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TECHNOLOGY TRANSFER IN THE EU'S EASTERN AND SOUTHERN NEIGHBOURHOOD 2019-2020

A COMPARATIVE OVERVIEW

SCIENCE, TECHNOLOGY, INNOVATION

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A COMPARATIVE OVERVIEW

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INTRODUCTION

The present report contributes to the European Commission's commitment of bringing the EU and its neighbours closer. The EU's European Neighbourhood Policy was launched in 2004 to help the EU support and foster stability, security and prosperity in its closest neighbourhood, and it governs the EU's relations with 16 of its closest Eastern and Southern Neighbours.

The EU is committed to supporting the economic development of its partner countries. Technology transfer represents a central area where distinct sections of society including academia, private research, government, and public and private enterprises interface with one another to improve the overall economic and social conditions for those involved and the communities around them.

By investing in the facilitation of technology transfer, governments can direct policy and funds to ensure the greatest outcome for society. With this process in mind, the ultimate objective of the present study is to inform policymaking in technology transfer and build stronger cooperation between the EU and its Eastern and Southern neighbours.

STUDY METHODOLOGY

The Competence Centre on Technology Transfer (CCTT) of the Joint Research Centre (JRC) launched this study to conduct a brief diagnostic analysis and comparative overview of the state of Technology Transfer in twelve Eastern and Southern neighbouring countries, including Armenia, Azerbaijan, Belarus, Georgia, Republic of Moldova, Ukraine, Algeria, Egypt, Jordan, Lebanon, Morocco and Tunisia.

The study describes the main characteristics of the landscape, including relevant stakeholders, players and technology transfer models, identifies strengths and weaknesses of the ecosystem, and provides conclusions and recommendations for each country, with the aim of informing policymaking in this domain.

To achieve this objective, the Expert Group commenced with a desktop review to gather, examine, and understand relevant policies, laws and literature concerning technology transfer in the respective study countries. This preliminary phase was employed to characterise the status of technology transfer in the region, to identify the key stakeholders, crucial issues, and possible areas of improvement.

Secondly, the identified issues served as guiding material in the design of questionnaires for relevant stakeholders. The list of stakeholders included: Government bodies (Ministries with role in intellectual property and innovation, i.e., Ministry of Science, Education, Economy, etc., Innovation Agencies), Universities, Academies of Sciences (management, technology transfer offices, and researchers), Industry (incubators, science and technology parks, companies), and private investors.

On-site interviews with stakeholders took place in some of the study countries before March 2020, however, to respect health and safety concerns of the Coronavirus disease (COVID-19), all interviews that took place after March 2020 were online via video conferences. Both the information from questionnaires and interviews helped as source data for the diagnostic country reports – an analysis of the technology transfer ecosystem and country specific recommendations.

Lastly, the study concludes with a comparative report to detail some of the similarities and differences between the countries.

EVALUATION METHODOLOGY

The Southern and Eastern neighbourhood have been object of study and analysis in the recent years[1] [2]. For example, the Sub-regional Innovation Policy Outlook (IPO), a pilot United Nations Economic Commission for Europe (UNECE) flagship publication, provides a comprehensive assessment of innovation policy across countries with shared economic, structural, and institutional features. Incorporating country specificities and Sustainable Development Goals (SDG) priorities, the IPO compares the scope, quality, and effectiveness of existing innovation policies, institutions and processes and provides concrete recommendations to foster innovation-led growth and overall sustainable development. Complementary to other international composite indices measuring innovation inputs, outputs and performance, the IPO serves as a useful tool for policy makers to examine and benchmark the role that policies and institutions play in promoting innovation in the country. The aim of the IPO is to create an exchange of best practices across the sub-region, act as a change management tool, foster inter- and intra-ministerial coordination and private sector involvement in policymaking, and complement the more in-depth national UNECE Innovation for Sustainable Development Reviews. The first IPO iteration for Eastern Europe and the South Caucasus (EESC) sub-region (Armenia, Azerbaijan, Belarus, Georgia, the Republic of Moldova, and Ukraine) was launched at a high-level meeting in November 2020. UNECE plans to repeat the IPO assessment in the EESC sub-region as well as apply the methodology to other sub-regions.

1 https://www.consilium.europa.eu/en/policies/eastern-partnership/
2 https://www.coleurope.eu/sites/default/files/research-paper/miltner.pdf

A study on regional integration in the Union for the Mediterranean (UfM) has been recently published by the Organisation for Economic Cooperation and Development (OECD)[3]. This report examines and makes recommendations for the Euro-Mediterranean region's integration development. Regional integration can aid recovery from the COVID-19 pandemic by promoting green and digital transformation, increasing sustainable commerce, investment, and innovation, and fostering good employment and social equity.

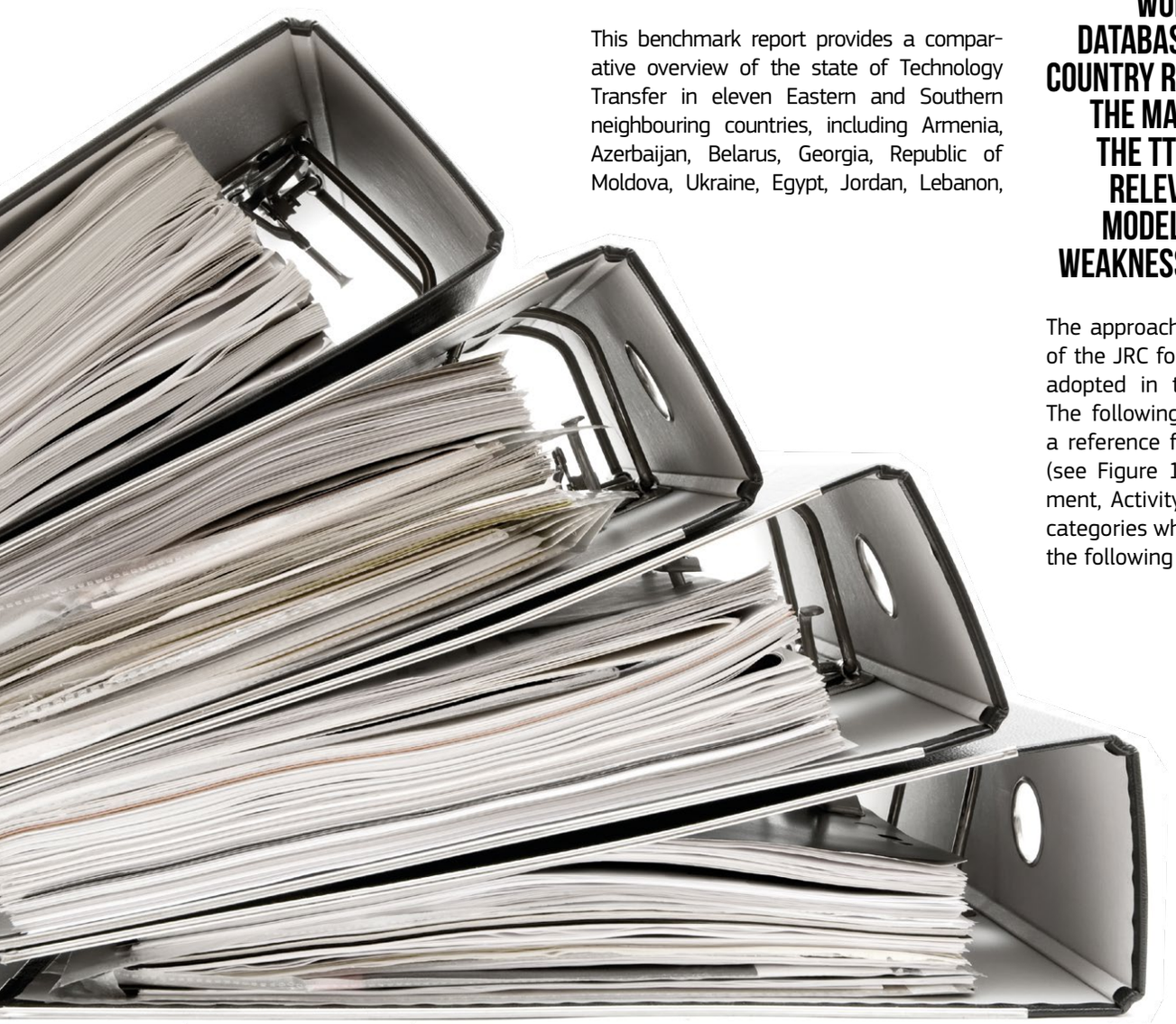
Specifically, regional cooperation in research and higher education can help improve the quality of skilled labour and promote the diversification of economic activities. Key indicators have shown that integration in the Euro-Mediterranean region has increased unevenly in line with the growing but unequal capacity in research and higher education in Southern Union for the Mediterranean countries.

Regional integration in research and higher education requires that countries share a vision and commitment to science, technology and innovation, as a source of their own country's economic and social development.

3 https://ufmsecretariat.org/wp-content/uploads/2021/05/Regional-Integration-in-the-UfM_EN.pdf

Based on the data collected during this technology transfer (TT) study, heterogeneity is evident in terms of national and local policies, legal and regulatory frameworks, development of the innovation ecosystem and public research organisations (PROs). In general, quantitative indicators, such as financial data or intellectual property assets, are not sufficient to describe the complexity of knowledge transfer (KT), commercialisation processes, and their longer-term impacts as acknowledged by the major international associations of KT. Taking into account the complexity of the TT field, the core data set presented here and the utilisation of definitions can be used for a comparative and longitudinal analysis.

This benchmark report provides a comparative overview of the state of Technology Transfer in eleven Eastern and Southern neighbouring countries, including Armenia, Azerbaijan, Belarus, Georgia, Republic of Moldova, Ukraine, Egypt, Jordan, Lebanon, Morocco and Tunisia. Although Algeria was initially under the scope of this diagnostic and comparative study, unfortunately it could not be analysed due to lack of sufficient data.



