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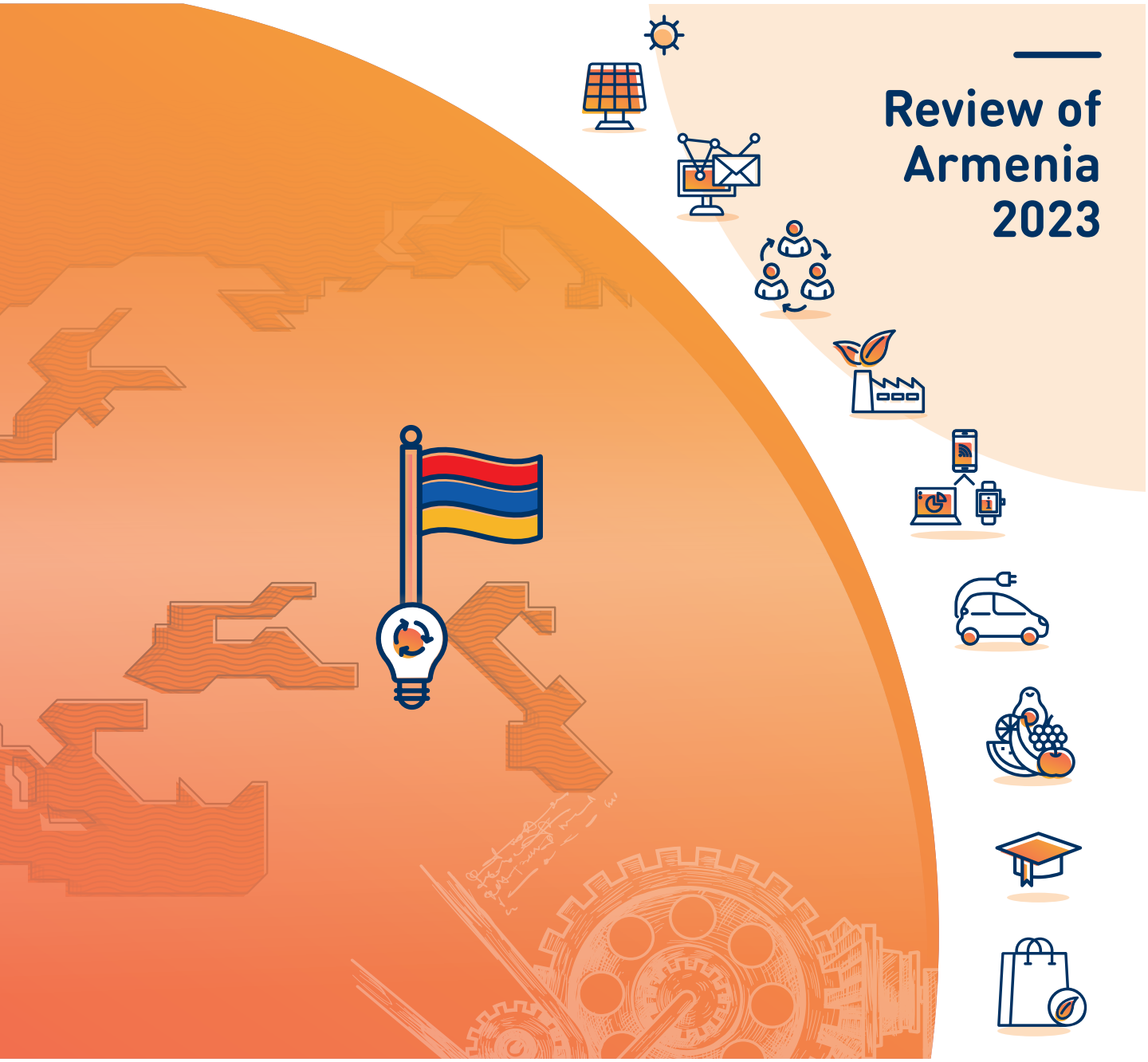
Innovation for Sustainable Development

Review of Armenia 2023



UNITED NATIONS

UNITED NATIONS ECONOMIC COMMISSION FOR EUROPE

Innovation for Sustainable Development

Review of Armenia 2023

UNITED NATIONS
Geneva, 2023

United Nations Publications
405 East 42nd Street
S-09FW001
New York, NY 10017
United States of America

Email: permissions@un.org
website: https://shop.un.org

This publication is issued in English and Russian only.

United Nations publication issued by the United Nations Economic Commission for Europe.

This Innovation for Sustainable Development Review was funded by the Government of Sweden.

ECE/CECI/34

UNITED NATIONS PUBLICATIONS

ISBN: 978-92-1-117331-4
eISBN: 978-92-1-002490-7
Sales: E.23.II.E.7

FOREWORD

The COVID-19 pandemic and the war in Ukraine have hurt economic development in UNECE member States, disrupting international trade, remittances flows, investment and cooperation, as well as progress towards the Sustainable Development Goals. Like other transition economies in Eastern Europe and the South Caucasus, Armenia has been hit especially hard, due to its location and development level and structural economic challenges, such as reliance on remittances, vulnerability to commodity price fluctuations and disruption of exports and tourism, as well as added strains on the health-care system. Innovation – systematically trying new ways to create value with new products, services, processes and business models – is central to strengthening Armenia's ability to address structural challenges and external pressures to achieve a robust, resilient recovery and support green and digital transformations towards sustainable development.

Armenia shows great potential for innovation-led growth, with a strong legacy of applied research, high levels of educational attainment, and a large and resourceful diaspora. Its efforts to support high-tech development have made the ICT services export sector a pocket of innovation excellence. The imperative now is to diffuse this success and strengthen more traditional sectors so that innovation happens more systematically country-wide. To do so, Armenia needs to strengthen its innovation policy governance and support, including developing more effective policy coordination between the public and private sectors and civil society and putting in place sound, evidence-based processes. Also important are strengthening the innovation infrastructure – taking a coordinated, coherent approach, specifically for technology transfer and commercialization – and leveraging the potential of the diaspora to help modernize agriculture and other sectors.

Following UNECE's *Innovation Performance Review of Armenia* (2014), this *Innovation for Sustainable Development Review* provides an update on trends and developments in innovation policy and outlines actionable policy recommendations based on priorities for innovation and areas identified as central to sustainable development by the Government of Armenia. This review takes a detailed look at the effectiveness of the innovation infrastructure and examines challenges and opportunities in fostering diaspora investment for innovation-led growth in the agriculture sector.

I hope that the findings and recommendations in this publication help Armenian policymakers in identifying, monitoring and addressing challenges to strengthening innovation policy. UNECE stands ready to keep up the momentum created by this review for national and sub-regional policy dialogue.

Olga Algayerova

United Nations Under-Secretary-General
UNECE Executive Secretary

PREFACE

Research, analysis and advisory work on innovation and competitiveness policies is part of UNECE's work on economic cooperation and integration that aims to harness innovation as a driver of sustainable development. National reviews of innovation policy, carried out upon the request of member States, have developed significantly since their inception more than a decade ago. They now follow a recently updated methodology and approach that has resulted in the Innovation for Sustainable Development Reviews (I4SDRs). This new approach addresses national priorities under the United Nations 2030 Agenda for Sustainable Development.

Strengthening innovation policy governance to foster innovative activity in Eastern Europe and the South Caucasus (EESC) is an important element in "Promoting circular economy and sustainable use of natural resources in the UNECE region" as well as encouraging "Green and digital transformations for sustainable development in the UNECE sub-region" – the leading themes of the UNECE 69th and 70th Sessions, respectively.

The research for the I4SDR of Armenia began in Q4 2021 with a virtual project launch and consultations with national authorities and other stakeholders to agree on the scope of the review. National priorities for sustainable development were selected for in-depth consideration in two elective chapters on innovation infrastructure and innovation-enhancing diaspora investment in agriculture. The review provides detailed policy recommendations that reflect national specificities and sustainable development priorities.

The I4SDR is the result of in-depth dialogue and consultation among the UNECE Secretariat, leading subject matter experts, Government officials, academics, private sector actors and other innovation stakeholders in Armenia. In March 2023, the draft text was submitted to the national authorities for comments and to a group of independent international experts for peer review. The findings and recommendations were endorsed by national stakeholders in Q1 and Q2 2023. The final text of the review reflects the outcome of these discussions as well as other comments and suggestions from various stakeholders.

Prepared for publication by the UNECE Secretariat, the I4SDR complements other workstreams undertaken by the UNECE Economic Cooperation and Trade Division to support countries in harnessing the power of trade, investment and innovation for sustainable development and economic circularity, and the green and digital transformations. UNECE advisory work in this area draws on its longstanding engagement across the EESC, which includes conducting and publishing the *Sub-regional Innovation Policy Outlook (IPO) for the EESC* (2021), the *Interim IPO for the EESC* (2023), the *Handbook for Innovative High-Growth Enterprises for the EESC*, and *Innovation for Sustainable Development Reviews* of Georgia (2020), the Republic of Moldova (2021) and Ukraine (forthcoming), as well as delivering targeted capacity-building activities. Other complementary UNECE workstreams include the Studies on Regulatory and Procedural Barriers to Trade, agricultural quality standards, trade facilitation standards and recommendations, and normative guidance for public-private partnerships.

ACKNOWLEDGEMENTS

The Innovation for Sustainable Development Review of Armenia was developed under the auspices of the UNECE Committee on Innovation, Competitiveness and Public-Private Partnerships. The project was made possible by generous financial support from the Swedish Government. UNECE expresses its gratitude to the national focal points: Tatevik Soghomonyan and Ani Toroyan (Ministry of High-Tech Industry); Goharik Grigoryan, Verej Isanians and Hamlet Mkrtchyan (Ministry of Economy); and Arevik Khnkoyan (Science Committee). Their dedication and support have been essential.

The publication was written under the leadership of Elisabeth Türk, Director of the UNECE Economic Cooperation and Trade Division, and under the supervision and guidance of Anders Jönsson, Chief of the UNECE Innovative Policies Development Section. The project was managed by Jakob Fexer, UNECE Economic Affairs Officer. The authors of the chapters are Immanuela Badde and Iuliia Drobysh (chapter 1), Immanuela Badde (chapter 2), Immanuela Badde and Darya Podgoretskaya (chapter 3), Qnarik Baghdasaryan and Sevak Hovannisyan (chapter 4) and Nadejda Komendantova (chapter 5). Immanuela Badde and Darya Podgoretskaya provided coordination support throughout the project. Ludmila Boichuk provided technical and administrative assistance. Lise Lingo copyedited the manuscript.

The continuous engagement of the Ministry of High-Tech Industry of Armenia, the lead national partner for this review, has been essential throughout the process. Special thanks go to Davit Sahakyan, Deputy Minister of High-Tech Industry. The project received valuable support from the Permanent Mission of Armenia to the United Nations Office and other international organizations in Geneva. The UN Resident Coordinator Office of Armenia and the United Nations Development Programme in Armenia provided useful support at various stages.

UNECE extends its sincere thanks and appreciation to all contributors for their engagement in this important project. Special thanks go to Peter Cederblad, Christina Danielsson and Sanna Leino (Sida), as well as to Tigran Tshorokhyan (Armenia National SDG Innovation Lab); Vivek Raman and Paolo Spantigati (Asian Development Bank); Mariam Babayan (Innovative Tourism and Technology Development for Armenia project, Deutsche Gesellschaft für Internationale Zusammenarbeit); Areg Badalyan and Ilona Terminasyan (International Organization for Migration); Vache Kirakosyan (International Organization for Migration, Enhancing Development through Diaspora Engagement in Armenia project); Francesco Alfonso and Daniel Quadbeck (Organisation for Economic Co-operation and Development); Aleksandr Gevorkyan (St. John's University); Ralph Heinrich, Ariel Ivanier, and Jose Palacino (UNECE); Arevik Anapiosyan (United Nations Regional Coordination Office); and Ifeyinwa Bonheur (World Bank).

UNECE would like to express its deep gratitude to the Swedish Government for its financial support for this project.

"The UNECE Innovation for Sustainable Development Review of Armenia is not just a publication, it is a milestone in our collective efforts to promote sustainable development through innovation. I am particularly proud of the positive impact this review will have on Armenia's innovation ecosystem, as well as its potential to inspire and inform innovative solutions that tackle pressing social and environmental challenges facing our world."

Olga Algayerova, Under-Secretary-General, Executive Secretary, UNECE

"The Swedish Government is especially proud to have supported the development of the UNECE Innovation for Sustainable Development Review of Armenia, because it has had a significant positive impact on the country's innovation and sustainable development efforts. As current holder of the presidency of the EU, Sweden recognizes the importance of supporting and promoting sustainable development in all countries, and this publication is a testament to our commitment to that cause."

Patrik Svensson, Ambassador of Sweden to Armenia

"Building a well-functioning national innovation system and enhancing the innovation capacity in the Republic of Armenia is a priority for the Armenian government. In this regard, the UNECE Innovation for Sustainable Development Review of Armenia, which is a comprehensive review of the innovation performance in the country, will help us design and implement capacity-building programmes to strengthen the innovation performance of the country in the rapidly evolving global context."

Robert Khachatryan, Minister of High-Tech Industry, Armenia

"The findings and recommendations of the I4SDR of Armenia provide valuable inputs on how to strengthen innovative activities in the country. The review will be important to help strengthen linkages between research and industry, paving the way for greater collaboration and knowledge-sharing between academia and businesses. With this fresh impetus, we are confident that Armenia's science and technology sector will continue to drive economic growth and social progress, benefitting both our nation and the wider region."

Sargis Hayotsyan, Chairman of the Science Committee of Armenia

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"The I4SDR comprehensively analyses Armenia's innovation ecosystem, encompassing a wide range of sectors and industries. It emphasizes the crucial role of technological advancements, knowledge-intensive entrepreneurship and public-private partnerships in driving our country's economic growth and social well-being. This review is an opportunity for Armenia to showcase its achievements, identify areas for improvement and chart a course towards a more prosperous and sustainable future."

Vahan Kerobyan, Minister of Economy, Armenia

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ABBREVIATIONS

BANA	Business Angel Network of Armenia
ECA	Europe and Central Asia
EIF	Enterprise Incubator Foundation
EPIC	Entrepreneurship and Product Innovation Centre
FAST	Foundation for Armenian Science and Technology
FDI	foreign direct investment
GCI	Global Competitiveness Index
GDP	gross domestic product
GII	Global Innovation Index
ICT	information and communication technology
IT	information technology
IOM	International Organization for Migration
IoT	Internet of Things
IRIS	Increased Resilience of Syrian Armenians (programme)
ITTD	Innovative Tourism and Technology Development (project)
MIC	Microsoft Innovation Center
MoE	Ministry of Economy
MoESCS	Ministry of Education, Science, Culture and Sports
MoHTI	Ministry of High-Tech Industry
NIS	national innovation system
NPUA	National Polytechnic University of Armenia
OHCDA	Office of High Commissioner on Diaspora Affairs
RIA	regulatory impact assessment
R&D	research and development
SDGs	Sustainable Development Goals
SEUA	State Engineering University of Armenia
SMEs	small and medium enterprises
SMEDA	Small and Medium Enterprise Development Authority
SSC	State Statistical Committee of Armenia
VC	venture capital
WTO	World Trade Organization

EXECUTIVE SUMMARY

Main messages

CHAPTER 1 – ECONOMIC OVERVIEW

- Armenia has made remarkable progress over the past decades, showing strong albeit volatile economic growth. Yet, many of the early drivers of growth have run out of steam; regional conflict and instability and structural economic shortcomings pose further development challenges.
- Armenia's production is dominated by low levels of diversification and value added activities, while high unemployment, low productivity in some sectors and strong reliance on remittances make the country vulnerable to external shocks and fluctuations.
- With government support, Armenia regained growth in 2021 following the negative impact of the COVID-19 pandemic. The outbreak of war in Ukraine led to initial challenges but also important opportunities for innovation, for example owing to the influx of IT specialists.
- A significant characteristic of the labour force is the low participation of women relative to men; thus, strengthening women's participation presents an important opportunity to drive innovative development.
- Building a solid foundation for Armenia's transition to a knowledge-based economy by supporting innovation is crucial for addressing these challenges and reinvigorating the country's economic growth.

CHAPTER 2 – INNOVATION PERFORMANCE

- In recent years, Armenia's reforms have established a blossoming private sector and resulted in the rapid growth of the export-oriented ICT services sector.
- Armenia's pocket of excellence in the ICT sector and its strong culture of ICT entrepreneurship shows the country's potential for successfully fostering innovation. This dynamic has not yet diffused to other sectors because of low levels of absorptive capacity.
- Allocating research and development (R&D) spending more effectively, building stronger science–business linkages, closing the gap between demand for and supply of labour market skills, and making use of Armenia's large and highly skilled diaspora will all be crucial in supporting innovation-led sustainable development.

CHAPTER 3 – STRENGTHENING INNOVATION POLICY GOVERNANCE IN ARMENIA

- Despite recent improvements in innovation policy and support, Armenia must consolidate and evaluate its policy to ensure that these efforts are strategic and coordinated across government bodies with science, technology and innovation competencies.
- An overarching innovation strategy, which Armenia currently does not have, could help guide policy and support across multiple areas and sectors, aligning them with overall national development priorities.
- Inefficiencies in the policymaking process, including fragmented public-private consultations, insufficient practice of ex ante analysis and evaluation of policy context, and the lack of innovation statistics, constrain the effectiveness of innovation-related policies.

- More effective development of human capital and adoption of demand-creating tools such as innovation-enhancing procurement could help spur innovation in the private sector.
- Further enhancing education for innovation and building research capabilities in Armenia could strengthen the national innovation system and address challenges in the labour market.

CHAPTER 4 – IMPROVING THE EFFECTIVENESS OF THE INNOVATION INFRASTRUCTURE

- Over the past decade, Armenia's innovation infrastructure grew both in the number of initiatives and the types of support offered to entrepreneurs, which include incubation, acceleration, mentorship and networking programmes, and venture capital funding networks.
- The innovation infrastructure remains uncoordinated and fragmented between initiatives, and most programmes cater to early-stage start-ups. The lack of coordinated technology transfer efforts results in insufficient levels of commercialization.
- Programmes and institutions struggle to attract eligible start-ups because of the limited pool of projects, which leads to the same start-up teams benefiting from different programmes, thus reducing the overall efficiency of support. Many programmes measure only the number of start-ups that graduate instead of tracking key success metrics such as number of employees, revenue and funding, thereby hindering the effectiveness of the programmes.
- Tracking the performance results of initiatives can help Armenia to identify which support mechanisms work and which should be phased out, to identify gaps and to enhance government support for innovation-led growth.

CHAPTER 5 – ENGAGING THE ARMENIAN DIASPORA TO SPUR INNOVATION IN THE AGRICULTURE SECTOR

- The agriculture sector has untapped potential for technological upgrading and innovation, which can be spurred by diaspora investment.
- Armenia's large and highly skilled diaspora could drive innovation in the sector by deploying digital and clean technologies, by providing investment and by transferring know-how.
- Recognizing differences within the diaspora in terms of entrepreneurship experience and motivations for involvement is crucial to attract investment. Differentiating between individual diaspora, collective diaspora and diaspora-connected corporate investors would also help Armenia develop targeted support mechanisms.
- Armenia's efforts to attract diaspora investment have already simplified and streamlined procedures, yet additional efforts to build trust, attract investment to regions outside of Yerevan and support diaspora entrepreneurs are necessary.

Source: UNECE.

In the context of slowing economic growth and geopolitical instability, innovation can become an essential driver of future sustainable development in Armenia

Over the past decades, Armenia showed strong economic growth, yet that progress decelerated and growth became increasingly volatile in the face of regional instability and global crises. The country's dependence on remittances and reliance on low-productivity activities, for example in agriculture, hinder economic growth. Coupled with high unemployment, outmigration and dependence on exports of low value added commodities, these issues present structural challenges for future sustainable growth.

Armenia's pocket of excellence in the information, communication and technology (ICT) service sector, a recent driver of growth and employment, presents an opportunity to restructure the economy and transition into high value added economic activity driven by the ICT sector. With about 1,000 ICT companies in 2022 – focused on customized software solutions and web development – Armenia has a large ICT sector with considerable export potential and international linkages. The ideas created in the ICT sector do not yet filter down to other sectors. Armenia's growth is further inhibited by low levels of research and development (R&D), low firm absorptive capacity, skills mismatches and underdeveloped science–business linkages. Nevertheless, levels of R&D have increased significantly in the last year.

Harnessing the full potential of innovation and building a solid innovation ecosystem will be essential to reinvigorate growth, promote long-term development and mitigate uncertainties created by geopolitical events. Armenia's potential lies in adapting external knowledge, on a trial-and-error basis, and experimenting to find what kind of innovation proves most successful in the national context. This process requires Armenia to embrace a systematic and widespread process of creating value with new ideas and improvements of products, services and business models – in other words, innovation.

Strengthening public support mechanisms for innovation and enhancing innovation policy governance is essential to realize Armenia's full potential

Armenia has made significant strides towards aligning its national priorities with the UN Agenda 2030 for sustainable development, while also improving innovation policy and support, particularly in high-tech and engineering. In 2019, the country established the Ministry of High-Tech Industry (MoHTI) and introduced several policies and support mechanisms to promote innovation infrastructure and commercialization. These efforts sparked the growth of a vibrant entrepreneurial culture and strengthened Armenia's pockets of excellence, not only in the ICT sector but also in the tourism and food processing industries.

Yet, innovation policy in Armenia lacks a systematic approach and coordination between government agencies, which hinders the effectiveness of innovation-related activities. A holistic approach to designing innovation policy institutions, frameworks and governance mechanisms is needed to ensure the effective use of public resources and to drive innovation. Although the current system of innovation policy

governance focuses on the high-tech and ICT sectors, a whole-of-government approach is necessary to establish consensus on the role of innovation in socioeconomic development and account for innovation in non-high-tech products. Systemic coordination between innovation actors at national and regional levels is crucial to ensure that the policy is holistic. A high-level policy coordination body with strong political support and broad engagement could support such coordination. Similarly, adopting a comprehensive innovation strategy aligned with national development goals can guide innovation support across policy areas and stakeholders, leading to impactful policy interventions that drive innovation across all sectors of the economy.

The quality of innovation governance in Armenia is also often hindered by policy design issues, including lack of methodological rigour in background analysis, insufficient external and internal policy consultations, and a weak tradition of post-implementation evaluation and policy learning. Armenia could improve the analytical capacities of line ministries to conduct foresight and background context analysis during the policy design stage. Ensuring effective and inclusive consultations with the public is also crucial for identifying and solving real issues faced by society. Improving the process of interministerial consultations by amending the short feedback time frames could, in turn, help in coordinating initiatives across ministries. Finally, Armenia needs to systematically integrate evidence-based progress assessments and evaluations to improve policy effectiveness and learn from experience. To facilitate evaluations and enable the use of evidence at all stages of the policy cycle, Armenia needs to begin gathering high-quality statistics on innovation and address current shortages of trained staff and equipment that hinder data collection.

Another opportunity for spurring innovation in the private sector lies in increasing support for human capital development and adopting tools that create demand for innovation, such as innovation-enhancing procurement. In Armenia, most SMEs lack the necessary practical managerial and organizational skills, and resources to integrate innovative products, services and processes into their business activities, limiting their competitiveness, absorptive capacity and innovation potential. Although efforts have been made to enhance entrepreneurial skills and update the educational and vocational training curricula with practical modules on entrepreneurship, there is still a skills mismatch between graduates and the private sector.

To address these challenges, the Government can introduce targeted business advisory services and skill development programmes for entrepreneurship and innovation, in collaboration with academic and private sector partners. Innovation-enhancing procurement can also help create demand for R&D and innovation. Stronger collaboration between education and the private sector can build human capital and innovation capacity. Another solution for improving coordination between the private sector and academia is to establish sectoral skill councils for dialogue. Strong linkages between science, industry and academia are important for effective national innovation systems as they enable businesses to access and commercialize publicly available research while also facilitating training of graduates, problem-solving through consultancies, knowledge transfer and networking.

Strengthening Armenia's innovation infrastructure will require further efforts to expand and coordinate current support mechanisms

Aggravated by the absence of a holistic strategic plan and a regulatory framework for innovation, the innovation infrastructure faces both policy and operational challenges. The lack of coordinated technology transfer support, leading to insufficient commercialization and internationalization of innovative products and services, is one of the critical challenges. The infrastructure mainly supports projects in the early stages of development, limiting the number of start-ups that reach maturity. The most common aspects of innovation support in Armenia are training, mentorship and networking programmes, which target start-ups in the pre-seed or seed stages of development. The innovation infrastructure also concentrates on supporting start-ups in the ICT and high-tech sectors and is unevenly distributed among Yerevan and the regions. Finally, programmes and institutions struggle to attract eligible start-ups because of the limited pool of innovative and scalable projects. As a result, multiple start-up teams apply to and benefit from different programmes, reducing overall support efficiency.

To enhance the effectiveness of its innovation infrastructure, the Armenian Government should expand its role in the innovation ecosystem by enhancing the legal framework, providing coordination and introducing measures to assess the efficiency of innovation support by tracking performance results on a regular basis. These elements will be essential for Armenia to drive the development of an effective innovation infrastructure for sustainable, innovation-led growth.

To leverage its large diaspora for innovation in the agriculture sector, Armenia should adopt a range of support mechanisms to attract and sustain investment

The diaspora, consisting of about 7 million people spread across 100 countries – almost three times as large as the country's population – has the potential to become a significant driver of innovation projects in Armenia, particularly in the agriculture sector. Diaspora investment in agriculture could transfer know-how and skills to help implement innovation projects. The three types of diaspora investors – individual, collective and diaspora-connected corporates – require diversified and targeted support mechanisms and policy measures to leverage their knowledge and investment inflows for innovation in the country.

The agriculture sector has untapped potential for technological upgrading and innovation, which can be spurred by diaspora investment. Digitalization, including such technologies as global positioning system devices, sensors and drones, can improve efficiency and reduce waste. Clean technologies, such as renewable energy sources, also require investment, which can be supported by de-risking mechanisms. Armenia is currently considering various instruments to support diaspora investment, including information campaigns, financing incentives and business support. These instruments should aim to not only attract investments but also sustain them, through capacity-building for entrepreneurs and access to finance. Incentives should be provided for investment in areas associated with risk and should cover associated risks so as to contribute to profitability, moving away from the charity investment model. Finally, the Government should prioritize building trust with the diaspora by including the diaspora in decision-making processes and building engagement.

Policy messages and recommendations

As Armenia continues on its development path, addressing its innovation policy challenges, strengthening the innovation infrastructure and effectively engaging its large diaspora for innovation are becoming priorities. The Government should continue playing a catalytic role in bolstering Armenia's innovation-led sustainable development through strategic yet flexible policy and support mechanisms. To assist the Government in this endeavour and strengthen innovation-led growth in Armenia, this I4SDR provides concrete policy recommendations, depicted here. These recommendations will further inform future UNECE support to the country.

Chapter 3 – Strengthening innovation policy governance in Armenia

Recommendation 3.1: Strengthen the policy and legal framework for innovation-led growth.

Recommendation 3.2: Improve innovation policy coordination and alignment across ministries and all government levels.

Recommendation 3.3: Ensure inclusive, effective and evidence-based policymaking processes involving both public and private sector representatives.

Recommendation 3.4: Strengthen private sector innovation by supporting enhanced absorptive capacity and demand for innovation.

Recommendation 3.5: Strengthen the education and R&D sectors to facilitate human capital development and research for innovation.

Chapter 4 – Improving the effectiveness of the innovation infrastructure

Recommendation 4.1: Create a strategy defining the objectives and functions of innovation infrastructure in line with the overarching vision for promoting innovation in Armenia.

Recommendation 4.2: Expand State support instruments and funding for innovation by improving the legal and regulatory framework.

Recommendation 4.3: Optimize and expand support available through the innovation infrastructure on the basis of geographic specificities and stages of innovation.

Recommendation 4.4: Leverage funding, networking and mentorship opportunities by establishing linkages with international accelerators, incubators, VC firms and investors, specifically emphasizing the involvement of diaspora.

Recommendation 4.5: Develop technology transfer capacities in government and the private sector for both technology absorption and commercialization.

Recommendation 4.6: Establish a monitoring and evaluation framework for regularly assessing infrastructure performance.

Chapter 5 – Engaging the Armenian diaspora to spur innovation in the agriculture sector

Recommendation 5.1: Increase the awareness of and information on potential opportunities for investment, to drive innovative growth in the agriculture sector.

Recommendation 5.2: Provide diversified financing mechanisms and instruments for diaspora investors, considering the heterogeneity of their specific needs.

Recommendation 5.3: Strengthen the logistical infrastructure and implement capacity-building support measures for diaspora members and support organizations.

Recommendation 5.4: Increase trust and engagement between the diaspora and the Armenian Government to facilitate the engagement of the diaspora in policy formulation and implementation.

Source: UNECE.

Synergies and complementarities of the I4SDR of Armenia with other UNECE workstreams

The I4SDR of Armenia is part of UNECE's broader effort to promote sustainable development in line with the UN Agenda 2030 in its member States. An example of a complementary initiative is the **UNECE Environmental Performance Review** (EPR). Conducted at the request of national governments, the EPR is a UNECE flagship programme that helps countries reconcile environmental and economic targets while meeting international environmental commitments. Since 2022, UNECE has been working on the second EPR of Armenia. Set to be published in 2023, the report will cover several policy issues of particular significance to Armenia such as climate change mitigation, air quality, water management, biodiversity, waste management and soil conservation. The review will also address the strategic, legal and institutional frameworks; the use of environmental data and information; and alignment of Armenia's environmental performance with global environmental commitments. The I4SDR and the EPR have several synergies: innovation and the creation of new technologies and climate solutions can be powerful tools in reducing pollution and improving resource use efficiency.

The I4SDR also supports and builds on **other publications and initiatives by UNECE**, which assists member States in integrating into the world economy and fostering regulatory and policy environments conducive to sustainable development. UNECE's country-specific Studies on Regulatory and Procedural Barriers to Trade, for example, are in-depth analytical products that focus on non-tariff barriers to trade, helping member States facilitate trade and improve regional integration. In 2019, UNECE conducted an RPBT study on Armenia that supported the country's transition to a paperless trading system, improving its quality assurance and metrology systems and enhancing technological capability in its manufacturing enterprises. In addition, the RPBT study emphasized the role of the diaspora in facilitating exports and highlighted how trade can support the Sustainable Development Goals. Expanding exports in member States can be a crucial catalyst to innovation as it opens new foreign markets for technologies and products. Table 1 presents more examples of relevant UNECE work.

Table 1 **Selected UNECE tools relevant to the issues discussed in the I4SDR**

Workstream	Selected UNECE tools
Business development, SMEs	*Handbook on Supporting Innovative High-Growth Enterprises in Eastern Europe and the South Caucasus* (2021)
	"Findings and recommendations emerging from UNECE COVID-19 impact assessments targeting micro, small and medium enterprises in selected countries: Armenia, Belarus, Georgia, the Republic of Moldova and Serbia" (2021)
	The Impact of COVID-19 on the Trade and Business Development Prospects of Female-owned Enterprises: Armenia (2021), the Republic of Moldova (2021)
	UNECE Transformative Innovation Network activities, including seminars, policy dialogue sessions, meetings and publications on transformative innovation
Trade, trade facilitation	*Regulatory and Procedural Barriers to Trade*: Belarus (2012), Kazakhstan (2014), Tajikistan (2014), Kyrgyzstan (2015), Albania (2016), Republic of Moldova (2017), Georgia (2018), Armenia (2019), Serbia (2021), Uzbekistan (forthcoming)
	More than 50 trade facilitation recommendations and hundreds of e-business standards, technical specifications and guidance materials on electronic exchange of trade data, developed by UN/CEFACT
	National Trade Facilitation Road Maps: Greece (2012), Tajikistan (2019), Kyrgyzstan (2021)
	Global Survey on Digital and Sustainable Trade Facilitation and *UNECE Regional Report on Digital and Sustainable Trade Facilitation* (2015, 2017, 2019, 2021)
Agricultural trade, including food loss or waste	More than 100 UNECE standards for the commercial quality of agricultural produce including for fresh fruit and vegetables, dry and dried produce, meat, seed potatoes, cut flowers, eggs and egg products
	"Simply measuring – quantifying food loss & waste: UNECE food loss and waste measuring methodology for fresh produce supply chains" (2020)
	Handbook on Implementing UN/CEFACT e-Business Standards in Agricultural Trade (2016)
	"Specifications for an electronic quality certification system for fresh fruit and vegetables" (2022), together with UNCTAD
	"UNECE code of good practice – reducing food loss and ensuring optimum handling of fresh fruit and vegetables along the value chain" (2020; 2022)
	E-Learning online course on agricultural quality standards and food loss reduction in fresh produce supply chains
Circular economy, environment and infrastructure	UNECE Circular Stakeholder Engagement Platform
	Environmental Performance Reviews: Georgia (2016), the Republic of Moldova (2014), Armenia (2000)
	PPP and Infrastructure Evaluation and Rating System (PIERS), for evaluating public-private partnerships and infrastructure projects on their contribution to sustainable development

Source: UNECE.

Chapter 1

ECONOMIC OVERVIEW

Main messages

- Armenia, a small, landlocked, open economy, showed strong economic growth over the past decades, although this growth has been volatile, especially in recent years.
- Services and industry, specifically mining, are the main drivers of growth, yet high unemployment, lack of competitiveness in the private sector, low agricultural productivity and reliance on remittances for growth are underlying structural challenges that reduce sustainable growth prospects.
- Armenia regained growth in 2021 following the negative impact of the COVID-19 pandemic, which the Government met with support programmes. The outbreak of war in Ukraine has led to initial challenges, but also important opportunities for innovation, for example as a result of the influx of IT specialists.
- The strong reliance on remittances and focus on commodity exports, with few notable exceptions, amplifies the economy's vulnerability to external shocks and fluctuations.
- Fostering women's participation in the labour force presents an important opportunity to drive innovative development.
- Strengthening innovation will play a central role in ensuring the country's sustainable development, building a solid foundation for its transition to a knowledge-based economy and facilitating the transition towards a circular economy and green and digital transformations.

