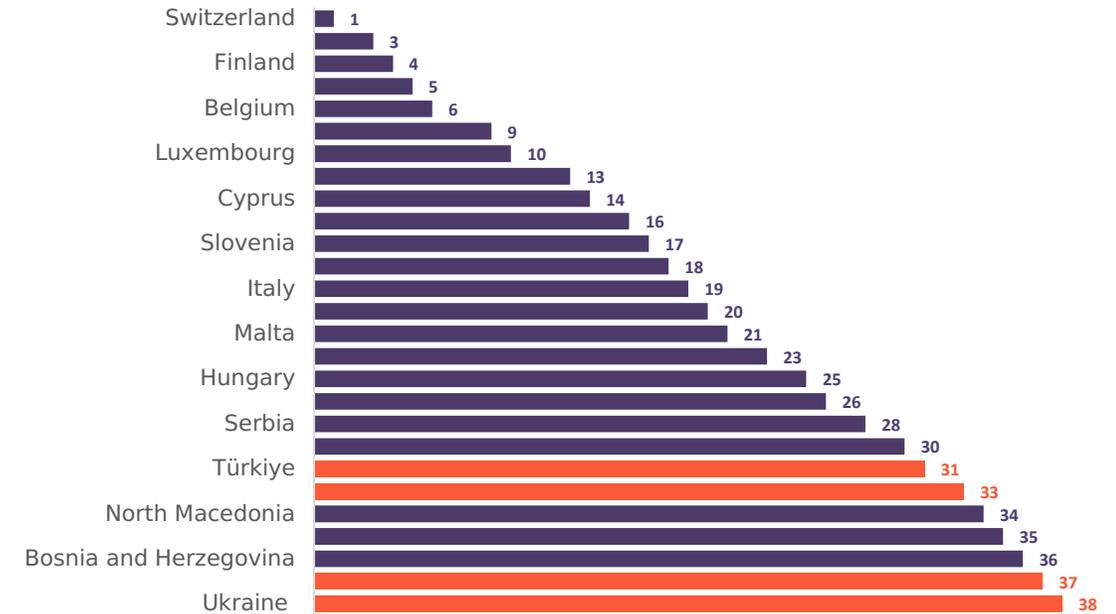
□ **Türkiye** recorded a significant increase in its score for **Creative Outputs**, ranking the highest among the reviewed countries in 2022 and 2023. Before that, in 2020 and 2021, Bulgaria held the top regional position. Similarly, Georgia recorded a considerable decline, ranking the lowest among Black Sea countries in 2022 and 2023 years.

*The *GII* is calculated by averaging the scores of its two main sub-indices: the *Innovation Input Sub-Index* and the *Innovation Output Sub-Index*. The *Innovation Output Sub-Index*, on the other hand, offers insights into the outcomes that result from innovative activities within the economy. It is comprised of two pillars: **Knowledge and technology outputs** and **Creative outputs**.

Summary Innovation Index** (normalized scores)
(2019-2023)



Summary Innovation Index Ranking (2023)



- ❑ Romania, Bulgaria, Türkiye, and Ukraine are classified as **Emerging Innovators** with performance levels below the group average. From 2016 to 2023, their performance improved at a slower rate than that of the EU, widening the performance gap between them and the EU.
- ❑ In 2023, **Ukraine's** performance level equated to 31% of the EU average, **Romania's** to 33.1%, **Bulgaria's** - 46.7%, and **Türkiye's** to 47.6%."
- ❑ Regarding specific aspects of the EIS framework, **Bulgaria** excels relative to the EU average in **Intellectual Assets** (Innovation Activities) and **Sales Impact** (Impacts).

- ❑ Similarly, relative to the EU average:
 - **Romania** has demonstrated strength in **Digitalization** (Framework Conditions) and **Firm Investments** (Investments),
 - **Türkiye** in **Sales Impact** (Impacts), **Linkages** (Innovation Activities), and **Finance and Support** (Investments).
 - And **Ukraine** in **Environmental Sustainability** (Impacts).