THIS DOCUMENT IS BASED ON SEVERAL SOURCES THAT INCLUDE WORLD BANK DATA, PATENT DATABASES AND THE INDIVIDUAL COUNTRY REPORTS[4] THAT DESCRIBE THE MAIN CHARACTERISTICS OF THE TT LANDSCAPE, INCLUDING RELEVANT STAKEHOLDERS, TT MODELS, AND STRENGTHS AND WEAKNESSES OF THE ECOSYSTEM.

The approach proposed in a recent study of the JRC for TT indicators[5] was partially adopted in this benchmarking exercise. The following categories will be used as a reference for the comparative analysis (see Figure 1), Internal context, Environment, Activity, and Impact, with the subcategories whenever possible organised in the following structure:

4 https://publications.jrc.ec.europa.eu/repository/handle/JRC125679, https://publications.jrc.ec.europa.eu/repository/handle/JRC125742, https://publications.jrc.ec.europa.eu/repository/handle/JRC126059, https://publications.jrc.ec.europa.eu/repository/handle/JRC126057, https://publications.jrc.ec.europa.eu/repository/handle/JRC125744, https://publications.jrc.ec.europa.eu/repository/handle/JRC125680, https://publications.jrc.ec.europa.eu/repository/handle/JRC123284, https://publications.jrc.ec.europa.eu/repository/handle/JRC123283, https://publications.jrc.ec.europa.eu/repository/handle/JRC123282, https://publications.jrc.ec.europa.eu/repository/handle/JRC125677, https://publications.jrc.ec.europa.eu/repository/handle/JRC125678

5 https://publications.jrc.ec.europa.eu/repository/bitstream/JRC120716/kjna30218enn.pdf

Environment: government activity and its involvement in innovation, the level of interest and involvement of the local industry, the level of development of spin-offs and start-ups categorised in four phases including (Activation, Globalisation, Expansion, and Integration), the level of overall funding provided to the innovation ecosystem.

Internal context: in this category the average Knowledge Transfer Organisations (KTO)/Technology Transfer Office (TTO) size and maturity, its funding and strategy were considered. The population of researchers and the overall research expenditure were also taken into account.

Activity and **Impact**: the output categories of Activity and Impact are difficult to apply in this context, as KT activities are generally low in the region as well as the overall TT impact. Therefore the comparative analysis will be limited only to the input categories with exception of reporting the patenting activity and scientific publications in the region.

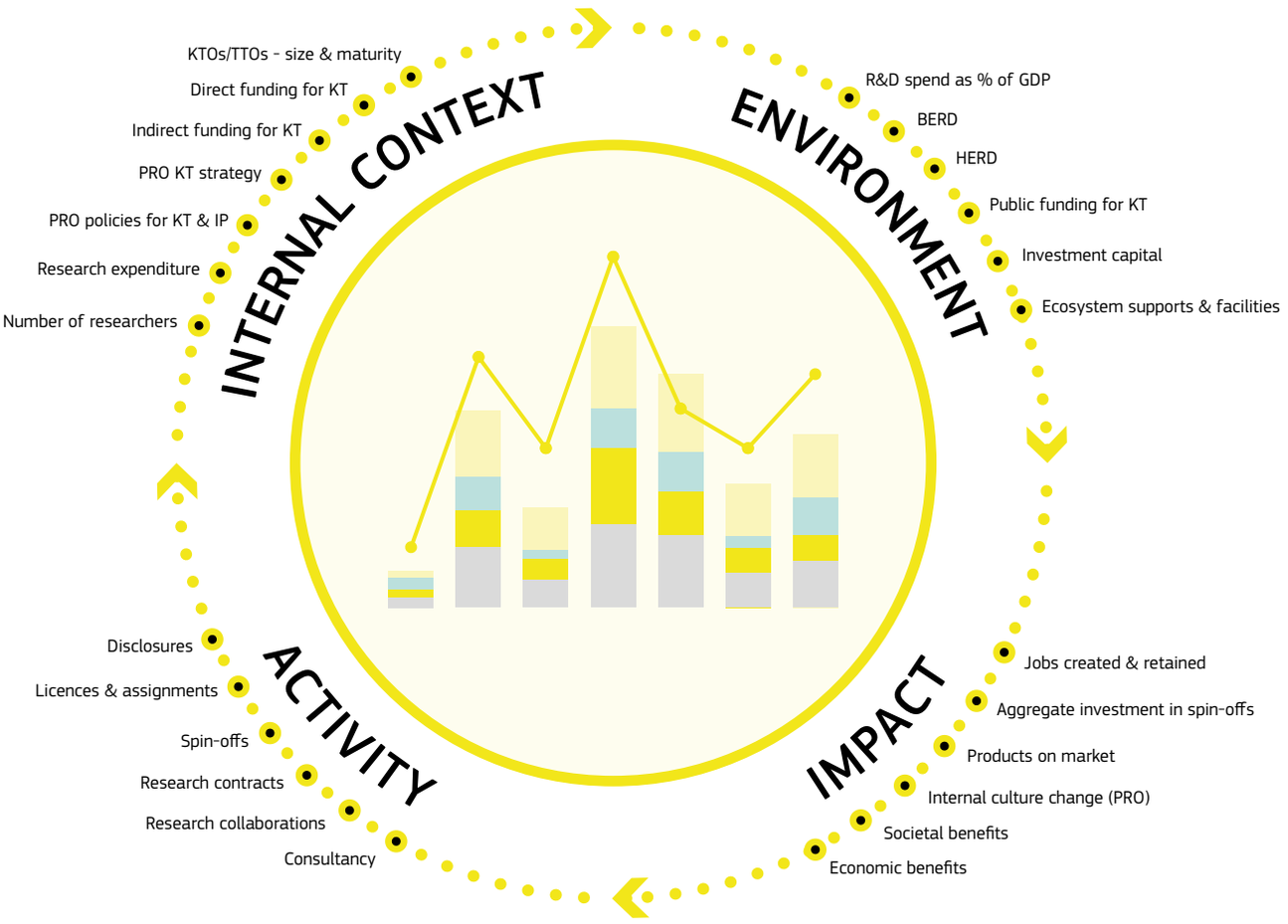


Figure 1: TT indicators

THE ENVIRONMENT

Government activity and its involvement in innovation

The role of government in fostering innovation is becoming more and more relevant as globally knowledge-based societies are becoming predominant.

In relation to the different regions included in the study, a summary of the findings[4] is presented in Table 1.

Country	Government activity and its involvement in innovation
Armenia 	The government expresses a clear desire to transform Armenia into a high-tech, industrial nation, and recognises that attracting foreign investment necessitates improved intellectual property rights (IPR) protection. Two core policy documents are guiding research and innovation policies in the country, the Strategic Programme for the Development of Science Sector (SPDSS), 2017-20, and the Initial strategy of the formation of innovation economy (ISFIE). The Government identified several actions to be taken including regulation of R&D and technology activities, creation of a national venture investment fund for Armenian start-ups, grant programmes targeted to start-ups, creation of local accelerators and partnerships with international accelerators, development of an IPR regulatory framework for international IP protection in Armenia, fostering competitiveness of Armenian high-tech companies, positioning Armenia as a start-up and technology hub, promotion and sale of Armenian high-tech products and services, development of technological centres in Yerevan and the regions, and with respect to the defence industry, fostering investments and cooperation with science and the education sector, to attract talent.
Azerbaijan 	The government has recognised that in order to become a knowledge-based economy it needs to diversify from oil and gas and to improve innovation capability. The national development strategy, Azerbaijan 2020: Vision for the Future[6], places a high value on innovation-driven growth, which has been proclaimed a national priority. A national innovation plan has been devised along with the creation of government agencies to support the innovation ecosystem. A significant number of measures have already been implemented, but more time is needed for these measures to become fully operational and to have a measurable impact. The SMBDA (Small and Medium Business Development Agency), established in 2017, provides financial assistance to small and medium enterprises (SMEs) while also contributing to innovation and tax legislation. It conducts training and participation initiatives for diaspora members. The Innovation Agency, which was founded in 2019, offers funding for innovation, including technology transfer and research commercialisation. The Copyright Agency was created to carry out government IPR policy. The Intellectual Property Agency was established in 2018. The agency's development has been modest thus far, and much of its attention has been focused on copyright disputes rather than patents or other technology-related issues.