Despite its strong progress over past decades, recent crises show that Armenia needs to seize opportunities for innovation-led, sustainable growth

Armenia, a small, landlocked, upper-middle-income economy in the South Caucasus neighbouring Azerbaijan, Georgia, the Islamic Republic of Iran and the Republic of Türkiye, has made remarkable progress in its transition to a market-based economy following its independence in 1991. Growth levels have been mostly above the regional average for Eastern Europe and the South Caucasus (EESC) (table 1.1). Compared with other Commonwealth of Independent States countries, Armenia embarked early, on a range of privatization, financial and trade liberalization reforms, including accession to the World Trade Organization in 2003 (UNECE, 2014; 2020). Regulatory policies, including the reduction of regulatory obstacles to private sector development, have improved the business climate, leading to the country's rank of 69/141 in the 2019 Global Competitiveness Index.

Fuelled also by remittances and foreign direct investment (FDI), the country's post-independence reforms stimulated domestic demand and strengthened expansion of construction and services in particular, as well as manufacturing, tourism and agribusiness. The financial crisis of 2009 led to a sharp decline of 14 per cent in GDP, the second largest decline in the sub-region after Ukraine at 15 per cent (World Bank, 2023). Some of the main reasons for this strong contraction were the undiversified economic structure and export basket, high reliance on remittances, narrow fiscal base and lack of competitiveness in key sectors (Varoudakis, 2010). In the following years, exports and remittances drove economic recovery.

Armenia also has a strong legacy of entrepreneurial culture and pockets of innovation excellence, such as the information and communication technology (ICT) service exports sector. Improvements in tax and customs administration have helped rein in corruption. In 2018, anti-government protests driven by high levels of corruption in the Government led to a peaceful change in power known as the Velvet Revolution, providing new momentum for further institutional reforms. In 2020 geopolitical tensions strained the country's growth

as regional disputes re-erupted, the effects of which continue to negatively affect the economy. Although the resulting political uncertainty ameliorated slightly in the elections in the summer of 2021, the outbreak of war in Ukraine in early 2022 exacerbated the complexity of the geopolitical landscape. It has also provided opportunities for innovation in the economy (box 1.1) (IMF, 2022).

Box 1.1 The impact of the war in Ukraine on Armenia

Because Armenia has a close economic relationship with the Russian Federation, the war in Ukraine has had an initial negative impact on the Armenian economy. The country's dependence on the Russian Federation for about one third of imported goods, such as mineral fuels and cereals, means that the rise in commodity prices and increase in costs of household consumption negatively affected Armenia in the short term (IMF, 2022; ADB 2022a).

Despite the initial risks caused by the war in Ukraine, however, growth recovered in 2022, presenting some opportunities to foster innovation-led growth in the economy. This recovery is attributed to the significant influx of skilled professionals from the Russian Federation (estimated at about 100,000 in October 2022), especially in IT, and those who relocated their businesses to Armenia. Both increased personal money transfers, boosting the local economy, strengthening the services sector and financing Armenia's widening trade deficit.[a] The country has seen 20 per cent growth in foreign reserves and an 18 per cent increase in exchange rates (ADB, 2022a).

Source: UNECE.

[a] Bitsadze, R., "Strong economic performance in Caucasus amid geopolitical turmoil", 28 September 2022, https://www.ebrd.com/news/2022/strong-economic-performance-in-caucasus-amid-geopolitical-turmoil.html.

Armenia has made substantial progress towards the SDGs and has shown resilience to recent external shocks caused by macroeconomic support policies. Yet, the country faces geopolitical pressures that include regional disputes and closed borders with two of its four neighbours.

In addition, despite the growth in 2022, the economy faces structural challenges.[1] They includes high levels of unemployment, especially among youth, the skills mismatch in the labour market and lack of competitiveness in the business sector.[2] Gross capital formation decreased from 39 per cent of GDP in 2010 to 17 per cent in 2019, slightly increasing to 21 per cent in 2021, negatively affecting the growth potential in the medium term (World Bank, 2023). Addressing these challenges and improving economic competitiveness will require strengthening innovation performance to enable and encourage public and private stakeholders to diversify, upgrade and green the economy.

1 Bitsadze, R., Strong economic performance in Caucasus amid geopolitical turmoil, 28 September 2022, https://www.ebrd.com/news/2022/strong-economic-performance-in-caucasus-amid-geopolitical-turmoil.html.

2 World Bank, The World Bank in Armenia, latest updated 10 October 2022, https://www.worldbank.org/en/country/armenia/overview#:~:text=Despite%20these%20many%20achievements%2C%20however%2C%20Armenia%E2%80%99s%20economy%20continues,weak%20firm%20competitiveness.%20Last%20Updated%3A%200ct%2010%2C%202022.

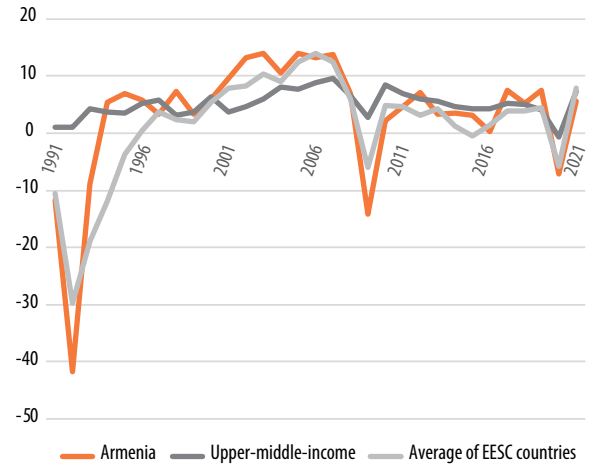
Table 1.1 Basic macroeconomic indicators of Armenia

Population	
Total (millions), 2022	2.9
Capital city: Yerevan (millions), 2022	1.1
Urban (per cent of total), 2022	63

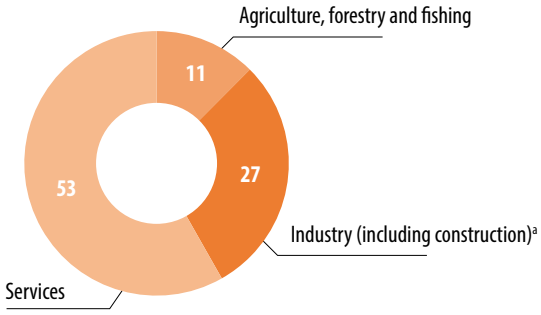
Natural resources	
Land area (square kilometres), 2022	29
Agricultural land (per cent of land area), 2022	69

GDP	
At current prices ($ billion), 2021	13.9
Per capita, PPP (current international $), 2021	15,593
Average annual growth (2010–2021)	5.9

GDP growth, annual (per cent), 1991–2021



Value added (per cent of GDP), 2021



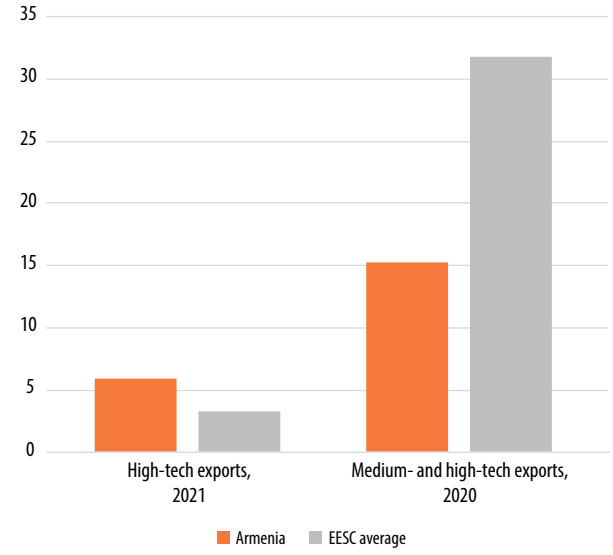
Private sector	
Share of SMEs[b] (per cent of total enterprises), 2019	99.8
Private sector SME[b] contribution to GDP (per cent), 2019	65.4
Share of SMEs in employment (per cent of total employed), 2019	69.7
New business density (new registrations per thousand population ages 15–64), 2020	2.9

Labour market	
Employment rate (per cent of total population ages 15+), 2021	54
Unemployment rate (per cent of total labour force), 2021	15.5

Trade	
Exports and imports ($ billions)	
Exports of goods and services (per cent of GDP), 2021	35.3
Imports of goods and services (per cent of GDP), 2021	43.8
Trade balance (per cent of GDP), 2020	-11.1
High-tech exports (per cent of manufactured exports), 2021	6

Major export markets (per cent of exports), 2019	
Russian Federation	27.5
Switzerland	17.5
Bulgaria	7.9
China	7.4
Iraq	6.8

High- and medium-tech exports (per cent of manufactured exports), 2020 and 2021



Macroeconomic environment	
Current account balance (per cent of GDP), 2021	-3.7
Tax revenue (per cent of GDP), 2020	21.9
Inflation (consumer price index, annual per cent), 2021	7.2
FDI net inflows (per cent of GDP), 2021	2.6
Real interest rate (per cent), 2021	4.6
Gross capital formation (per cent of GDP), 2021	21
Remittances (per cent of GDP), 2021	11.2
Public debt (per cent of GDP), 2020	63.4

EESC = Eastern Europe and the Southern Caucasus, GDP = gross domestic product, PPP = purchasing power parity, SMEs = small and medium enterprises.
Source: UNECE, based on data from World Bank (2023), Armstat (2019; 2021; 2023), EC (2021), UNCTADstat (2023), FAO (2023).
[a] In the last quarter of 2021, manufacturing contributed 11 per cent of GDP, construction 7 per cent, and mining and quarrying 5 per cent (Armstat, 2022a).
[b] SMEs include enterprises with up to 249 employees per year on average.

Following an initial downturn, Armenia managed to recover economic growth following the COVID-19 pandemic

The shocks caused by both the COVID-19 pandemic and regional disputes contributed to a 7.4 per cent contraction of Armenia's economy in 2020 as well as welfare loss, such as the loss of jobs and income because of lockdown measures and constraints (UNDP, 2020). As outlined in UNECE's Sub-regional Innovation Policy Outlook (2021) and the Interim Sub-regional Innovation Policy Outlook (2023), in the Armenian economy the pandemic hit some sectors harder than others, including construction and retail. Challenges to trade caused by the lockdown measures of the pandemic consequently caused a drastic fall of Armenia's commodity exports, including metals and food stuffs, which constitute over a third of merchandise exports. In 2020, the public debt ratio was pushed to 67.4 per cent of GDP while high food and energy prices, coupled with the depreciating dram, caused inflationary pressures. Inflation peaked at 8.1 per cent in March 2023.

Armenia's economic contraction due to the COVID-19 pandemic was one of the sharpest in the EESC region – further worsening poverty rates, especially in urban areas – but was met by the Government with fiscal support measures. Reflecting the base effect of a contraction and following the Government's fiscal expenditures, the country's economic recovery was due to the services sector, rebounding private consumption, rising employment rates and remittance inflows, among other factors. As a result, Armenia continued to recover in 2021 and 2022, as GDP grew by 5.7 per cent in 2021 and about 12.6 per cent in 2022, as a result of growth in services, such as IT, finance and tourism (World Bank, 2023; Armstat, 2023b). The government engaged in structural and institutional reforms, such as enhancing tax compliance, strengthening governance and supporting the stability of the financial

sector.[3] To ensure Armenia builds economic resilience and sustain high levels of growth, innovation policy will need to further help the country diversify and upgrade the economy for sustainable development. Diversification and upgrading can facilitate the country's circular economy transition and support green and digital transformations.

A closer look at sector decomposition shows that the Armenian economy requires new sources of growth

Although the production structure has diversified in recent years, it remains focused on low value added activities with only a few exceptions, limiting the competitiveness and growth potential of the economy. This is reflected in the sectoral decomposition. The services sector, as one of the main drivers of growth, provides more than half of value added to GDP (table 1.1) and employs more than half the labour force (51 per cent in 2019) (World Bank, 2023), with the largest shares in trade, financial services, tourism and the growing ICT services exports. The share of agriculture in GDP is declining but remained the highest among EESC countries at 11 per cent in 2021 (table 1.1) (World Bank, 2023). Despite its comparatively low share in GDP, the sector employed 24 per cent of the labour force in 2019. Employment in agriculture has contracted significantly over the past decade, declining by almost a third between 2015 and 2019 (World Bank, 2023). In recent years, investment in primary agricultural activities has begun to transform the employment structure of the sector, e.g. through the introduction of newer technologies; yet insufficient infrastructure, lack of skills and slow adoption of digital tools impedes further growth of the sector (USAID and others, 2022). Industry has contributed about 25 per cent to GDP since 2013 with a slight increase to almost 27 per cent in 2021, in part due to the manufacturing sector, which contributed about 11 per cent of GDP. Armenia also has some mining resources, such molybdenum, gold and iron, many of which support the chemicals sector and make up a significant share of exports. Most SMEs concentrate on low value added activities: in 2020 more than half of them (64 per cent) were in wholesale and retail trade and some in manufacturing (10 per cent). High value added innovation-driven sectors that could enable creation of sustainable high-quality jobs and diversification, for example for intermediary, more complex products, remain underdeveloped.

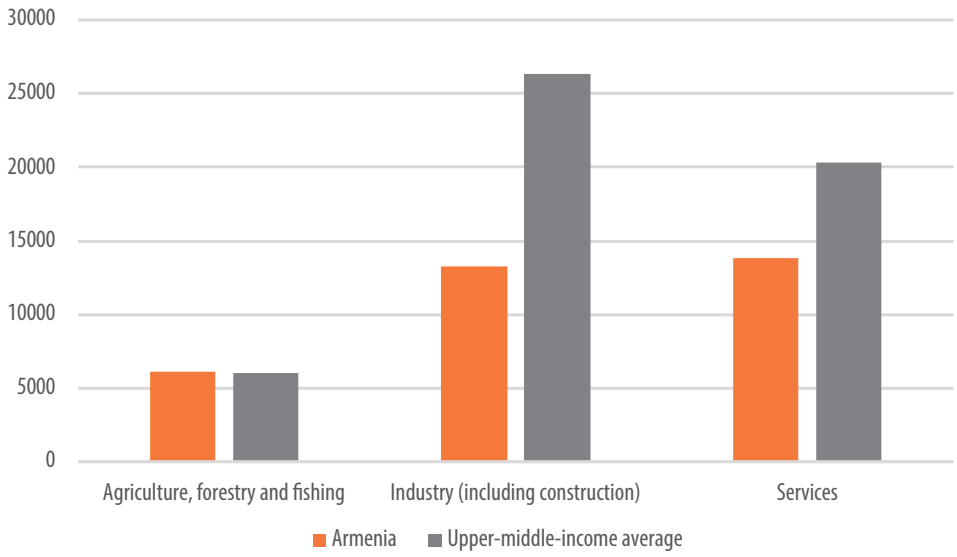
Reliance on low value added activities constrains labour productivity, especially in industry and services, where value added per worker remained below the income average in 2019 (figure 1.1). That same year, SME productivity was significantly lower than the average in the European Union (EU), and 30 per cent lower than the average in large companies (EC, 2021).[4] Given the country's size and landlocked location and its reliance on local domestic resources, especially human resources, increasing productivity will be important to drive economic growth and build a solid foundation for sustainable development. Strengthening productivity will require upgrading and modernization. Armenia should catalyse broader positive resource allocation and systematically shift factors of production from less productive to more productive activities. This needs to happen both within individual areas

3 IMF (International Monetary Fund), Sixth Review under the Stand-By Arrangement—Press Release; and Staff Report, 3 May 2022, https://www.imf.org/en/Publications/CR/Issues/2022/05/03/Republic-of-Armenia-Sixth-Review-under-the-Stand-by-Arrangement-Press-Release-and-Staff-517511.

4 Small and medium enterprises (SMEs) play a significant role in the economy, especially in the non-financial sectors, making up to 99 per cent of firms in 2019 (table 1.1). In the same year, SME value added to GDP amounted to 65.4 per cent. SMEs also employed 69.7 per cent of the work force, higher than EU averages.

of economic activity to reward the most efficient firms and between different economic sectors to capitalize on new market opportunities.

Figure 1.1 Value added per worker by sector, 2019 (constant 2015 dollars)



Source: UNECE, based on data from World Bank (2023).

Low levels of diversification and productivity in the economy impede the creation of high-quality jobs. They contribute to challenges in the labour market such as the historically high unemployment rate, which has recently declined, to about 15 per cent in 2021 (Armstat, 2023a). The rate of unemployment in youth is also quite high – about 23 per cent of 15- to 25-year-olds in 2021 (ILOstat, 2023). Informal employment is also high – about 37 per cent of total employment in 2020 – and it is highest in agriculture, which has low levels of productivity (USAID and others, 2022). Armenia's overall unemployment rate, one of the highest in Europe and Central Asia, stems largely from structural challenges such as the dominance of low-productivity industries and poor social and economic infrastructure. Compounded by an ageing population and outward migration, this puts additional pressure on human capital development.

The economy's vulnerability to external shocks is amplified by low value added exports and high reliance on remittances

Although Armenia has taken steps to diversify the economy's export basket, it remains narrow and focused on only a few main trading partners. Transport costs are high because of the country's landlocked situation and its disrupted trade relations with two of its four neighbours. The country's main service exports are in ICT, tourism, transport and financial services, and its main goods exports are in mineral products such as copper ore, precious stones such as gold, foodstuffs (mainly tobacco and liquor) and metals such as ferroalloys. The low level of export sophistication is reflected in the country's rank of 77/133 countries

in the 2020 Economic Complexity Index[5] (Harvard Growth Lab, 2022) – the second lowest rank in the EESC. Furthermore, in 2020 only 8.6 per cent of SMEs engaged in exports (EC, 2021). Main imports include machinery and equipment, cars, and fuel and natural gas. Both exports and imports are highly concentrated in neighbouring countries, most notably the Russian Federation, which received almost 27 per cent of Armenia's exports in 2021 (OEC, 2022; Enterprise Armenia, 2021).

An exception is the export-oriented ICT services sector, one of the fastest growing sectors in the economy. Its growth derived from the internationalization of Armenian IT companies, which in 2020 produced the first unicorn in Armenia, the animator Picsart (chapter 4). The country's early focus on R&D activities in industrial and defence applications, the strong entrepreneurial spirit, the range of qualified professionals and the supportive diaspora make ICT services one of the country's most promising and dynamic sectors (chapter 2).

Driving structural transformation towards greater specialization into high value added activities can help strengthen Armenia's trade and competitiveness in the global market, which is especially important given its landlocked situation. In addition to acceding to the World Trade Organization in 2003, Armenia has been part of the Eurasian Economic Union since 2015 and has free trade agreements with various countries of the Commonwealth of Independent States. Since March 2021, trade relations with the EU have been regulated by the Comprehensive and Enhanced Partnership Agreement, replacing the Partnership and Cooperation Agreement of 1999. The current geopolitical situation with two of Armenia's neighbours places significant impediments on transport routes, limiting the development of the manufacturing sector and diversification of the economy. The only available ground transportation route to international markets is on high mountain roads through Georgia to the Russian Federation that frequently closes for poor weather conditions and through the Islamic Republic of Iran.

Another crucial factor contributing to Armenia's economic vulnerability is its dependence on remittances as a source of economic growth as one of the main sources of foreign exchange and spending power. According to the latest data from the Central Bank of Armenia, remittances soared in 2022 (as for many countries in the region), contributing about 19 per cent of GDP in Armenia in 2022 (figure 1.2) (World Bank, 2023). Most came from the Russian Federation, following the outbreak of the war in Ukraine.[6] However, quite often remittances and personal transfers drive consumption as opposed to employment and innovation-generating investment.

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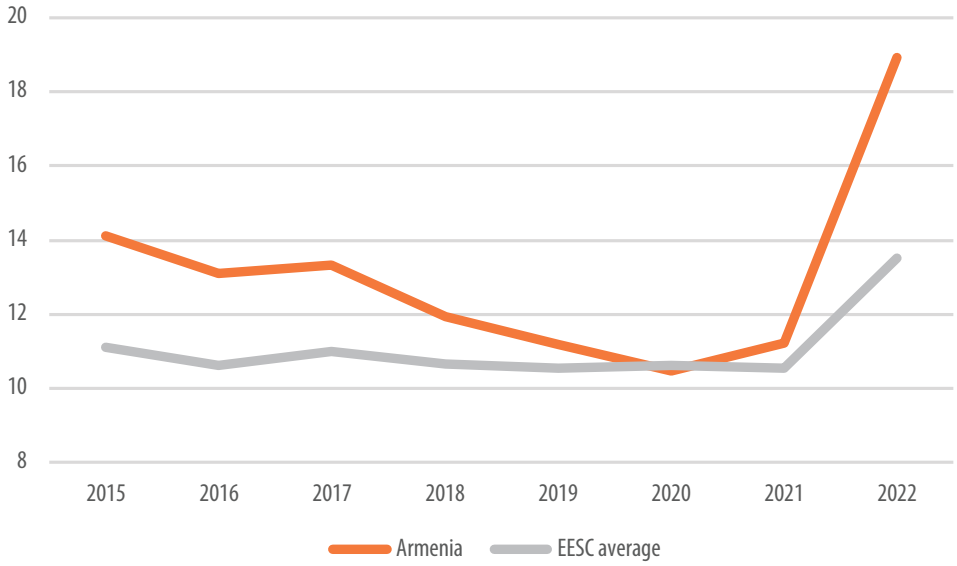
5 Economic complexity measures the diversity of a country's exports and their ubiquity among other countries. Countries that sustain a diverse range of productive, sophisticated and unique knowledge can produce a diversity of goods, including products that are complex and that only a few other economies can produce (Harvard Growth Lab, 2022).

6 Armenia News, "Transfers of individuals from Russia to Armenia increased to $3.6 billion 2022", 21 February 2023, https://news.am/eng/news/746015.html.

Figure 1.2 Inflow of personal remittances as share of GDP, 2015–2022 (per cent)



Source: UNECE, based on data from World Bank (2023), UNCTADstat (2023) and Knomad (2023).

FDI levels, an important source of investment, expertise and skills, are low in Armenia

FDI inflows to Armenia are low, showing an overall declining trend between 2016 and 2021, albeit with a sharp rise in 2021 (figure 1.3), despite the attractions of its highly skilled labour force and competitive wages. That said, the appreciation of the dram by about 20 per cent against the dollar in 2022 increased labour costs in the country for foreign investors.[7] This is an issue that many employers, for example in the manufacturing sector, now face.[8]

Most FDI between 2014 and 2017 flowed into the mining and energy sector, followed by tourism, foodstuffs and in smaller amounts export-oriented sectors, such as agriculture, ICT and pharmaceuticals. In 2020, Armenia had the second lowest FDI inward stock in the EESC (UNCTAD, 2021). To ensure that FDI flows support promising sectors, the UNCTAD Investment Policy Review (2019) emphasized that Armenia will need to modernize the investment climate by introducing tailored investment promotion strategies and sector-specific policy packages for each target industry. In 2022, FDI financed the current account deficit in Armenia (ADB, 2023).

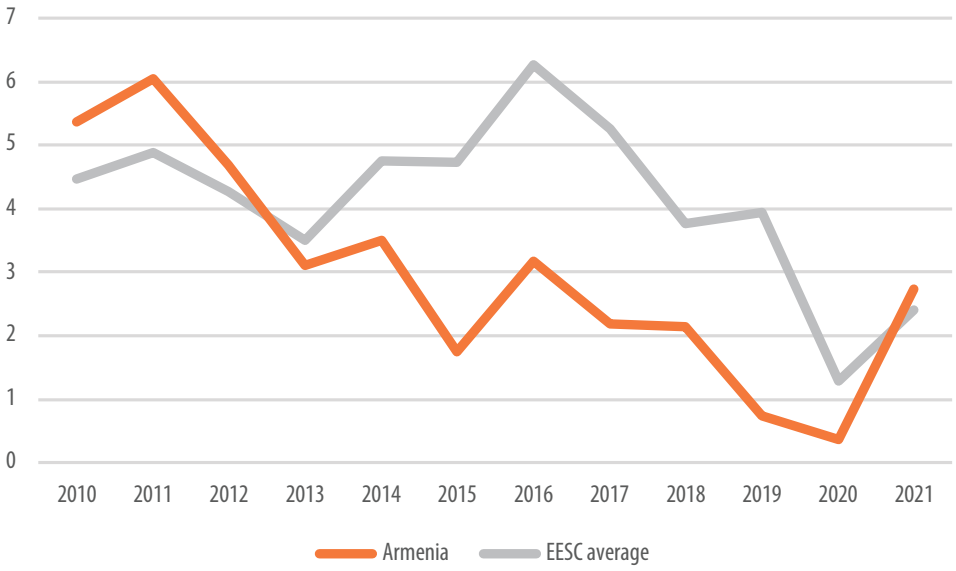
Besides increasing investment in innovation, attracting FDI can help to effectively strengthen the competitiveness of the economy and support domestic firms in their integration into global value chains (chapter 5). FDI can enable the transfer of resources, skills and tacit knowledge to local firms, as well as support the diffusion of innovation

7 Economist Intelligence, "Armenian dram appreciates sharply against the US dollar", 11 August 2022, https://country.eiu.com/article.aspx?articleid=642346847.

8 Simonian, K., S. Harutyunian and R. Zargarian, "Thousands of Armenian workers face layoffs after dramatic rise of the dram", 21 June 2022, https://www.rferl.org/a/armenia-currency-dram-layoffs-inflation-russia-ukraine/31907960.html.

more broadly by creating and strengthening linkages and interactions between domestic firms and foreign technology providers. Aside from increasing domestic capacities in R&D and skills, targeted FDI policies offer considerable potential for supporting the technology transfer and upgrading that is required for systematic innovation (UNCTAD, 2003).

Figure 1.3 FDI inflow as a share of GDP, 2010–2021 (per cent)



Source: UNECE, based on data from UNCTADstat (2023).

Obstacles to long-term, inclusive development include high poverty levels, strong outmigration trends and environmental concerns

The targets outlined in the United Nations 2030 Agenda and the Sustainable Development Goals (SDGs) aim to ensure inclusive growth by reducing poverty and inequality and decoupling economic growth from environmental degradation. Armenia shows noteworthy commitment to these ambitions by including the SDGs in the country's sectoral reforms, as well as by nationalizing and localizing them in strategy and policy papers. As seen in Armenia's Transformation Strategy 2020–2050, the country's mega-goals include the transformation of Armenia to a more business-attractive and knowledge-based country, including the improvement of governance and rule of law, green growth and education, and stronger diaspora ties and repatriation (chapter 3).[9] The country also underwent its second Voluntary National Review in 2020,[10] which focuses on progress with justice reform and democracy, economic growth, innovation-led development, poverty reduction, health, gender equality, education, as well as some challenges for climate change adaptation.

9 Prime Minister of the Republic of Armenia, PM: "We perceive the development and implementation of Armenia's Transformation Strategy as an all-national movement based on our national values and goals", 21 September 2020, https://www.primeminister.am/en/press-release/item/2020/09/21/Nikol-Pashinyan-meeting-Sept-21.

10 Voluntary National Reviews are reports that are part of a procedure through which nations evaluate and outline the steps they have taken to achieve the 2030 Agenda, including fulfilling the 17 SDGs and the commitment to leave no one behind. As indicated in the name, countries are not obligated to submit these reports.

In addition, the Statistical Committee included a national SDG database to monitor the country's progress in reaching the SDG targets (United Nations, 2020; Armstat, 2022b).

Based on data from the SDG dashboard, the country ranked 66/163 in the 2022 SDG Index – the lowest in the EESC, slightly below Georgia at 51/163 (Sachs et al., 2023). As table 1.2 shows, a significant challenge remains in the SDG 9 indicator *Industry, innovation and infrastructure*, specifically because of the economy's weaker performance in terms of the quality of trade and transport-related infrastructure, the Times Higher Education Universities ranking, articles published in international journals, the share of the population using the Internet and the low expenditure on R&D**.** Encouraging and enabling innovation to address the remaining challenges will require public policy to facilitate systematic experimentation with new ideas to create value, finding out what works and what does not, as well as absorbing and adapting successful ideas from elsewhere.

Table 1.2 Armenia SDG progress overview

Assessment	SDGs
Major challenges remaining	
Significant challenges remaining	
Challenges remain	

Source: UNECE, based on data from https://dashboards.sdgindex.org/profiles/armenia and Sachs et al. (2022).
Note: No information provided for SDG 14 – Life below water.

The share of the population living below the national income poverty line has been declining overall, from 35.8 per cent in 2010 to 26.4 per cent in 2019. Yet, poverty rates are said to have increased following the pandemic, especially in urban areas (World Bank, 2020a, 2021; ADB, 2022b). The observed fall of the GINI coefficient, a measure of the income distribution across populations, is a welcome and favourable achievement, although inequality remains, in the distribution of income rather than consumption.

A significant characteristic of Armenia is the difference between genders in the labour force – women show higher shares of tertiary education, but their labour force participation is lower than that of men. Indeed, table 1.2 also shows that Armenia has room for improvement when it comes to SDG 5, *Gender equality*. In 2021, gross tertiary enrolment was higher for women than for men, 66 per cent and 46 per cent respectively. In their studies, women tend to focus on subjects such as social sciences, health and education, rather than science, technology, engineering and mathematics, with about 40 per cent of such graduates being women (WEF, 2022). A higher share of women also engaged in vocational training in 2019 (ETF, 2020). Nevertheless, the rate of female labour force participation was about 38 per cent in 2021 (World Bank, 2023). Furthermore, the country ranks second lowest among EESC countries on the 2022 Global Gender Gap Index, mainly because of low scores on the sub-indicators *Political empowerment* and *Economic participation and opportunity* (WEF, 2022).[11] The Government has only one female minister and in 2021, 34 per cent of seats in parliament were occupied by women, a share lower than in the Republic of Moldova and Belarus (each at 40 per cent) (World Bank, 2023). Furthermore, of the Armenian firms in the 2020 Enterprise Survey, 27.4 per cent had female participation in ownership, compared with 33.7 per cent in Europe and Central Asia (World Bank, EBRD and EIB, 2020).

In part because of the lack of employment opportunities, Armenia historically has had a high rate of outmigration. The rate has been decreasing in recent years but in 2019–2021 remained the second highest in the EESC after Georgia (World Bank, 2023), indicating significant brain drain from the country. This outmigration, i.e. the outflow of skilled labour from the economy, may have adverse effects on the country's prosperity as investment in the development of that human capital does not flow directly back into the economy. This issue is compounded by an ageing population as well as reduced demand for goods and services in the country. To address this issue, public efforts need to create a favourable environment for fresh graduates and young professionals, incentivizing them to stay and develop businesses in the country. The arrival of many qualified IT specialists from the Russian Federation has also opened up new opportunities, with the potential to positively affect start-up creation, investment and growth of the ICT sector.[12]

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11 Armenia's overall rank in the 2022 Global Gender Gap Index was 89/146. The composition scores of the sub-indicators for Armenia, measured from 0 (imparity) to 1 (parity), were *Economic participation and opportunity* (0.669), *Educational attainment* (1.000), *Health and survival* (0.954) and *Political empowerment* (0.170).

12 Sergeev, L., "Russian emigres in Armenia settle in for the long haul", 28 October 2022, https://www.reuters.com/world/russian-emigres-armenia-settle-long-haul-2022-10-26; Gilchrist, K., "These economies are booming as Putin's war drives migrants and money out of Russia", 25 November 2022, https://www.cnbc.com/2022/11/25/georgia-armenia-turkey-economies-boom-with-russian-wealth-migration.html; Borak, M., "Fleeing Putin, Russian tech workers find a home in Armenia", 20 July 2022, https://restofworld.org/2022/russian-tech-workers-armenia, Walker, S., "Russian émigrés fleeing Putin's war find freedom in the cafes of Armenia", 13 May 2022, https://www.theguardian.com/world/2022/may/13/russia-emigres-putin-war-ukraine-armenia.

Armenia can benefit from measures that foster innovation for greener growth to improve resource efficiency and production processes in the mining sector and reduce the negative environmental impacts of inefficient resource use. Owing to unsustainable practices in the mining sector, energy productivity and CO_2 productivity (both OECD indicators of green growth) were below the EU average (EU4Environment, 2019). Strengthening innovation in the sector will be crucial to upgrade and modernize industry practices. In addition, encouraging environmental practices by SMEs in the agriculture sector can strengthen competitiveness in export markets such as the EU, where environmental requirements play an important role (chapter 5).

Innovation will be essential to addressing socioeconomic challenges and ensuring sustainable development

Despite its condition as a small, landlocked country in a difficult geopolitical situation, Armenia has reached relatively high but volatile levels of economic growth over the past decade, in part because of its political commitment to economic policy reform. As a result, recent years have shown increases in trade, a strengthened business environment and a considerable decline in poverty as well as decreased emigration rates. Nonetheless, high levels of unemployment, a considerable gap in living standards and weaknesses in domestic market competitiveness remain, negatively affecting the economy's resilience to external shocks such as the COVID-19 pandemic, as well as the economy's competitiveness.

In light of the challenges outlined in this chapter (table 1.3), fully leveraging the innovative potential of Armenia will be vital for ensuring inclusive and long-term sustainable development and facilitating the transition towards economic circularity. In this context it is important for innovation to happen systematically across the economy, enabling and encouraging public and private stakeholders to experiment with new ways of creating socioeconomic value. Moreover, most of the country's potential lies in adapting and absorbing external knowledge and, on a trial-and-error basis, understanding what kind of innovation that has proven successful in other countries can also spur innovation in Armenia. Although some notable pockets of excellence are emerging, public support needs to be catalytic and allow these successes to diffuse to other, less innovative sectors. To better understand the general context as well as specific challenges and opportunities the country faces for innovation-driven growth, the next chapter provides an overview of Armenia's innovative performance.

Table 1.3 Overview of main strengths and challenges of the Armenian economy

Strengths and opportunities	Next development milestones
✓ Armenia had strong albeit volatile growth over the past decade.	! Remaining structural challenges in the economy as well as external challenges such as regional conflicts inhibit the country's further development.
✓ The services sector is one of the main contributors to growth, especially in tourism and ICT services.	! The production structure in Armenia largely focuses on low value added activities.
✓ Armenia has significantly reduced poverty levels in the last decades.	! Low levels of productivity inhibit economic competitiveness and create challenges in the labour market, such as high unemployment rates.
✓ The country is integrating the SDGs into strategic documents and national development objectives.	! Significant reliance on remittances and a narrow range of commodity exports leave the country vulnerable to external shocks.
✓ The arrival of IT specialists and skilled migrants from the Russian Federation provides new opportunities to spur the growth of the local economy.	! FDI inflows are on a downward trend, leaving untapped significant potential for skills and knowledge transfer and the diffusion of innovation more broadly.