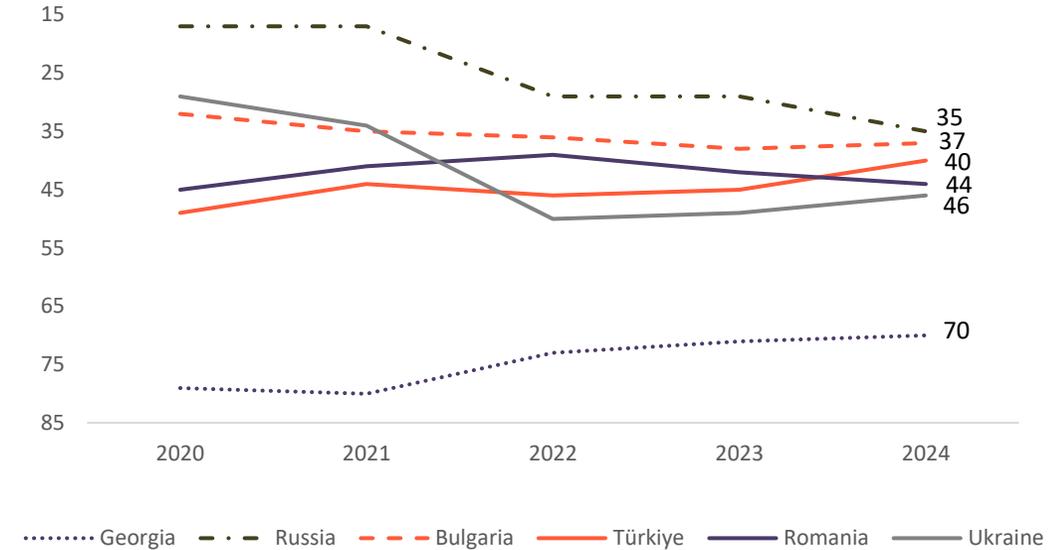
*European Innovation Scoreboard (EIS) offers a comparative evaluation of countries' research and innovation capabilities. While **only four Black Sea countries (Bulgaria, Romania, Türkiye, and Ukraine) are included in the EIS**, the insights it provides are valuable for understanding the state of their innovation ecosystems

**The Summary Innovation Index (SII) consolidates data from various categories within the European Innovation Scoreboard (EIS) to offer a composite measure of a country's overall innovation system performance.
Source: EIS

Country Profiles in the Global Startup Ecosystem Index (GSEI) 2024

Country	Rank	Rank Change (from 2023)	Country's Top Industry Globally	Main City's Top Industry Globally	Notable Startups (according to GSEI)
Russia	35	-6	Social & Leisure (31st)	Sportstech (45th)	Uchiru
Bulgaria	37	1	Social & Leisure (26th)	Gaming (7th)	Payhawk
Türkiye	40	5	Software & Data (31st)	Artificial Intelligence (26th)	Getir
Romania	44	-2	Energy & Environment (26th)	Edtech (16th)	UiPath
Ukraine	46	3	Software & Data (35th)	SaaS (14th)	Grammarly
Georgia	70	1	Fintech (55th)	Cryptocurrency (10th EU)	Bitnet

Black Sea Countries' Rankings in the Global Startup Ecosystem Index (2020-2024)



Source: Global Startup Ecosystem Index, StartupBlink

- ❑ The **Russian** startup market is currently facing **challenges** due to the war in Ukraine, marked by **reduced investment activity, sanctions, and obstacles** to global market development, which is evident in their declining performance in GSEI ranking. Despite this **decline**, Russia remains the **leader** in the region.
- ❑ Ukraine fell 21 place in 2022 **due to the war**, but has begun to **recover**, ranking 46th by 2024.

- ❑ **Thanks to supportive government initiative, Türkiye** has **risen** to 40th place in 2024, surpassing Romania which held higher rank than Türkiye in previous years,
- ❑ **Georgia gradually improved** from 79th place in 2020 to 70th by 2024, driven by **government initiatives and business support**.
- ❑ **Bulgaria**, the second-best performer among Black Sea countries, and **Romania**, have held **relatively stable** positions in the last years.