6 https://president.az/files/future_en.pdf

Country	Government activity and its involvement in innovation
Belarus 	Innovation policy in the country is the remit of the State Committee of Science and Technology (SCST) supported by a multi-ministerial and industrial council. The policy implementation is guided centrally by the SCST which includes an IT (information technology) institute, the Republican Library for Science and Technology, the National IP centre, the Belarusian Innovation Fund, two regional Technical and Business Information Centres and a Centre for Analytics in Innovation and TT. There is a strong public government presence through interventions and ownership of enterprises. The growth is in state-run industrial sectors backed by government wage and income policies, in contrast with a limited small growth for SMEs. The national innovation policy is a core component of the national socio-economic policy and is aimed at combining the resources of public (strong) and private (weak) sectors of the economy.
Egypt 	Knowledge and innovation are strategic for Egypt as recognised in the strategies that shape the future of the country, such as "The Sustainable Development Strategy Vision 2030", "The National Strategy for Science Technology and Innovation 2030", "The Technology and Innovation Entrepreneurship Strategy", and the Law 23/2018 on Incentives to Science, Technology and Innovation, among others. The main government body responsible for national research policy at public universities and some of the main research institutes is the Ministry of Higher Education and Scientific Research. The entities mainly in charge of executing TT policies are mainly the Science and Technology Development Fund (STDF) and the Academy of Science Research and Technology (ASRT). The establishment of TTOs was promoted by ASRT in the framework of the TICOs Programme.
Georgia 	The country has a liberal economic regime, which offers supportive framework conditions to do business and to increase innovation. The regulatory framework regarding IPR[7] is relatively new and is still in development. There have been several reforms in innovation infrastructures in recent years. The Socio-Development Strategy–Georgia 2020 determined the development of the national innovation and technology sector as one of the cornerstones of sustainable economic development and global integration. Under this policy the Research and Innovation Council was established to provide strategic coordination of the country's innovation policies. The focus of the Strategy is on improving access to finance for R&D and support in commercialisation, developing necessary infrastructure and developing the Information and Communication Technologies (ICT) sector. The national innovation policy regulates the investment from public resources into PROs and the private sector. The government has provided for the state to carry out the implementation of innovation policy via the Georgian Innovation and Technology Agency (GITA).
Jordan 	The Higher Council of Science and Technology (HCST) has the responsibility for the ratification of the National Science and Technology Policy for the Hashemite Kingdom of Jordan as it defines its priorities as well as establishing related programmes and plans. A National Centre for Innovation has been recently established. It is affiliated with the HCST and it was created to reduce the redundancy in the innovation ecosystem. Its activities include capacity building of researchers, enhance their international exposure, promote innovation and provide innovation awards. Although Jordan does not have a formal innovation and TT strategy, aspects of enterprise transformation, human resource development, and other more recent efforts all support innovation and contribute to the broader objective of building an inventive society. Furthermore, the government has established a system of awards that recognises not just industry achievement, but also openness and good governance in government.

7 https://matsne.gov.ge/en/document/view/3322328?impose=translateEn&publication=0

Country	Government activity and its involvement in innovation
Lebanon 	Government and financial measures, notably the financial law referred to as Article 331, have gone some way to stimulating tech start-ups in Lebanon. The Ministry of Economy & Trade has a stated mandate within Lebanon to foster economic development at the strategic national level. The National Council for Scientific Research is the principal funding body of research and development institutions. However, despite certain policy measures, the government could go further in supporting the practical implementation of those policies to bring about increased commercialisation of university research and output of research centres, as there is currently limited TT from PROs to industry. Even though Lebanon is signatory to various international IP agreements and conventions, the country is not member of the Patent Cooperation Treaty (PCT).There is very little overall evidence of the use of IP or its enforcement by rights holders.
Moldova 	Under the National Research, Development, and Innovation Program (NRIP) for 2020-2023, one of the country's major goals is to shift its economic development model toward competitiveness and innovation. The National Programme in Research and Innovation and the Action Plan are the main policy documents through which the Government sets out priorities and promotes innovation. The majority of support measures target PROs and only few stimulate business R&D and innovation activities. Private firms are practically excluded from governmental funding for research and innovation.
Morocco 	With its 2009 National Innovation System (NIS) and its 2014 update, the National Strategy for expanding scientific research through 2025, Morocco is updating and modernising its approach to research and promote a culture of innovation. The *Centre National de Recherche Scientifique et Technique* (CNRST) has a key role in the innovation ecosystem as it helps implement R&D development programmes based on the government's priorities. The goal is to establish a working ecosystem of universities, research institutions, venture capital (VC) firms, and creative businesses.
Tunisia 	Commercialisation of research outcomes from PROs has become a key priority of Tunisia's Science, Technology and Innovation policy and framework over the previous two decades. Since 1996, programmes to link science to economic goals have been created, and new organisations have been established to help researchers commercialise their findings. In 2017, the Ministry of Higher Education and Scientific Research adopted a five-year strategic plan to promote IPR protection, the acceleration of TT and the creation of innovative start-ups. The Tunisian government has made active efforts to support the promotion of entrepreneurial ventures in the country. In this sense the government adopted the "Startup Act 2018" which aimed at putting high-growth sectors at the heart of the country's economic transformation.
Ukraine 	TT from publicly funded research organisations does not currently play a central role in the national economic strategy for Ukraine. The government is allocating more resources to research, and the European Research Area (ERA) roadmap for 2018 called for the establishment of a National Research Foundation, which would be a meaningful grant-based financing tool for all areas of Ukrainian science. Despite a number of attempts, the country's innovation activity is still low. The state economic initiative "Creation of the Innovation Infrastructure in Ukraine 2009-2013" did not receive state funding and thus activities were not completed. Same fate followed the state initiative of building a monitoring system for the innovation ecosystem.

Table 1: Government activity and its involvement in innovation

THERE IS A POSITIVE TREND TOWARDS INNOVATION IN ALL THE GOVERNMENTS OF THE REGION.

Therefore, actions have been taken in support of innovation and TT. In addition, there is overall awareness that innovation and migration towards a knowledge-based society (i.e. a society gathers and elaborates information to generate relevant actionable resources) are key ingredients for their countries. Some of these actions are very recent and thus the impact on the national ecosystem is still in very early stage.

Interest and involvement of the local industry

Local industry and its capability of technology and innovation absorption is a key component of a strong innovation ecosystem. In Table 2 the findings from the country reports[4] are presented.

Country	Interest and involvement of the local industry
Armenia 	Multinational corporations play a key role in bridging the gap between academia and industry. Multinational firms' subsidiaries in Armenia are active in R&D and build appropriate skills through funding PhD programmes and research centres. Armenian businesses are often small and constrained to a local market, with little opportunity to boost efficiency. Many businesses are focusing on the outsourcing market. Despite the strong outsourcing focus, the Armenian ICT industry is growing in the development of products and services, in engineering, systems development, and R&D services. The development of mobile applications is expected to have strong potential.
Azerbaijan 	The oil and gas industry dominates Azerbaijan's business landscape, accounting for a significant portion of the country's gross domestic product. The ICT sector had a positive trend in the last years but since 2015 the growth has been slow. Most SMEs reported no innovation during the time analysed[8]. Involvement of the private sector in research and development is still very low. Funding challenges, as well as a lack of awareness among the business community of the research infrastructures and competencies available within research institutes, are contributing factors.
Belarus 	SMEs are neither the leading supplier nor the adopter of innovative technologies. Large state-owned companies are the drivers of TT due to the structure of the state programmes that finance innovation. State funding programmes for companies for applied science must lead to production-ready innovations in a time of 3 years from inception that can be potentially extended to an additional five-year term. If the commercialisation of the product or service fails, the company must repay in full the grant. Only large state-owned companies can handle the risks associated with this approach.
Egypt 	Egypt had 2.41 million firms according to the Egyptian National Economic Census (2013). By the number of employees, 97% of Egypt firms are micro firms and just a small fraction are small firms (2.7%). Only 0.4% are medium and large in terms of size. More than 50% of the industrial activity lies in the wholesale and retail sector; 35% of SMEs carried any type of information being process innovation the most common pattern. R&D outsourcing is not common practice (only 6% of SMEs reported this activity). Less than 2% of the firms had universities or research centres as partners[9].
Georgia 	SMEs do not drive innovation nor have the capability and the need of innovative technologies. The absence of available growth capital in the country restricts their progression. The technology market is small and includes about 4 000 active businesses with a total turnover volume of about USD 600 000, of which only 10% can be attributed to high-tech industry. According to GeoStat[10], of 700 000 registered businesses in 2020 only 25% are active (168 000). In 2020, 10 companies were engaged in scientific and technical activities, 92 in manufacturing of pharmaceutical goods, and 108 in R&D activities.
Jordan 	Most enterprises in Jordan (≈ 90%) are SMEs (2020). They do not generally engage in innovation and are not likely to undertake significant levels of research & development (R&D). Exceptions to this rule exist mostly in the service sector and particularly in the ICT area. The industry is increasingly recognising the need to foster a culture of innovation, creativity, and entrepreneurship. To this end, measures are being progressively implemented to encourage the creation of innovation and technology-based businesses.

8 https://publications.jrc.ec.europa.eu/repository/handle/JRC126059
9 https://ideas.repec.org/a/kap/jtecht/v44y2019i5d10.1007_s10961-019-09737-w.html
10 http://br.geostat.ge/register_geo/index.php?action=report_30&lang=en&search10=25-09-2015

Country	Interest and involvement of the local industry
Lebanon 	Due to a variety of variables, including local enterprises' focus on services and trade, family-owned Lebanese firms' conservative investment plans, and a lack of confidence in universities' ability to deliver value, traditional Lebanese corporations do not engage in innovation-led activities. Lebanese start-ups have interest for innovation but they are currently not well connected with university research, but are developing positively in particular in the ICT sector.
Moldova 	In Moldova, SMEs represent the most important part of the economic agents, accounting for 98.7% of the total number of enterprises in 2016. SMEs are more innovative than large enterprises in the country. Even though, the share of innovative SMEs in the total SMEs in the Republic of Moldova is extremely small: only 1.2% (in 2016). In particular, innovative SMEs in the industry sector accounted for 52.4% of all innovative SMEs also in 2016.
Morocco 	In its current state, the Moroccan industry is not well equipped to absorb products and innovations developed by universities and translate them into new processes and products. There is an urgent need to modernise industry and increase its absorptive capacity for innovation. There are no indirect financial support systems for companies to engage in R&D and innovation, such as tax credits or public procurement of innovative goods and services, common in other countries with similar development.
Tunisia 	Tunisian businesses are generally small. According to the Tunisia TT report[11], in 2019 there were approximately 5 500 companies employing more than ten people. There were 975 international enterprises in the offshore sector among them. The number of large businesses is limited at 100. Approximately 10% of these SMEs are likely to be interested in innovation initiatives. Only a small percentage of multinational corporations have their own R&D departments and are active innovators.
Ukraine 	The local private sector is neither a leading technology supplier nor a source of demand for IP. It does not conduct activities that would create demand for R&D from PROs; there are few policy instruments to stimulate demand and linkages with PROs are weak. According to the State Statistical Service of Ukraine[12], Ukrainian businesses purchased 1 131 innovative technologies in 2015 but they only sold 98, of which 20% to foreign firms and 80% to local companies. Only 11% of TT cases have been linked to the purchase of patents and the obtaining of licenses. On the other side, the Ukrainian start-up ecosystems developing ICT scalable technology, and many of the developers have chosen to create their own company.