Source: UNECE.

Chapter 2

INNOVATION PERFORMANCE

Main messages

- Recent reform efforts have led to greater development of the private sector, with a rapid expansion of the export-oriented information and communication technology (ICT) services sector.
- This dynamic has not yet diffused to other sectors of the economy, as low levels of absorptive capacity inhibit spillover effects and further innovation-led growth of the private sector.
- Increasing investment in research and development (R&D) and strengthening linkages between industry and science will be important for Armenia to fully realize the economy's commercialization potential.
- Addressing pervasive skills mismatches in the labour market by establishing the right incentives and institutions will be crucial to aligning education and skills with labour market needs.
- The large and widespread diaspora represents an opportunity to spur imports of investment, skills, knowledge, networks and technology for innovation, but engagement with the diaspora needs to be more systematic to foster innovation across all sectors.

Ensuring economic resilience and sustainable growth requires innovation to happen more systematically across the economy

Innovation, a cornerstone of sustainable development and a central driver of long-term productivity gains and inclusive economic growth, is also an important element in supporting the transition towards a circular economy (box 2.1) and catalysing green and digital transformations. In Armenia, innovation needs to occur more systematically across the economy, society and government, through a systematic and widespread process of trying out improved products, services and business models that may be new to the country, as well as new to an industry or a firm. This process will enable Armenia to become more competitive and adaptive to change – important factors for mitigating the impact of external shocks and global crises that negatively affect the country and region (chapter 1).

Box 2.1 Circular economy for sustainable development

Innovation lies at the core of fostering sustainable development and economic circularity, as it drives value creation by improving existing products, services and processes as well as creating new ones that ensure sustainable and responsible production and consumption (Sustainable Development Goal 12).

A circular economy is broadly defined as an economic model in which the value generated through products, materials and resources is maintained within the economy for as long as possible. It relates to the sustainable management of materials and improvements in efficiency and productivity, building on a systemic approach to maximizing the social, economic and environmental benefits from introducing circular economy practices.[a] Regenerative by design, a circular economy fosters environmental sustainability as it preserves and enhances natural capital, optimizes resource yields and minimizes systemic risks by managing stocks and renewable flows. Ultimately, circularity allows economic growth to take place with limited resources in a sustainable manner, moving away from resource-intensive processes towards creating new value and revenue streams along the value chain to maximize

the use of existing assets. In this vein, a range of emerging technologies, processes, services and business models is already reshaping all stages of product life cycles, from design through production and usage, to disposal and recycling.

In Armenia, some efforts and initiatives are being undertaken to support the sustainable use and consumption of resources and move towards circular business models, especially in the energy and waste management sectors. At the 69th Session of UNECE in April 2021, devoted to circular economy and the sustainable use of natural resources, the Minister of Economy of Armenia highlighted that the Government recognizes the importance of facilitating this process and is taking measures to transform the energy industry, increase the use of clean and efficient energy solutions in buildings and industries, decarbonize transportation and improve waste management strategies.[b] To facilitate the circular economy transition, Armenia will need to strengthen the capacities of the public sector; address gaps in legislation, regulation and institutions; and provide the required infrastructure and support.

Following the decision of the 69th UNECE Commission's Session in April 2021, UNECE has been promoting the circular economy as an efficient instrument for achieving higher economic growth decoupled from negative environmental impact. To unite stakeholders across the region, UNECE launched a multi-stakeholder knowledge-sharing network on the circular economy called Circular STEP. As of March 2023, more than half of the 56 UNECE member States have officially appointed their focal points, including Armenia, which nominated representatives of the Ministry of Economy to coordinate its participation in the network.

Circular STEP unites a broad set of actors to support the circular economy transition through exchanging experience, generating and disseminating knowledge, including analytical work, and capacity-building. In its pilot phase, Circular STEP has been supporting governments in developing national circular road maps. The network has developed seven policy papers on harnessing different policy areas for the circular economy: trade, innovation-enhancing public procurement, traceability and transparency of value chains, waste management in the agrifood sector, financing, institutional arrangements and digital solutions.

As significant room for improvement remains, it will be important for Armenia to further explore and use the opportunities that circularity represents for innovation, competitiveness and overall inclusive and sustainable growth, including through active participation in Circular STEP, in line with the UN Agenda 2030.

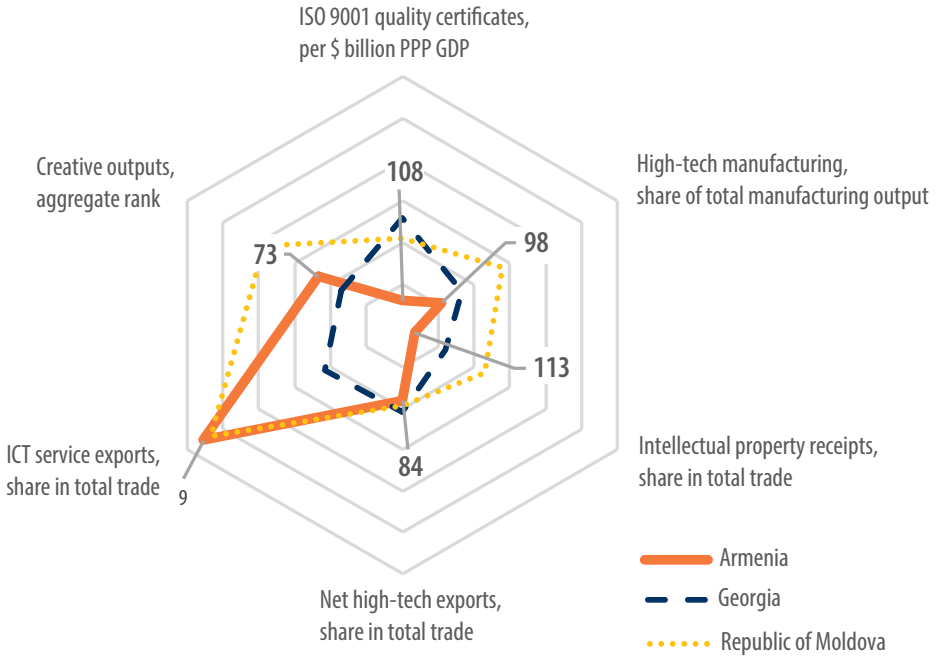
Source: UNECE.

[a] UNECE, Coordination of international statistical work in the United Nations Economic Commission for Europe region: Measuring circular economy, 69th plenary session, 23–25 June 2021, https://unece.org/sites/default/files/2021-05/ECE_CES_2021_8-2104744E_0.pdf.

[b] UNECE Biennial Report, 9 April 2019–20 April 2021, E/ECE/1494, https://unece.org/sites/default/files/2021-05/E_ECE_1494_e_Final.pdf.

Armenia shows significant potential for innovation, including a legacy of applied research, high levels of educational attainment and a large diaspora – almost three times as large as the country's domestic population. As a result, the country exhibits positive trends in its innovative development and performance, with several niches of excellence, such as exports of information and communication technology (ICT) services. The 2022 Global Innovation Index (GII) ranks Armenia 80/132 countries, with the strongest performance in *Institutions* (55/132) and the weakest in *Business sophistication* (84/132), *Market sophistication* (85/132) and *Human capital and research* (91/132).[13] The country ranks 25th among 36 upper-middle-income group economies and, on average, produces more innovation outputs relative to its innovation inputs (investment). This average is very much affected by the strong performance of the ICT services sector. As figure 2.1 shows, some output indicators, such as the high-tech share in manufacturing output and exports, have room for improvement. The number of ISO 9001 certificates, for example, is an indicator of absorptive capacity in firms. The shares of high-tech manufacturing, net high-tech exports, ICT services exports, intellectual property receipts and, to a lesser extent, creative output, are indicators of innovation outputs, showing that Armenia is performing well on ICT but not as well on other indicators.

Figure 2.1 Innovation performance by selected Global Innovation Index (GII) indicators, 2022, ranks

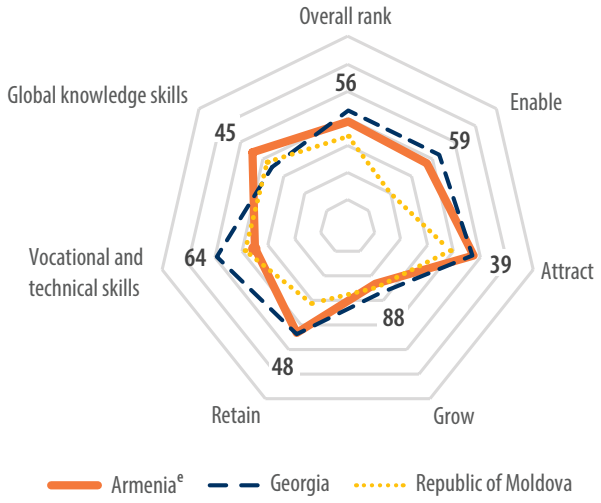


GII = Global Innovation Index, ICT = information and communication technology, ISO = International Standards Organization, PPP = purchasing power parity.
Source: UNECE, based on data from WIPO (2022).

13 The GII is a comprehensive and widely used benchmarking tool that measures innovation performance on the basis of various international and national secondary data sources across 132 economies. It is valuable for policymakers and other innovation stakeholders, enabling them to better understand innovation trends and developments. Although the GII includes many important indicators on innovation inputs and innovation outputs, the list is not exhaustive. Innovative development relies significantly on innovation policy processes and measures in place to effectively translate innovation inputs into outputs. In this regard, this UNECE I4SDR publication aims to complement the information provided by the GII by looking at specific policy governance, processes and instruments that affect the innovative development of economies.

Table 2.1 Innovation performance overview of Armenia

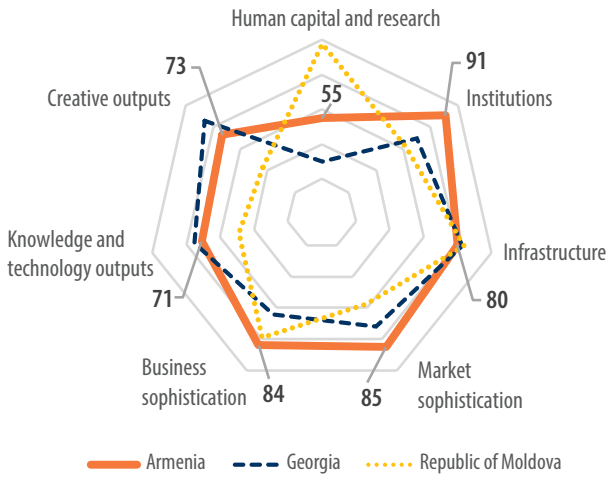
Global Talent Competitiveness Index, 2022 (rank out of 133 economies)[a]



Global Competitiveness Report, 2019[b]

Indicator	Score[c]	Rank[d]
Institutions	56.2	62
Infrastructure	69.4	60
ICT adoption	62	59
Macroeconomic stability	75	64
Health	80.7	68
Skills	66.8	61
Product market	59.1	44
Labour market	66.4	32
Financial system	60.2	69
Market size	37.5	118
Business dynamism	62.5	57
Innovation capability	39.4	62
Overall score	-	**69**

Global Innovation Index, 2022 (rank out of 132 economies)[f]



Innovation in the private sector, 2019

Patent applications, per million population (rank out of 141)	2.7 (53)
Companies embracing disruptive ideas, range from 1 to 7 (rank out of 141)	4 (38)
Growth of innovative companies, range from 1 to 7 (rank out of 141)	4.2 (54)
Attitudes towards entrepreneurial risk, range from 1 to 7 (rank out of 141)	4.5 (28)

R&D and education

Graduates in science and engineering (per cent of graduates, 2022)	14.6 (98)
Government expenditure on education (per cent of GDP, 2021)	2.8
QS university ranking, average score top 3 (rank, GII, 2022)	72

GDP = gross domestic product, GII = Global Innovation Index, ICT = information and communication technology, R&D = research and development, QS = Quacquarelli Symonds.
Source: UNECE, based on INSEAD (2022), WIPO (2022), WEF (2019) and World Bank (2023).

[a] The Global Talent Competitiveness Index measures talent inputs (Enable, Attract, Grow, Retain), i.e. the efforts a country makes to develop talent, and outputs (Vocational and technical skills, Global knowledge skills), i.e. what talent is available as a result of the inputs. Enable refers to the regulatory, business, labour and market landscape that facilitates talent attraction and growth. Attract is the capacity of an economy to draw foreign resources, e.g. through foreign direct investment and high-skilled immigration, as well as to reduce barriers for entering the talent pool domestically (especially for underprivileged groups), for talent development. Grow examines opportunities for education, training and skill development. Retain includes factors that help keep talent, such as quality of life. The output indicators measure availability of mid-level skills (Vocational and technical skills) and high-level skills (Global knowledge skills), the former being an indication of the levels of skills mismatch and the adequacy of educational systems and the latter dealing with knowledge workers in managerial or leadership positions that require problem-solving and creativity, and thus levels of innovation and entrepreneurship, and with the growth of high value added industries.

[b] Improvements compared with the 2018 edition are in green and declines in red. The 2019 edition is the latest available edition, measuring national performance through indicators.

[c] Scores are calculated on a scale from 0 to 100, representing an optimal situation or frontier.

[d] Rank out of 141 economies measured in the 2019 Global Competitiveness Index.

[e] Armenia ranks 4th in in the upper-middle-income group on Attract and 6th on Retain and on Global knowledge.

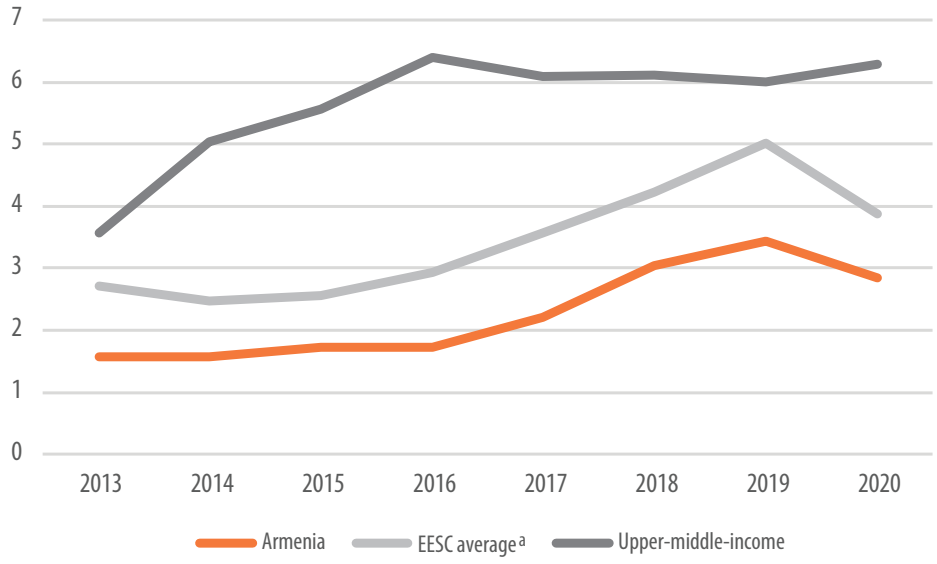
[f] As these values reflect ranks, higher values indicate lower comparative performance.

The imperative now is to seize opportunities and address structural challenges to ensure innovation is more systematic, trying out new ways for creating value and scaling up those ideas that are successful, and ensuring that the benefits of innovation are diffused more broadly across the economy. This requires the country to enhance productivity and competitiveness in the private sector, including strengthening the absorptive capacity of firms, reinforcing linkages between innovation stakeholders, increasing public and private investment in research and development (R&D), reducing the skills mismatch in the labour market by improving the role and relevance of education, and further tapping the potential of the diaspora for innovation.

Recent reforms and policy efforts have led to greater entrepreneurial activity, especially in the export-oriented ICT sector

Previous reforms have improved Armenia's regulatory and business environment, helping the country ranking 69/141 in the 2019 Global Competitiveness Index (GCI), higher than the Republic of Moldova (86), Ukraine (85) and Georgia (74) (WEF, 2019). The country also has a vibrant entrepreneurial environment, resulting in comparatively high levels of early-stage entrepreneurial activity. In 2019, 21 per cent of the working-age population consisted of either nascent entrepreneurs or owners or managers of a business (GEM, 2022). This indicates that a start-up movement is emerging in the country, and the rate of new business creation is increasing – albeit not yet at the level of Georgia or the EESC average (figure 2.2).

Figure 2.2 New business density, new registrations per 1,000 people ages 15–64, 2013–2020



Source: UNECE based on World Bank (2023).

[a] Missing values for the Republic of Moldova (2013, 2019, 2020) and Ukraine (2018, 2019, 2020).

One of Armenia's main competitive advantages is its flourishing and internationally linked ICT sector, especially in services exports. The growth of these ICT exports is in part supported by strong government efforts and driven by international venture capital investments, linkages with the diaspora and the strong research heritage, leading to the country becoming a hub for technology and software development. Between 2000 and 2018, about 800 ICT firms were established in Armenia, and by 2022 the figure reached over 1,000,[14] focused on customized software, web design and development, IT services and consulting, and computer graphics, with other areas emerging in data science and artificial intelligence, among others. Approximately a third of these ICT firms have foreign ownership, including from the United States, Europe and the Russian Federation. The sector is characterized by a vibrant entrepreneurial ecosystem, supported by quality IT infrastructure, and is expanding at an annual rate of 20 per cent and has turnover of more than $1 billion, despite the COVID-19 pandemic (ITA, 2021). These factors provided the opportunity for the country to emerge as a key player in the so-called "digital solutions value chain" (UNCTAD, 2020) and to strengthen the sector's migration towards emerging niche technologies and applications, such as biotech and cleantech solutions (World Bank, 2020a). Furthermore, the outbreak of the war in Ukraine contributed to the significant influx of highly educated IT specialists (box 1.1), which presents further opportunities for growth of the sector.

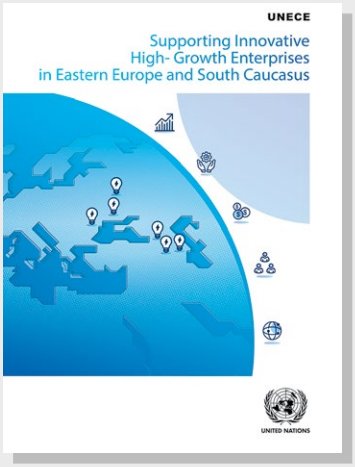
However, the sector made up only about 4 per cent of gross domestic product (GDP) in 2022 (Armstat, 2023) and some ICT firms experience challenges in scaling up their activities, in part because of the lack of relevant skills in the labour market. The ideas, technology and export competitiveness emerging from the ICT sector do not filter systematically to other parts of the economy. To enable this dynamic to create sufficient spillover effects, innovation policy needs to address the skills gap and ensure that firms are equipped with the tools necessary to identify and adapt ideas for products, services and business models that have proven successful elsewhere.

Low levels of absorptive capacity inhibit further innovation-led growth of the private sector

A crucial challenge for systematic innovation and improved innovative performance in the private sector – especially for potentially high-growth enterprises that experiment, commercialize and diffuse new ideas across the economy and society (box 2.2) – is to ensure that firms develop sufficient levels of absorptive capacity. To innovate, firms need to be equipped with the necessary knowledge and skills as well as organizational and managerial capacity to identify, adopt and implement external knowledge and technologies to create new value (Cohen and Levinthal, 1990). Innovation can be new to the world, but that is the most difficult, risky and expensive kind. Innovation can also be new to the country, new to the industry or new to the firm, in declining order of difficulty, riskiness and cost. In a country such as Armenia, which is relatively far from the tech frontier in most fields, the return on innovation that is not new to the world can be very large. Therefore, the focus should be on generating more innovation of this kind: relatively easy, sure and cheap, and

14 International Trade Administration, "Information and telecommunication technology", Armenia – Country Commercial Guide, 31 July 2022, https://www.trade.gov/country-commercial-guides/armenia-information-and-telecommunication-technology.

Box 2.2 Innovative, high-growth enterprises as drivers of innovation-led growth and sustainable development



Innovative, high-growth enterprises (IHGEs), which make up a small share of the business population in developed and emerging economies, play a disproportionately large role in spurring innovation in an economy. They act as transformational agents of change that have substantial potential to support the process of systematically experimenting with new ideas in response to emerging challenges and opportunities: a core feature of ensuring innovation-driven growth and sustainable development. In Armenia's recovery from the COVID-19 crises and against the backdrop of tightening fiscal space and rapid technological advancements, promoting the development of IGHEs through targeted and effective support is especially important for the country. This needs to be done by developing a comprehensive understanding of the characteristics, dynamics and needs of IGHEs in the country. To support such efforts, UNECE has published a policy handbook – *Supporting Innovative High-Growth Enterprises in Eastern Europe and the South Caucasus* – that provides concrete recommendations for policymakers on designing effective policies and institutions.

Source: UNECE, based on UNECE (2021b).

with a high return. To do this, knowledge and technology has to be imported from abroad and adapted to the Armenian context, and this is where the importance of strengthening absorptive capacity comes in.

Sectoral and national data on current innovation activity and performance in the private sector in Armenia does not exist. This significant constraint creates a large gap in the policy support system (UNECE, 2021a) that should be urgently filled. For policymakers to make evidence-based decisions as well as plan and monitor innovation policy support, it will be vital to collect consistent, accessible and internationally comparable statistical information on innovation (chapter 3).

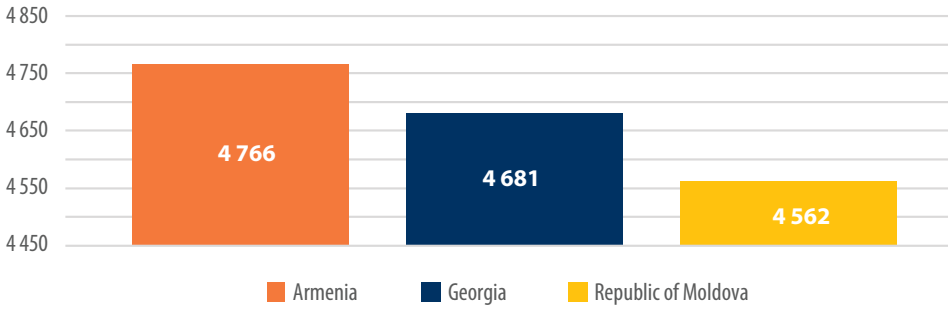
Available data shows low levels of innovation activity in the private sector, a reflection of its limited absorptive capacity. A survey conducted by the National Statistics Service of Armenia (2017) shows that in 2016, only 9.4 per cent of firms engaged in innovative activity, albeit varying significantly between sectors, ranging from 25 per cent of firms in

the scientific and technical sectors[15] to about 14 per cent in manufacturing and mining, 13 per cent in agriculture, 11.4 per cent in ICT and only 3.3 per cent in construction. These shares are significantly lower than the shares of innovative firms in the Republic of Moldova (where in 2019–2020, 12.6 per cent of surveyed firms were innovative).[16] It is also lower than the average in member economies of the Organisation for Economic Co-operation and Development (OECD) and its partners, where about 35 per cent of firms reported at least one product or business process innovation between 2016 and 2018 (OECD, 2022). Furthermore, just 5.1 per cent of Armenian firms surveyed engaged in innovation in marketing, 4.3 per cent in products, 2.8 per cent in processes, 6 per cent in both products and processes, and 3.5 per cent in organizational innovation.

In Armenia, ICT adoption is relatively low, particularly among non-tech companies. In 2020, for example, 34 per cent of SMEs had their own website and 58 per cent used email for their business activities. In addition, 15 per cent of SMEs used online sales and e-commerce applications and 12 per cent used cloud computing services (World Bank, 2020b; 2020c).

The private sector has made limited progress in attaining international quality standards – an important element of technology upgrading and a prerequisite for integrating into global value chains. This is seen in the low adoption of ISO 9001 quality standards (figure 2.1): only 7.8 per cent of firms had an internationally recognized quality certification in 2020, substantially lower than the average in Europe and Central Asia of 21.9 per cent (EBRD, EIB, World Bank, 2022). However, in terms of the number of trademark applications, an indicator of innovation in knowledge-intensive sectors (Gotsch and Hipp, 2014), Armenia fares quite well (ranking the country 17/132 in the 2022 GII for trademarks by origin) – also, compared with other countries in the region (figure 2.3).

Figure 2.3 Annual number of trademark applications, average 2015–2021



Source: UNECE, based on WIPO (2023).

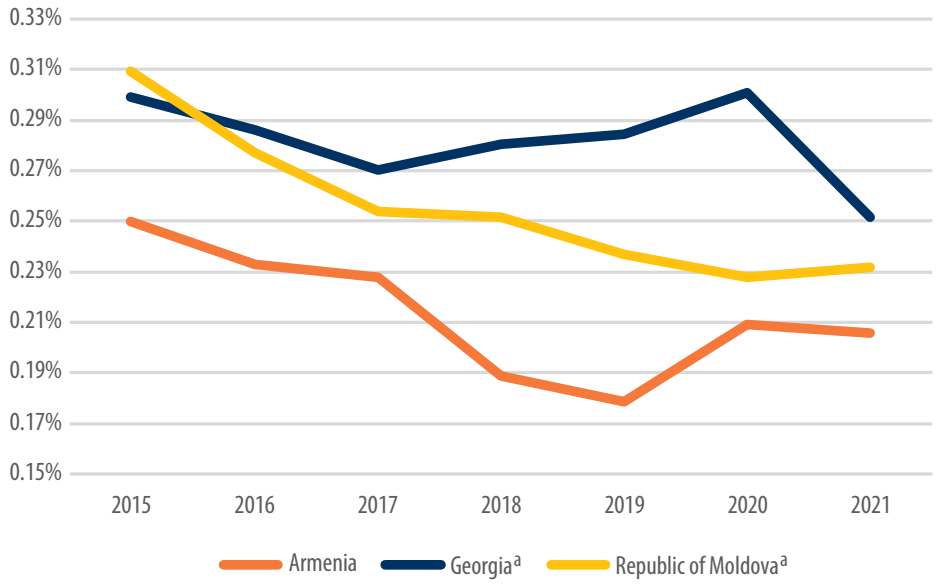
15 Under the Statistical classification of economic activities in the European Community (French: Nomenclature statistique des activités économiques dans la Communauté européenne, NACE), this indicator is attributed to classification code M 74, "Other professional, scientific and technical activities". It includes specialized design activities, photographic activities, translation and interpretation activities, and others. European Union, Cases by NACE code – M: https://ec.europa.eu/competition/mergers/cases/index/by_nace_m_.html#m74; Eurostat, Glossary: Statistical classification of economic activities in the European Community (NACE), https://ec.europa.eu/eurostat/statistics-explained/index.php?title=Glossary:Statistical_classification_of_economic_activities_in_the_European_Community_(NACE)#:~:text=NACE%20is%20a%20four%2Ddigit,developed%20within%20the%20European%20statistical.

16 National Bureau of Statistics of the Republic of Moldova, "Innovation", https://statistica.gov.md/en/statistic_indicator_details/44.

Strengthening R&D activity as well as linkages between industry and science can help Armenia fully realize the economy's commercialization potential

Technologically more advanced countries typically spend more on R&D, an important innovation input. Gross expenditure on R&D (GERD) in Armenia in 2021 was about 0.2 per cent of gross domestic product (GDP), lower than in Georgia and in the Republic of Moldova (figure 2.4), but in 2022 that figure increased to almost 0.5 per cent (UNESCO, 2023). Although this is a positive development, it remains to be seen whether these levels of R&D investment can be sustained or even increased in the next years. There is little information on private sector investment in R&D, such as within and across sectors, though the 2022 GII indicates that the private sector funded 16.7 per cent of GERD.[17] Furthermore, most R&D in the private sector is conducted by foreign firms and a few large domestic companies (EC, 2019). Besides limited funding, R&D activities in Armenia are impeded by insufficient cooperation and lack of demand for R&D among local businesses, which in turn inhibits the commercialization of R&D results in both local and international markets.

Figure 2.4 Gross expenditure on R&D, 2015–2022, share of GDP



Source: UNECE, based on data from World Bank (2023) and UNESCO (2023).
[a] Data for Georgia and the Republic of Moldova in 2022 is not available.

Low absorptive capacity and low investment in R&D, compounded by insufficient alignment of research priorities with the needs of the economy (UNECE, 2021a), leave underdeveloped the linkages between industry and science – one of the most significant structural components in creating a conducive environment for commercialization and innovation (UNECE, 2014; Inzelt, 2015). Indeed, according to the 2019 GCI, on

17 WIPO retrieved this data from the UNESCO Institute for Statistics online database (http://data.uis.unesco.org); the Eurostat database (https://ec.europa.eu/eurostat/data/database); the OECD Main Science and Technology Indicators database (https://stats.oecd.org/Index. aspx?DataSetCode=MSTI_PUB); and the Ibero-American and Inter-American Network of Science and Technology Indicators (http://www.ricyt.org/en/). Data years: 2011–2020.

Multistakeholder collaboration Armenia ranked 73/141, and the 2022 GII ranked Armenia 100/132 in *University–industry R&D collaboration* (WEF, 2019; WIPO, 2022).

The innovation support infrastructure does not fully support such linkages or innovative business development, with many initiatives delivering mixed results in terms of their effectiveness. Although Armenia has made efforts to expand the infrastructure, for example in the form of innovation and technology centres in ICT and engineering, beyond these sectors there are fewer support elements. These challenges were highlighted in UNECE's *Sub-regional Innovation Policy Outlook* (2021a), with the recommendation to conduct a comprehensive quality review of the infrastructural elements available and the investment priorities to ensure that public support is effective in driving innovation activity. Chapter 4 delves deeper into this issue, providing an in-depth assessment of the innovation infrastructure. It provides concrete recommendations on how to strengthen the effectiveness of elements in supporting systematic innovative activity.

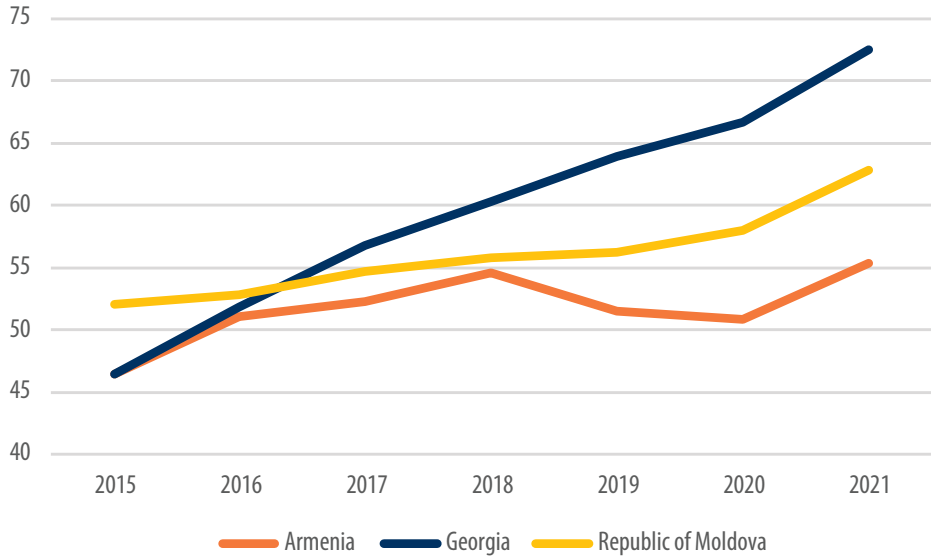
Establishing the right incentives and institutions to align education with labour market needs is essential for addressing the skills mismatch

The imperfect alignment between education, research and industry has led to a skills mismatch in the labour market: usually, there are not enough qualified candidates for employment opportunities – an issue identified in previous analysis (UNECE, 2014). This mismatch is reflected in the 2020 World Bank Enterprise Survey, in which 35.9 per cent of the 546 firms surveyed perceived the workforce's lack of relevant skills for the labour market as a major constraint (EBRD, EIB, World Bank, 2022). To address the skills mismatch and ensure that capacities for innovation can emerge more systematically within the population, it is essential to update and adapt the educational system and curricula, better aligning the relevance, quality and flexibility of human capital. Despite recent efforts to strengthen entrepreneurial education, graduates do not have adequate skillsets for the labour market (WEF, 2019; USAID and others, 2022). In addition, in 2021 government expenditure on education was the lowest in the sub-region (2.8 per cent of GDP) (table 2.1), and tertiary enrolment lagged behind comparator countries (figure 2.5). Given the success of the ICT services sector and the expertise developed in it, the country has the opportunity to leverage its competitive advantage and expand into digital education (UNCTAD, 2020).

Armenia also faces a shortage of science, technology, engineering and mathematics (STEM) graduates – in 2021 only 12 per cent of graduates were in STEM, lower than in Georgia (18 per cent) and Kazakhstan (22 per cent). In addition, low enrolment in STEM courses at the tertiary level suggests that the educational system will face challenges in meeting future demand for skills (Armenia 2041 Foundation, 2021).

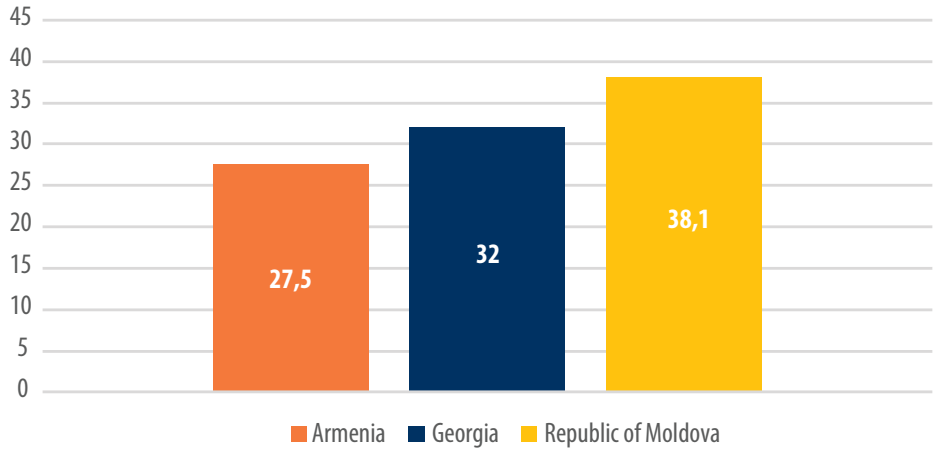
Support for skill development in the private sector has further room for improvement. Less than a third of firms offered formal training in 2021, a smaller share than in either Georgia or the Republic of Moldova (figure 2.6), and lower than the average for Europe and Central Asia (32 per cent) and the average for upper-middle-income countries (36 per cent). In addition, the quality of vocational training is low, ranked 86/141 in the 2019 GCI (WEF, 2019; World Bank, EBRD and EIB, 2020). According to the 2022 GII, less than 20 per cent of the workforce was employed in knowledge-intensive jobs, lower than in both the Republic of Moldova (31.3 per cent) and Georgia (24.7 per cent) (WIPO, 2022).