Some of the large startup supporting programs in Black Sea countries

Country	Program	Outcomes
Bulgaria	Bulgaria Innovation Hub	61 startups given USD 146M funding
Türkiye	TÜBİTAK BIGG	supported 2351 startups with 5 funds
Romania	SeedBlink	250 startups given EUR 342M funding
Ukraine	USF	380 startups given USD 8.7M funding
	Startup Ukraine	30 000 students trained; 500 companies launched
Georgia	GITA	641 startups given USD 11.7M funding
	500 Eurasia	69 startups added to its portfolio
Russia	Skolkovo Foundation	4000 startups given USD 5B funding

Some of the large international startup conferences and events held in Black Sea countries

Country	Conference	Volunteers/ Attendees
Bulgaria	Startup Competition WMF International Roadshow	40 startups (WMF - 60,000 participants, 89 country)
Türkiye	Startup World Cup Championship for children and youth	Participants and volunteers from 35 country
Romania	Bucharest Tech Week	5000+ participants, 30000+ visitors
Ukraine	IT ARENA, Future of Ukraine summit.	27857 (30 country), 988 startups
Georgia	Regional Startup World Cup; AXEL's Investment Ecosystem Meeting	Participants from 10 countries
Russia	Startup village	10,000 visitors from 80 countries

- ❑ All Black Sea countries have **startup-supporting programs** that go beyond funding startup ideas and provide entrepreneurs with essential resources like mentorship, funding, and networking opportunities.
- ❑ **Skolkovo Foundation in Russia leads** the region with 4,000 funded startups, followed by **Türkiye's BIGG program**, which has supported 2,351 startups.
- ❑ Countries around the Black Sea region routinely host **international startup conferences**, bringing together participants from all over the world to exchange ideas and provide support for startups. Though there is a need to actively pursue partnerships and scale up existing conferences.

- ❑ Notably, Russia's Startup Village attendance has **declined** since war in Ukraine began.
- ❑ While international startup conferences aim **to attract foreign entrepreneurs**, inconsistent **migration policies** in Black Sea countries pose barriers. Russia is the only country in this region without any type of entrepreneur or digital nomad visa, while **Türkiye's Tech Visa for startups stands out in a region**, as it offers not only residence permit (like for example, Bulgaria's startup visa), but also benefits such as **tax exemptions, office space, venture capital access, and mentoring**.

The SCImago ranking displays the total number of institutions from a particular country that have been evaluated and assigned a rank based on their performance across various indicators.

To be included in the ranking, institutions must have published a minimum of 100 documents in the SCOPUS¹ database in the past year, with at least 75% being citable (articles, chapters, conference papers, reviews, and short surveys).

❑ Bulgaria (2023)

- **27** institutions ranked: 10 government organizations, 16 universities, 1 medical institution.
- Highest ranking: Government organization at 2485th place.
- Lowest ranking: University at 8389th place.

❑ Georgia (2023)

- **5** institutions ranked: 4 universities, 1 government institution
- Highest ranking: University at 6659th place.
- Lowest ranking: University at 7880th place.

❑ Romania (2023)

- **42** institutions ranked: 12 government bodies, 30 universities.
- Highest-ranking: Government institution at 1235th place.
- Lowest ranking: University at 7848th place.

❑ Russia (2023)

- **338** institutions ranked: 152 government bodies, 21 health sector entities, 162 universities, 3 companies.
- Highest ranking: Government institution at 9th place.
- Lowest ranking: Government institution 8431st place.

❑ Türkiye (2023)

- **144** institutions ranked: 2 government bodies, 7 health institutions, 134 universities, 1 company.
- Highest ranking: University at 1720th place.
- Lowest ranking: University at 8282nd place.

❑ Ukraine (2023)

- **67** institutions ranked: 44 universities, 22 government bodies, 1 health sector institution.
- Highest ranking: Government institution at 1195th place.
- Lowest ranking: Government institution at 8432nd place.

¹Scopus is a large, multidisciplinary database of peer-reviewed literature: scientific journals, books, and conference proceedings.