Table 2: Interest and involvement of local industry

As it can be seen from Table 2, local industries, in most countries of the region, have a relatively limited potential to absorb innovative technology. This is because businesses are small and operate in markets with limited research, development, and innovation (R&D&I) demands. Moreover, in these countries the innovation culture is not well established. However, the ICT sector is developing at different stages in all countries.

11 https://publications.jrc.ec.europa.eu/repository/handle/JRC125744
12 https://ukrstat.org/en/operativ/oper_new_e.html

Level of development of spin-offs and start-ups

The amount of resources a given ecosystem is able to recruit into the innovation process is a critical indicator of innovation success for spin-offs and start-ups. A well-known characterisation[13] to describe the start-up ecosystem is used here. A start-up ecosystem's development can be articulated into four phases:

Activation Phase – in this phase, the ecosystem has little start-up experience on mentors the innovation community, company founders', investors', and support systems' expertise. A low start-up output of approximately 1 000 start-ups or fewer characterises this phase.

Globalisation Phase - once the increased start-up experience has resulted in triggers in the ecosystems, such as exits of 100 million EUR or more, and the start-up output has increased to over 1 200 start-ups, the ecosystem resource globalisation in terms of start-ups, entrepreneurs, talent, and investors, begins.

Attraction Phase - once the ecosystem accounts for more than 2 000 start-ups and some unicorns and exits reach and exceed 1 billion EUR, generating global resource attraction, a start-up ecosystem enters a phase of attraction.

Integration Phase – once a start-up ecosystem reaches global resource attraction, produces a high and self-sustainable degree of global connectedness and flow of knowledge into the ecosystem and reaches more than 3 000 start-ups, it enters the integration phase.

The number of start-ups[14] in the region is outlined in Figure 2.

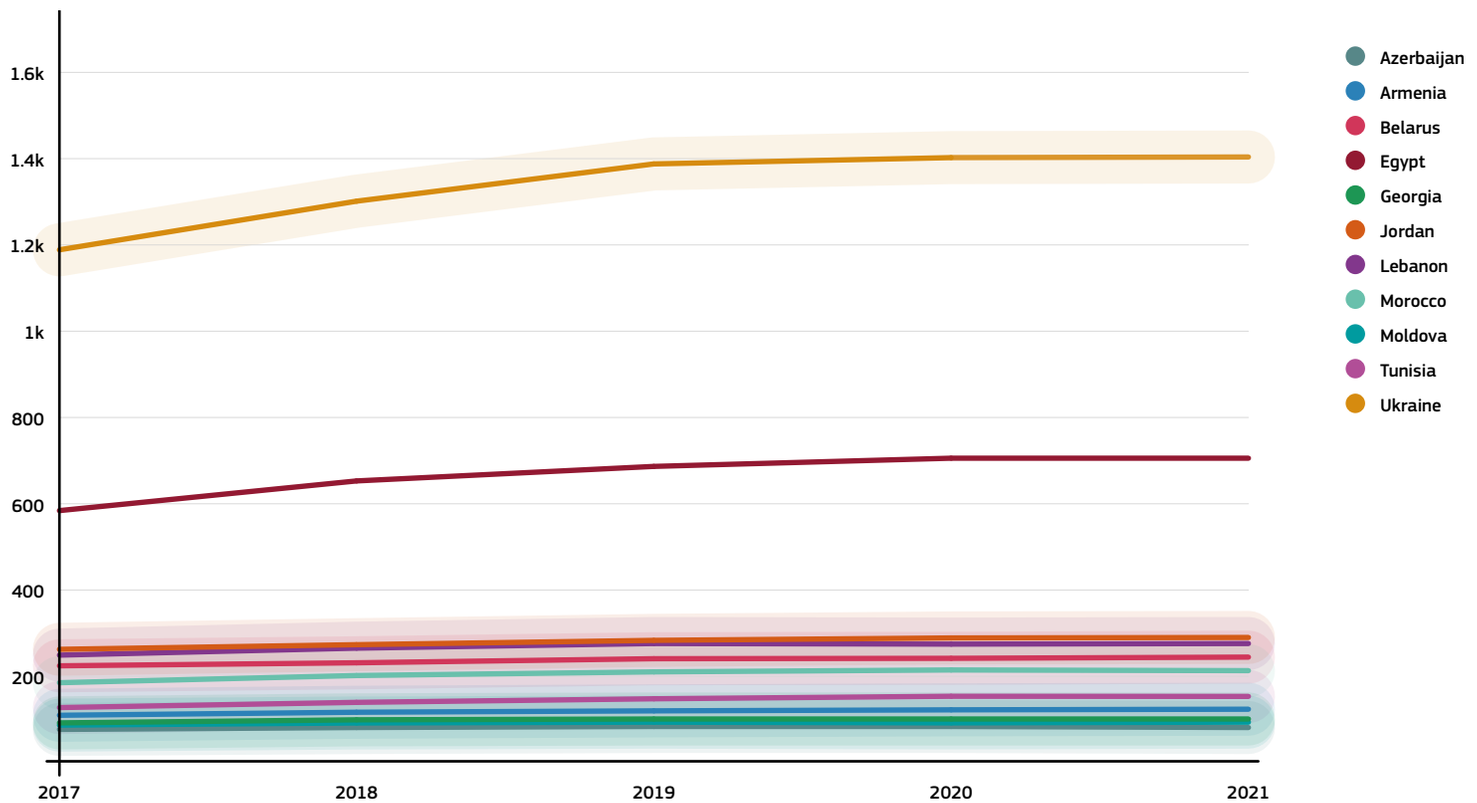


Figure 2: Number of Start-ups in the region

13 https://startupgenome.com/article/ecosystem-lifecycles
14 Source: Author custom search on Dealroom.co database

THE REGIONAL START-UP ECOSYSTEM IS MAINLY IN THE "ACTIVATION" PHASE. IN THIS INITIAL STAGE, FUNDAMENTAL EFFORTS ARE MADE TO BUILD AN INNOVATION COMMUNITY BY SUPPLYING MECHANISMS THROUGH WHICH LOCAL ENTREPRENEURS AND INVESTORS CAN BE BROUGHT TOGETHER.

As of 2020 the number of start-ups is below 1 000 with exception of Ukraine, and while the experience of founders, investors, and the start-up support community is growing, there is still a spill-off of start-ups to more mature ecosystems and considerable brain drain.

Lebanon's government permits free foreign investment, but on the other side the heavy bureaucracy is an obstacle to start-up creation. Beirut is engaged in a variety of industries but has been severely damaged by an explosion in August of 2020, which has affected the start-up ecosystem and caused a refocusing of resources on recovery.

Jordan has seen the creation of a start-up ecosystem and it is home of several initiatives including Response Innovation Labs, Accelerate, Oasis 500, Innovative Jordan, and the World Bank's Innovative Startups Fund Project, all focused in making the Jordan ecosystem appealing, in particular to foreign investors, by fostering entrepreneurial networks and developing innovation centres such as the Wadi Araba innovation valley.

The Armenian start-up ecosystem has grown in the recent years in terms of entrepreneurship and technological development. Armenia also ranks 10th in the world for ease of doing business, according to the World Bank. Armenian companies and start-ups target the worldwide market, as the size of the internal market is small. Furthermore, the Armenian government is promoting digital businesses by not imposing an income tax. The Armenian economy benefits from a substantial and prosperous Armenian diaspora, and numerous successful business people of Armenian descent have close ties to the nation.

In Belarus, the start-up founders mostly come from the private sector. Even the fact that tax incentives are offered for technological start-ups, which are placed in techno-parks, the absence of available growth capital in the country, restricts their progression. Graduate start-ups and spin-offs from universities or PROs are very few and the country still lacks incubator and accelerator programmes aimed at non-software businesses. Expertise, equipment and industry relationships are present but there is little-to-none collaborative industry research.

Egypt's start-up ecosystem is one of the strongest in North Africa, with large potential, particularly in Cairo and Alexandria. Egypt also provides enterprises with qualified and reasonably priced talent.

Azerbaijan should continue to establish Baku as a regional start-up center and nurture the seed start-up ecosystems of other cities in the country in order to build its start-up ecosystem. The Azerbaijan 500 ASAN Business initiative[15] aims to innovate and grow the country's nascent start-up ecosystem through events that will help the growth of entrepreneurship in country, as well as create networking chances for national and international start-ups.

The Georgian Innovation and Technology Agency[16] is an example of a supportive government that promotes entrepreneurship and business development around the country by creating programmes like Startup Georgia[17]. The main challenges of Georgia's start-up ecosystem are a lack of experienced entrepreneurs, a small consumer market and limited investments.

The Tunisian start-up ecosystem is developing and shows initial potential. The Tunisian government is aware of the importance of creating start-up hubs and has recently passed a Startup Act[18] that encourages start-up growth by easing tax policies, providing government-sanctioned salaries to founders, and helping start-ups file for international patents.

Moldova's start-up ecosystem has a lot of promise and government backing, including tax breaks and one of Europe's most affordable talent pools. Moldova has also made significant attempts to build a network of entrepreneurs, skilled founders, and corporate investment. Moldova has the potential to become a bridge between powerful start-up ecosystems and exploit their success since it is near to the much larger start-up ecosystems of Romania and Ukraine, and it has quite a strong link to Russia.