Figure 2.5 Tertiary enrolment, 2015–2021, per cent of gross



Source: UNECE, based on World Bank (2023).

Figure 2.6 Knowledge-intensive employment and firms offering training, 2021, share of surveyed firms



Source: UNECE, based on WIPO (2022).

According to the 2022 Global Talent Competitiveness Index,[18] Armenia ranks 56/133 economies, higher than the Republic of Moldova (ranked 67) but lower than Georgia (48). Some of the country's largest challenges are the low expenditure on tertiary education (ranked 101), the low relevance of the education system to the economy (97) and the high unemployment of educated people (94), indicating insufficient practical training in education and a lack of retention of skilled individuals (85) (table 2.1). In addition to the

18 The Global Talent Competitiveness Index is based on a model that measures input efforts, specifically the support provided to produce and acquire talent, as well as what these efforts achieve (output) for skills development in an economy.

need to increase investment in education, these challenges highlight the need to create incentives and other support mechanisms for strengthening the quality of education and adapting it to the needs of the labour market, and ensuring the availability of employment opportunities so as to be able to retain skilled workers in the country. This could be done by reinforcing consultation between private sector representatives and educational institutions to identify what skills are needed and how they could be better provided by tertiary institutions (chapter 3).

The Armenian diaspora represents a unique opportunity to spur the transfer of investment, knowledge and technology for innovation

The diaspora, approximately 7 million people living in 100 countries,[19] has made a significant contribution to trade and investment in the economy (UNCTAD, 2020). It is characterized by high levels of wealth, education and achievement, and it represents a significant opportunity as a source of funding, ideas, experiences and networks, which can generate innovation domestically. The large diaspora can also contribute to closing the skills gap in the economy by bringing in external expertise and nurturing local talent. For this reason, channelling and increasing trade and investment and, perhaps most importantly, entrepreneurship, linkages and knowledge spillovers with the diaspora is important for promoting and sustaining innovation for sustainable development (UNECE, 2014).[20] Yet, without systematic policy support and "engagement infrastructure"[21] (Gevorkyan, 2021, p. 14), the innovative potential of the diaspora is left unexploited, confined to only a few sectors, such as ICT.[22] Chapter 5 provides an in-depth analysis of the diaspora: its context, trends in its engagement and investment, and challenges and opportunities that it offers for sustainable, innovation-driven growth in the agriculture sector.

Public policy needs to be catalytic in increasing innovative activity across the economy

Armenia has pockets of excellence of innovative development such as ICT services exports. Yet challenges remain that constrain the country from ensuring that the benefits of innovation diffuse across other sectors and from exploiting the potential of ICT as an important driver for innovation-led growth and sustainable development (table 2.2). To effectively encourage systematic innovation to discover new ways of creating value and introducing them in the economy, Armenia needs to address the insufficient capacity of firms to absorb and adapt external ideas and knowledge for innovation. Greater investment

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19 Office of the High Commissioner for Diaspora Affairs, Armenian Diaspora Communities, http://diaspora.gov.am/en/diasporas#:~:text=Today%2C%20an%20estimated%207%20million,100%20countries%20around%20the%20world..

20 The potential of using the diaspora to spur innovation-led growth was the theme of a UNECE policy dialogue, "Leveraging diasporas to promote innovation for sustainable development", on 31 May 2021. https://unece.org/info/events/event/356379.

21 According to Gevorkyan (2021), engagement infrastructure could include, for example, support mechanisms that help diaspora members contact local counterparts or provide travel and accommodation opportunities for diaspora members, which would facilitate active engagement and strengthen connections between diaspora experts and national stakeholders in the country.

22 Examples of how clear and targeted policy support, with a flexible engagement infrastructure, can foster diaspora engagement with the private sector to facilitate the effectiveness and sustainability of initiatives in place are elaborated in the recently published UNECE *Innovation for Sustainable Development Review of Moldova* (2022).

in R&D, as well as reinforced linkages between industry and science, will allow successful commercialization of research outputs. To strengthen human capital for innovation, it is crucial to address skills gaps in the labour market. In addition, systematically facilitating ties with the diaspora across sectors has potential for spurring innovative growth by encouraging the transfer of skills, knowledge and technology.

As innovation cannot be planned or predicted, strong policy support and effective public intervention across sectors will be required to shape, incentivize and support further innovation-led growth. The following chapters of this review examine how innovation policy in Armenia can shape and provide a conducive environment for relevant stakeholders to interact and create new value, by examining innovation policy governance and coordination (chapter 3), the innovation infrastructure (chapter 4) and leveraging of diaspora investment to spur innovation in the agriculture sector (chapter 5).

Table 2.2 **Overview of main strengths and areas for improvement for innovation-driven growth in Armenia**

Strengths and opportunities	Next development milestones
✓ Over the past decade Armenia has made efforts towards building a conducive business environment, leading to greater entrepreneurial activity.	! The lack of absorptive capacity in the private sector limits the successful diffusion of innovation across sectors.
✓ Spurred by investment and public support, rapid growth can be seen in the export-oriented ICT sector.	! Low levels of R&D investment and underdeveloped science–industry linkages leave the economy's commercialization potential underexploited.
✓ Armenia is making efforts to introduce entrepreneurship and innovation into its curricula.	! Low levels of investment in education and insufficient alignment between education and the needs of the labour market have created a skills mismatch in the economy.
✓ The diaspora has contributed to many innovation success stories thus far and provides a unique opportunity to transfer external knowledge, skills and investment to strength innovation in the economy.	! Lack of systematic support for diaspora engagement for innovation leaves the potential of the diaspora underexploited.

Source: UNECE.

Chapter 3

STRENGTHENING INNOVATION POLICY GOVERNANCE IN ARMENIA

Main messages

- In addition to aligning national strategic priorities with the UN Agenda 2030 for overall sustainable development, Armenia has made strong progress in improving innovation policy and support in recent years, especially in high-tech and engineering.
- With these efforts leading to some pockets of excellence, the country would benefit from focusing on effectively evaluating and consolidating policy support for a coherent strategic approach to innovation-led growth.
- Gaps in policy, institutional and legal frameworks and inefficient consultation between public and private actors impede the development of effective strategic guidance for innovation-related support and activities.
- Some mechanisms to enhance the quality of innovation policymaking are in place; to apply them systematically and effectively requires involving other actors across the policy cycle as well as improving the collection of information and data on innovation.
- Growing support for human capital development, especially in terms of innovation capacity, and the use of demand-creating tools such as innovation-enhancing procurement (IEP) will be important for spurring innovation in the private sector.
- As recognized in ongoing reforms, it is vital to enhance innovation aspects of both research and education in order to strengthen the national innovation system (NIS) and address the remaining challenges of the labour market skills mismatch and the innovation capacity of the research sector.

Recommendations at a glance: Strengthening innovation policy governance in Armenia

Recommendation 3.1: Strengthen the policy and legal framework for innovation-led growth.

Actions		Priority	Time frame	Actors
3.1.1	Develop and implement a more holistic definition and approach to innovation at the national level to support innovative products, process, services, business and marketing models beyond the high-tech sector.	①	Short-term	Government together with MoHTI, MoE, MoESCS
3.1.2	Develop and adopt an overarching national innovation strategy.	②	Medium-term	MoHTI, MoE, MoESCS

Recommendation 3.2: Improve innovation policy coordination and alignment across ministries and all government levels.

Actions		Priority	Time frame	Actors
3.2.1	Enhance innovation policy coordination, for example by establishing a national innovation council or the equivalent.	①	Medium-term	Government, together with MoHTI, MoE, MoESCS, universities
3.2.2	Establish working groups under the coordination body to enhance policy implementation and ensure effective collaboration between ministries that influence innovative activity.	①	Short-term	MoESCS, MoE, MoHTI
3.2.3	Consistently and systematically engage sub-national authorities in coordination and governance of innovation policy .	③	Long-term	MoHTI, MoE, MoESCS

Recommendation 3.3: Ensure inclusive, effective and evidence-based policymaking processes involving both public and private sector representatives.			
Actions	**Priority**	**Time frame**	**Actors**
3.3.1 Develop the analytical capacities of line ministries to integrate innovation foresight and use of evidence into policy processes, focusing on the fundamental skills of qualitative and quantitative analysis, design thinking and policy foresight.	①	Medium-term	Government, together with MoHTI, MoE, MoESCS
3.3.2 Develop more inclusive criteria for setting up consultative committees, ensuring that these bodies include a variety of SMEs and civil society actors.	②	Long-term	Government, together with MoHTI, MoE, MoESCS
3.3.3 Assess the effectiveness of digital platforms and policy consultation structures to better understand and address their shortcomings.	②	Short-term	MoE, MoESCS
3.3.4 Set well-designed and more process-oriented performance targets that go beyond output indicators, and establish a system for consistently monitoring policy and re-evaluating policy documents.	②	Short-term	Government, together with MoHTI, MoE, MoESCS
3.3.5 Consider adopting best international practices in innovation statistics collection.	①	Short-term	MoHTI, MoE, NSC
Recommendation 3.4: Strengthen private sector innovation by supporting enhanced absorptive capacity and demand for innovation.			
Actions	**Priority**	**Time frame**	**Actors**
3.4.1 Introduce and continuously update targeted training as well as support programmes to develop skills and capacity for innovation in the public and private sectors.	①	Medium-term	MoESCS
3.4.2 Consistently engage private sector stakeholders and employers in designing and implementing support for skill development.	①	Short-term	MoESCS
3.4.3 Support awareness of and incentivize and encourage the use of support for skill development.	②	Short-term	MoESCS, MoHTI, MoE
3.4.4 Introduce coordination mechanisms between the education and private sectors, such as working groups for sector-specific skill development.	②	Medium-term	MoESCS
3.4.5 Introduce IEP practices and a framework, including mechanisms for outcome-based budgeting.	③	Long-term	MoESCS, MoHTI, MoE
Recommendation 3.5: Strengthen the education and R&D sectors to facilitate human capital development and research for innovation.			
Actions	**Priority**	**Time frame**	**Actors**
3.5.1 Conduct an in-depth study on the factors and trends in STEM graduates to use in continuously updating relevant curricula on the basis of labour market needs.	①	Medium-term	MoESCS
3.5.2 Introduce mechanisms to monitor the performance of graduates in the labour market.	②	Short-term	MoESCS
3.5.3 Consider introducing mechanisms to foster interactions and linkages between research, academia and industry more systematically.	①	Medium-term	MoESCS

IEP = innovation-enhancing procurement; MoE = Ministry of Economy; MoHTI = Ministry of High-Tech Industry; MoESCS = Ministry of Education, Science, Culture and Sport; NSC = National Statistical Committee; R&D = research and development; SMEs = small and medium enterprises; STEM = science, technology, engineering and mathematics; SSC = State Science Committee.

Source: UNECE.

Having made far-reaching changes to its innovation policy landscape, Armenia needs to effectively consolidate, streamline and evaluate measures to ensure a coherent strategic approach to innovation-led growth

Armenia shows strong political commitment to fostering innovation-led growth; it has a growing entrepreneurial culture and a pocket of innovation excellence in information, communication and technology (ICT). In recent years, the country has established the Ministry of High-Tech Industry (MoHTI) and introduced a range of policies and support mechanisms for science, technology and innovation. These aim to expand both the innovation infrastructure and support for commercialization, for example by setting up incubators and accelerators, strengthening innovation in academia and science, and providing access to early-stage financing. These efforts contributed to building pockets of innovation excellence, including in the rapidly growing ICT sector.

Nevertheless, as chapter 2 outlined, challenges remain to improving the country's innovative performance. At the moment, innovation focuses on the high-tech and engineering sectors; it is not yet happening systematically across more traditional sectors, such as agriculture, that have high potential for driving economic growth. This stems from challenges to innovation governance, coordination and support mechanisms within the national innovation system (NIS). To address these challenges, before introducing additional reforms and support to the NIS (box 3.1), it is important for Armenia to review the effectiveness and efficacy of innovation policy and measures. Specifically, evaluating current initiatives, drawing lessons from initial successes and ensuring that these successes also occur in other areas of the economy can help better shape future efforts to support innovation. It will be essential to understand which kind of support is effective and which is less so, discontinuing those that are not effective.

The following discussion looks at current innovation policy governance, including the institutional and legislative framework, policy coordination and alignment. In this context, this chapter will explore the opportunities and constraints for setting up an innovation policy council in the country. It also sheds light on how to strengthen the data collection and evidence-based policymaking processes needed to reinforce innovation policy support within the NIS. The discussion will also examine the effectiveness of policy support mechanisms in developing capacities in the private sector to absorb innovation and in catalysing networks and linkages for innovation. The findings and recommendations in this chapter derive from desk research and in-person interviews with more than 100 public and private national stakeholders and international partners in Armenia. The desk research component relied on previous UNECE support to Armenia, including the Innovation Performance Review of Armenia (box 3.2) and the Sub-regional Innovation Policy Outlook (IPO) for Eastern Europe and the South Caucasus (box 3.3), as well as other analytical publications by international organizations.

Box 3.1 National Innovation Systems and innovation policy governance

The notion of an NIS has evolved as a way to understand the many aspects and dynamics that drive the process of innovation – systematically experimenting with and trying out new ideas. Typically, the subsystems of an NIS include the following:

- International and national markets for innovative products and services
- International and national firms and entrepreneurs, developing and commercializing innovative products and services
- Knowledge-generating institutions, such as universities, public research organizations and R&D institutions
- Innovation intermediaries, providing support services
- Framework conditions that shape incentives and create a conducive environment for innovation

Creating and experimenting with new ideas will also require effective linkages between all participants in the NIS, including government, the private sector, research and academia. Such linkages can help generate, diffuse and apply innovation across the economy and improve the efficiency of the innovation process.[a] Weak linkages between public and private stakeholders are a common shortcoming in the NISs of transition economies that impede full realization of their potential for innovation-led growth.

Innovation policy governance is the ability of government administrations to promote innovation through comprehensive, cross-sectoral policy interventions. It includes broad institutional, legislative and policy frameworks as well as policy processes that define how innovation policy initiatives should be designed, developed and implemented. To create the conditions required for sustainable growth, innovation policy needs to manage tensions and create synergies and complementarity across different parts of the NIS.

Source: UNECE, based on OECD and Eurostat (2018); OECD (2015).

[a] Based on the definitions and explanations in the OECD Oslo and Frascati Manuals.

Box 3.2 The 2014 Innovation Performance Review of Armenia

In 2014, at the request of the Government, UNECE conducted its first Innovation Performance Review (IPR) of Armenia. Challenges identified included the narrow focus of support for cutting-edge, technological innovation; a lack of evidence-based policy formulation; and the fragmentation of the NIS. These meant that the country was missing out on additional opportunities and that policy measures were not fully effective in spurring innovation. In addition, the IPR noted weak linkages between actors in the NIS, low demand and lack of skills for innovation in the private sector, absent early-stage financial support for start-ups and the lack of a conducive environment for entrepreneurship. Recommendations resulting from the IPR were to streamline and strengthen innovation policy governance, enhancing industry–science linkages, improving support for innovation in SMEs and involving the business sector more closely in the innovation policy process.

Reflecting both global and national changes and crises over the past decade, this I4SDR (2023) provides policymakers with an update on trends and developments in innovation policy governance since 2014. In addition, the updated I4SDR methodology made possible an in-depth analysis of specific challenges within the NIS, related to the strategic priorities of the country in regard to the United Nations (UN) Agenda 2030 for Sustainable Development and the Sustainable Development Goals (SDGs).

Source: UNECE.

Box 3.3 Sub-regional Innovation Policy Outlook 2020: Eastern Europe and the South Caucasus

The IPO, a first-of-its-kind UN publication, guides UNECE member States in assessing, reforming and strengthening efforts to enable and promote innovation for sustainable development in line with the UN Agenda 2030 and the SDGs. It provides a cross-country, comparative assessment of the scope, quality and effectiveness of innovation policies, institutions and processes across countries within a UNECE sub-region that share economic, structural and institutional features. The IPO complements international composite indices that measure innovation inputs, outputs and performance, such as the Global Innovation Index (GII) developed by the World Intellectual Property Organization, by looking closely at the role that policies and institutions – the intermediaries between innovation inputs and outputs – play in promoting innovation.

The first iteration of the IPO for Eastern Europe and the South Caucasus was launched in 2020, funded by the Swedish Government and at the request of the six beneficiary countries. Its findings and recommendations have fed into national strategies, programmes and initiatives in the sub-region and created synergies and complementarities with other UNECE workstreams on innovation for sustainable development. In 2023, UNECE published an Interim IPO, which provides an update on trends in the sub-region since the first iteration and homes in on two topics chosen as priorities by the beneficiary countries: how to strengthen science-industry linkages and how to use IEP to foster innovation-driven development in the sub-region. UNECE is planning to apply the IPO methodology to other UNECE sub-regions, such as Central Asia and the Western Balkans.

Based on the sub-regional and national findings outlined in the IPO (2020), this I4SDR provides an update on recent trends and developments in innovation policy governance, mechanisms and processes in Armenia, especially in light of recent crises that had a significantly negative impact on growth in the sub-region. In addition, the elective chapters on the innovation infrastructure (chapter 4) and diaspora investment for innovation in the agriculture sector (chapter 5) complement the literature and delve deeper into Armenia's untapped innovation potential.

Source: UNECE.

A holistic approach to designing innovation policy institutions, frameworks and governance mechanisms is essential to using public resources effectively and ensuring that policies drive innovation

Innovation policy governance reflects the capacity of governments to establish the right institutional, strategic and legal frameworks to guide the design, formulation and implementation of coherent and complementary policy initiatives and interventions. Given the multifaceted nature of innovation, good governance of innovation policy also addresses the capacities of and coordination efforts among government entities involved in innovation policy.

Armenia has various institutions in place to drive innovation across the economy

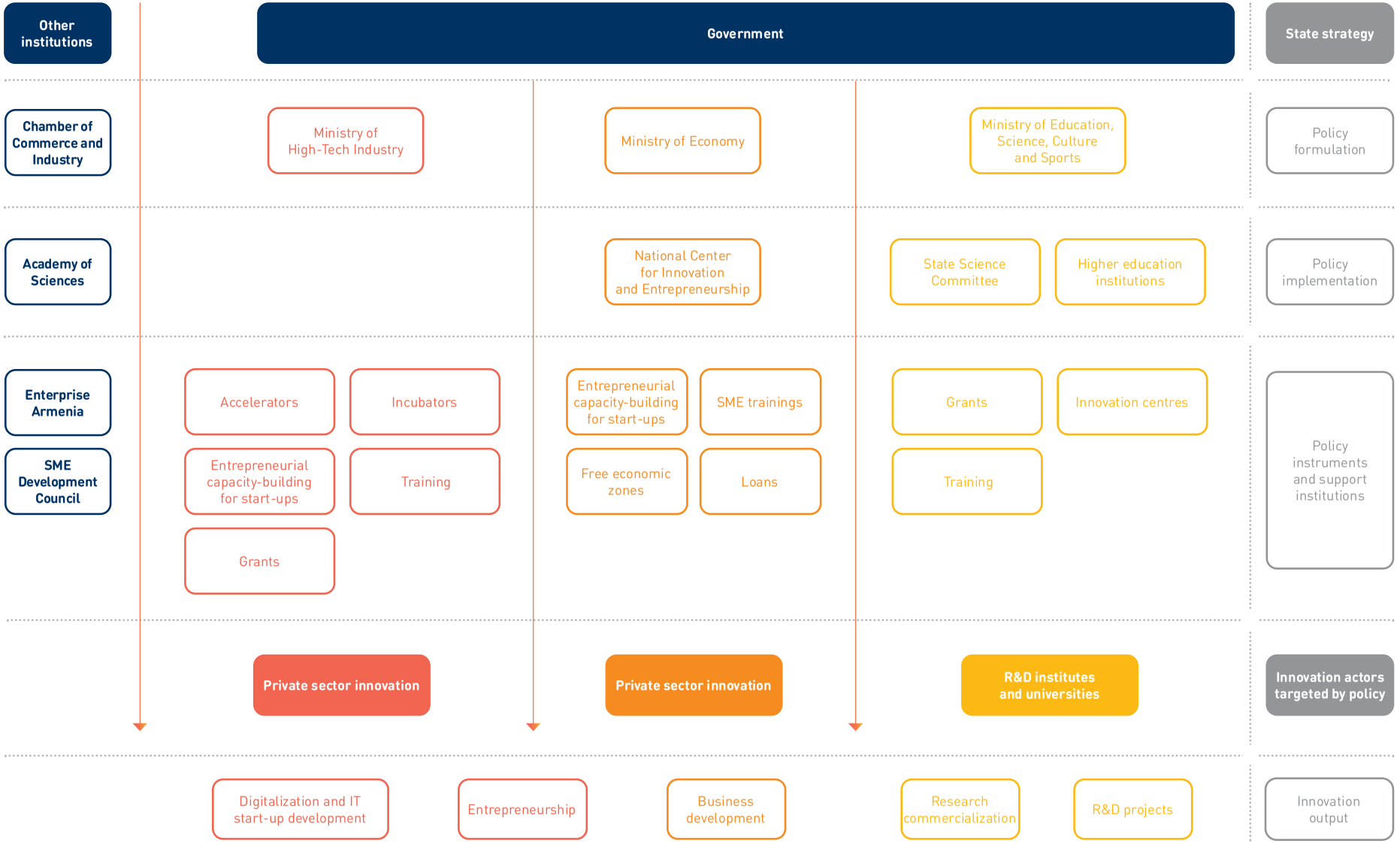
As innovation policy is cross-cutting by nature, various public institutions typically shape innovative activities in UNECE member States, and this is the case in Armenia (figure 3.1). Since 2019, the MoHTI has been the main body for implementing and formulating policy for developing the high-tech sector. The Ministry of Economy (MoE) is in charge of supporting innovation activity in traditional sectors. The Ministry of Education, Science, Culture and Sport (MoESCS) is responsible for shaping and implementing support for general, higher and vocational education and training.[23] The State Science Committee (SSC), under the MoESCS, provides support to science and academia, including efforts to strengthen linkages between research, academia and industry. The SSC also manages the public budget for scientific activities. The National Academy of Sciences has 30 research institutes and conducts research across five fields: physics and astrophysics, math and technical sciences, chemistry and earth sciences, natural sciences including medicine and biology, and humanities and social sciences.

Enterprise Armenia is the national investment promotion agency, whose mission is to promote investment, including attracting new foreign direct investment and providing investment aftercare services. With support from the European Bank for Reconstruction and Development (EBRD), Armenia established the Investment Council and the SME Development Council under the MoE, to provide strategic direction to support for small and medium enterprises (SMEs) and serve as a platform for dialogue between government and SMEs. It examines the legislative framework for SME development and collaborates with the relevant ministries to draft reform packages aimed at improving the business and investment climate. Although there is currently no separate SME support agency, the National Centre for Innovation and Entrepreneurship, which is currently being restructured, is planned[24] to be the main body responsible for providing support to SMEs, focusing primarily on innovation support and technology transfer across all sectors of the economy.

23 Some changes are planned to the structure of the MoESCS: the division in charge of higher education under the Ministry is set to merge with the SSC, thereby expanding the functions of the SSC.

24 As of February 2023, a final decision had not yet been made.

Figure 3.1 Innovation policy governance in Armenia



Source: UNECE.

Innovation plays a central role in implementing the SDGs in line with Armenia's national priorities for sustainable development

The Government needs to align innovation policies with overall government strategic objectives to ensure coherence and clarity for stakeholders. Armenia has put inclusive and sustainable development high on the political agenda. Innovation and digital transformation as well as the transition towards a knowledge-based economy are among the medium- to long-term development priorities of Armenia.

The country submitted its second Voluntary National Review[25] in 2020 (chapter 1), when the Office of the Prime Minister also developed the Armenia Transformation Strategy 2020–2050,[26] which outlines 16 overarching national sustainability goals that link the country's long-term strategic development ambitions in regard to the SDGs (annex table A3.1) (UN Armenia, 2021). These goals act as guidelines for further policy initiatives and can be adapted over time to correspond to current realities and challenges. One of the main objectives of the strategy is to invest in creating a knowledge-based and innovative economy.[27] However, given developments since 2020, such as the outbreak of war in Ukraine, the re-elections in 2021 and the adoption of the new five-year programme for 2021–2026, the Government will need to update the strategy to adapt it to the current context of the country and the challenges it faces. This should be done with the help of broader stakeholder consultation.

In 2017, together with the UN Development Programme (UNDP), Armenia also established the SDG Innovation Lab, an innovation hub that encourages and fosters innovation and experimentation in policy for sustainable development and growth and supports the implementation of the UN Agenda 2023 and the SDGs. In close collaboration with the Government and UNDP Armenia, the Lab manages innovation projects[28] that aim to address complex socioeconomic and environmental challenges and cultivate public policy and service innovation (Armenia National SDG Innovation Lab, 2022). It uses various approaches and tools, such as behavioural experimentation, data science and design thinking, to experiment with innovative approaches for policy reforms and support across 13 sectors.[29] To achieve its sustainability objectives, Armenia is also engaging with various international partners on several policy areas to foster sustainable development as well as green growth and digital transformation, including the second UNECE Environmental Performance Review of Armenia (box 3.4).

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25 Voluntary National Reviews are comprehensive reports by countries on their performance and efforts in aligning national policies and strategic documents with the UN Agenda 2030 and the SDGs. They seek to encourage the exchange of experiences, including achievements, problems and lessons learned; to improve the effectiveness of governmental institutions and policies; and to facilitate and encourage partnerships and support across stakeholders to meet the targets outlined in the SDGs.

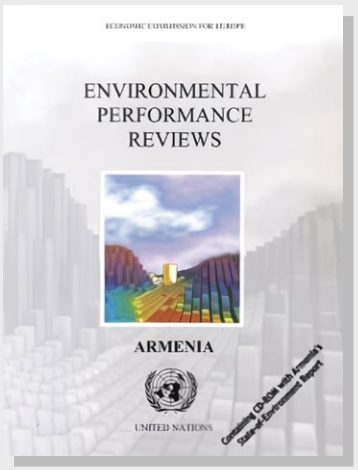
26 United Nations Department of Economic and Social Affairs, 2020 Voluntary National Review of Armenia, https://sdgs.un.org/basic-page/armenia-24737; The Armenian Transformation Strategy: https://www.primeminister.am/u_files/file/Haytararutyunner/Armenia2050_7_5.pdf.

27 *The Armenian Weekly*, "Armenia Transformation Strategy 2050 briefly explained", 23 September 2020, https://armenianweekly.com/2020/09/23/armenia-transformation-strategy-2050-briefly-explained.

28 In 2022, the Lab successfully implemented 20 projects and innovative solutions. Some of their flagship projects include AI4 Mulberry (enhancing citizen–government communication); BarevBalik (iimproving the quality of health care for mothers and children); SDG Monitor (monitoring Armenia's progress towards the SDGs); Edu2work (promoting STEM in education and addressing the skills mismatch between the labour market and educational programmes).

29 Armenia National SDG Innovation Lab: https://www.sdglab.am/en/about-us#.

Box 3.4 UNECE Environmental Performance Review of Armenia



The flagship UNECE Environmental Performance Review (EPR) Programme assists and supports member States in improving their environmental management and performance. Conducted at the request of national governments, EPRs assess the progress of countries in reconciling environmental and economic targets and strategies to meet international environmental commitments in line with the 2030 Agenda. The findings and recommendations help countries integrate environmental policies into economic sectors, promote greater accountability to the public and contribute to achieving and monitoring relevant SDGs. The research process promotes exchange of information on policies and experiences among countries and strengthens the cooperation of countries with international stakeholders. In 2022 UNECE initiated work on the second EPR for Armenia,[a] which looks at trends and developments in the country's environmental policy performance and evaluates efforts to implement the recommendations of the first EPR for Armenia in 2000.

The EPR examines environmental policy frameworks and compliance assurance systems, as well as government initiatives to promote a green economy, track environmental performance, encourage public involvement and enhance education. It addresses issues of specific importance to environmental policy in Armenia, including efforts in climate change mitigation, air quality and water management, biodiversity maintenance, waste management and soil conservation. It further examines the strategic, legal and institutional frameworks, the collection and use of environmental data and information, and the alignment of Armenia's environmental performance with international environmental commitments. The EPR will be published in 2023.

To achieve sustainable development – and in particular SDG target 8, which calls for improving resource efficiency and decoupling economic growth from environmental degradation – innovation will be important, especially in environment-related R&D and technologies.

Source: UNECE.

[a] UNECE, "UNECE kicks off second Environmental Performance Review of Armenia", 22 March 2022, https://unece.org/climate-change/news/unece-kicks-second-environmental-performance-review-armenia.

The country's Development Strategy 2014–2025 outlines the main strategic priorities for the overarching goal of improving citizens' welfare. It includes objectives for specific sectors, the labour market, regional development, poverty and inequality, social protection, human capital development, environmental protection and public administration reforms. The strategy highlights the need to prioritize science and technological innovations to strengthen economic growth and promote the transition to a knowledge-based economy.[30] In addition, the Programme of the Government of the Republic of Armenia 2021–2026[31] presents 439 goals covering objectives for economic, infrastructural and human capital development in the transition to a knowledge-based economy. The programme highlights the importance of strengthening science and education as essential drivers for sustainable and inclusive development and highlights the important role of the country's high-tech sector in entrepreneurship and innovation. The programme sets out the goal to increase the sector's share in GDP from 4 per cent in 2020 to 7 per cent by 2026 by supporting entrepreneurship, commercialization and wide application of technological solutions in the economy and the public sector. Guided by these overarching strategic documents, each ministry develops and implements five-year strategies within its relevant area, financed by its budget (table 3.1). Armenia also adopted a Digitalization Strategy in 2021, aiming to support the digital transformation of public administration and the economy.

Each of these strategies was drafted on the basis of the mandates of each ministry, often developed and implemented in isolation. In addition, in some instances these mandates lack clarity; for example, there is no clear definition of "high-tech" in the support provided by the MoHTI, an issue that the Ministry aims to address in its forthcoming strategy. Interviews revealed that issues remain in intellectual property (IP), including the lack of enforcement of contracts or insufficient protection of property rights. The MoE is developing a new national IP strategy in cooperation with the World Intellectual Property Organization that aims to address these challenges, including improving education and training for IP and strengthening efforts for the transition towards a knowledge-based economy.

30 Governmental decree, Armenia Development Strategy 2014–2025, No. 442, 27 March 2014. https://policy.asiapacificenergy.org/sites/default/files/Development%20Strategy%20of%20the%20Republic%20of%20Armenia%20for%202014-2025_ENG.pdf; https://www.gov.am/files/docs/3133.pdf.

31 Plan, Programme of the Government of the Republic of Armenia 2021–2026, No. 1363, 18 August 2021, https://www.gov.am/files/docs/4737.pdf.

Table 3.1 List of strategies that impact innovation in Armenia

Name of strategy	Year adopted	Main objectives targeted	Responsible entity
Export-led Industrial Strategy 2030[a]	2011	Drive export-led growth and diversification across existing and potential export sectors.	MoE
Small and Medium-sized Entrepreneurship Development Strategy 2020–2024	2020	Strengthen the entrepreneurial environment for SMEs, supporting skill development and facilitating access to financial resources, with the overall goal of improving SME productivity and promoting an entrepreneurial culture.	MoE
Ensuring Economic Development in the Agricultural Sector 2020–2030[b]	2020	Invest in national digitalization initiatives and platforms in agriculture, promote broad innovation and adoption of non-digital technological innovation, digitalize public agricultural systems, develop public capacities for digital services and expand support for education in digital agriculture and innovation.	MoE
State Development Programme for Education until 2030 Strategy 2030	2022[c]	Transform the education sector and improve the quality, efficiency and effectiveness of education, defining new directions to address challenges that arose in recent crises, with emphasis on industry and practical learning.	MoESCS
Digitalization Strategy 2021–2025	2021	Foster the digital transformation of the Government, the economy and civil society by introducing innovative technologies, enhancing cybersecurity, strengthening data policy and e-government systems, coordinating digitalization processes and creating common standards.	Information Systems Agency of Armenia Foundation[d]
High-tech sector development strategy	2023	As of March 2023, the document is not yet publicly available.	MoHTI
Strategic Programme for the Development of the Science Sector for the period of 2023–2027	Being drafted[e]	Promote excellence in scientific and technical activities, creating an optimally managed and effective national research system that is competitive in the international arena, particularly in the European Research Area.	SSC
SME Digitalization Strategy	Being drafted with the OECD and the European Union	As of March 2023, the document is not yet publicly available.	MoE

MoE = Ministry of Economy; MoESCS = Education, Science, Culture and Sport; MoHTI = Ministry of High-tech Industry; OECD = Organisation for Economic Co-operation and Development; SMEs = small and medium enterprises.

Source: UNECE.

[a] Ministry of Economy of Armenia, Industrial Policy, https://www.mineconomy.am/en/page/97.

[b] Ministry of Economy, The Strategy of the Main Directions Ensuring Economic Development in Agricultural Sector of the Republic of Armenia for 2020–2030, https://mineconomy.am/en/page/1467#:~:text=The%20vision%20of%20%E2%80%9CThe%20Strategy,care%20of%20natural%20resources%2C%20producing.

[c] The action plan was shared with the public for feedback in February 2023.

[d] The foundation was established by the Central Bank, of which the MoHTI is a member of the board of trustees. The foundation is accountable to the Deputy Prime Minister's office.

[e] The draft of the Amendments and Additions to the Law of RA on Science and Science-technical Activities is circulating for review. Once it is adopted, the Strategic Programme for the Development of the Science Sector for the period of 2023–2027 will be adopted. Amendments and additions are also planned for mechanisms for funding scientific activities.