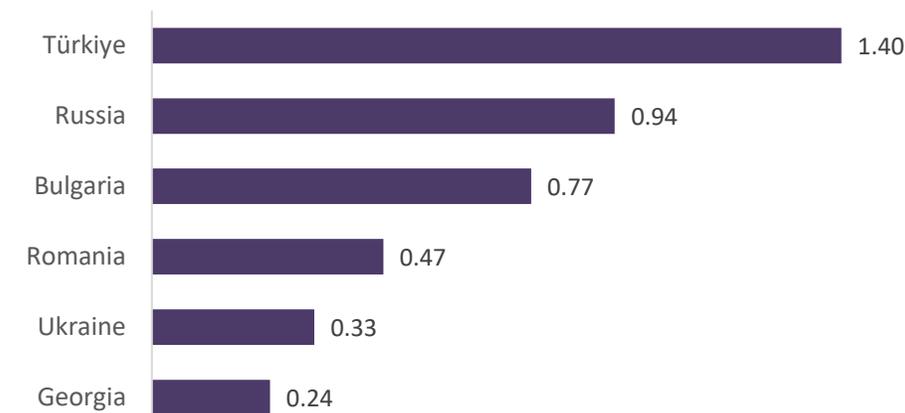
Patent applications and grants in Black Sea countries in 2022

Country	Patent applications	Growth rate compared to last year	Patent grants	Patent grant rate from applications	Patent applications Per million population	Most granted technology
Bulgaria	548	17,6%	259	47,3%	32.8	Measurement (11%)
Türkiye	11114	2,3%	4293	38,6%	110.1	Medical (8%)
Romania	1140	2,3%	515	45,2%	44.9	Pharmaceuticals (6%)
Ukraine	1080	-36,7%	823	76,2%	20.9	Other (40%)
Georgia	97	26,5%	41	42,3%	23.2	Pharmaceuticals (27%)
Russia	25188	-2,8%	20456	81,2%	135.2	Medical (9%)

Source: World Intellectual Property Organization (WIPO), 2022

- Based on the WIPO's 2022 statistics, in the region **Russia leads** in absolute numbers with more than 25000 applications, despite a slight decrease compared to 2021 year, achieving a **high grant rate** as well.
- Despite a **drop** in applications, **Ukraine's high grant rate** indicates a **rigorous selection process**. On the opposite, **Türkiye** demonstrates robust patenting activity, but a **low grant rate**.
- Four out of six Black Sea countries focus on **Medical** and **Pharmaceutical** technology.
- Enhancing** patent activity in Black Sea countries is **crucial** for stimulating innovation, attracting foreign investment, and boosting economic competitiveness.

R&D expenditure (as a % of GDP)* in Black Sea countries, 2021-2022



Source: World Bank Group

- One measure of a country's innovation capability is its investment in Research & Development. In the Black Sea region, **Türkiye leads in GDP spent on R&D**.
- Notably, the percentage of GDP invested in R&D for **Romania, Ukraine and Georgia** are **lower than 0.50%**.
- The Black Sea countries **lag behind global leaders in R&D investments**, with even the highest spending nation, Türkiye, falling below the top global performers. For example, Israel ranks first globally with R&D spending at 5.56% of its GDP. Meanwhile, the **European Union (EU) invests three times the average of the Black Sea countries** of GDP in R&D (2.28%).

*The numbers for Bulgaria, Romania, and Türkiye are from 2021, while the others are from 2022.

Based on the analysis of various rankings and indices, the publication highlights that the innovation ecosystems of Black Sea countries are intricate and multidimensional, defying a simple summary.

However, this analysis also underscores the need for further development in various aspects of their innovation ecosystems, particularly in areas that currently lack sufficient advancement.

By implementing the recommendations below, Black Sea countries can build more resilient and competitive startup and innovation ecosystems, thus fostering sustainable economic development and enhancing their global competitiveness in the innovation landscape:

- **Increase R&D Investment:** Governments should significantly increase R&D expenditure as a percentage of GDP to enhance innovation outputs and catch up with global leaders.
- **Invest in Education and Training:** Expand programs focusing on STEM education, entrepreneurial skills, and vocational training, and collaborate with international educational institutions.
- **Enhance Infrastructure and Market Sophistication:** Invest in digital and physical infrastructure and improve access to finance and streamlined business processes to support startup growth.
- **Engage in Global Startup Ecosystem:** Increase involvement in the global startup ecosystem, particularly in sectors (like, for example, AI) which are now top priorities for leading countries.
- **Expand Startup-Supporting Programs:** Scale up incubators, accelerators, venture capital, and regulatory changes (such as by introducing SAFE as a funding instrument) for startup funding, and learn from successful programs in other regions.
- **Streamline Immigration Policies:** Simplify work and residence permits, offer tax incentives, and learn from successful startup visa programs in countries like Bulgaria and Türkiye to attract global talent.

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