Morocco's start-up ecosystem provides entrepreneurs and companies with a cost-effective and reliable context to approach the North African market. Morocco has the potential to be a powerful innovation centre in the area, with a young and talented population focused on technology and connectivity.

Ukraine deserves special consideration since it is the country in the region closest to entering the Globalisation phase, with over 1 000 start-ups thriving in the global start-up environment. Thanks to the brilliance of their developers, the Ukrainian start-up ecosystem, which focuses on Marketing & Sales Technology and Software & Data, is producing scalable and worldwide technology, and many of them have chosen to establish their own firm.

15 https://ecosystems.500.co/azerbaijan500asan
16 https://gita.gov.ge/en
17 http://startup.gov.ge/eng/faq
18 https://www.insme.org/the-tunisian-startup-act/

Level of funding provided to the innovation ecosystem and PROs

The funding and the support systems of TT are among the most important components to enable the growth of an innovation ecosystem. New companies do not generate revenue at the beginning of their activities, but they do need to validate their technology, test it, and market it by themselves. These crucial steps may not be taken if sufficient funding is unavailable. A summary of the findings presented in the country reports[4] relative to ecosystem and PRO funding in the region is presented in Table 3.

Country	Level of funding provided to the innovation ecosystem and PROs
Armenia 	There is a lack of financial instruments from early seed to round A to allow innovative start-ups to establish themselves and grow. Access to external donor funding is inefficient. Various sources of public support for research are available including tax relief for innovative enterprises, loan guarantees and innovation matching grants but the government has a relatively small budget for R&D. The Diaspora makes a significant contribution to the ecosystem and is now a vital component of many local projects, as well as VCs and business angels. Business Angel Network of Armenia (BANA) funded in mid 2017 is the first and largest local business angel network. VC funds such as Formula VC, Hive Ventures, Granatus Ventures, provide venture funding, mentorship, and international connections to early stage start-ups led by Armenian entrepreneurs, anywhere in the world.
Azerbaijan 	Azerbaijan's government support for research is small and it accounts for the majority of the country's research investment. Although the Small and Medium Business Development Agency, the Agriculture Fund, and the Innovation Agency Fund all provide funding mechanisms, the financial markets are not yet developed enough to provide sufficient finance for R&D&I operations.
Belarus 	The innovation funding system is centralised and complex, with a limited number of financial instruments available to stimulate innovation. The support for applied research spans from early development up to 'manufacturing ready' phase often supported by the PROs. The overarching goal is to transfer the technology to a bigger industrial partner serving broad markets. This model, which was created to provide TT to large state-owned firms, is well-established. Funding programmes encourage the development of industrial technologies, but there are consequences for failure. SMEs development is constrained in the country due to a lack of available growth capital. The country has a Business Angel Network, and Russian partners are showing early signs of venture capital.
Egypt 	The Science and Technology Development Fund[19] is the main funding organisation for valorisation and TT, with a diverse portfolio of financial instruments. It also operates support programmes for university-industry collaborations. In the context of the Egypt Knowledge and Technology Alliances (EG-KTAS)[20], mixed consortia that include universities, non-governmental organisations (NGOs) and industry can apply for financing of up to EGP 10 million. As of 2020, 14 partnerships have been funded, resulting in the signing of more than 20 TT contracts and the development of 30 new products. The Information Technology Industry Development Agency (ITIDA) is in charge of promoting Egypt's ICT sector. Its ITAC programme funds university-industry collaborations in ICT. VC and private equity companies, business angels, private investment funds, and crowdfunding platforms and brokers are all active in the country.

19 https://stdf.eg/
20 https://eib.eg/innovation-enablers/eg-ktas-egypt-knowledge-and-technology-alliances/

Country	Level of funding provided to the innovation ecosystem and PROs
Georgia 	The research funding is articulated on basic and applied research. The applied research path supports both early-stage development (Technology Readiness Level (TRL) 2) and technology prototype and testing. Only PROs with their own small scale production facilities, such as Eliava Institute, reach the 'manufacturing ready' phase. There are no funding programmes that assist technological development from conception to manufacturing scale-up. SME development is hampered by a lack of available expansion capital in the country. Capital investments are focused mainly on large projects including infrastructure development, real estate, agribusiness and large state-run energy and manufacturing. Very little financial resources are allocated to home-grown technology and innovation.
Jordan 	The Scientific Research Support Fund (SRSF)[21] has the control of the majority of Jordan's public funding for academic research and its priorities. Limited funds for TT and cooperative research are available. VCs are also active in the country. For example Oasis 500, focused mainly on ICT and which offers entrepreneurship training, mentorship and guidance, business incubation and acceleration, and follow-up on investment and funding; and BeyondCapital established by a seed grant of USD 10 million and launched as a partnership between Endeavor Jordan and Silicon Badia in October 2017. Since then they have built a network of collaboration within the entrepreneurial ecosystem and investment ecosystem with a three pillar approach to bridge existing gaps.
Lebanon 	The overall government funding is low, but its allocation is aligned with market needs. The level of funding available has been reduced due to the economic crisis and is placing a pressure on the quality and quantity of commercial research outputs. Lebanon's start-up sector made a considerable progress with the help of Circular 331, an initiative launched by the government in August 2013 that encouraged banks to invest in start-ups by issuing loan guarantees of up to 75%.
Moldova 	The National Agency for Research and Development (NARD) is the main funder in the country for R&D activities. Insufficient government funding and low contribution of the private sector to the development of science and innovation results in low absorption of new technologies by the business environment. Limited availability of appropriate finance for the life cycle of innovation, starting from seed funding, business angel investment, VC, equity finance, and crowdfunding is limiting the development of the innovation ecosystem.
Morocco 	The Ministry of Economy and Finance is in charge of the financing of science, technology and research & innovation initiatives. In 2010, the Maroc Numeric Fund was launched as part of the Maroc Numeric 2013 national plan, with a budget of EUR 8.9 million to invest in Moroccan technological start-ups, alongside small sums invested by a few business angels. A second fund was created in 2018 (the Maroc Numeric Fund II). The Moroccan government is supporting the Innov Invest Fund[22] that runs a seed, early-stage, and VC investment programme with public funds. It invests in creative start-ups through public private equity funds and supports existing start-up funds. It targeted approximately 300 innovative projects over five years, with an investment of nearly MAD 700 million. The delivery of these funds was through pre-seed, seed and capital risk investments. The Caisse Centrale de la Garantie has also signed agreements with four selected seed funds (Azur Innovation, Seaf Morocco Growth Fund, Maroc Numeric Fund II and Green Innov Invest), being this amplified in 2019 with ten additional support players.

21 https://www.wipo.int/tisc/en/search/details.jsp?id=10204
22 https://www.insme.org/the-innov-invest-fund-in-morocco/

Country	Level of funding provided to the innovation ecosystem and PROs
Tunisia 	The *Programme national de recherche et d'innovation* (PNRI) finances R&D, innovation projects, improvement of industrial capacities, and the modernisation of production processes through the collaboration and partnership between industrial companies, PROs and technical centres. The country lacks sufficient funding for innovation, in particular pre and early seed. There is an emergent venture capital industry. Despite the existence of two developed initiatives (BIATLabs[23] and Flat6Labs[24]), Tunisia's long-standing major challenge remains insufficient private investment in R&D.
Ukraine 	The government is the main funder of research. Since the end of 2019 the government permits the provision of minor state aid (up to EUR 200 000 for three years) for higher education institutions and business entities. The implementation of this resolution will provide financial support to participants in EU research and innovation programmes, regardless of their legal form and subordination. Even though the government has provided financial allocations, innovation infrastructure is still undeveloped and underfunded. Recently, the government has increased the remuneration for the inventors of those technologies, which are being implemented in the real economy. The country has an established Business Angel Network and evidence of venture funding and of private investor activity by successful business people from the Diaspora.

Table 3: Ecosystem funding in the region

The findings overall indicate that the innovation and the TT ecosystems are underfunded. As in any region with a developing innovation ecosystem, the landscape of funding has several variations. A great part of the regions rely on public funding and thus the government involvement in innovation plays a key role. Business angels and VCs are present with different levels of intensity. Finally, some of the funding programmes are in a very early stage. The Diaspora makes a significant contribution to the regional ecosystem.

The diverse governments across the regions should have as a priority the provision of adequate funding for public research and its protection from fluctuations. The expansion of knowledge is a long-term investment that comes with risks that the private sector is unlikely to take.

In addition, as mentioned in the section related to the population of researchers, the region faces difficulties in obtaining the necessary talents for R&D. Because of the low salary in these countries, the working conditions for researchers, especially young ones, are not very favourable, and this leads to a considerable brain drain[4].

23 https://www.biatlabs.com/en/home/
24 https://www.flat6labs.com/

INTERNAL CONTEXT

KTO size, maturity, funding and strategy

To assess the performance of TT it is essential to analyse the status of the entities that are the key actors of this process: the knowledge/TT offices.

A summary of the findings presented in the country reports[4] regarding KTO/TTO size, maturity, funding and strategy in the region is presented in Table 4.