Adopting an overarching innovation strategy can help strategically guide innovation support across policy areas, aligning them with overall national development goals

Typically, a broad range of policy areas affect innovation activities in an economy; for example, science, research, education and skill development, and business development. In Armenia, as the research for this I4SDR shows, innovation policy targets the high-tech and IT sectors (chapter 4). To ensure synergies and complementarities between policies and institutions, support within the NIS will require a holistic view of innovation policy, considering various stakeholders, regulations and processes and how these can most effectively reinforce interactions, collaboration, and knowledge and technology sharing and co-creation. Innovation policies need to be aligned with overall strategic objectives of government and documents to ensure coherence and clarity for stakeholders, using innovation to drive socioeconomic change.

Policymakers in Armenia should develop a whole-of-government approach,[32] ensuring consensus on the role of innovation for socioeconomic development, considering innovation more broadly to include not only high-tech but also non-high-tech products, services, technologies, business models and processes. Coordinating policy governance and support with science and education institutions as well as establishing formal and informal linkages between actors in the NIS should be priorities. Achieving this will lead to high-quality policy interventions that are appropriately targeted, coherent and comprehensible to innovation stakeholders, ensuring that public resources are used efficiently and measures are impactful in driving greater innovation. Such an approach in Armenia will enable public support to foster innovation more broadly across all sectors of the economy, beyond the high-tech sector, enhancing productivity and competitiveness in more traditional sectors such as agriculture (*recommendation 3.1.1*).

Given the many national, regional and local government actors involved in designing and implementing innovation policy, developing a strategy that entails the overarching strategic vision for innovation will be important. Currently there is no such vision. In 2018 the Government drafted a national innovation strategy, working with the German aid agency, Gesellschaft für Internationale Zusammenarbeit (GIZ), under the European Union (EU) SMEDA programme, but it was never adopted. The draft strategy outlines three main challenges that the country faced with regard to innovation-led growth:

1. **Insufficient levels of technology progress and knowledge generation**, owing to lack of human capital and financial support. This resulted from fragmented research funding and an insufficient number of STEM graduates, as well as weak integration of science and education in innovative activity.
2. **Low scale and intensity of the business innovation needed to enhance competitiveness**, owing to low rates of innovative activity in key sectors, such as manufacturing and services.

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32 A whole-of-government approach involves close coordination between public entities beyond their areas of competence. This includes a shift from public administration operating in isolated silos to operating in formal and informal networks. This approach facilitates greater policy coherence for development, especially in the context of more complex socioeconomic challenges. European Commission, Supporting policy with scientific evidence: https://knowledge4policy.ec.europa.eu/glossary-item/whole-government-approach%C2%A0_en; United Nations, United Nations E-Government Survey: https://publicadministration.un.org/egovkb/Portals/egovkb/Documents/un/2012-Survey/Chapter-3-Taking-a-whole-of-government-approach.pdf.

3. **Limited innovation in and for society**, owing to the lack of cost-effective policy solutions to address the country's socioeconomic challenges – for example, by encouraging partnerships between the public, private and civil sectors – and weak understanding of the importance of innovation in this process.

Most of these challenges persist. The innovation strategy proposed three approaches to address them: (1) driving technological specialization, (2) focusing on managerial and technological upgrading in the economy and (3) developing partnerships and raising awareness about innovation as a key element in driving progress. Taking these findings and approaches into consideration, it will be important to adopt an updated national innovation strategy. This strategy should provide a clear and broader definition of innovation, including both high-tech and non-high-tech sectors; and set out clear roles and responsibilities for public entities. It should target capacity-building for innovation in the private sector, and create broad and effective national and international linkages between science, education, industry, the public sector and civil society (*recommendation 3.1.2*).

Such a strategy will help define how innovation can contribute to Armenia's socioeconomic development, set priorities for innovation support and investment, identify needs for policy reforms, mobilize and engage innovation stakeholders on certain objectives, create a common vision and facilitate the coordination of innovation support. The strategy should be drafted in collaboration with relevant public and private stakeholders, including those ministries that influence innovation, and should include sufficient funding. As in many countries of the Organisation for Economic Co-operation and Development (OECD), the implementation of the national innovation strategy could be coordinated by a dedicated national innovation council or similar mechanism (discussed later) and supported operationally by a national agency, for example the National Centre for Innovation and Entrepreneurship under the MoE (OECD, 2016).

The legislative framework needs to be updated, taking into consideration current innovation trends in the economy

As outlined in the IPO (2020), the legal framework for innovation in Armenia is outdated and does not adequately reflect current opportunities, challenges and strategic priorities for innovation-led growth. The two pertinent laws are the Law on Scientific and Technological Activity (2000)[33] and the Law on State Support for Innovative Activities (2006),[34] which outline main strategic directions and the formulation and implementation of innovation policy. These laws were adopted in the early years of the country's transition from a State-run economy, so gaps remain in the regulations and the laws do not incorporate current trends or accurately reflect current conditions for innovation. For example, there is no legal act on technology transfer and support for public procurement for innovation. Furthermore, important concepts such as start-ups and spin-offs are either vaguely defined or missing

33 This law outlines the relationships between R&D performers, users and State bodies and defines goals and principles for formulating and implementing national policy in scientific and technological activity. https://www.arlis.am/DocumentView.aspx?docid=804. The MoESCS has submitted an update to the Law on Science and Scientific and Technical Activities, but the draft is still under revision.

34 This law is the main legal framework for innovation and innovation policy support. It outlines the main direction for innovation policy support, including creating favourable legal frameworks for investment and financial support for innovation, and for cooperation between science, education and industry, as well as supporting the technological modernization of the economy and improving the innovation infrastructure. https://www.arlis.am/documentview.aspx?Docid=24697.

entirely, impeding the formulation of appropriate policy measures. Therefore, Armenia needs to adopt legislation that introduces terms relevant for innovation, as well as develop legislation on currently important concepts for innovation, such as technology transfer, aligning these with the country's overall development goals and priorities (chapter 4).

Holistic innovation policy support requires concerted and systematic coordination between relevant innovation actors, as well as relevant public sector capacity to manage innovative processes

Effective innovation policymaking requires mechanisms that reinforce coordination of policy across relevant actors and entities in both the public and private sectors. They include bringing together stakeholders to align strategies across interrelated policy areas, ensuring a coherent strategic approach that lays the foundation for setting the innovation policy agenda. On the national level, there is active dialogue between the public and private sector, especially in high-tech. Yet, systematic mechanisms for coordinating policy between public institutions at the national level and between the national and subnational levels are missing, impeding the effective functioning of the NIS (UNECE, 2020).

Armenia does not have sufficient mechanisms for national innovation policy coordination in place, creating a fragmented policy landscape as ministries develop and implement their strategies and initiatives in isolation (UNECE, 2020). Some formal coordination mechanisms are in place, such as cross-ministerial task forces dedicated to specific policy issues, but these are more formalities, rather than spaces to actively identify trends and needs and discuss potential gaps and overlaps in innovation policy support. This highlights the lack of an institutionalized coordination mechanism to oversee innovation policy developments in the country.

A national council on science, technology and innovation or national innovation council (NIC) or similar horizontal interministerial coordination mechanism (box 3.5) can act as a forum for representatives not only from relevant ministries but also research, the private sector and academia, to discuss how to strengthen innovative performance and how to inform and coordinate innovation policy efforts at a strategic level (*recommendation 3.2.1*). Should an innovation strategy be developed, such a coordination mechanism could manage formulation and implementation of the strategy. It would help create synergies at a strategic level and foster implementation at an operational level (UNECE, 2020).

In setting up an NIC, Armenia could draw from the experiences and lessons learned from the SME Development Council set up by EBRD and the Armenian Government in 2012. That council is the country's official platform for public-private dialogue for business-oriented policy reforms. It includes representatives from the Ministry of Justice, the State Revenue Committee, the State Cadastre Committee, the EBRD Investment Council[35] and Enterprise Armenia.[36] The Council, chaired by the Deputy Prime Minister, meets four times a year. Under the SME Development Council, the SME Development Sub-Council,[37] chaired by the Minister of Economy, meets once a month to discuss, review and shape the policy

35 The EBRD Investment Council, funded by the Government of the United Kingdom's Good Governance Fund since 2020, is part of the Secretariat of the SME Development Council, guiding its activities.

36 MoE, "The regular meeting of the SME Development Council took place", 2 May 2022, https://mineconomy.am/en/news/2560.

37 The sub-council includes 11 members from non-governmental organizations, business associations and foundations, as well as representatives of the MoE, the State Revenue Committee and the Ministry of Finance.

agenda for SME development. The preliminary discussions at the sub-council meetings help identify topics for discussion and policy reform at the SME Development Council meetings based on selected criteria such as the impact, urgency and feasibility of suggested reforms. Since its establishment, the SME Development Council has passed 25 large-scale reforms, including the preferential tax regime for ICT start-ups.[38] Although neither Council nor sub-council meetings have been held regularly over the past few years, most recently however in 2022, they provide an effective platform to discuss reform needs and opportunities in the business sector.

Important for setting up any such coordination mechanism are to establish a clear and strong mandate, aligning incentives, setting up appropriate funding mechanisms, as well as ensure broad engagement and strong, high-level political support. For example, an NIC could be chaired by the Prime Minister, operating under his or her office, to ensure high-level political engagement and commitment to innovation coordination, enabling the NIC to reinforce the role and integration of innovation policy across ministries. Members of the NIC would have to include representatives from various ministries and institutions, external advisers and experts, businesses, and research and academia, with proven expertise in research and innovation activities.

An NIC could provide oversight on the implementation of initiatives and facilitate the diffusion of ideas; create an open dialogue between local, regional and national activities; and benefit knowledge exchange on strategy formulation and implementation. Such a council will be most effective if it includes all actors relevant to encouraging systematic innovation, including representatives not only from the MoHTI, MoE and MoESCS, but also from the Ministry of Finance and the Ministry of Territorial Administration and Infrastructure. Participation in the NIC will also require ensuring that both public and private sector stakeholders possess the right capacities for innovation management. To ensure transparency in the governance of the NIC and the outcomes of its meetings, meeting reports could be published to inform the public on topics discussed and encourage them to provide feedback. Establishing working groups guided by decisions and strategic directions set out by the NIC within a dedicated engagement framework could further help implement and coordinate initiatives and support (*recommendation 3.2.2*).

Coordination between national and regional governments is marginal, with no dedicated communication channels. Local authorities typically have limited resources, both financial and human capital capacity, and there are only a few examples of how municipalities inform policymaking at a strategic, rather than only an operational level. Each of the 14 regions has its own development strategy, and each local authority is tasked with developing a five-year strategy. However, planning for these strategies is not efficient, in part because of the lack of sufficient capacity and political commitment. The largest part of the small regional budgets flows to salary and basic infrastructure, leaving only limited funding for development projects. Furthermore, little experimentation and learning seeps up from the local to the national level, and sub-national authorities do not have their own innovation strategies. To ensure that innovation policy strategies and support achieve the desired impact in the regions, it is important to ensure closer coordination between all levels of

38 Investment Council: SME Development Council: https://icarmenia.am/en/SME-Council/Mission-Structure.

Box 3.5 Examples of National Innovation Councils

A prominent example of science, technology and innovation councils is the Swedish National Innovation Council. Complementing the Swedish Research Policy Council, a government agency established within the Ministry of Education and Research in 2001, the National Innovation Council (NIC) was created in 2015 by the Prime Minister under the auspice of his office.[a] The NIC focusses on innovation policy in a broad sense, including not only research but also the business sector and academia. It comprised four ministers responsible for different areas,[b] as well as external advisers from industry (chief executive officers from large firms, innovative entrepreneurs and business angels), unions and academia (university professors), all appointed by the Prime Minister. The NIC meetings, convened four to five times per year, were informal; they were chaired by the Prime Minister in person and produced no formal reports. Accepting advice from external advisers was at the discretion of the Government and no formal decisions were made (Edquist, 2019).

Another example is the Finnish Research and Innovation Council (2016), which, like the Swedish council, is chaired by the Prime Minister and discusses issues related to research and innovation policy. The overall objective is to support the development, coordination and monitoring of innovation policy and to provide policy advice for future strategies and initiatives. Members include vice-chairs of the Prime Minister and three appointed ministers, currently those of Education, Justice and the Interior. The council meets approximately once every two months.[c]

Source: UNECE.

[a] Since December 2021, the NIC has been under the regular activities of Government Offices.

[b] The Minister of Environment and Climate, the Minister of Finance, the Minister of Business, Industry and Innovation and the Minister for Higher Education and Research.

[c] https://valtioneuvosto.fi/en/research-and-innovation-council; https://research.fi/en/science-innovation-policy/research-innovation-system; https://tem.fi/en/innovation-policy.

government entities, for example in coordinating the individual development strategies within the national context (*recommendation 3.2.3*).

Another element of ensuring effective innovation policy governance and coordination is having the right capacities and specialists in the public sector to design, formulate, implement and manage innovation policy initiatives and processes. In Armenia, these skills are currently lacking. For example, interviewees reported a lack of IP specialists, such as attorneys. This and other public administration challenges are being assessed for reform through the national Public Administration Reform 2022–2024 under the Ministry of Justice, working with UNDP Armenia. Programme efforts build on four pillars: strategic planning and policy development, public services, human capital and institutional development. Across these areas, the reform is examining current capacities, structures and processes with the aim of improving the functioning of public administration.

Setting up an effective, transparent and evidence-based policy process that allows for experimentation and continuous learning is essential to propel innovation

The innovation policymaking process includes the stages through which the Government establishes and carries out a new policy measure, strategy or tool. The policy process feeds directly into the effectiveness of innovation governance, shaping how innovation inputs are converted into innovation outputs (chapter 2). If these processes are poorly designed and executed, government efforts are likely to be ineffective, could waste public resources and in some cases could create additional administrative burdens (UNECE, 2020).

As described in the IPO (2020), UNECE defines four consecutive stages in the innovation policy process:

1. **Preparation:** the background analysis of the policy context, the problems at hand and the rationale for policy implementation
2. **Design:** planning, decision-making, private sector consultations and interministerial coordination for policy coherence
3. **Implementation:** measures that correct the process against the action plan, address changes in the environment or respond to unpredictable challenges that arise.
4. **Post-implementation:** how the government assesses the impact of a policy intervention and extracts lessons for future interventions.

The IPO (2020) highlighted several positive strides made by Armenia in strengthening the policy process. The overall principles and rules of public policymaking reflect the principles of good governance, such as predictability and reliability, transparency, accountability and effectiveness, and the rule of law. Notably, Armenia also has a strong tradition of private and civil society consultation, which provides opportunities for open and transparent dialogue on policies. Yet, Armenia continues to face several challenges related to the practices of planning, executing and learning from innovation policy interventions. These challenges mean that despite a sophisticated legal framework that configures the innovation policymaking cycle on paper, several processes are ineffective in practice. Building on the results of the IPO assessment (UNECE, 2020), it is essential to re-evaluate Armenia's performance on each of the four policy process stages, providing concrete suggestions on how to fill gaps.

Preparation: Armenia stands to benefit from a more evidence-based approach to preparing innovation policy that critically assesses the context, rationale and potential effects of interventions and involves input from stakeholders

Good innovation policy should address any opportunities, constraints and issues, ensuring that the intervention offsets real market failures and does not waste public resources. Policymakers should also have sufficient foresight to ensure that a measure tackles the most impactful and urgent and not only the most immediate problems. To this effect, the preparation stage of the policy cycle, when the Government determines the context and rationale for an intervention, is crucial in setting up a policy intervention for success.

In the past decade, Armenia made progress in setting up mechanisms for preliminary policy analysis and preparation. Since 2014, the Government has introduced several governance and public administration reforms mandating regulatory impact assessments

(RIAs) and putting in place legal frameworks for evidence-based policymaking. The Law on Normative Legal Acts[39] mandates the inclusion in policy drafts of context analysis and problem definition clearly outlining the issue at hand, a statement of purpose that justifies the need for an intervention and an outline of expected results. In line with the requirements, Armenia's Digitalization Strategy 2021–2025, for example, benefits from an extensive analysis of policy context that outlines the state of play in the country, identifies main challenges and synthesizes other analytical efforts by international organizations. The strategy also provides an overview of digitalization efforts across the State system, contributing to coordination across agencies. These elements set out the context for the strategy and provide a justification of the effectiveness of the strategy in correcting the underlying market failures.

Yet the mandated background analysis often lacks the analytical rigour required to ensure that the assessment is valid, relevant, complete and evidence-based. As a result of working on a tight time schedule and operating under human resource constraints, policymakers treat the background assessment step as a formality rather than a necessary exercise in testing the need for an intervention. Unless the policy is developed in cooperation with international donors that require and sponsor background analysis, government agencies rarely allocate enough resources to conduct comprehensive research. Background assessments often rely purely on brief desk research and do not use data analysis or stakeholder interviews, constraining the amount of new insights gathered at the policy preparation stage. The process of drafting evidence-based laws that reflect objective market demands is further constrained by the lack of innovation statistics. Such statistics can include data on the number and types of patents filed, the number of new products or technologies introduced, the level of research and development expenditure, and the level of collaboration between different organizations or sectors (OECD, 2018). These indicators can be collected and analysed at the national, sectoral and firm level. Currently, the National Statistical Committee (NSC) does not regularly collect innovation statistics, citing resource and human capital deficiencies as the main constraint to doing so.

UNECE observed this pattern in practice during its fact-finding missions for both the IPO and the I4SDR. Using the case study of the IT Law of 2014 drafted by the former Ministry of Economic Development and Investment, the IPO highlighted the lack of both evidence and market failure analysis. Instead of relying on an analysis of the policy context and needs, the justification for the implementation of the law was to promote the Government's strategic vision for SME support. The recent consultations with various ministries involved in innovation policymaking, including the MoHTI, the MoESCS and the MoE, showed low quality of background assessments, with levels varying by actor. The MoHTI, for example, does not collect primary data or conduct extensive interviews to establish the needs of innovation stakeholders. With no innovation statistics, policymakers developing a strategy also do not use data and evidence to assess the policy context. Instead, they often develop strategies based only on desk research and a small number of closed consultation meetings with the private sector. This example echoes the conclusions of the IPO analysis, indicating that Armenia still stands to improve its approach to policy preparation (UNECE, 2020).

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39 Government of Armenia, On normative legal acts, 21 March 2018, No. HO-180-N, https://www.arlis.am/documentview.aspx?docID=120733.

Box 3.6 Good practices in evidence-based policy design – the case of Estonia

Evidence-based policymaking is the idea that public interventions should be based on objective data and research as opposed to the more intuitive, commonsense, anecdote-based approach often observed in transition economies. Overcoming policy challenges implies correctly identifying and diagnosing the underlying market failure using insights both from economic and policy theories and from empirical evidence. Bridging gaps between researchers, statisticians and policymakers is crucial to ensure that they diagnose problems correctly.

A good-practice example of evidence-based intervention design comes from Estonia's approach to youth policy. The country has adopted principles of evidence-based policy design; the Ministry of Justice, responsible for ensuring the quality of legislation, has published regulations and recommendations for evidence-based policy design including the 2012 Act on Rules for Good Legislative Practice and Legislative Drafting,[a] which outlines detailed instructions for background analysis. Estonia's Youth Field Development Plan 2021–2035[b] was developed using these guidelines and relies heavily on the outcomes of scientific research, practical know-how acquired by on-the-ground workers and, most notably, inputs and contributions from young people themselves. Policymakers involved various stakeholders in working groups, public consultations and engagement events throughout the design process to collect diverse input. The strategy also reflects the results of the evaluation of the Estonian Lifelong Learning Strategy 2020 to leverage policy learning.

In addition to extensive consultations, the strategy also benefited from Estonia's data collection systems. Since 2010, Estonia has collected and monitored economic, demographic and social data on youth through a platform called Noorteseire. In 2019, the Education and Youth Board and Statistics Estonia also launched a data tool called Juhtimislauad to provide up-to-date data on various issues and target groups related to youth work and youth policy, such as youth employment and unemployment, entrepreneurship, education attendance and participation. The development plan and other policies on youth in Estonia have thus been based on relevant and contemporary knowledge. Furthermore, the well-developed data collection system is heavily used for monitoring, adjusting and evaluating the strategy.

Finally, academia and research institutions participate in developing interventions. The Education and Youth Board has partnered with Tartu University and Tallinn University to create new frameworks for enhancing youth work in line with the strategy. These frameworks cover areas such as participation and exclusion, as well as local organization of youth work. The Government also frequently cooperates with think tanks and research institutions to analyse and design policies.

The main takeaways from the Estonia case study for Armenia's policymakers include the importance of clear and detailed instructions for evaluating policy, the need to engage a diversity of stakeholders (including experts, civil servants with on-the-ground perspective and, especially, those affected by the policy) in open consultations, and the key role of regularly collected and detailed statistics in good policymaking. Engaging research institutions in designing policies and performing background analysis as well as learning from previous evaluations are also important for successful evidence-based policymaking.

Source: UNECE.

[a] Government of Estonia, Rules for Good Legislative Practice and Legislative Drafting, No. 180, 22 December 2011, https://www.riigiteataja.ee/en/eli/508012015003/consolide.

[b] Ministry of Education and Research of Estonia, Strategic planning for 2021–2035, https://www.hm.ee/en/ministry/ministry/strategic-planning-2021-2035#documents.

RIAs are another important instrument to employ at the policy preparation stage to ensure that policies are relevant and effective, and present the best option among the alternatives. Although RIAs are mandatory in Armenia, their quality remains low. In 2020, the IPO concluded that RIA practices are rudimentary and often conducted as a formality to comply with policy development requirements. Since 2016, the Government has introduced reforms and training for civil servants conducting RIAs. Yet, as highlighted during interviews, the quality of such assessments remains variable across agencies, confirming the findings of the World Bank (2018). As a result, methodological grounds for ensuring cost- and result-efficient planning are still not in place. Two reasons for the low quality of RIAs are the resource and time constraints faced by policymakers. RIAs are sometimes seen as an unnecessary step that, imposed on already overstretched and understaffed ministries, creates an additional administrative burden.

To ensure that strategies and policies address real challenges and are effective and relevant, the Government should develop the analytical capacities of line ministries and integrate innovation foresight and use of evidence into policy processes (*recommendation 3.3.1*). Legal acts should not only set out the requirements for policymaking but also outline quality standards and concrete procedures to optimize the process. Market failure and policy context analyses should also be introduced as a step in the policy preparation cycle. Most importantly, the Government should buttress the formalization of assessment requirements with a proportional adjustment of human resource capacities and time constraints on policymakers.

Design: Implementing processes for multi-stakeholder scrutiny of government work and ensuring the engagement of the private sector and civil society on a systemic and equitable basis during the design stage remains a challenge

Consultations involving innovation stakeholders are an important element of good innovation governance because they provide a platform for the exchange of ideas, information and perspectives on innovation policy. These consultations can help policymakers gain a deeper understanding of the issues and challenges facing the innovation ecosystem, as well as the needs and priorities of different stakeholders. By engaging with a diverse group of stakeholders, policymakers can develop more informed and effective policies that align better with the needs of the innovation community. In addition, such policy consultations can help to build trust and cooperation between policymakers and innovation stakeholders, which is essential for creating a supportive and enabling environment for innovation. As identified in the findings of the IPO (2020) and confirmed during the I4SDR research process, Armenia has a tradition of open public sector consultation in all sectors. Stakeholders are invited to round tables, discussions and bilateral meetings to present their vision and give feedback on policies. In interviews, all ministries reported involving sectoral working groups and committees to gather feedback on polices and strategies.

Nonetheless, the impact of such consultations may be constrained by a lack of representation of SMEs. Private-sector stakeholders interviewed by UNECE reported that because agencies do not have objective criteria for the composition of consultative groups, large businesses are often overrepresented at the expense of SMEs. Similarly, the voices of individual actors from larger companies may have more personal leverage over proposed and adopted legislation. There are, however, differences between institutions: for example, whereas

MoHTI regularly consults with industry organizations representing SMEs, agencies that work on agricultural policy struggle to achieve representativeness.

Ensuring quality participation and feedback from civil society stakeholders similarly remains a challenge. The Law on Normative Legal Acts, for example, requires a public consultation period of at least 15 days for new legislative acts. Documents are published on the publicly accessible E-Draft[40] digital platform alongside a brief description, a justification and a summary of the number of content changes and suggestions submitted by citizens. The outcome of the consultation must be made public, along with any revisions made to the normative legal act (Hakobyan and Margaryan, 2021). The E-Draft platform used for open public consultations is a sophisticated and well-designed tool; yet, it is not yet widely used and does not see high levels of engagement. In addition, the 15-day time frame is often too short to gather meaningful input. For example, the recent law drafted by the MoHTI on State Support for the Promotion of High Technology Sector and on Amendments to the Tax Code garnered only 11 responses during the 15-day consultation period in September 2022.[41] The consultation on Armenia's Digitalization Strategy, an important policy document, garnered only 327 responses in June 2020.[42] The effectiveness of civil society participation is directly influenced by how proactive these organizations are (Council of Europe, 2019). In the research for this I4SDR, UNECE found little evidence of government agencies attempting to raise awareness of ongoing public consultations and engage the public more in the process.

Internal, interministerial consultations are similarly a critical component of policy design. Coordinating initiatives across multiple ministers is especially important given the cross-cutting nature of innovation policy. Policymakers are mandated to collect inputs from other ministries, but the effectiveness of such consultations remains variable. Armenia uses an electronic document management system, Mulberry 2.0, to automate the process of discussing, voting on and leaving feedback on policy drafts. Although the tool introduces new functionality to the process of interministerial coordination, in practice its use is constrained. Several agencies reported that the requirement to submit feedback on documents is often time-consuming and adds an extra burden to the day-to-day responsibilities of civil servants. In addition, the deadlines for feedback are often too short for meaningful contributions, with some documents having a turnaround of just one week. This creates an incentive to leave superficial comments so as to save time or to indicate that the ministry has no comments at all, as permitted by the Law on Normative Legal Acts. Thus, similar to E-Draft, Mulberry is a sophisticated tool that remains underused owing to underlying procedural constraints and misaligned incentives.

Developing concrete yet realistic criteria and guidance on how to run internal and external consultations with the private sector and civil society would be the next step in ensuring that open consultations are effective and representative (*recommendation 3.3.2*). Critically assessing which digital platforms and consultation structures work in practice and which do not would be the first step in developing such guidance (*recommendation 3.3.3*).

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40 Unified Website for Publication of Legal Acts' Drafts: https://www.e-draft.am/en.

41 MoHTI, "On state support for the promotion of high technology sector" and "On amendments to the tax code of the Republic of Armenia" of the laws of the Republic of Armenia, 16 September 2022, https://www.e-draft.am/en/projects/4707/digest.

42 MoHTI, "About approving Armenia's digitalization strategy", 24 June 2020, https://www.e-draft.am/en/projects/2524.

Implementation: Systematically integrating evidence-based monitoring of policy implementation and setting more holistic key performance indicators would help innovation policies achieve the desired impact

Innovation is inherently unpredictable and, as such, demands flexibility and adaptability from policymakers. Regularly evaluating policy against the action plan during the implementation stage makes it possible to mitigate this inherent unpredictability and overcome administrative, institutional or technical issues encountered during this stage. Most importantly, regular monitoring of progress against the goals and deadlines defined in the action plan ensures that the policy is being implemented effectively and efficiently, ultimately increasing the likelihood of achieving the desired outcome.

Armenia has a comprehensive legal framework that mandates monitoring and evaluation of policy and sectoral strategy (OECD, 2019). As examined in the IPO, using the example of the IT law, policymakers also adjust and redraft strategic and policy documents to amend changes in circumstances in practice. This is, for example, reflected in the recent draft law "On Amendments to the Tax Code of the Republic of Armenia". In response to industry feedback, the draft law would expand the maximum number of employees needed for entrepreneurs to apply for tax exemptions from 30 to 50, among other changes. Yet, a lack of innovation statistics constrains the quality of indicators used in monitoring policy, and alignment between planned and actual costs remains poor. For example, the amendment to the tax exemption law provides no quantitative or qualitative control mechanisms against which its success should be evaluated, nor does it sufficiently justify the amendments it introduces in relation to the original key performance indicators of the IT tax exemption regulations.

Performance targets and projections in strategic documents are often ambitious yet arbitrary. The Programme of the Government of the Republic of Armenia (2021–2026), for example, sets out to create 16,000 new high-tech sector jobs and a sectoral turnover reaching 500 billion drams (almost $1.3 billion), which would constitute 6–7 per cent of the GDP. Yet, aside from these quantitative output goals, the programme does not set out any strategic, operational or process-oriented key performance indicators. As a result, it is hard to measure the contribution of individual legal acts to the achievement of those targets, and other process- and governance-related achievements and improvements are underprioritized. More generally, without a comprehensive monitoring and evaluation framework and without access to accurate and up-to-date statistics, it is almost impossible to assess the impact and contribution of policy measures to the end results.

Systematically integrating evidence-based progress assessments is crucial to ensure that policies remain flexible and effective. Setting good performance targets that go beyond output metrics in policy documents and establishing a systemic linkage of monitoring to policy design is an important next step for Armenia (*recommendation 3.3.4*).

Evaluation: Using statistics for policy evaluation would ensure better accountability and provide opportunities for policy learning

After implementing a policy or a strategy, the Government must conduct an evidence-based evaluation. This process is essential to establish legitimacy and accountability for the use of public resources and, more importantly, to leverage lessons learned for future

policies. Although policymakers should rely on statistical analysis at all stages of the policy process, such evidence is especially important when assessing policy outcomes.

As UNECE concluded in the IPO, the monitoring and evaluation of government policies and measures, particularly those related to science, technology and innovation, is still inadequate. To that effect, the IPO recommended systematically integrating monitoring and evaluation into the design of science, technology and innovation policy. As with policy background analysis, evaluation stage is generally viewed as a formality and an administrative burden rather than a useful mechanism to optimize policymaking processes. No requirement defines the quality and independence standards of such evaluations. Comprehensive evaluation mechanisms are rarely included in policy documents and strategies. For example, the Digitalization Strategy 2021–2025 does not outline how to evaluate and measure implementation progress. When evaluations are conducted, the focus does not go beyond concrete and measurable outputs and provides little analysis on the lessons learned from the implementation process. In addition, the analysis rarely examines the long-term outputs and externalities associated with interventions comprehensively – an important aspect of future-oriented innovation policy interventions. This approach results in a lack of learning and feedback mechanisms to improve policy design processes.

Much of the institutional knowledge acquired through policy implementation, in turn, remains concentrated in individuals instead of being disseminated as policy knowledge. In the past, several agencies – including the MoE and the Small and Medium Entrepreneurship Development National Centre – published online annual activity reports summarizing their work and achievements for the year. These reports served as the basic impact analysis for the two bodies, yet no reports have been published since 2017.

Another major bottleneck that impedes evidence-based innovation policymaking is the lack of innovation statistics. Armenia does not systematically collect data on innovation, which hampers decision-making and evaluation. The collection of statistics for innovation is inhibited by the shortage of skilled staff, especially for labour-intensive tasks involving questionnaires and surveys, as well as by lack of financial resources, outdated software and outdated data collection and dissemination methods. In 2015, the NSC implemented a two-year EU twinning programme aimed at strengthening the collection and dissemination of statistics. One of the six components of the programme focused on innovation statistics, aiming to develop a plan for collecting statistics on the basis of identified user needs and in accordance with European standards. Within the framework of the fifth component of the programme, the NSC conducted the Pilot Survey of the Innovation Activity of Legal Entities and Individual Entrepreneurs (Armstat, 2017). The results were considered highly useful by various stakeholders in the MoHTI, the MoE and international organizations. Yet, it did not result in systematic collection of innovation statistics that could be used for tracking policy impact over time. Although in recent years the NSC has made efforts to digitalize statistics and make them more accessible through an online portal, the data available on the platform does not provide sufficient insight into the state of innovation and entrepreneurship in the country.

Armenia must use data and evidence to evaluate policies before and after implementation, accumulate policy knowledge over time and consider ways to build on the results of the 2017 pilot innovation survey. Statistics must be collected regularly, standardized across industries and used effectively in decision-making to support the development and

adoption of technologies, products and processes. To achieve this, Armenia should reassess its current use of statistical data for innovation and consider adopting best international practices from the Oslo Manual.[43] Armenia should carry out regular surveys to gather at least basic innovation-related statistics, such as the share of enterprises introducing innovation in production and processes, the number of enterprises that received public financial support for innovation activities, data on obstacles to innovation and statistics on innovation by sector (*recommendation 3.3.5*).

Although robust legislation mandates several aspects of the innovation policymaking process, practical challenges constrain the effectiveness of these normative regulations. Resolving these practical challenges would be key to optimizing the process of innovation policymaking. Armenia's openness to new solutions and proven track record of successful policy reform is important here. The creation of the Public Administration Report team in 2022 and the launch of the SDG lab for public sector innovations showcase Armenia's willingness to adopt new business models for public policy.

Innovation policy support, especially in non-tech sectors, needs to focus on ensuring relevant skills, capacities and demand for innovation

A central part of increasing innovative activity is ensuring that the private sector has sufficient absorptive capacity – the necessary managerial, organizational and technological capacities and resources to manage and integrate innovative products, services and processes into their business activities (chapter 2). The ability to systematically identify, absorb and assimilate external knowledge drives innovation and ultimately increases the productivity and competitiveness of firms (Cohen and Levinthal, 1990). In Armenia, the main challenge to private sector absorptive capacity is the lack of managerial, technical and technological skills, which has led to a skills mismatch in the labour market (USAID and others, 2022).

With no SME development agency, the responsibility for public support for skill development is distributed across various ministries, including the MoHTI, the Ministry of Labour and Social Affairs and the MoE, which develop specific support programmes and initiatives. Previously, SME support was implemented by the Small and Medium Entrepreneurship Development National Center, which is now the responsibility of the Investment Council under the MoE, within the framework of the SME Development Strategy 2020–2024. This strategy sets out, among other objectives, to foster capacity-building for SMEs, including the development of entrepreneurial skills. In addition, donors actively fund business incubation and acceleration programmes. Within the innovation infrastructure, educational and technological centres provide support for skill development targeted at youth, specifically in the IT and engineering sectors (chapter 4). Non-governmental support for skill development is also provided by business unions.

Nevertheless, many SMEs still lack the professional and business development skills required for innovative business development, limiting their capacity to improve competitiveness and boost innovation (chapter 2). Firms report a lack of both theoretical and practical knowledge among graduates (USAID and others, 2022). According to the 2020 OECD

43 The Oslo Manual provides widely accepted guidelines for collecting, measuring, reporting and using data on scientific, technological and innovation activities.

SME Policy Index, Armenia's score on policy development in SME skills (3.26) was lower than the average (3.36) in the Eastern Partnership. In a survey conducted in 2021 by the Republican Union of Employers, over half of the respondents stated that graduates are only somewhat or not at all equipped with the skills required by companies (Republican Union of Employers of Armenia and ILO, 2021). Furthermore, almost 95 per cent of companies were unaware of the training schemes offered by the Government. A recent study showed that 92.1 per cent of respondents had not taken advantage of free support services or training sessions between 2019 and 2021 – more so for SMEs than large firms, although smaller firms expressed their clear wish to develop business knowledge and skills (IFC, 2021). Furthermore, firms typically do not use private or public employment and career centres to hire new employees (USAID and others, 2022).

Outside the high-tech sector many firms struggle to adopt technology, an important way to increase productivity, stay relevant in global value chains build technological capacity, and increase local markets for sophisticated products and services (chapter 4). For example, in 2020 50 per cent or less of SMEs used IT to improve business processes, and only 20 per cent of SMEs used online contracting or digital payment. One of the reasons identified in a World Bank survey is that most firms do not see the relevance or value of using technology or online services in their business activities.[44]

To address these challenges, the Government will have to introduce and continuously update targeted business advisory services, such as training and skill development support programmes for entrepreneurship and innovation, to develop current and future skills needed in the private sector. These services should be based on the findings of continuously conducted, comprehensive assessments in the labour market in order to effectively address existing gaps and future skills needs (*recommendation 3.4.1*). Doing so will also require revising and updating civil servant training for innovation. With regard to increasing innovative capacity, support programs for both public and private sector actors should encourage a collaborative culture and foster experimentation, as well as use evidence-based and data-driven decision making.

Engaging private sector stakeholders and employers in designing and implementing skill development support and training could help ensure that such efforts adequately reflect and address labour market needs. This could be done, for example, by engaging individuals or industry unions in curriculum review committees (*recommendation 3.4.2*). Lastly, the Government needs to consistently support the awareness of and incentivize the use of skill development support, relaying the importance of technical, managerial and technological skills needed for business development and innovation. This will also require a deep understanding of the behavioural changes related to experimentation and innovation that are needed to make the impact of this support more sustainable. This could be done, for example, by matching coaches and mentors from industry with entrepreneurs (chapter 4) and by leveraging the knowledge and skills of the diaspora (chapter 5). Another option would be to introduce automatic (online) evaluation mechanisms for tech adoption capacities that can help companies identify skills gaps, subsequently connecting these to

44 World Bank Blogs, "Internet use in Armenia: How do individuals and businesses use the internet to access opportunities?", 1 May 2020, https://blogs.worldbank.org/europeandcentralasia/internet-use-armenia-how-do-individuals-and-businesses-use-internet-access.

relevant service providers as well as support tools such as co-financing tools and voucher schemes (*recommendation 3.4.3*). Business advisory services could be advertised through industry associations and networks.

Cooperation between the education and private sectors is marginal. With the exception of the IT sector, which closely engages in policy and curricula development related to skills support, cooperation across other policy areas is typically only in the form of internships. Strengthening strategic cooperation mechanisms will have a positive impact on feeding business needs into curricula development for innovation (USAID and others, 2022). This could be done by introducing dedicated coordination mechanisms such as working groups for sector-specific skill development and by further incentivizing private sector engagement, especially in non-IT sectors, in these coordination mechanisms. Furthermore, private sector stakeholders could further leverage alumni networks and university career services (*recommendation 3.4.4*). Expanding the use of matching grants[45] or innovation vouchers[46] would help subsidize and incentivize academia-industry R&D projects. Furthermore, the large diaspora (chapters 1 and 5) could help establish and strengthen the connection and collaboration between academia and businesses abroad, for example by actively involving them in scientific conferences, encouraging their cooperation on innovative projects, and supporting mentorship and exchange programs and visits.

Ongoing efforts to strengthen the role of women in innovation and provide opportunities for female entrepreneurship will be crucial to fully leveraging human capital for innovation

Although support to female entrepreneurs is available in the form of skill development and capacity-building, there are still challenges to spurring female entrepreneurship. On the level of policy development with regard to entrepreneurial learning and female entrepreneurship, Armenia scored lower than the EaP average in 2020 – 2.84 versus 3.58 (OECD, 2020).

Cultural and social norms as well as challenging conditions for childcare support are the main factors inhibiting women from engaging in entrepreneurship and reaching high-earning leadership roles in the labour market (IFC, 2021). Although interviewees perceived gender equality to be improving, many stereotypes and patriarchal perceptions continue to shape women's engagement in the labour market. Traditional gender roles remain strong as women are most often responsible for unpaid domestic work (UN Women, UNFPA, 2022). Between the ages of 21 and 40, women typically exit the labour market to take care of their children and families. For this reason, they typically reach only mid-level management positions. Female employment is highest between the ages of 40 and 54, but still lower than male employment, in many cases because of outdated skills or insufficient work experience upon re-entry into the labour market (Honorati, 2019; EU, 2021). Interviewees for the I4SDR mentioned that another impediment is the limited availability of preschool institutions and daycare facilities, especially in larger urban areas such as Yerevan. Those available are typically quite expensive and only partially financially supported by the State.

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45 A matching grant is a type of policy instrument that subsidizes innovation activity, matching a firm's innovation investment.

46 Innovation vouchers support collaboration between SMEs and academia that can help SMEs develop and deploy innovative ideas.

The Ministry of Labour and Social Affairs is developing a new labour strategy that will focus on female empowerment and support their engagement in the labour market. Support programmes – currently on hold until the Government adopts the new labour strategy – are also in planning to encourage women to return to the labour market, including training and upskill programmes and on-the-job training to ensure a smooth transition. Reforms have been made to facilitate options for paternity leave.

Making use of IEP can prove to be a powerful tool in incentivizing and spurring demand for innovation

Budgets for public procurement represent 13–15 per cent of GDP, with similar shares across countries with similar levels of income (Bosio and Djankov, 2020; OECD, 2021). In contrast to regular procurement, which focuses on specific product and service requirements, innovation-enhancing public procurement (IEP) defines only the functional requirements of a demanded innovation, leaving it to the discretion of the innovator or entrepreneur to develop novel and creative approaches and solutions to current challenges. IEP has the added benefit that it can be used as a tool for public policy that has the potential to significantly accelerate innovative activities by encouraging systematic experimentation with new ways of creating societal value and transformation (Edquist and others, 2015). IEP can create demand for R&D and innovation, playing a key role in addressing grand developmental challenges by incentivizing new ways of producing and consuming in line with the transition towards circular economy and the digital and green transformations. Despite IEP's important role in the invention of the Internet and digital platforms,[47] very few public procurement budgets specifically target IEP.

As noted in the IPO (2020) and the recently published IIPO (2023), Armenia does not yet use IEP to foster innovative activity. The 16 overarching mission-oriented goals outlined in the country's national Transformation Strategy 2050 provide a good basis for implementing IEP in current policies and strategies. Based on the best practices derived from the *UNECE Handbook on Innovation-Enhancing Procurement in Georgia* (2022), the IIPO (2023) provides an IEP road map that outlines barriers identified from international experience, for example in the legislative framework and linkages between science and business; it also describes the capacities needed to implement effective IEP policy (*recommendation 3.4.5*). In addition, funding for IEP will need to be adapted to be more outcome-based and flexible, to be able to better measure the success of IEP support and the achievement of targets and objectives outlined in strategic documents.

Despite recent policy initiatives, the education and R&D sectors still need improvement to spur innovation in the country

In recent years Armenia has made efforts to strengthen entrepreneurial skill development and update the educational curriculum across educational levels, including in vocational education and training, with the introduction of mandatory entrepreneurship modules and practical training for students. As outlined earlier, a key challenge for the country is the mismatch of graduates' skills and the skills needed in the private sector, which hampers

47 DARPA (Defense Advanced Research Projects Agency), "ARPANET", https://www.darpa.mil/about-us/timeline/arpanet#:~:text=Its%20initial%20demonstration%20in%201969,enabled%20ARPANET%20to%20become%20operational.

productivity and growth. The country is drafting a law on higher education and science (table 3.1),[48] as well as engaging with international donor support – for example, from the World Bank[49] – to address these challenges.

Recent trends show that more students are dropping out of higher education, especially in STEM education. Over the past decade, the absolute number of STEM students has been declining, leaving the country without a strong pipeline of STEM professionals. At the same time, the share of high-school graduates choosing to specialize in IT is increasing. Conducting an in-depth study of these trends and conditions is an important first step to understanding how Armenia can best encourage more students to opt for STEM education in areas outside the IT sector, continuously updating the curricula to the needs of the labour market (*recommendation 3.5.1*).

To address the labour skill needs in the private sector, the former Ministry of Education and Science[50] established a national framework of qualifications (decree adopted in 2011 and updated in 2016), developed with industry actors and differentiating requirements by sector. It lists the skills and knowledge requirements for graduates across the eight levels of education, from general to higher education. This framework is oriented towards requirements for formal education, leaving little room to include skills from outside the formal education system. It does not yet seem to be achieving its desired impact on the universities and graduates (ETF, 2021). Despite the mechanisms in place to involve industry employers in the design of training, strong engagement occurs mostly in the high-tech sector, not in other sectors of the economy. The lack of private sector engagement creates a chasm between the practical needs of employers and the theoretical nature of universities. In addition to incentives for private sector engagement in curricula design, as explained earlier, mechanisms to monitor the performance of graduates in the labour market could be a useful tool to help gather information that can feed into subsequent policy design (*recommendation 3.5.2*). Such mechanisms are being introduced.

Universities conduct studies of labour market needs, based on which each university suggests certain courses that they would like to introduce. Each university is responsible for choosing, designing and implementing these courses, whereas the MoESCS is responsible only for providing the overall framework, with which curricula need to align. Yet, the weak coordination between the private sector and academia inhibits effective curricula design that responds to labour market needs. Armenia has also introduced the concept of microqualifications, short-term training courses developed by universities, with regard to vocational education and training, which the MoESCS plans to include in the national skills framework. Currently, no concrete legislative provisions ensure cooperation between science and education. One way to address this need could be by establishing sectorial skill councils. Such councils would include representatives from the public and private sectors and academia as a platform for dialogue, as currently occurs for selected

48 The law was submitted but was not signed by the president owing to reported inconsistencies of the law with the Armenian Constitution. https://arminfo.info/full_news.php?id=62104&lang=3.

49 World Bank, "Armenia to improve education system and learning outcomes, with World Bank support", 20 May 2022, https://www.worldbank.org/en/news/press-release/2022/05/20/armenia-to-improve-education-system-and-learning-outcomes-with-world-bank-support.

50 In 2019, the Ministry of Education and Science and the Ministry of Culture, Sport and Youth Affairs merged into the Ministry of Education, Science, Culture and Sports of Armenia. MoESCS, "History", https://escs.am/en/static/history.

sectors under the five-year USAID Armenia Workforce Development Activity programme.[51] Another example from which Armenia could draw lessons is the Estonian coordination system for skill development, called OSKA (Oskuste arendamise koordinatsioonisüsteem). The OSKA coordination council, which includes a broad range of public and private sector stakeholders and experts, conducts skills anticipation exercises through regular reports on labour market trends and needs (Cedefop, 2020).[52]

In Armenia, institutional and competitive funding and support for research is provided by the SSC. The Academy of Sciences under the SSC manages and allocates funding to its 30 research institutes, dedicated to five areas of research. Gross expenditure on R&D (GERD) has recently increased (chapter 2), with a large part of it allocated to human capital development, including higher wages albeit from a low base, and to upgrading of the research sector, such as modernizing research facilities and infrastructure. Nonetheless, levels of GERD remain comparatively low and a large share of the funding flows into thematic funding rather than applied research (chapter 4). The portfolio of R&D projects is narrow and the projects are not yet impactful, and research institutes face difficulties in attracting younger talent.

In this context, increases in R&D funding will need to be accompanied by appropriate mechanisms to ensure the right prioritization of research and effective resource allocation and will need to have the intended impact in creating important linkages and driving entrepreneurship. Creating the right conditions and incentives as well as removing barriers to entrepreneurship in the research sector can help ensure greater R&D investment and catalytically support R&D activity and collaboration within the NIS. The five-year plan of the Academy of Sciences aims to increase the volume of interdisciplinary and applied research and establish a research university to engage youth.

A core point of intervention should be enabling and promoting networks and linkages more broadly

Strong linkages and networks between science, industry and academia are a vital element of any effective national innovation ecosystem, as they facilitate and incentivize collaboration and the co-creation of new products and organizational processes, enhance the transfer of knowledge and skills, foster the provision of a qualified labour force for business companies and support the commercialization of research. Currently, science–industry linkages and business clusters remain underdeveloped, with most support driven by donors, and rely on ad hoc initiatives, although the Government is undertaking greater efforts to address these challenges (chapter 4).

Collaboration between the public sector, research and industry is modest, and public research institutions often work in isolation from the private sector. According to the 2019 Global Competitiveness Index, the country scored 73/141 on *Multi-stakeholder collaboration*. As a result, few start-ups are science intensive. Recognizing this challenge, the government programme for 2021–2026 includes ambitions to strengthen the interactions between

51 MoESCS, "Workforce development in 3 sectors: a new program is launched", 9 December 2021, https://escs.am/en/news/10936.

52 The OSKA conducts these studies across 24 sectors every five to six years. These studies provide useful information for both individuals and educational institutions to make more informed decisions when choosing and/or designing educational paths and to help bridge the mismatch in the labour market.

education, science and the labour market. Yet, current support for science–industry linkages remains ad hoc, mostly through donor-driven projects, with some pilot initiatives introduced in recent years. Armenia should consider introducing mechanisms to foster interactions and linkages between research, academia and industry more systematically, for example, by introducing innovation voucher schemes or by expanding mobility programmes (*recommendation 3.5.3*). Sub-regional trends in science–industry collaboration are also examined in the recent UNECE IIPO. Given the country's relatively high share of ICT services exports and its integration into global ICT services supply chains, Armenia could build on the linkages created by foreign partners by supporting local ICT firms in upgrading and strengthening linkages with domestic R&D organizations and universities (UNECE, 2022).

Policy messages and recommendations

Since the first UNECE IPR of Armenia (box 3.2), there have been several positive developments towards improving innovation policy. Some aspects still face challenges, which Armenia will need to address to fulfil its potential for innovation-led sustainable development (table 3.2).

Table 3.2 **Developments and trends in innovation policy since the first UNECE IPR for Armenia (2014)**

Improvements	Remaining challenges
✓ The IPR (2014) noted strong political will and high-level support from the Government in driving innovation-led growth, an ambition that continues to this day, as seen in the adoption of the country's overarching national strategies and programmes for sustainable development.	→ The IPR (2014) noted the narrow focus of innovation support for cutting-edge, technological innovation. Since then, other types of innovation have been targeted, yet the focus remains on the high-tech and engineering sectors, missing out on opportunities, for example in process innovation, in less productive sectors such as agriculture (chapter 5).
✓ Armenia has complemented the institutional framework for innovation and high-tech growth – previously divided between the SCS and the MoE – by establishing the MoHTI. Support to the high-tech sector is important and can be beneficial to overall economic development, when undertaken in a coordinated manner with other ministries and sectors.	→ Despite the establishment of the MoHTI, the NIS remains fragmented with regard to policy strategies and interministerial coordination in innovation support.
✓ Armenia has introduced a range of organizations and institutions within the innovation infrastructure to create a conducive environment for innovation and entrepreneurship, especially in the ICT sector (chapter 4).	→ Similar to the situation in 2014, Armenia will need to continue investing effort in more closely involving the business sector in the innovation policy process, to be able to adequately address the needs and constraints of business and enhance the impact of initiatives introduced.
✓ Early-stage financing for start-ups has now been introduced through various financial support mechanisms in the innovation infrastructure, leading to a significant increase in the number of start-ups created (chapter 4).	→ Innovation policy processes still miss appropriate monitoring and evaluation procedures and measures to assess the impact of policies.
✓ The overall entrepreneurial culture has been expanding, especially among the younger population, through various programmes, incubators and other elements in the innovation infrastructure (chapter 4).	→ The IPR (2014) also recognized the lack of evidence-based policymaking and the poor statistical base for assessing policies and their implementation.
	→ The lack of skills in the private sector needed for innovation remains a shortcoming in the NIS, such as the need to strengthen support SMEs in finding qualified staff, despite some good initiatives in place.

Source: UNECE.

Table 3.3 provides concrete recommendations, based on the challenges and opportunities for innovation-led growth outlined in this chapter, on how to strengthen innovation policy governance in Armenia. The next chapter provides an in-depth analysis of how the innovation infrastructure can be improved to provide effective support for start-up and business development for innovation. Chapter 5 then looks at how the Government can support and engage the large Armenian diaspora to leverage opportunities to spur innovation-driven growth in the agriculture sector.

Table 3.3 Summary of policy recommendations on innovation policy governance in Armenia

Recommendation 3.1: Strengthen the **policy and legal framework** for innovation-led growth.

The policy landscape for innovation is fragmented and the legal framework largely outdated, with a lack of synergy and complementarities for innovative cooperation and co-creation.

Actions	Priority	Time frame	Actors
3.1.1 **Develop and implement a more holistic definition and approach to innovation at the national level** to support innovative products, process, services, and business and marketing models, beyond the high-tech sector.	①	Short-term	MoHTI, MoE, MoESCS
3.1.2 **Develop and adopt an overarching national innovation strategy** to provide strategic direction for innovation-led growth across sectors, ensuring its alignment with overall development strategies and involving all relevant government bodies.	②	Medium-term	MoHTI, MoE, MoESCS

Recommendation 3.2: Improve **innovation policy coordination and alignment** across ministries and all government levels.

Horizontal and vertical policy coordination is generally missing, hindering achievement of the desired impact of policy support.

Actions	Priority	Time frame	Actors
3.2.1 **Enhance innovation policy coordination**, for example by establishing a national innovation council or the equivalent to provide overarching strategic support and coordination oversight to drive innovation systematically across the economy and actors. The council should have a clear mandate to guide and coordinate innovation policy design and implementation, based on international experiences and adapted to national specificities.	①	Medium-term	Government, MoHTI, MoE, MoESCS
3.2.2 **Establish working groups** under an innovation policy coordination body on a more consistent basis, to enhance policy implementation and ensure effective collaboration between ministries that influence innovative activity.	①	Short-term	MoESCS, MoE, MoHTI
3.2.3 **Consistently and systematically engage sub-national authorities** in coordination and governance of innovation policy.	③	Long-term	MoHTI, MoE, MoESCS

Recommendation 3.3: Ensure **inclusive, effective and evidence-based policymaking processes** involving both public and private sector representatives.

Innovation policy design and development processes are not functioning effectively, resulting in gaps and negatively affecting the quality of policies. Evidence-based policymaking is weak because innovation data are not collected and used in designing innovation policy.

Actions	Priority	Time frame	Actors
3.3.1 **Develop the analytical capacities of line ministries** to integrate innovation foresight and use of evidence into policy processes. Ensure that civil servants develop both the skills – such as qualitative and quantitative evidence-based analysis, design thinking and policy foresight – and the mindset conducive to collaboration and willingness to learn from mistakes that is necessary for policy evaluation.	①	Medium-term	Government, MoHTI, MoE, MoESCS
3.3.2 **Develop more inclusive criteria** on the makeup of consultative committees to ensure the inclusion of SMEs and civil society actors.	②	Short-term	Government, MoHTI, MoE, MoESCS
3.3.3 **Assess the effectiveness of the digital platforms and policy consultation structures in place to understand how they work in practice**. Adjust the use of these consultation tools accordingly, addressing their practical shortcomings.	②	Short-term	MoE, MoESCS
3.3.4 **Set performance targets that go beyond simple output indicators**, instead also covering strategic, operational and process-oriented criteria, and establish a system for consistent monitoring and re-evaluation of policy.	②	Short-term	Government, MoHTI, MoE, MoESCS
3.3.5 **Consider adopting best international practices on innovation statistics collection** from the Oslo Manual, and integrate data and evidence into each step of the policymaking process. Start to carry out regular surveys to gather basic innovation-related statistics.	①	Short-term	MoHTI, MoE, NSC

Recommendation 3.4: Strengthen **private sector innovation** by supporting enhanced absorptive capacity and demand for innovation.

In addition to the problem of low demand for innovation in the private sector, many firms in the sector lack the skills necessary to identify, adopt and integrate external knowledge and processes for innovative business development.

Actions	Priority	Time frame	Actors
3.4.1 **Introduce and continuously update targeted training as well as public and private programmes for skill and capacity development support for innovation**, to fulfil current and future skill needs in the private sector.	①	Medium-term	MoESCS
3.4.2 **Consistently engage private sector stakeholders and employers in designing and implementing skill development support** to fully reflect current skill needs; for example, by engaging individuals or unions in curriculum review committees.	①	Short-term	MoESCS
3.4.3 **Support awareness of and incentivize the use of support for skill development**, relaying the importance of skills for business development and innovation, for example, by introducing automatic (online) evaluation mechanisms linked to relevant business advisory services and tools.	②	Short-term	MoESCS, MoHTI, MoE
3.4.4 **Introduce dedicated coordination mechanisms between the education and private sectors such as working groups for sector-specific skill development**, including incentives for private sector engagement in these mechanisms and other services provided by academia, such as alumni networks.	②	Medium-term	MoESCS
3.4.5 **Introduce IEP practices and a framework**, based on international and sub-regional best practices and including mechanisms for outcome-based budgeting.	②	Long-term	MoESCS, MoHTI, MoE

Recommendation 3.5: Strengthen the **education and R&D** sectors to facilitate human capital development and research for innovation.

Despite recent policy initiatives, the education and R&D sectors face challenges such as insufficient engagement with the private sector, which impedes the commercialization potential of the economy.

Actions	Priority	Time frame	Actors
3.5.1 **Conduct an in-depth study on factors and trends in STEM graduates** to use to continuously update relevant curricula on the basis of labour market needs.	①	Medium-term	MoESCS
3.5.2 **Introduce mechanisms to monitor the performance of graduates** in the labour market.	②	Short-term	MoESCS
3.5.3 **Consider introducing mechanisms to foster interactions and linkages between research, academia and industry more systematically**, for example, by introducing innovation voucher schemes or by expanding mobility programmes.	①	Medium-term	MoESCS

IEP = innovation-enhancing procurement; MoE = Ministry of Economy; MoHTI = Ministry of High-Tech Industry; MoESCS = Ministry of Education, Science, Culture and Sport; NSC = National Statistical Committee; R&D = research and development; SMEs = small and medium enterprises; STEM = science, technology, engineering and mathematics; SSC = State Science Committee.

Source: UNECE.

Chapter 4

IMPROVING THE EFFECTIVENESS OF THE INNOVATION INFRASTRUCTURE IN ARMENIA

Main messages

- The innovation infrastructure of Armenia is growing rapidly, not only in size but also in types of support for innovation for sustainable growth, reaching a new level of support for innovators.
- Many support elements, including incubators, accelerators, mentorship and networking programmes, and funding access, contribute effectively to innovation activities; however, remaining challenges impede further growth.
- Innovation support functions are dispersed among private and public initiatives and organizations operating within the innovation ecosystem, with most support programmes targeting early-stage start-ups.
- The innovation ecosystem lacks coordinated efforts to transfer technology, leading to insufficient commercialization and internationalization of innovative products and services.
- As the outcomes of innovation materialize only in the long term, measuring the efficiency of innovation support by tracking performance results on a regular basis will be essential to drive the development of effective innovation infrastructure for sustainable, innovation-led growth.

Recommendations at a glance: Improving the effectiveness of the innovation infrastructure

Recommendation 4.1: Create a strategy defining the objectives and functions of innovation infrastructure in line with the overarching vision for promoting innovation in Armenia.

Actions	Priority	Time frame	Actors
4.1.1 Define the strategic priorities for developing innovation infrastructure in the overarching strategic vision for innovation in Armenia.[a]	①	Short-term	MoE, MoHTI, MoESCS
4.1.2 On the basis of the strategic priorities defined, develop a three-year action plan for innovation infrastructure with a corresponding budget and results framework.	①	Short-term	MoE, MoHTI, MoESCS
4.1.3 Ensure close cooperation with key stakeholders in the public and private sectors for developing and validating the action plan, and attract funding for its implementation.	①	Short-term	MoE, MoHTI, MoESCS

Recommendation 4.2: Expand State support instruments and funding for innovation by improving the legal and regulatory framework.

Actions	Priority	Time frame	Actors
4.2.1 Map and analyse the legislation on the innovation infrastructure.	①	Short-term	MoHTI, MoE
4.2.2 Update regulations on developing innovation infrastructure.	①	Short-term	MoHTI, MoE
4.2.3 Expand the government tool set by introducing collaborative support instruments and funding mechanisms (including public-private partnership modalities) for innovation infrastructure elements.	②	Long-term	MoHTI, MoE

Recommendation 4.3: Optimize and expand support available through the innovation infrastructure on the basis of geographic specificities and stages of innovation.			
Actions	**Priority**	**Time frame**	**Actors**
4.3.1 Increase support for boosting a start-up culture and facilitating idea generation in the regions.	①	Long-term	MoHTI, MoE
4.3.2 Upgrade the infrastructure in Yerevan by increasing the support available for scaling innovative projects.	①	Long-term	MoHTI, MoE
Recommendation 4.4: Leverage funding, networking and mentorship opportunities by establishing linkages with international accelerators, incubators, VC firms and investors, specifically emphasizing the involvement of diaspora.			
Actions	**Priority**	**Time frame**	**Actors**
4.4.1 Foster linkages between the local innovation infrastructure and VC firms and/or investors from the diaspora (e.g. establishment of a diaspora investment fund, periodic networking and matchmaking events).	②	Long-term	MoE, MoHTI
4.4.2 Establish partnerships with international accelerators and incubators to support growth-stage start-ups when entering or scaling up in new markets.	②	Long-term	MoE, MoHTI
Recommendation 4.5: Develop technology transfer capacities in government and the private sector for both technology absorption and commercialization.			
Actions	**Priority**	**Time frame**	**Actors**
4.5.1 Map the scientific potential of Armenia by surveying universities and research institutions to inventory scientific inventions and assess their commercialization potential.	①	Short-term	MoE, State Science Committee
4.5.2 Identify business challenges and define technical assignments for R&D.	①	Long-term	MoHTI, MoE
4.5.3 Build the technology absorption capacity of the private sector.	①	Long-term	MoHTI, MoE
Recommendation 4.6: Establish a monitoring and evaluation framework for regular assessment of infrastructure performance.			
Actions	**Priority**	**Time frame**	**Actors**
4.6.1 Adopt a multilayer national framework of performance indicators for measuring the efficiency and effectiveness of support programmes.	①	Short-term	MoHTI, MoE
4.6.2 Encourage impact measurement.	②	Long-term	MoHTI, MoE
4.6.3 Publish periodic reports on the performance of the innovation infrastructure.	②	Long-term	MoHTI, MoE

MoE = Ministry of Economy, MoHTI = Ministry of High-Tech Industry, R&D = research and development, VC = venture capital.

Source: UNECE.

[a] This relates to and can be combined with recommendation 3.1.1 in chapter 3.

Armenia is in the process of introducing supporting elements to spur rapid expansion of the innovation infrastructure

With the ambition to further drive innovation-led growth and strengthen the innovation infrastructure within the national innovation system (NIS), Armenia has introduced several policies and programmes targeting innovation and technology entrepreneurship. In particular, the establishment of incubators, acceleration programmes and technology centres has expanded the scope and scale of innovation infrastructure.

Innovation infrastructure is a central component within an NIS as it provides targeted support in the form of capacity-building services and resources to strengthen entrepreneurial activity and start-up creation. Various parts of the infrastructure typically support firms and start-ups throughout the process of developing innovative businesses, from the idea phase all the way through the commercialization and scale-up phases (box 4.1).

The emergence of innovation infrastructure in Armenia can be traced to the early 2000s, following the establishment of the first incubator, the Enterprise Incubator Foundation (EIF), within the framework of a World Bank project (figure 4.1). Aiming to foster innovation and the growth of the information and communication technology (ICT) infrastructure in the country, EIF has implemented multiple projects, including the Science and Technology Entrepreneurship Programme and the Business Partnership Grant with the U.S. Civilian Research & Development Foundation and the Government of Armenia. EIF is one of the key players in the innovation ecosystem, being responsible for executing international and local projects in coordination with key partners such as the Government of Armenia, Microsoft, HP, Intel, the World Bank, the United States Agency for International Development (USAID), the United Nations Development Programme (UNDP) and the European Bank for Reconstruction and Development, among others.

One of the first elements of the innovation infrastructure, Viasphere Technopark, has hosted several local and international ICT companies. In the early 2000s, global tech companies such as Epygi Labs, Lycos and HPL established offices in the country, generating employment opportunities in the information technology (IT) sector. Many employees of these firms eventually applied the skills they acquired to establish their own tech ventures.

Despite this early activity, the innovation infrastructure did not advance much until the early 2010s, with the founding of the first generation of tech start-ups. Applying innovative software solutions, several founders, including some from the Armenian diaspora, introduced values and practices commonly associated with innovative entrepreneurship. The growth of the innovation infrastructure accelerated with the launch of the Microsoft Innovation Centre (MIC) in 2011 and the first venture capital (VC) firm in Armenia, Granatus Ventures, in 2013. Subsequently, a series of new start-ups emerged.

Currently, the infrastructure has entered the next stage of development, increasing in scale and variety with the emergence of new supporting elements. These include several accelerators and incubators, technological and educational centres, venture funds, business angel networks and grant schemes. Driven by private initiatives, these elements have been supported and funded by donor institutions. Over time, especially following the establishment of the Ministry of High-Tech Industry (MoHTI), the Government has increased its contribution to ecosystem development. These initiatives have been significant drivers of growth in the economy, resulting in the emergence and worldwide success of Armenian

Box 4.1 Definition of innovation infrastructure and its elements

Supporting infrastructure can be divided into two main types: **physical** and **virtual**.

Physical infrastructure refers to the facilities, tools and scientific instrumentation that the scientific and technological communities use to carry out research as well as the locations offered to host spin-off companies and other organizations involved in this process. Common types of physical infrastructure:

- Technology transfer offices, to transfer and commercialize technology outwardly as well as to absorb and adapt technology from elsewhere[a]
- Industry liaison offices, to develop cooperation between research and industry
- Proof-of-concept centres, to verify that new products and services will function
- Prototype development support facilities, to demonstrate that new products and services function
- Market and competitor intelligence surveillance organizations, to assess the market potential of commercialized technologies
- Physical quality facilities, to conduct metrology, standardization, testing, quality management, certification and accreditation, and assessment of conformity and quality, as well as incubators to grow early-stage businesses
- Scale-up centres, to conduct industrial production testing
- Multifunctional industrial platforms offering a variety of physical facilities

Virtual infrastructure refers to personal contacts, networks, systems and knowledge intermediaries as well as brokers. Personal contacts and networks, e.g. generated through individual working relationships between researchers in business and those at universities and public research organizations, can be effective starting points for licensing and joint research and development (R&D) contracts between universities and companies, with potential for formalizing research results though technology transfer offices. Virtual infrastructure also includes intellectual property (IP) laws, regulations and practices that support technology commercialization; investment funds (seed capital and later stage) to support business development; and funding for technology transfer and innovation, e.g. from a national innovation fund.

Elements of innovation infrastructure include the following:

Free economic zones are a kind of special economic zone designed by national trade and commerce administrations to facilitate economic activities through the reduction of taxes and other payments.

Business incubators help start-up companies and individual entrepreneurs to develop their businesses, offering a range of services from training in management to providing office space and facilitating access to financing.

Technology incubators support the commercialization of new and complex technologies on their way from innovation to market deployment.

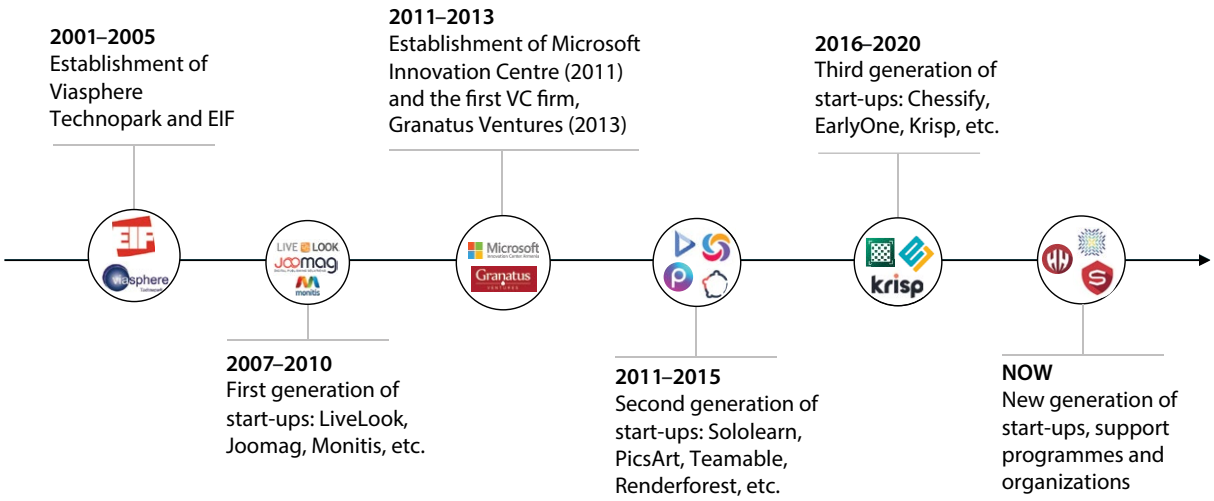
Science and technology parks are typically industrial parks that contain several research institutes, which often connect universities and facilities for technology transfer, advanced training and start-up funding, as well as providing awareness-raising measures for new technologies.

Accelerators provide companies with access to mentorship and networks of investors and peers. They usually target start-ups that have moved beyond the establishment stage, providing growing companies with access to logistical and technical resources.