Country	Average KTO/TTO size, maturity, funding and strategy
Armenia 	The Armenian KTOs are small and young. There is a lack of operational experience of the personnel involved in TT at the PROs. The TTO established in 2013 at the Institute for Physical Research of National Academy of Sciences of Armenia aims to promote the institute innovations but resources and capacity building are scarce. There are other NGOs, such as the Armenian Technology Transfer Association (TTA)[25], that support TT through matchmaking and promoting the TT culture.
Azerbaijan 	The innovation ecosystem and the TT activities are still in their infancy. TTOs are present in some PROs but staffing levels are low and skill sets are limited. Despite the numerous initiatives launched in recent years, there is a shortage of trained TT professionals to fully develop and sustain the national innovation ecosystem.
Belarus 	36 IP units are in operation within the PROs. The innovation process is heavily regulated and highly centralised. TT resources at PROs are available but TTOs are skilled in transfer to state-run industry and have limited knowledge in market research and technology appraisal for broader commercial activities. Belarus has an up-to-date and well-developed normative IP system. Copyright, technological inventions, utility models, industrial designs, non-disclosed information, trademarks, topographies of integrated circuits, and plant varieties are all protected within the framework, as well as unfair competition. The State Committee of Science and Technology is a state administrative body in charge of enforcing government IPR protection policies.
Egypt 	42 TTOs are quite reactive and do not have specific procedures for valorisation and TT. TTO financial support is provided in stages and subject to evaluation based on defined key performance indicators (KPIs). The TTO network has support for capacity building, technical advice from the Academy of Scientific Research & Technology, the Grant and International Cooperation Office (GICO)[26] and the Technology and Innovation Support Centre (TISC)[27].
Georgia 	At PROs, TT resources and expertise are not widely available. The Technology Transfer Pilot Program, which supports the commercialisation of Georgian research findings, began in 2019 and will run for three years. A selected and most promising number of projects will be given access to financial and technical resources.

25 https://www.zsi.at/en/object/partner/2880
26 http://www.eyas.eg.net/index.php/asrt-departments/tico/gico
27 http://www.eyas.eg.net/index.php/asrt-departments/tico/tisc

Country	Average KTO/TTO size, maturity, funding and strategy
Jordan 	There are currently 20 operational TTOs. A TT network has been established, with TT officers assigned to a variety of institutions, including public and private universities, the Royal Scientific Society, and the Chamber of Commerce. More than half of Jordan's universities have established TTOs, but in great part inactive due to a lack of funding and staff. Except for a few universities, Jordanian universities have very little, if any, TT and commercialisation activities.
Moldova 	The NARD, which is primarily focused on PRO promotion vs. SMEs, provides the most assistance for public-private knowledge transfer and stimulation of innovative activities. The growth of TT in the country is hampered by a lack of clarity about the goals for the development of innovation policy, both at the national and regional levels, by fragmented policies, and by lack of policy execution. TT is still at an early stage of development despite being part of the national development strategy. The TT system lacks funding, a proper innovation infrastructure as well as trained personnel. There is no obvious evidence of actual TT resulting in licencing or sale of IP.
Morocco 	In Morocco there are 19 TTOs scattered throughout the country, some of them covering several industrial sectors such as biotech, ICT, engineering, agriculture and agritech, energy and the environment. In the recent years four centres called Cities of Innovation were created. They are supposed to be the main interface between research, universities and businesses, and handle TT. Several issues have emerged with this initiative including shortage of mentors and trainers to assist students and young entrepreneurs. Cities of Innovation lack a particular administrative status, which might leave them in a state of administrative and decision-making limbo, preventing them from having a greater influence.
Tunisia 	25 TTOs established through the framework of a cooperation agreement between the National Agency for Scientific Research Promotion (ANPR) and the hosting PRO are in operation, spread across the main universities and major research centres. Staff, budget and management is provided by the PRO while ANPR provides training sessions on IPR. There is a lack of experienced professional and adequate financial resources in most of the established TTOs. As a result, the only way for academics who want to commercialise their findings is to apply for governmental funding.
Ukraine 	Most PROs have TTOs and internal IP policy to regulate ownership and benefit sharing. Staff in TTOs are weighted towards legal protection rather than marketing and transfer. There is little evidence of frameworks, guidelines or internal expertise within TTOs or TT support bodies for invention appraisal for commercial potential, technology marketing, or IP valuation.

Table 4: KTO size, maturity, funding and strategy

On average, in all the countries in which TTOs/KTOs are present, they are small, with few resources and their skill sets are limited due to the scarce training on TT-specific activities provided. TT experts with the complete spectrum of abilities required to adequately create and sustain the national innovation eco-system are in short supply. Overall, there is a lack of a national and regionally coordinated TT strategy.

Size of the researcher population

Science, technology, and innovation are important drivers of economic development and prosperity. The involvement of qualified researchers and developers is a key enabler for progress in these areas. The population of researchers for a given country is the total number of people working in research and development (researchers, technicians, and other support workers) expressed in full-time equivalents, measured per million of the country inhabitants. World Bank data for the region is reported below in Figure 3[28]. On the basis of the available data (2018) the population of researchers in the countries is in general low and below the European average[29].

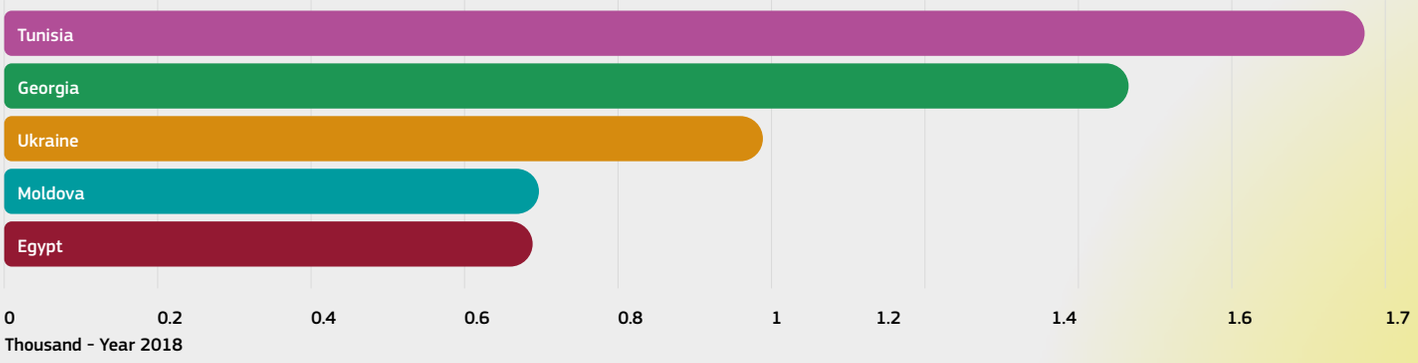


Figure 3: Researchers in R&D per million people

As indicated in the Egypt country report[30] there has been an increasing number of researchers in Egypt (2011-2018), coupled with growth in the scientific quality as well as in the number of publications with international collaboration. For the other countries, as indicated in the reports[4], the population of researchers is in decline and two are the main challenges. The first is a lack of access to the necessary skills for R&D, due to a high turnover of young researchers leaving PROs and going to industry or emigrating, and the second is an increase in the average age of active researchers.

28 https://data.worldbank.org/indicator/SP.POP.SCIE.RD.P6?end=2018&locations=AM-AZ-MD-UA-JO-GE-BY-MA-TN-EG-LB&start=2018&view=bar
29 https://statnano.com/report/s90
30 https://publications.jrc.ec.europa.eu/repository/handle/JRC123284

Overall research and development expenditure

The entire expenditure (current and capital) on R&D carried out by all resident firms, research institutes, universities, and government laboratories, etc. in a nation is referred to as gross domestic expenditure on R&D (GERD). R&D is critical for economic growth, job creation and industrial competitiveness and thus is one of the relevant indicators used in this study. The GERD as a percentage of gross domestic product (GDP) is shown in Figure 4 (only partial data is available, limited to 2018).

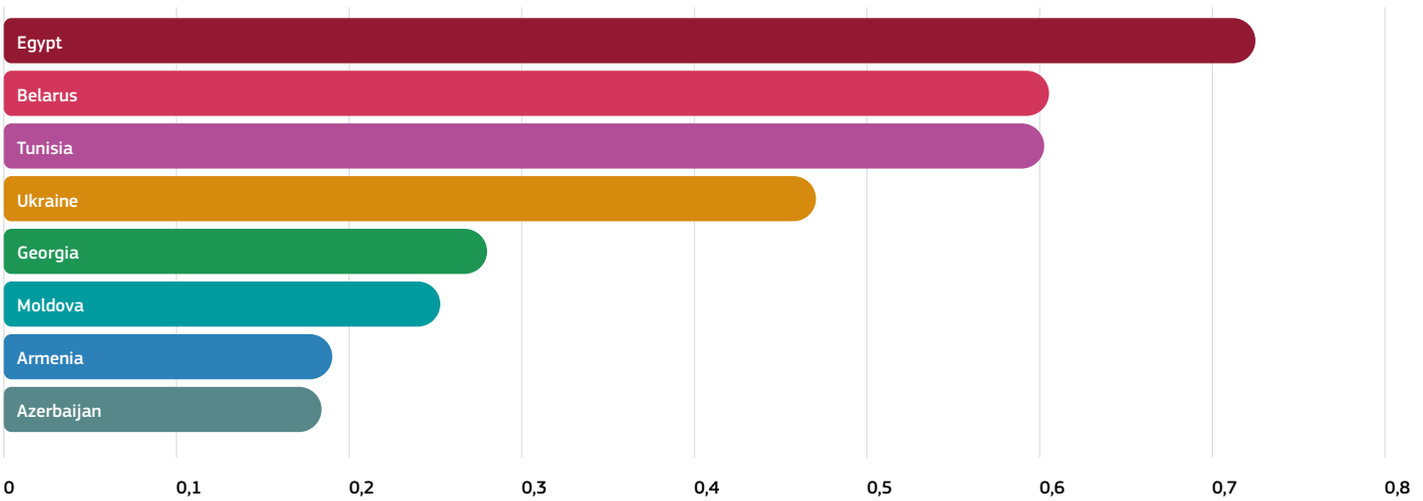


Figure 4: 2018 R&D expenditure (%GDP) selected countries

As it can be seen in Figure 8, the R&D expenditure[31] (Lebanon, Morocco, Jordan data not available from World Bank Database for the period of interest to this study) is on average quite low and below the corresponding EU 2.18% R&D expenditure for 2018 (2.19% in 2019)[32], being especially low in Armenia, Azerbaijan, Moldova and Georgia.