Source: UNECE.

[a] Technology transfer is the transfer of knowledge and technological components, such as machinery and equipment, production processes and software, from one stakeholder to another (UNCTAD, 2014; European Union Regulation on Technology Transfer Block Exemption. Commission Regulation (EU) No. 316/2014 of 21 March 2014 on the application of Article 101(3) of the Treaty on the Functioning of the European Union to categories of technology transfer agreements).

Figure 4.1 The evolution of the Armenian innovation infrastructure



Source: UNECE.

start-ups, such as CodeSignal, SuperAnnotate, IntelinAir, Krisp and PicsArt. The latter attained unicorn status in 2021. The process of designing and implementing such initiatives is shifting towards greater collaboration among the Government, donors and private organizations. In addition, four free economic zones operate in Armenia but do not contribute significantly to the innovation infrastructure. Instead, they aim to attract export-oriented foreign direct investment, specializing in manufacturing and trade.

To map the infrastructure and assess the efficiency of its operation, this chapter begins by looking at the overall challenges to it, including the current regulatory and legal framework. It then examines the supporting programmes and institutions for innovation and their efficiency within the innovation infrastructure, grouped into the following categories:

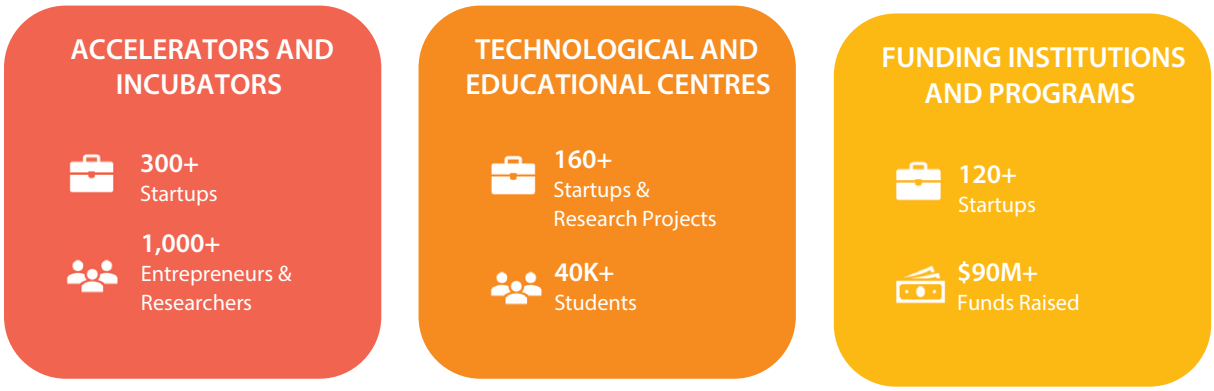
- **Accelerators and incubators**, programmes and institutions providing support to start-ups in generating ideas; in validating and commercializing processes through training, networking and mentorship opportunities; and in gaining access to the necessary infrastructure.
- **Technological and educational centres**, facilitating skill development among young people by offering training programmes and providing access to software and hardware infrastructure.
- **Funding institutions**, including VC firms, business angel networks and grant programmes implemented by private, international or government initiatives.

The subsequent discussion examines the training, mentorship and networking programmes that are available. Next, the chapter focuses on the capacities and institutions for technology transfer, an essential component to facilitate the commercialization of innovative products and services. The chapter concludes with concrete and targeted recommendations for strengthening the innovation infrastructure for sustainable development.

Although many policy support programmes help foster innovation activities, several challenges still restrict infrastructure development

The innovation infrastructure provides various support initiatives that have contributed to the success of innovative start-up and research projects. Figure 4.2 illustrates some of the main quantitative indicators for components of the infrastructure, reflecting the scale of its performance.

Figure 4.2 Performance indicators of the mapped innovation infrastructure elements (since early 2010s)



Source: UNECE.
Note: Numbers aggregated from publications available and web resources of mapped elements, as well as interviews with key stakeholders.

Although the infrastructure engages youth and links international and local tech communities, its further development depends on its capacity to address current challenges (table 4.1).

Table 4.1 Innovation infrastructure: strengths and challenges

Strengths	Challenges
✓ Ecosystem offering ways to **bridge international and local expertise** in tech and entrepreneurship	✗ Lack of an overarching vision and comprehensive regulatory framework
✓ **Active engagement of youth**, e.g. students, early-stage professionals and young entrepreneurs, in tech education	✗ Difficulty in attracting and retaining talent
✓ Flexibility due **to project-based structure** and small scale	✗ Concentration of support on ICT and high-tech start-ups, especially in the early stages of development
✓ Prioritization of **high-impact solutions**	✗ Concentration of physical infrastructure elements in Yerevan, and a relative scarcity of hard infrastructure in the regions
	✗ Narrow pipeline of innovative and scalable projects
	✗ Weak collaboration between business, education and science
	✗ Lack of established mechanisms for periodic data collection and monitoring
	✗ Lack of coordination among players, leading to insufficient collaboration and synergy within the infrastructure

Source: UNECE.

Armenia's efforts to build innovation infrastructure have produced several positive results

Since the early 2010s, the infrastructure has offered a set of mechanisms to support the generation and development of innovative ideas and products. Support programmes have been successful in promoting tech entrepreneurship throughout the country, especially in the ICT sector. Recent developments in infrastructure have been significant drivers of shifts in entrepreneurial mindset and career aspirations, especially among youth. Being more open to collaboration and innovation, the IT sector has raised awareness about management practices and approaches that are new to the economy. In addition, the advancement of the IT sector has resulted in increased interest among students in tech specialization. In fact, according to a 2022 study, about 15 per cent of high school students on average aim to pursue careers in IT or science, technology, engineering and mathematics (USAID and others, 2022). Following successful results in the IT sector, the focus in the innovation infrastructure is shifting towards high-impact innovative solutions in agriculture, health and environment, with the goal of digital and green transformation and in line with the goals outlined in the Sustainable Development Goals (SDGs). The main advantages of the infrastructure are elaborated in this section.

The ecosystem offers ways to **bridge international and local expertise in technology and entrepreneurship**. The emergence of the innovation infrastructure has contributed to a significant shift towards technology-oriented growth in the economy. The institutions and programmes observed have introduced international knowledge, skills and processes and linkages to global knowledge chains to the start-up community. Their initiatives have driven cultural change in terms of innovation, fostering the generation of new ideas and uncovering opportunities for their deployment and expansion.

Particularly in universities and regional cities, **educational centres and technoparks can efficiently engage youth – not only students but also early-stage professionals and young entrepreneurs**.[53] Difficulty in attracting and retaining talent is one of the most critical challenges facing both the private and the public sectors in Armenia. The challenge particularly constrains innovative projects and start-ups, as they require multilevel competencies in technology and entrepreneurship. Educational and technological centres have been quite successful in attracting youth and enhancing their potential, to help them enter the innovation sector. Partnerships with educational institutions have been strengthened: Armath Laboratories and TUMO target schoolchildren, and centres such as the Armenian National Engineering Laboratories, the Innovative Solutions and Technology Centre Foundation, the MIC, the AgriTech Accelerator by ImpactAim and the Entrepreneurship and Product Innovation Center (EPIC) Incubator of the American University of Armenia have university-based facilities and focus on enrolling university students in their programmes. In addition, the technoparks in Gyumri and Vanadzor, two of the largest cities after Yerevan, create opportunities for youth from the region to pursue careers in IT, engineering and the creative industries.

The institutions' small scale and **project-based structure offer potential avenues for strengthening communication and collaboration**. Most initiatives are implemented within the framework of a few large, donor-funded projects, such as EU4Business's

53 The definition of youth in Armenian policies is the share of the population between ages 18 and 29.

"Innovative Tourism and Technology Development for Armenia (ITTD)", under the aegis of the EU Small and Medium Enterprise Development Authority (better known as SMEDA), the ImpactAim Venture Accelerator by UNDP and various initiatives of EIF supported by the World Bank. This structure makes it possible to open channels for synergy and higher efficiency at a project level. In some cases, separate initiatives derive from the same network of founders, offering the opportunity to benefit from existing knowledge and interpersonal connections. The initiatives carried out within the ITTD project, for instance, distinguish clearly the functions and stages for which they provide support: the Business Angel Network of Armenia (BANA) Startup Incubator is facilitating start-ups in the idea stage, whereas further development falls under other programmes such as the Armenia Start-up Academy and the SAP Start-up Factory. In addition, successful start-ups have the opportunity to raise angel or venture funding through BANA and SmartGate[54] VC as key partners of the project.

Support programmes and institutions increasingly prioritize high-impact innovative solutions. For instance, through its thematic accelerators UNDP ImpactAim contributes to the implementation of the SDGs, and the second Granatus VC fund targets investments in high-impact deep-tech solutions.

Despite recent efforts, the fragmented innovation infrastructure and narrow pipeline of start-up and research projects highlight the need for an overarching vision and solid legislative framework

Because of the lack of an overarching vision and comprehensively regulated support mechanisms, the innovation infrastructure remains dispersed and lacks sustainability. Given the limited number of both State intervention mechanisms and instruments available, most of the support programmes in the innovation infrastructure are driven by donor projects and private initiatives. Some are conducted in active cooperation with the Government; however, the Government remains unable to allocate significant, dedicated funding for innovation. Furthermore, the legal framework for innovation is not exhaustive, especially in terms of covering all the support elements and schemes available. In these circumstances, the established regulatory framework is unable to reflect the current development agenda for the innovation infrastructure. In addition, the efficiency of both public and private initiatives is constrained by the lack of a commonly accepted vision to guide individual efforts aimed at facilitating innovation. As a result, support organizations and programmes operate without a common goal and remain decentralized and inconsistent. Although the small size of the ecosystem enables collaboration and personal connections among the key players, the institutions in the infrastructure do not generate synergies from collaboration and the system remains fragmented.

To address the challenges to the innovation infrastructure, the Government needs to define strategic priorities for its development in line with the overarching strategic vision for promoting innovation in the country.[55] Building on the types of support that have become widely available in recent years, such as for IT and for youth innovation, the overarching vision for expanding the innovation infrastructure needs to focus on filling the remaining gaps and diversifying to offer other types of support. Strategic priorities should be defined

54 SmartGate VC, "Armenian startup ecosystem: open secrets, big opportunities", 12 October 2017, https://www.smartgate.vc/post/armenian-startup-ecosystem-open-secrets-big-opportunities.

55 This relates to recommendation 3.1.1 in chapter 3.

considering the prevailing challenges to the innovation infrastructure, specifically (a) the need to foster collaboration and partnership among key players and (b) the need to expand available support where necessary in terms of geographic coverage, type of support and stage at which support is offered (*recommendation 4.1.1*).

The commonly accepted objectives and functions should be the basis for the innovation infrastructure development agenda. To implement the agenda, it is recommended to develop a three-year[56] action plan to address strategic priorities for innovation infrastructure development (*recommendation 4.1.2*). It will be important to ensure close coordination with key stakeholders in the ecosystem, to identify sources to finance the achievement of those priorities and to encourage donors and private sector stakeholders to validate them (*recommendation 4.1.3*). The current legal framework defining innovation infrastructure is limited to the Law on State Support for Innovation Activities adopted in 2006.[57] It defines innovation infrastructure as a set of institutions – science and innovation centres, business incubators, technoparks, foundations and other specialized organizations – that facilitate innovative activity. It touches on the concepts of venture funds, business incubators, and science and technology parks; however, significant gaps remain in terms of reflecting the innovation agenda and efficiently regulating initiatives implemented throughout the innovation ecosystem. In addition, the law anticipates the adoption of annual government programmes for implementing innovation policy; however, none have yet been developed.

With the purpose of ensuring consistency and interconnectedness in innovation support, the Government should expand its role in the innovation ecosystem by concentrating additional capacity in **the regulatory framework**. Greater interconnectedness requires enhancing the legal framework and/or adopting legal instruments to fully reflect the current structure and agenda of the innovation infrastructure. This is especially the case when defining infrastructure elements such as accelerators, incubators and technoparks and when regulating technology transfer. To achieve this, Armenia will need to map existing legislation for innovation to identify areas for improvement (*recommendation 4.2.1*) and then update current regulations (*recommendation 4.2.2*). With an enabling regulatory framework in place, the Government should allocate more State funding to innovation support, especially through collaborative mechanisms such as programme co-financing or public procurement for R&D (*recommendation 4.2.3*).

Difficulty in attracting and retaining talent is a key challenge. In the case of acceleration or incubation programmes, support for innovation is generally offered by non-profit organizations, which often face challenge in attracting and retaining talent. In addition, some organizations employ staff on a voluntary or part-time basis, which might negatively affect the motivation and commitment of team members, exacerbating the problem of finding like-minded and competent people. The limited number of experts and mentors in Armenia is another constraint to scaling and improving the efficiency of the support programmes implemented (chapter 3). In this regard, the potential to use the resources and expertise of the diaspora has yet to be fully explored (chapter 5).

The infrastructure **supports innovative projects mainly in the early stages of development, which limits the number of start-ups that can reach maturity**. The

56 Action plans are typically developed for a three-year time frame, as the Mid-term Expenditure Framework for Armenia is developed for three years, with annual updates.

57 Law on State Support for Innovation Activities, Republic of Armenia, 2006.

support and funding available both target start-up projects in the pre-seed and seed stages. As a result, the number of new start-ups is rapidly increasing; however, only a small portion reach maturity and successfully attract funding beyond the seed stage. In addition, the number of start-ups that raise funding after early-stage investment rounds is relatively low, with the majority inclined toward international markets.

Despite its expansion in recent years, the **innovation infrastructure still concentrates on supporting start-ups in the ICT and high-tech sectors**. Most of the infrastructure elements are geared specifically towards enterprise software, fintech, artificial intelligence (AI) and data analytics. Although some support is available for impact-oriented solutions in agriculture, health and environment, additional efforts are required to foster innovation systematically across non-tech sectors (chapter 3). Technology adoption in non-tech enterprises remains low, with only 15 per cent of small and medium enterprises (SMEs) using e-commerce platforms and only 34 per cent having their own website (World Bank, 2020b; 2020c).

Infrastructure elements are distributed unevenly among Yerevan and the regions. The physical infrastructure is concentrated in the capital, with only a few centres located in the regions. Facilities in the regions are limited to two technoparks initiated by EIF in Vanadzor and Gyumri, two TUMO Centres in Gyumri and Dilijan, and an informal educational hub, the COAF SMART Center, in Lori. The lack of on-the-ground support constrains the degree of innovation in the regions.

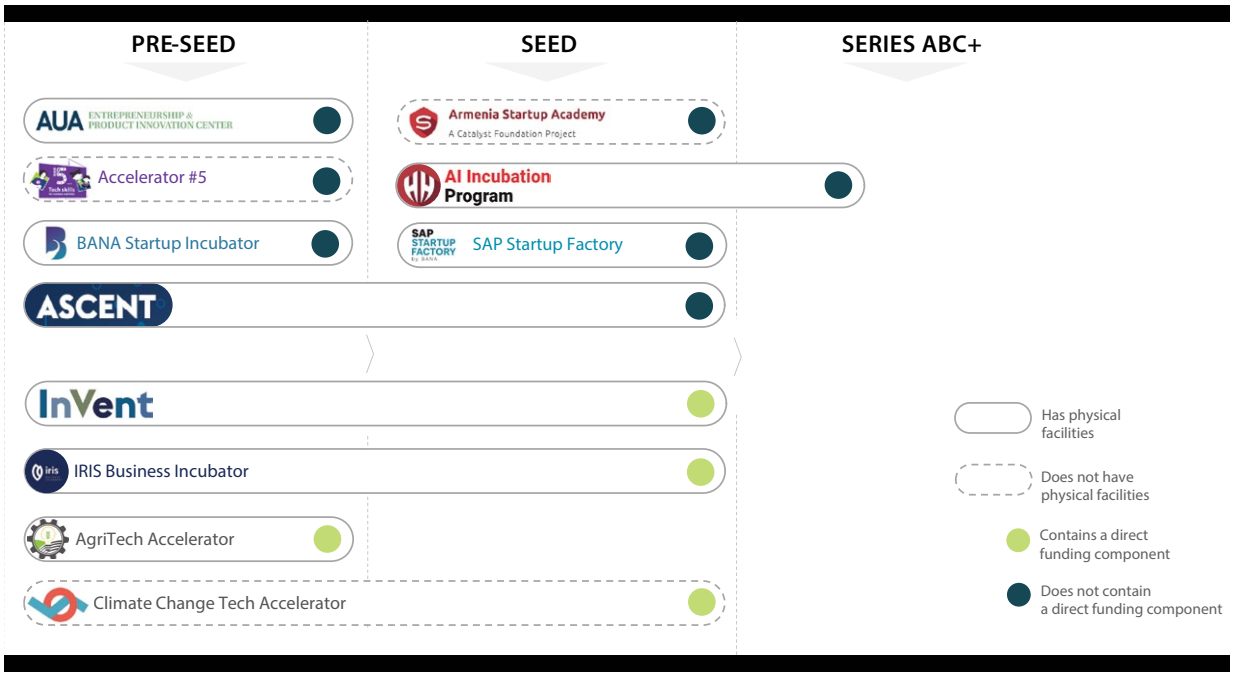
Programmes and institutions face difficulties in enrolling eligible start-ups owing to the **narrow pipeline of innovative and scalable projects**. The number of high-quality innovative solutions that are scalable is small. The number of tech companies engaged in R&D activity is estimated at more than 200, which constitutes only a small share of the approximately 3,000 IT companies operating in the country (Enterprise Armenia, 2022). As a result, many of the same start-up teams apply to and benefit from different programmes, thus reducing the overall efficiency of the provided support.

The effectiveness of support programmes is only partially reflected in their current outcome indicators, as the subsequent **success of alumni start-ups**[58] **is not monitored**. The programmes usually evaluate outcome indicators on the basis of the quantity of start-ups that graduate, rather than their success. They do not track information such as number of employees, revenue and funding.

The innovation ecosystem is characterized by **weak collaboration among business, education and science actors, resulting in underutilization of R&D capacity** (chapter 3). One of the main constraints on innovation is the mismatch between business needs and research priorities. The main factors restricting industry-academia synergy are the lack of formal procedures and institutions for collaborative research and an informal culture of research collaborating on research. In addition, there is a need for increased funding and skilled personnel to facilitate collaboration. The underutilized R&D infrastructure leaves untapped potential for fostering innovation in the economy. For instance, a number of higher educational institutions received grants for modernizing and upgrading technology within the framework of the World Bank's "Education Improvement Project", yet they are not using the grants at full scale because of lack of demand from the private sector (chapter 3).

58 "Alumni start-up" refers to a start-up company that graduated from or was founded by individuals who are graduates of an acceleration or incubation programme, or a technological or education centre.

Figure 4.3 Mapping of acceleration and incubation programmes in Armenia

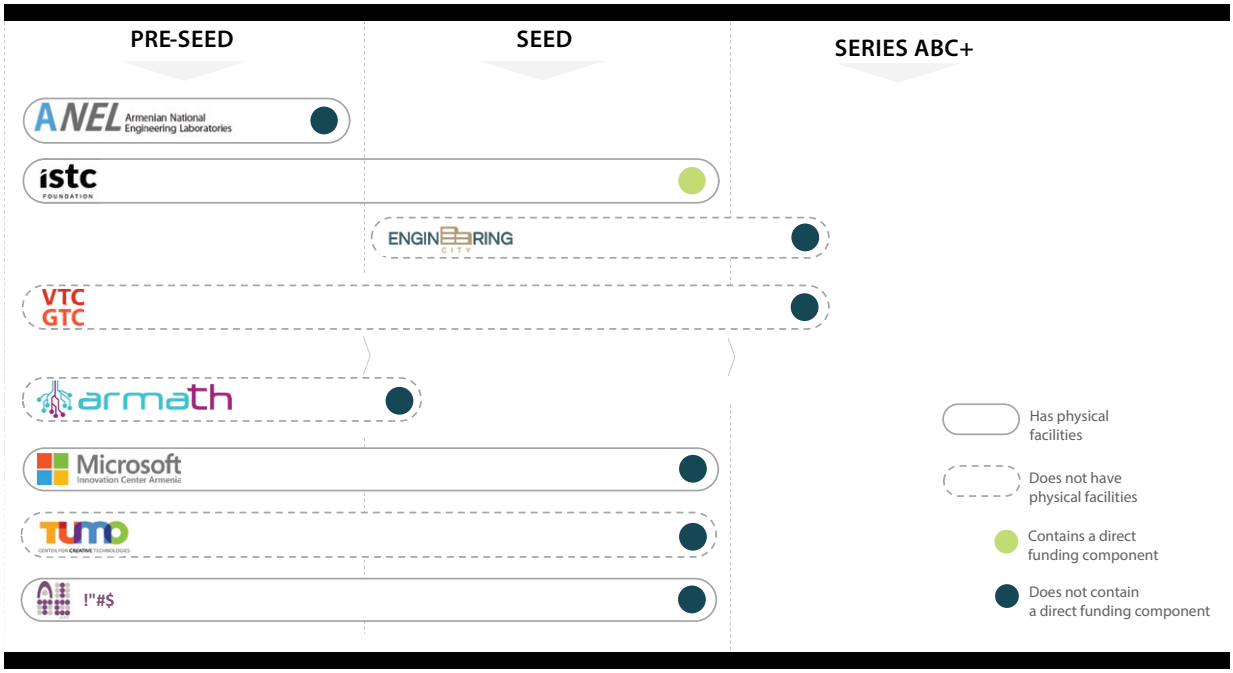


Source: UNECE.

Note: Accelerator 5, Agritech Accelerator, Climate Change Tech Accelerator (see table A4.1) and GovTech Accelerator are all components of the ImpactAim Accelerators. The first three appear separately in the figure because of differences in funding, facilities and stage of support. GovTech was not included because it had only one batch in 2019 and has not been relaunched.

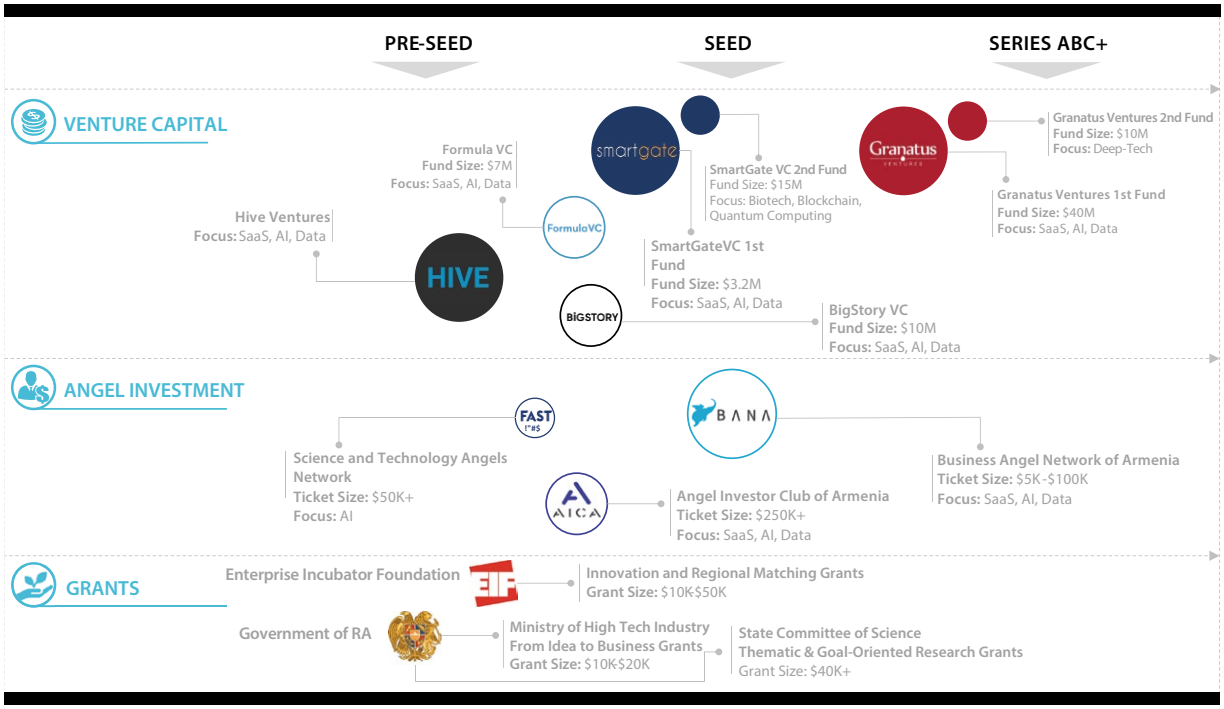
[a] Series ABC+ = Series A, Series B and Series C rounds. Most start-ups end their external equity funding with a Series C round and then have enough value for an initial public offering. Series A+ rounds follow established business models and thus generate frequent waves of investment from VC firms, private equity firms, investment banks, hedge funds and the like.

Figure 4.4 Mapping of technological and educational centres in Armenia



Source: UNECE.

Figure 4.5 Snapshot of VC firms, angel investor networks and grant programmes in Armenia



Source: UNECE.

Note: VC firms and angel networks were categorized by portfolio size, considering factors such as amount of raised funds and size of average investment per start-up.

Innovation support functions are dispersed among private and public initiatives and organizations operating within the infrastructure

Acceleration and incubation programmes and institutions, driven by both private and public initiatives, are key players in the innovation infrastructure. As observed earlier, both accelerators and incubators in Armenia focus on facilitating innovation and start-up projects in the early stages of development (pre-seed and seed). These initiatives provide support through capacity-building and skill-enhancement programmes, access to mentorship and networks of investors, and the creation of an enabling environment with the necessary software and hardware infrastructure. The overwhelming majority emphasize the IT and engineering sectors, with only a few accelerators targeting non-tech sectors (e.g. agriculture, climate). A snapshot of the main acceleration and incubation programmes active in the country appears in figure 4.3. Components and outcomes of these programmes are described in table A4.1. Most of these programmes, which are implemented through internationally funded projects, facilitate start-ups in the early stages of development, as observed earlier. Figure 4.4 maps technological and educational centres in Armenia in a similar fashion. Detailed descriptions of the operation models and outcomes of these centres appear in table A4.2.

Insufficient access to **funding** for innovation projects has been one of the most prevalent challenges in the ecosystem. In recent years, new financing options – mainly in the form of VC or angel investment – have been introduced (figure 4.5). They concentrate on funding idea- and seed-stage innovative solutions in software, AI and data analytics, thus making possible some access to finance in the IT sector.

VC firms are the most common type of private equity aimed at scaling up innovative start-up projects in Armenia. In addition to direct support through equity funding, they foster innovation by enabling access to a vast network of expertise. Six VC firms are now active in the country, with the first, Granatus Ventures, having launched in 2013.[59] They focus predominantly on innovative tech start-ups with high-growth potential on a global scale.

Since 2017, the innovative ecosystem has experienced a noticeable rise in activity with the launch of three **angel networks**: the Science and Technology Angel Network, BANA and the Angel Investor Club of Armenia. These networks provide access to investment and mentorship opportunities, focusing specifically on early-stage start-ups and research teams.

In addition to funding from investment institutions, innovative projects receive funding through a number of State or international **grant programmes**:

- *Innovation and regional matching grants* are implemented by EIF within the framework of the World Bank's Trade Promotion and Quality Infrastructure project. EIF's matching grants aim to foster innovation, with specific emphasis on certain regions.
- *From Idea to Business Grants* are implemented and financed by the MoHTI. The programme focuses on idea- and growth-stage start-ups offering technological solutions in both tech and non-tech sectors.
- *Thematic and goal-oriented research grants* are programmes financed by the State budget and implemented by the State Science Committee. These programmes aim to foster applied and collaborative research.

In 2022, ImpactHUB launched the first impact investment fund for social enterprises – the VIA Fund – within the framework of the EU-funded "Collaborate for Impact" project, led by EVPA (the European Venture Philanthropy Association). The fund focuses on investing in early-stage social enterprises with the aim of scaling their social impact. It plans to work with each social enterprise for three to five years, providing both financial and non-financial support, such as mentorship, capacity-building, networking opportunities and guidance on impact measurement. The early portfolio consisted of four social enterprises, but the fund intends to invest in five to seven companies annually. The fund size is $405,000, and so far 3 per cent of the funds have been distributed.

Currently, the MoHTI is coordinating the establishment of the National Venture Fund initiative within the World Bank's Trade Promotion and Quality Infrastructure project. The fund will invest in Armenian high-tech start-up companies and facilitate their expansion into global markets.

Armenian VC firms and angel networks have already attracted some interest from international investors; however, there is still vast untapped potential for leveraging international knowledge and resources, especially of the diaspora (chapter 5). One way to unlock this

59 As of 2022, six VC firms operated in Armenia: Granatus, SmartGate, Hive, BigStory, Formula and the newly established Triple S.

potential is by using VC financing. Armenia can expand access to finance, mentorship and networking opportunities by fostering linkages between the local innovation infrastructure and VC firms and/or investors from the diaspora. This can be achieved by establishing a diaspora investment fund, organizing regular networking and matchmaking events, and so on (*recommendation 4.4.1*). In addition, local programmes should be helped to establish partnerships with international accelerators and incubators. Such collaborations are essential to provide growth-stage start-ups with necessary support and guidance to navigate the challenges of entering and scaling up in new markets (*recommendation 4.4.2*).

The most common elements of innovation support are training, mentorship and networking programmes that target early-stage start-ups

Overall, the innovation infrastructure aims to foster the generation and successful implementation of innovative ideas to drive growth in the economy for digital and green transformation and sustainable development towards achievement of the SDGs. For this purpose, research and start-up teams receive support for advancing in several directions, delivered by a number of public and private institutions in the ecosystem:

- *Physical infrastructure*, which pertains to the existence of R&D facilities (i.e. prototyping or production laboratories with the necessary software and hardware) and/or shared working facilities (i.e. co-working space, conference rooms, office space)
- *Training programmes* for building capacity in terms of entrepreneurial and digital skills through the implementation of workshops and training courses
- *Networking and mentorship*, including the implementation of matching and networking events, road shows, pitch sessions and mentorship programmes at both the international and local levels to help teams connect with mentors, entrepreneurs and investors
- *Business development services*, including the provision of specialized advisory and consultation services in product development, IP), marketing and management (e.g. market research, business plan evaluation, patent registration, market entry strategy)
- *Funding* through direct financing instruments, including the provision of grants or facilitation of financing, specifically enabling access to VC and business angel investment

Table 4.2 identifies the type of support available for applicants to initiatives that offer support for innovative projects in Armenia.

The most common aspects of support provided in Armenia are training, mentorship and networking. In the early stages of development, start-ups receive support from the **acceleration and incubation programmes**. These focus on enhancing strategic, market, communication and leadership skills of entrepreneurs. Owing to the wide range of mentorship and networking events, start-ups gain the opportunity to connect with potential investors and business partners. Participation in such programmes allows start-ups to improve their investment readiness and progress into later stages of development. Some of the programmes contain a funding component, offering direct financing such as grants, or enabling access to business angel networks, VC firms and grant programmes.

Table 4.2 Innovation support organizations by type of support offered

Name	Training programmes	Networking and mentorship	Business development services	Funding	Shared working facilities	Physical facilities for R&D
American University of Armenia EPIC Incubator	✓	✓	✓	✓	✓	✓
Armath Engineering	✓	✓				
Armenian-Indian Center for Excellence in ICT	✓	✓			✓	✓
Armenian National Engineering Laboratories	✓	✓				✓
BANA[a]	✓	✓	✓	✓	✓	
Catalyst Foundation[d]	✓	✓		✓	✓	
Engineering City	✓	✓			✓	✓
FAST Foundation[b]	✓	✓		✓	✓	
Gyumri Technology Centre	✓	✓	✓		✓	✓
ImpactAim Accelerators[c]	✓	✓		✓	✓	
Innovative Solutions and Technology Centre Foundation	✓	✓		✓	✓	✓
IRIS Business Incubator & Academy	✓	✓		✓	✓	
Microsoft Innovation Centre	✓	✓	✓		✓	✓
TUMO Center for Creative Technologies	✓	✓			✓	
Vanadzor Technology Centre	✓		✓		✓	✓

BANA = Business Angel Network of Armenia, EPIC = Entrepreneurship and Product Innovation Centre, FAST = Foundation for Armenian Science and Technology, IRIS = Increased Resilience of Syrian Armenians, TUMO = nickname for Tumanyan.

Source: UNECE.

Note: Shared working facilities and physical facilities for R&D are considered physical infrastructure. As knowledge intermediaries and brokers are not widely available in Armenia, this type of support was included in networking and mentorship. These initiatives support knowledge sharing by connecting with experts, entrepreneurs and investors from various fields.

[a] BANA initiatives include the BANA Start-up Incubator, the SAP Startup Factory and the Business Angel Network.

[b] FAST Foundation initiatives include the ASCENT and InVent programmes, and the Science and Technology Angel Network.