31 https://data.worldbank.org/indicator/GB.XPD.RSDV.GD.ZS?end=2018&locations=AM-AZ-MD-UA-JO-GE-BY-MA-TN-EG-LB&start=2010&view=chart
32 https://ec.europa.eu/eurostat/web/products-eurostat-news/-/ddn-20201127-1

ACTIVITY

Only the activities in the region related to patent applications and scientific publications are reported here.

Patents

A country's place in the global innovation ecosystem and the state of its knowledge economy is expressed also by its number of patents per capita. Countries having a high density of patents per capita are better positioned to success in a knowledge-based society. Patent applications of residents in the region[33] are presented in Figure 5 whereas patent applications of non-residents[34] are presented in Figure 6 together with the trend (last column on the right). Note that data available reported are from 2019 with the exception of Lebanon and Tunisia. As the data shows, the number of applications for both resident and non-residents are very low compared to other countries in Europe and worldwide[35]. On average, the trend is also negative, except for Lebanon, Egypt and Tunisia.

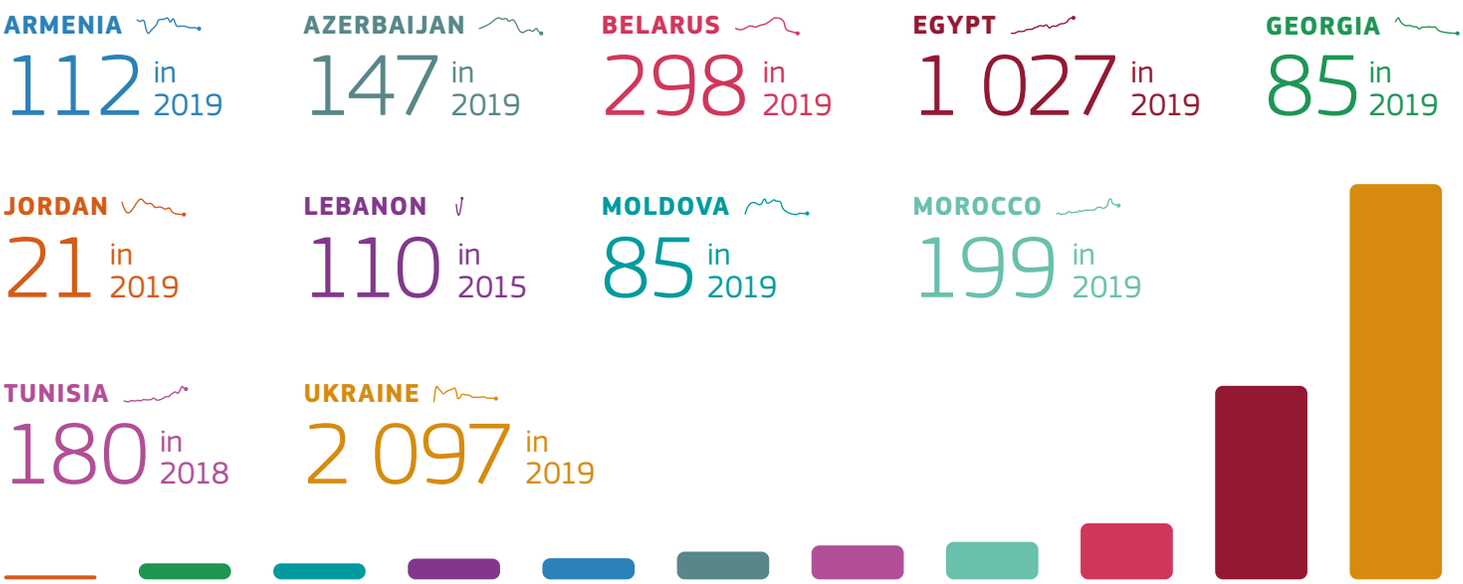


Figure 5: 2019 Patent applications residents (thousands of patents)

33 https://data.worldbank.org/indicator/IP.PAT.RESD?locations=AM-AZ-MD-UA-JO-GE-BY-MA-TN-EG-LB
34 https://data.worldbank.org/indicator/IP.PAT.NRES?locations=AM-AZ-MD-UA-JO-GE-BY-MA-TN-EG-LB
35 https://www.wipo.int/publications/en/series/index.jsp?id=37

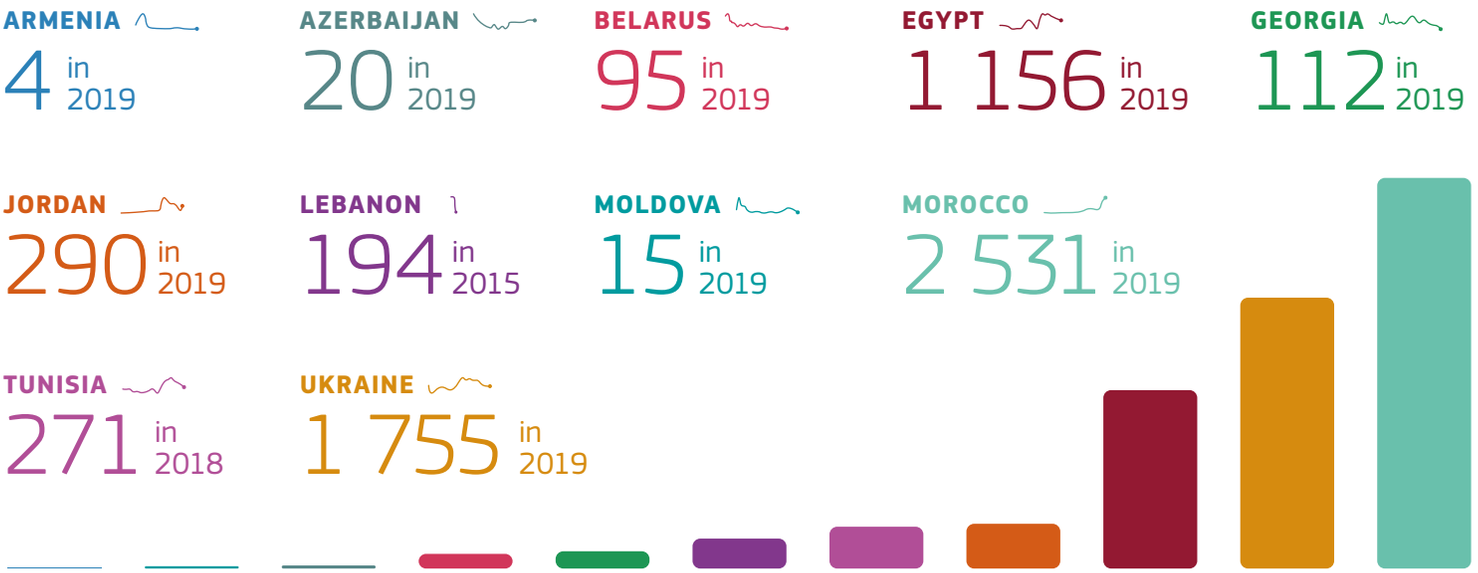


Figure 6: 2019 Patent applications non-residents (thousands of patents) for selected countries

The findings reported in the individual country reports[4] indicate that the reasons for a very low patent activity are several and span from the lack of funds, the low quality of the patent applications, the lack of TT professionals to poor IPR policies. PROs are in most cases not motivated to patent and when there is an incentive, as including patent filing in the PRO ranking metrics for academics, such incentive did not help in improving the patent activity.

In Armenia IP is only certified at the national level. Patent filings in Azerbaijan have a low success rate, with just 120 successful submissions out of 200. In addition to having the fewest patent applications (none from PROs in 2018 and just three in 2017), Egyptian universities' already low patenting activity decreased from 1.3% in 2010 to 0.13% in 2017. The Lebanon Patent Office lacks an examination-based system because of lack of funds. PROs are the source of the bulk of patents filed in Georgia, Moldova and Ukraine, but funding is insufficient for further development of IP. Morocco's recent capability of European patents validation led to a very significant increase in the number of foreign patents in the country as Figure 10 shows. In 2019, the number of resident-filed patents was 199, while non-resident patents were 2 531.

The number of national patents in Belarus is dropping, as applicants consider that the filing of a national patent is more an issue than an advantage as it provides the invention disclosure to the international community without profit to them or the PRO. Thus, a lot of the IP is non-disclosed.

In Tunisia most patent applications generated by the PROs are filed at the *Institut National de la Normalisation et de la Propriété Industrielle* (INNORPI). Each PRO oversees the application process, and the Ministry of Higher Education and Scientific Research (Directorate General for the Valorization of Research) pays for the patent registration and protection for a maximum of four years. Finally, the Jordanian Patent Office used to receive on average more than 200 applications per year, of which 20% were from residents. Since joining the PCT, the number of applications has consistently increased.

Scientific Publications

Figure 7 shows the number of scientific and technical journal papers (only data from 2018 is available) published in the region as well as the trend according to World Bank data[36]. Overall the trend in number of publication is positive for great part of the region with exception of Moldova, Georgia and Tunisia.

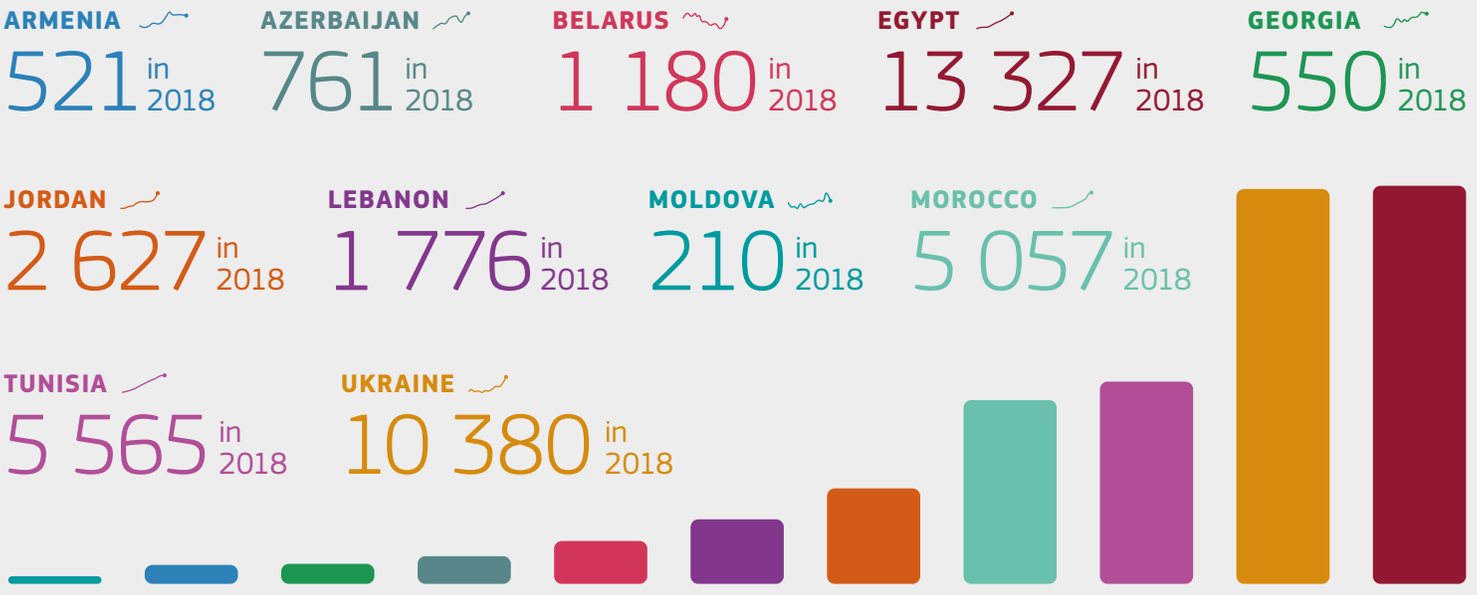


Figure 7: 2018 Scientific and technical journal articles (in thousands)

THE IMPACT OF SCIENTIFIC PUBLICATIONS HAS LONG BEEN A SUBJECT OF INVESTIGATION AND VALIDATION, AND THE MOST FREQUENT METHOD FOR ASSESSING A PAPER'S SCIENTIFIC VALUE IS TO COUNT THE NUMBER OF CITATIONS.

The H index is a quantitative indicator based on publishing data analysis using publications and citations that provides an estimate of the importance, significance, and broad impact of a scientist's cumulative research contributions (Hirsch, 2005). Publication ranking of countries in the region and corresponding H index[37] is presented in Figure 8 (except Moldova, as there is no data for 2019-2020).

36 https://data.worldbank.org/indicator/IP.JRN.ARTC.SC?end=2018&locations=AM-AZ-MD-UA-JO-GE-BY-MA-TN-EG-LB&start=2018&view=bar
37 https://tcdata360.worldbank.org/indicators/149fb88c?country=ARM&indicator=40577&countries=AZE,BLR,EGY,GEO,JOR,LBN,MDA,MAR,TUN,UKR&viz=line_chart&years=2019,2020&indicators=944

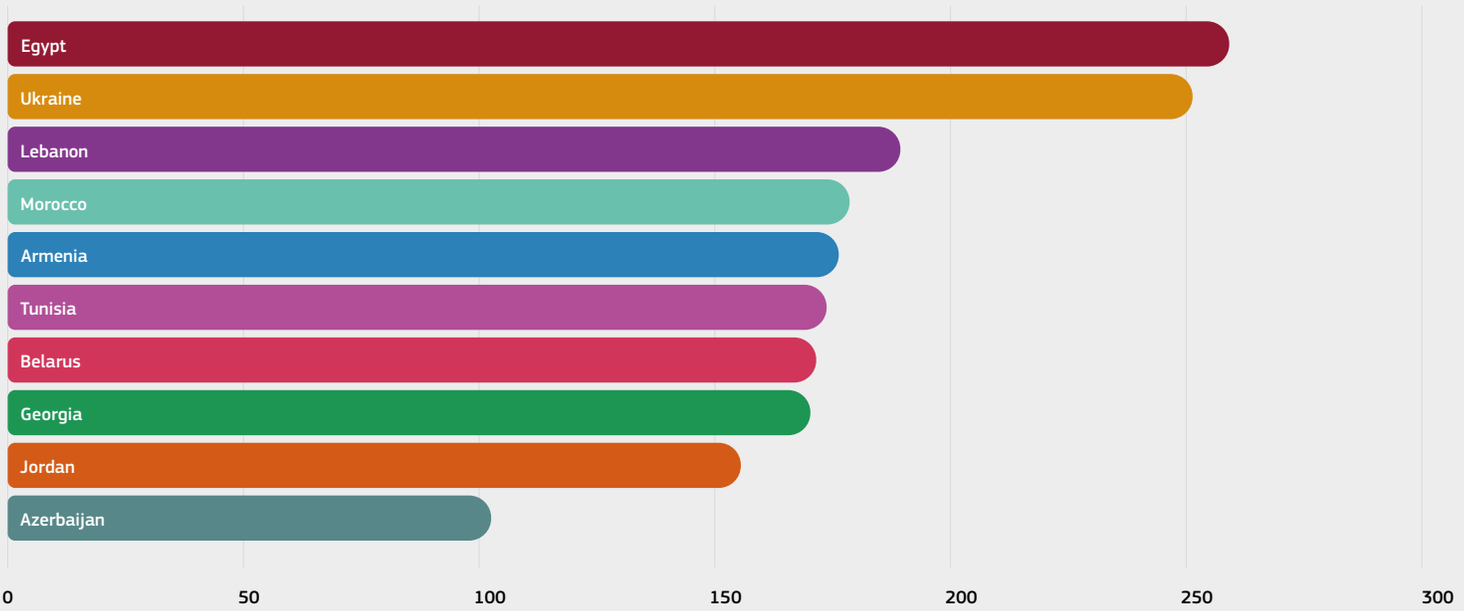


Figure 8: 2019-2020 Countries' H index

As shown in Figure 8, there is an overall positive trend for the H index in the region. We can also distinguish three categories: the top performers Egypt and Ukraine, then a second category in which the great majority of the countries fits and finally Azerbaijan, which is the lowest performer.

Conclusions

In terms of TT in the 2019-2020 timeframe covered for this study, the landscape in the region is uneven. TT activity is generally in early stages of development and active TT networks are not common. PROs, the sources of the technology that are the subject of TT, present significant hurdles with few exceptions in developing strong and competitive innovation, because of low R&D budgets and a general decline in the researcher population, and do not provide a competitive alternative to migration or industry. As scientific research is increasingly a pivot element for progress, ensuring that research personnel is motivated, equipped and supported in the TT process is key to allow engagement with the international community and to avoid brain drain. On the other hand, the local industry, which is the beneficiary and consumer of the PROs' technology, is frequently composed of micro and small businesses with limited interest or potential for innovation. However, it is worth mentioning that, in terms of innovation, the region's start-up ecosystems are thriving, with a special focus on ICT.

Governments in all countries should keep the current effort in national investment in research and TTOs to enable the integration of technology into local economic production systems and to attract international R&D, human and capital resources. They should also strengthen scientific collaboration in other non-ICT related sciences and create new opportunities for regional cooperation.

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Acronyms

ANPR	National Agency for Scientific Research Promotion
ASRT	Academy of Scientific Research & Technology
BANA	Business Angel Network of Armenia
CCTT	Competence Centre of Technology Transfer
CNRST	*Centre National de Recherche Scientifique et Technique*
EESC	Eastern Europe and the South Caucasus
EG-KTAS	Egypt Knowledge and Technology Alliances
EGP	Egyptian Pound
ERA	European Research Area
GDP	Gross Domestic Product
GERD	Gross domestic expenditure on research and development
GICO	Grant and International Cooperation Office
GITA	Georgian Innovation and Technology Agency
HCST	Higher Council of Science and Technology
ICT	Information and Communication Technologies
INNORPI	*Institut National de la Normalisation et de la Propriété Industrielle*
IP	Intellectual Property
IPO	Innovation Policy Outlook
IPR	Intellectual Property Right
ISFIE	Initial strategy of the formation of innovation economy
IT	Information Technology
ITIDA	Information Technology Industry Development Agency
JRC	Joint Research Centre
KPI	Key Performance Indicator
KT	Knowledge Transfer

KTO	Knowledge Transfer Organisation
MAD	Moroccan Dirham
NARD	National Agency for Research and Development
NGO	Non-governmental organisation
NIS	National Innovation System
NRIP	National Research, Development, and Innovation Program
OECD	Organisation for Economic Cooperation and Development
PCT	Patent Cooperation Treaty
PNRI	The *Programme national de recherche et d'innovation*
PRO	Public Research Organisation
R&D	Research and Development
R&D&I	Research, Development and Innovation
SCST	State Committee of Science and Technology
SDG	Sustainable Development Goals
SMBDA	Small and Medium Business Development Agency
SME	Small and Medium Enterprises
SPDSS	Strategic Programme for the Development of Science Sector
SRSF	Scientific Research Support Fund
STDF	Science and Technology Development Fund
TISC	Technology and Innovation Support Centre
TRL	Technology Readiness Level
TT	Technology Transfer
TTA	Armenian Technology Transfer Association
TTO	Technology Transfer Office
UfM	Union for the Mediterranean
UNECE	United Nations Economic Commission for Europe
VC	Venture Capital

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