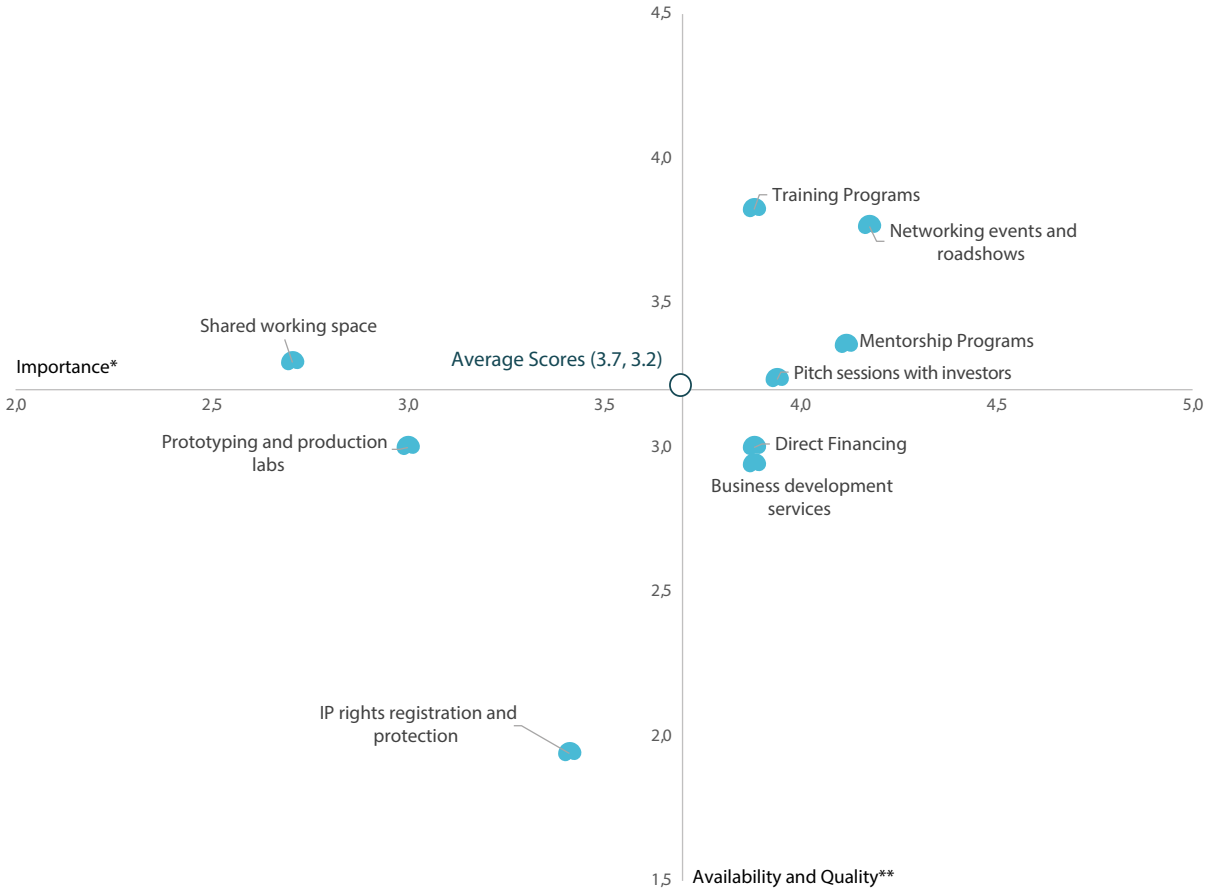
[c] The four ImpactAIM thematic accelerators are the Agritech Accelerator, the Climate Change Technology Accelerator, Accelerator #5 – Tech Skills of Women and Kids, and the GovTech Accelerator.

[d] Established by SmartGate VC, the initiatives of the Catalyst Foundation include the HeroHouse AI Incubator, the Armenia Startup Academy and the Entrepreneurial Assistants' School.

The infrastructure is also supported by several **educational centres and technoparks**, which create an enabling and technologically equipped environment for experimental learning and product development. They offer access to physical facilities such as office spaces, co-working areas or prototyping and production laboratories, facilitating the process of generating, testing and implementing innovative solutions.

A recent small survey (box A4.1) indicates that engaging in acceleration and incubation programmes, one of the most common forms of support within the innovation infrastructure, helped start-ups increase both their number of employees and their revenue and improved their investment readiness (figure 4.2). Specifically, the answers received from 20 graduate start-ups of the BANA Start-up Incubator, Armenia Start-up Academy and SAP Start-up Factory indicate the following:

Figure 4.6 Average assessment scores by surveyed firms of the importance and availability of selected support initiatives



Source: UNECE.

* 1 - Not important at all; 2 - Slightly important; 3 – Important; 4 - Very important; 5 - Extremely important

** 1 - Not offered; 2 - Offered rarely, limited capacity to address my needs; 3 – Offered occasionally, mixed in terms of meeting my needs; 4 - Offered regularly, mostly meeting my needs; 5 - Offered systematically, adaptive for my needs

- Employment: Before participating, nine of the start-ups employed five or fewer people. After receiving support, six hired new employees, employing between 5 and 15 people at the time of the survey. The average size of start-up teams increased from 6 to 10 people after receiving support.
- Revenues: Ten of the start-ups mentioned that they were not generating revenue before enrolling in the programmes. More than half of the start-ups managed to increase sales, with expected revenues for 2022 reaching up to $100,000.
- Investment readiness: The programmes improved the investment readiness of the start-ups: 13 indicated that they had not raised funds before enrolling in the programmes. Six had advanced to the seed stage of investment at the time of the survey. Moreover, each start-up had three or more investors, of which at least half are foreign.

The start-ups were asked to rate the importance and availability of aspects of support (figure 4.6). Direct financing and business development services are key factors for attention, as they scored above average in importance and below average in availability and quality.

The infrastructure is currently concentrated on providing support to idea-stage tech start-ups in Yerevan, with only a few support elements in the regions. The infrastructure in Yerevan is relatively advanced and has the capacity to facilitate the process of generating ideas and scaling solutions into ventures with a specific market offering. Yet, start-ups encounter challenges in reaching wider segments of customers, advancing into larger investment rounds and achieving profitable business models. Given the lack of growth-stage support in the ecosystem, most start-ups fail to reach maturity. Meanwhile, lack of on-the-ground support in the regions constrains the flow of innovative ideas, which implies untapped potential for innovation.

Considering that Yerevan and the regions in Armenia are in different stages of development in terms of entrepreneurship and, specifically, innovation, the **available support should be optimized and expanded** on the basis of geographic specificities and innovation stages. In this regard, the infrastructure elements need to apply a differentiated approach in Yerevan and the regions, which suggests two efforts:

- Support for boosting a start-up culture and facilitating idea generation should be expanded to the regions, in the form of pre-seed funding, capacity building and networking programmes as well as physical facilities, such as prototyping laboratories. Fiscal and financial incentives targeting regional start-ups should be introduced (*recommendation 4.3.1*).
- The infrastructure in Yerevan should transition into the next stage of development, aiming to support start-ups in scaling their business models: this requires more growth-stage funding and availability of professional business development services and production laboratories (*recommendation 4.3.2*).

Improvements in the infrastructure are challenged by the lack of coordinated support for technology transfer, leading to insufficient commercialization of innovative products and services

One of the most critical challenges facing the innovation infrastructure in Armenia is the lack of institutionalized support for technology transfer,[60] caused by both *regulatory* and *institutional* gaps:

Regulatory gaps. No legislation is dedicated to technology transfer. Thus, regulations on procedures for commercializing technology – the process of transitioning from the research lab to the marketplace – and on the relationship among parties involved in transactions are generally incomplete and do not incentivize the commercialization of research outcomes. This is a critical gap, especially in the case of public research institutions.

Institutional gaps. The ecosystem lacks well-established and functional technology transfer offices or other forms of institutions responsible for facilitating technology transfer and commercialization. The Intellectual Property Office under the MoE is the main institution responsible for IP protection in Armenia. Organizations such as the Technology Transfer Association and the National Centre for Innovation and Entrepreneurship have insufficient resources and capacities, and do not coordinate operations and interactions with potential partners and stakeholders.

The main pathways for commercializing technology are described in table 4.3.

Table 4.3 Technology commercialization pathways and identified areas of support in Armenia

Technology commercialization process	Implementers		Description	Support needs
	Supply side	*Demand side*		
Establishment of an innovative start-up company	Local start-up teams	Local and foreign individuals and organizations	• Innovative entrepreneurship • Offering of a new or improved product or service • Common in the IT and tech sector	***Supply side*** • Training on entrepreneurial knowledge • Mentorship and networking • Business development services • Funding • Physical infrastructure for R&D • Prototyping and product development services • IP rights registration and protection ***Demand side*** • Business development services on technology absorption • Funding

60 Technology transfer is a collaborative process that allows scientific findings, knowledge and intellectual property to flow from creators, such as universities and research institutions, to public and private users. The goal is to transform inventions and scientific outcomes into new products and services that benefit society. Technology transfer relates closely to knowledge transfer (WIPO, 2023).

Technology commercialization process	Implementers		Description	Support needs
	Supply side	*Demand side*		
Commercialization of local research outcomes in external markets	Local research teams (individual researchers, scientific institutes, universities)	Foreign organizations	• Research results usually appear in the form of patented products or processes. • Patented products are offered to an established company abroad.	***Supply side*** • Mentorship and networking • Funding • Physical infrastructure for R&D • Prototyping and product development services • IP rights registration and protection
Commercialization of local research outcomes in the Armenian market	Local research teams (individual researchers, scientific institutes, universities)	Local organizations	• Research topic or business challenge is usually defined early on • Feasible ideas are selected for implementation • Teams receive support to carry out R&D • Final product is applied by the client company	***Supply side*** • Mentorship and networking • Funding • Physical infrastructure for R&D • Prototyping and product development services • IP rights registration and protection ***Demand side*** • Business development services on technology absorption • Funding
Absorbing foreign solutions in the Armenian market	Foreign research teams or companies	Local organizations	• Internationally developed technologies are adapted to local needs	***Demand side*** • Business development services on technology absorption • Funding

Source: UNECE.

Currently, technology commercialization takes place mainly in the IT and IT-related sectors, which are more integrated into the global economy and do not require large-scale investments in research infrastructure. The main modes are the establishment of technological start-ups or direct collaboration between university and research organizations and multinational companies. Outside IT, technology commercialization lacks a systemic approach, with only a few initiatives. With a large untapped demand for technological upgrading, specifically in the non-tech sector, it is becoming increasingly important to build capacity for facilitating technology transfer in the country.

Mapping the scientific potential of Armenia is the first step towards realizing the country's full potential for commercializing technology. A comprehensive survey of universities and research institutions in the country would make it possible to inventory existing scientific inventions and assess their commercialization potential (*recommendation 4.5.1*).

Further steps for commercializing local innovative solutions are highly interconnected with the untapped potential in the economy. Realizing them requires that the function of

technology transfer be perceived as a component of the tool set for supporting SMEs, in order to develop the technological absorption capacities of SMEs and foster commercialization of local solutions offered by the research community. Technology transfer support should undertake the following efforts:

- Identify specific business challenges and define technical assignments for R&D to help research teams and start-ups come up with innovative solutions that can be commercialized in the local economy (*recommendation 4.5.2*).
- Build the technology absorption capacity of the private sector by adopting new mechanisms for delivering support, such as external expert consultations and government co-financing tools for upgrading technology (chapter 3) (*recommendation 4.5.3*).

Essential to improving the innovation infrastructure will be measuring and monitoring the initiatives implemented

The outcomes of innovation materialize in the long term; thus, measuring the effectiveness, efficiency and impact of innovation support requires **monitoring performance results** on regular basis. Yet, in its current stage of development, the innovation infrastructure lacks established mechanisms for periodic data collection and monitoring (chapter 3). The outcome indicators used to measure the effectiveness of support programmes vary among players in the ecosystem. Moreover, the programmes evaluate them on the basis of the quantity of graduate start-ups, rather than the success of their performance. Therefore, a comprehensive monitoring and evaluation framework for innovation support should be developed and adopted (*recommendation 4.6.1*). Armenia should set common metrics and measures that reflect the success of alumni start-ups (e.g. number of employees, revenue figures, funding raised). In addition, the Government needs to encourage impact measurement by collecting and tracking data on programme beneficiaries (*recommendation 4.6.2*). Finally, information on the effectiveness of support programmes as well as other aspects of the infrastructure, such as funding and available resources, should be aggregated into a periodical publication on infrastructure performance (*recommendation 4.6.3*).

Policy messages and recommendations

The analysis of infrastructure elements in this chapter indicates that gaps exist at both policy and operational levels deriving from the lack of a comprehensive strategic vision and regulatory framework for innovation. Meanwhile, the ecosystem faces challenges in terms of the availability and distribution of specific types of support. One of the main challenges is the narrow pipeline of start-ups and R&D projects with scalable and commercializable outcomes. In these conditions, it is becoming crucial to facilitate idea generation by ensuring the availability of pre-seed and seed stage support. Another prevailing challenge is the weak collaboration between business, education and science, leading to constraints in commercializing and absorbing technology. This weakness is due to the lack of coordinated support for technology transfer within the ecosystem. Last, to better understand the impact of innovation policy support within the infrastructure, regular monitoring of the performance of support and initiatives in place is crucial to feed into subsequent policy reforms. Table 4.4 outlines a set of targeted recommendations aimed at addressing the issues identified and fostering greater effectiveness of the infrastructure.

Table 4.4 Summary of policy recommendations for improving the effectiveness of the innovation infrastructure in Armenia

Recommendation 4.1: Create a strategic vision defining the objectives and functions of innovation infrastructure in line with the overarching vision for promoting innovation in Armenia.

Owing to the lack of an overarching vision, the innovation infrastructure remains fragmented, and neither private or public initiatives maximize synergies.

Actions	Priority	Time frame	Actors
4.1.1 **Define the strategic priorities for developing the innovation infrastructure** in the overarching strategic vision for innovation in Armenia.[a]	①	Short-term	MoE, MoHTI, MoESCS
4.1.2 **Develop a three-year action plan for improving the innovation infrastructure**, based on defined strategic priorities and with a corresponding budget and results framework.	①	Short-term	MoE, MoHTI, MoESCS
4.1.3 **Ensure close cooperation with key stakeholders in the public and private sectors** for developing and validating the action plan, and attract funding for its implementation.	①	Short-term	MoE, MoHTI, MoESCS

Recommendation 4.2: Expand State support instruments and funding for innovation by improving the **legal and regulatory framework**.

The legal framework for innovation is incomplete in terms of covering infrastructure elements, which limits the capacities and instruments of the Government to deliver support in this area.

Actions	Priority	Time frame	Actors
4.2.1 **Map and analyse the legislation for innovation infrastructure**.	①	Short-term	MoHTI, MoE
4.2.2 **Update current regulations** for developing innovation infrastructure.	①	Short-term	MoHTI, MoE
4.2.3 **Expand the government tool set** by introducing collaborative support instruments and funding mechanisms for innovation infrastructure elements (e.g. programme co-financing, procurement for R&D).	②	Long-term	MoHTI, MoE

Recommendation 4.3: Optimize and expand available support in the infrastructure based on geographic specificities and stages of innovation.

The infrastructure elements are concentrated in Yerevan, with only a few centres located in the regions, which leads to significant geography-specific gaps in entrepreneurship and innovation.

Actions	Priority	Time frame	Actors
4.3.1 **Increase support for boosting the start-up culture and facilitating idea generation in the regions** (e.g. by offering more pre-seed funding, implementing capacity-building and networking programmes, establishing prototyping labs and shared work facilities, and introducing fiscal and financial incentives for regional start-ups).	①	Long-term	MoHTI, MoE
4.3.2 **Upgrade the infrastructure in Yerevan by increasing the support available for scaling innovative projects** (e.g. through more growth-stage funding, availability of professional business development services and production labs).	①	Long-term	MoHTI, MoE

Recommendation 4.4: Leverage funding, networking and mentorship opportunities by **establishing linkages with international accelerators, incubators, VC firms and investors**, specifically emphasizing the engagement of **diaspora**.			
Insufficient linkages exist in terms of attracting international knowledge and resources, and tapping the large potential for diaspora funding.			
Actions	**Priority**	**Time frame**	**Actors**
4.4.1 **Foster linkages between the local innovation infrastructure and VC firms and/or investors from the diaspora** through the establishment of a diaspora investment fund, organization of periodic networking and matchmaking events, and other such activities.	②	Long-term	MoE, MoHTI
4.4.2 **Establish partnerships with international accelerators and incubators** to support growth-stage start-ups when entering or scaling up in new markets.	②	Long-term	MoE, MoHTI
Recommendation 4.5: Develop the **technology transfer capacities of the Government and the private sector** in technology absorption and commercialization.			
The infrastructure is challenged by the lack of coordinated processes for transferring technology, leading to insufficient levels of commercialization and absorption of innovative products and services.			
Actions	**Priority**	**Time frame**	**Actors**
4.5.1 **Map the scientific potential of Armenia** by surveying universities and research institutions to inventory scientific inventions and assess their commercialization potential.	①	Short-term	MoESCS
4.5.2 **Identify business challenges and define technical assignments for R&D** to help research teams and start-ups come up with innovative solutions that can be commercialized in the local economy.	①	Long-term[b]	MoE, MoHTI
4.5.3 **Build the technology absorption capacity of the private sector** by adopting new mechanisms for delivering support (e.g. expert consultations, government co-financing tools).	①	Long-term	MoE, MoHTI
Recommendation 4.6: Establish a **monitoring and evaluation framework** for regular assessment of infrastructure performance.			
Measuring the effectiveness of support programmes is inhibited by limited data availability, and the existing data only partially reflects the success of graduate start-ups.			
Actions	**Priority**	**Time frame**	**Actors**
4.6.1 **Adopt a multi-layer national framework of performance indicators** for measuring the efficiency and effectiveness of support programmes within the infrastructure.	①	Short-term	MoHTI, MoE
4.6.2 **Encourage impact measurement** by collecting periodic data and tracking support programme beneficiaries.	②	Long-term	MoHTI, MoE
4.6.3 **Publish periodic reports on the performance of the innovation infrastructure**.	②	Long-term	MoHTI, MoE

Source: UNECE.

[a] This is related to and can be combined with recommendation 3.1.1 in chapter 3.

[b] This action should be implemented in the long term, with short-term periodic reviews taking into account geopolitical factors.

Chapter 5

ENGAGING THE ARMENIAN DIASPORA TO SPUR INNOVATION IN THE AGRICULTURE SECTOR

Main messages

- The diaspora can become a driver of innovation if diaspora investors receive support through diversified, targeted mechanisms and policy measures that build on knowledge and investment inflows for innovation.
- The agriculture sector, which has significant untapped potential for technological upgrading and innovative processes, can particularly benefit from diaspora investment to spur innovation, for example, by supporting the increased use and diffusion of digital and clean technologies.
- Despite significant efforts to drive diaspora investment, for example by simplifying and streamlining procedures, further efforts are needed to facilitate such investment across various regions and diversify it into innovative projects. Long-term funding, adequate resources and operational infrastructure should be provided to support diaspora engagement programmes.

Recommendations at a glance: Engaging the Armenian diaspora to spur innovation in the agriculture sector

Recommendation 5.1: Increase the awareness of and information on potential opportunities for investment, to drive innovative growth in the agriculture sector.

Actions	Priority	Time frame	Actors
5.1.1 Strengthen information exchange inside and outside Armenia about opportunities for investment in the agriculture sector and innovative projects.	②	Short-term	Foreign representatives of Armenia, representatives for diaspora affairs within the country, private and civil society networking platforms
5.1.2 Map investment opportunities in the agriculture sector and the diaspora skills available to facilitate such investment.	①	Short-term	OHCDA, MoE, Ministry of Agriculture
5.1.3 Create and support the development of networking platforms, "hub" organizations, an online diaspora engagement portal and events in agriculture for the diaspora.	②	Medium-term	OHCDA, MoE, Ministry of Agriculture, Chamber of Commerce and Industry of Armenia

Recommendation 5.2: Provide diversified financing mechanisms and instruments for diaspora investors in the agricultural sector, considering the heterogeneity of their specific needs.

Actions	Priority	Time frame	Actors
5.2.1 Support the development of crowdfunding platforms and mechanisms in agriculture for the diaspora.	①	Short-term	OHCDA, MoE, Armenian National Interests Fund
5.2.2 Examine the feasibility of and measures for implementing diaspora bonds, leasing and insurance mechanisms to cover the investment risks of innovative projects in agriculture.	②	Medium-term	OHCDA, MoE, Armenian National Interests Fund
5.2.3 Establish venture and guarantee funds for innovative projects in agriculture.	①	Long-term	OHCDA, MoE, Central Bank of Armenia, FINCA

Recommendation 5.3: Strengthen the logistical infrastructure and implement capacity-building support measures for diaspora members and support organizations.			
Actions	**Priority**	**Time frame**	**Actors**
5.3.1 Expand the logistical infrastructure, including through logistical hubs, centres and dry ports.	②	Medium-term	MoE, Ministry of Territorial Administration and Infrastructure
5.3.2 Implement capacity-building measures for diaspora members on doing business in Armenia, including in the agriculture sector.	①	Short-term	OHCDA, MoE, Chamber of Commerce and Industry of Armenia, Ministry of Labour and Social Affairs, MoHTI
Recommendation 5.4: Improve trust between the diaspora and the Armenian Government to facilitate engaging the diaspora in policy formulation and implementation.			
Actions	**Priority**	**Time frame**	**Actors**
5.4.1 Create a diaspora engagement framework to include the diaspora in decision-making processes.	①	Medium-term	OHCDA, State Migration Service
5.4.2 Establish diaspora representative offices and/or provide diaspora members with advisory or decision-making roles for policy intervention.	②	Medium-term	OHCDA, MoE
5.4.3 Involve diaspora representatives, based on a comprehensive stakeholders matrix, in consultations on ministry strategies through dedicated working groups.[a]	①	Short-term	Government of Armenia, MoE, MoHTI, MoESCS, OHCDA

MoE = Ministry of Economy, MoESCS = Ministry of Education, Science, Culture and Sports, MoHTI = Ministry of High-Tech Industry , OHCDA = Office of the High Commissioner on Diaspora Affairs.
Source: UNECE.
[a] This recommendation is related to recommendation 3.2.1.

The large diaspora represents a unique avenue to fostering knowledge inflow and investment for innovation-driven growth in the agriculture sector

Armenia's diaspora – people of Armenian descent living permanently outside the country – is a unique factor in the economic development landscape (Lewis, 2015). The diaspora's scope and scale for spurring growth and sustainable development, including innovation, are vast (chapter 1). Its size in 2022 was estimated to be about 7 million, spread across countries including Australia, Brazil, Canada, the Russian Federation and the United States of America, as well as countries of the European Union.[61]

Investment by the diaspora, if available, could become a significant driver for deploying potential innovative projects in general and in the agriculture sector in particular. By attracting international talent, diaspora investment – like foreign investment in general – offers several benefits in addition to financing, such as know-how and technology transfer, financing, learning and skills development as outlined in the UNCTAD Investment Policy Review of Armenia (UNCTAD, 2019). Diaspora investment brings an additional component: emotional attachment. Such investment can help create jobs and increase overall economic activity. The diaspora can also offer significant charitable, humanitarian and financial support to the home country (Shabaka, 2021).

61 OHCDA, Armenian Diaspora Communities, http://diaspora.gov.am/en/diasporas.

Diaspora investment can contribute to the deployment of new digital and clean technologies in the agriculture sector. The sector shows significant potential to drive economic growth, considering that it contributed about 11 per cent to the country's gross domestic product (GDP) between 2019 and 2021 and is responsible for 35 per cent of employment (World Bank, 2023). Currently only a few large-scale investments exist, in winemaking and almond orchards. There is significant potential for encouraging innovative projects and leveraging ongoing processes such as regional integration, digitalization and green growth. Such investment can facilitate the transformation of the sector towards an export orientation and support the creation of regional logistical hubs, allowing the sector to leapfrog in its development (UNCTAD, 2019). Diaspora direct investment can be channelled into various regions and projects as it is driven not only by profit orientation but also by emotional values and therefore could tolerate higher risk and lower benefit in exchange for greater societal impact for the country (OECD and Ministry of Foreign Affairs of France, 2021). In general, diaspora members are open to share best practices and know-how that they have acquired in different countries (IOM, 2013).

In recognition of this opportunity for growth, the Government of Armenia has implemented some support mechanisms and initiatives to foster the integration of the diaspora into the country's economic development. Examples include establishing the Office of the High Commissioner on Diaspora Affairs (OHCDA),[62] adopting the Digital Agriculture Strategy, creating networking and specialized capacity-building organizations – for example to provide training and access to further information sources on how to implement projects in Armenia, as well as information exchange platforms, and other ad hoc support initiatives and programmes. Several educational and cultural projects have been facilitated through diaspora investment. However, gaps remain in policy support that do not yet fully enable Armenia to exploit the vast potential of its diaspora. Regulatory, institutional and financial frameworks are missing and will need to be developed to facilitate diaspora investment. Government-led initiatives are also needed to create drivers for such investment and to create a trusting partnership between diaspora members and stakeholders both in Armenia and outside the country.

To understand how policy can support diaspora investment in the agriculture sector, this chapter first looks at the general characteristics of the diaspora and foreign direct investment (FDI) trends in Armenia. This is followed by a discussion of the specific characteristics of the agriculture sector and the potential that diaspora investment has for strengthening export competitiveness and innovation in the sector. The chapter concludes with concrete recommendations.

62 The OCHDA was established in 2019 in place of the Ministry of Diaspora.

The highly diversified diaspora holds strong cultural and emotional ties to Armenia that affect their investment ambitions

The Armenian diaspora is a highly diversified group (Government of Armenia, 2015). It includes first, second, third and fourth generations, the last three born outside of Armenia (Gevorkyan, 2013).

There are two kinds of diaspora – the so-called "old" and "new" (Gevorkyan and Gevorkyan, 2012). A significant share of the old diaspora is formed by people from outside of today's Armenia, who feel connected to their historic homeland (Tölöyan and Papazian, 2014). They have few direct personal links, so their connection is mainly cultural and economic. They often invest through family and friends and do not have professional experience in developing projects, often resulting in negative experiences such as risk-related loss of investment. To address this problem, the Government needs to disseminate information and awareness of current trends, conditions and investment opportunities, as well as build capacity to keep the old diaspora connected to the country. The new diaspora has stronger linkages to the country through personal connections, as many of their relatives and friends still reside in Armenia. A significant share of this diaspora left during the country's transition from a centrally planned economy because of uncertainties and socioeconomic challenges, such as the high unemployment rate during this period, but also because of war and economic devastation (Gevorkyan, 2018). Several interviews revealed that some of these diaspora members may retain an outdated, poor image of the country that does not reflect reality. The diaspora as a whole is not well organized, and among it are some strongly polarized organizations (Gevorkyan, 2022a). The strongest organizations are connected to the church and to political parties, within Armenia as well as in countries of residence of diaspora members. These organizations can play a significant role in diaspora investment.

Both old and new diaspora members are emotionally attached to Armenia as a historical and cultural homeland and have typically been to the country at least once. According to a recent survey (Tchilingirian, 2018), these are mainly short-term visits. Another survey (Gevorkyan, 2019) showed that 59 per cent of visits are not family related, suggesting that they relate to tourism or business. Diaspora members show emotional attachment to the country by regularly following the news on Armenia; expressing interest in Armenian history, politics, culture, the economic situation and social development; and engaging with their local Armenian community. Emotional attachment is also expressed through their willingness to support financial organizations within Armenia. In this regard, responses to the abovementioned survey indicated that diaspora members are eager to donate between $100 and $500 annually. Emotional attachment also includes readiness to provide non-financial support such as voluntary teaching, research cooperation, infrastructure collaboration and medical services. Respondents showed only limited interest in moving to Armenia for permanent settlement, such as for work or study (Armenian Institute, 2019).

When discussing diaspora investment, it is necessary to distinguish between types of investment and types of support needed to drive those types of investments:

- The first type is **professional business investment**: diaspora members who have successfully established businesses outside the country and are searching for opportunities in Armenia to expand their business or to start a new one. This

category can be diversified further into small and medium enterprises (SMEs) and large businesses.

- The second is diaspora members who are **emotionally attached to the country** and would like to contribute to its economic development or to support their relatives or friends in creating small family businesses. This investment is sometimes done by people who lack a business background, thus resulting in unsuccessful business endeavours and investment loss.

Typically, the old diaspora invests to help the country, whereas the new diaspora invests to help relatives and friends (Gevorkyan and Gevorkyan, 2012). Both types of investments are, however, small and those involved often lack relevant skills and competences.

According to the OHCDA, 74 per cent of diaspora members are ready to invest in Armenia.[63] Those who reside in the Russian Federation (29 per cent of diaspora investors), the United States (17 per cent) and the Islamic Republic of Iran (14 per cent) invest most frequently. There is a strong preference for investment in services and trade, followed by manufacturing – which includes apparel, gems and jewellery, as well as the chemical and pharmaceutical industries; a minor share goes to construction. Yerevan is the preferred location, with the highest share of diaspora investment.

The improved investment and business climate and the expansion of critical and innovation infrastructure facilitates growing investment

The average flow of FDI to Armenia during the last years was less than $365 million, the peak reached in 2022, according to statistical data from the Central Bank of Armenia (CEIC, 2023). Currently a major share of investment, including diaspora investment, comes from four countries: Argentina, Cyprus, France and the Russian Federation. That share goes to mining and quarrying, agriculture and food processing, information technology (IT) and research and development (R&D), tourism, and energy generation and distribution (UNCTAD, 2022). Frequently, these flows come from a small group of large investors. The Armenia Development Strategy for 2024–2025 envisages closer involvement of the diaspora in developing innovation infrastructure such as modern research laboratories, innovation centres and technoparks, as well as joint consortium programmes with leading scientific and research organizations.

One of the reasons for the upward FDI trend is the improvement in the business climate and in the ease of doing business (chapter 1). The Government has done a lot to facilitate investment, in ways that can significantly spur innovative activity in the country (box 5.1). For example, registering a business now takes only two days on average, is free and can be done at a one-stop shop of the State Registry of Legal Entities of the Ministry of Justice. There is also an option for electronic registration. The registration of property is also straightforward and requires only three procedures. The process of certification was also significantly improved with the introduction of the "single window" system and the implementation of annual plans for standardizing various products and services. Various

63 Armenpress, "Number of Diaspora-Armenians wishing to invest in Armenia is higher than it was in 2019 – High Commissioner", 10 November 2022, https://armenpress.am/eng/news/1096918.html.

Box 5.1 Importance of investment for innovation-led growth

FDI not only brings financial resources into the country, but also promotes innovation through the transfer of new technologies and capacities. Such investments can help improve productivity as well as provide access to international markets, further driving the growth of local firms.[a] An effective investment climate should provide businesses with the right incentives to invest in greater productivity.

The inflow of FDI, for example from the Armenian diaspora, has significant potential to facilitate innovation by strengthening international economic competitiveness and helping domestic firms integrate into global value chains. This includes the transfer of technologies, skills and knowledge from diaspora-owned firms in developed countries, which can enable innovations to diffuse through various linkages and interactions. With the necessary domestic absorptive capacities, such as skills, R&D capabilities and infrastructure – which needs to be strengthened (chapter 3), targeted FDI and investment policies can encourage the necessary technological transfer and upgrading (UNCTAD, 2003) for systematic innovation across the economy. The efficiency of policies supporting knowledge transfer depends on a set of other domestic institutions, including educational and intermediary institutions.

Source: UNECE.

[a] UNIDO, Investment and Technology, https://www.unido.org/our-focus/advancing-economic-competitiveness/investing-technology-and-innovation/investment-and-technology

quality standards certificates – for example, for wine – can be obtained free of charge. Armenia is among the top 10 countries in the world for openness of FDI regulations: there is almost no restriction on access to various sectors, with limitations only on airlines, banks and television, where local ownership is mandatory (World Bank, 2020e).

During the interviews conducted for this study, several representatives of the private sector mentioned the introduction of electronic management systems and the optimization of the inspection system (introduced in 2020), as significant improvements during the last few years. Electronic administration, particularly electronic document circulation and exchange, significantly decreases the paperwork load and saves working hours. The introduction of an electronic system for services provided by the State improves the openness, accountability and transparency of the operations of the public administration on the one hand and on the other, reduces corruption risks by significantly lowering the number of direct and personal contacts between public servants and the private sector. Various projects for introducing an electronic accreditation process are also being piloted and tested. They will form the basis for the registry, and the certification process will be done electronically (IMF, 2018; Heritage Foundation, 2020; Kaufmann and Kraay, 2022).

Compared with most other economies in Eastern Europe and Central Asia, Armenia is advanced in terms of infrastructural connectivity – such as electricity – in terms of procedures, time and costs (World Bank, 2020b). In contrast, the conditions of the roads and their networks need significant improvement, especially farther away from Yerevan. As described in chapter 4, the innovation infrastructure is growing, for example for the

ICT sector, albeit with some reservation about the scale of that sector's growth and its fragmentation. Armenia is also successfully exporting IT services, including back-office and support services, although some issues remain with contract enforcement and property rights protection, including trademark infringement (Department for International Trade, 2020). The majority of such exports go to the United States and Canada, followed by the Russian Federation, the Commonwealth of Independent States (CIS) and Europe.

There is still room for improvement with regard to good governance and financing issues, particularly the need to strengthen for example, the protection of minority investors against the misuse of corporate assets by directors for their personal gain as well as shareholder rights, governance safeguards and corporate transparency requirements that reduce the risk of abuse. Further improvements are also needed in the process of resolving insolvency. From a financial perspective, the recovery rate[64] is low (40 cents on the dollar in comparison with 70 cents on average for members of the Organisation for Economic Co-operation and Development). In addition, recovery takes up to two years. Tax payments could also be improved in terms of payments required and time spent (World Bank, 2020d).

Free economic zones (FEZs)[65] are an important vehicle for FDI in Armenia, specifically for manufacturing and trade (chapter 4). Residents of FEZs enjoy tax exemptions, except on payroll taxes, and simplified procedures through one-stop services and under customs regulations.

Diaspora investment can take a variety of forms but currently focuses on a narrow range of sectors

When examining diaspora investment in Armenia, it is important to consider the heterogeneity among investor types, as different types require different kinds of investment support tools.[66] The first type are individual diaspora investors who invest in a particular project, alone or together with other diaspora members. The second are collective and individual investors who invest in diaspora-connected companies together with other diaspora members or companies. The third are diaspora-connected corporate investors who invest in companies that are connected already to the diaspora through various links such as top executives, key shareholders or other kinds of connections. A part of diaspora investment from these three types of investors over the last decade flowed into the services sector. A significant share was also directed towards industries. From a sectoral perspective, the main areas of investment were ICT, gems and jewellery, tourism, agribusiness and food processing, apparel and construction. Investment in sectors other than these was minor, despite some exceptions (large-scale investment in wine grapes, nuts and the like). Table 5.1 describes other sectors that provide significant opportunities for investment. The main barriers to investment in these sectors are lack of capacity, knowledge and awareness related to projects and lack of finance-supporting tools and mechanisms.

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64 Recovery rate refers to the amount recovered when a loan defaults. In other words, the recovery rate is the amount, expressed as a percentage, recovered from a loan when the borrower is unable to settle the full outstanding amount.

65 FEZs are areas in which companies are taxed very lightly or not at all in order to encourage economic activity. For more info on FEZs in Armenia, visit https://mineconomy.am/en/page/255.

66 Several intermediary investment facilitation entities reported the lack of diversified investment support tools as a remaining challenge in Armenia.

Table 5.1 Potential sectors for diaspora investment that can enhance the competitiveness of local firms in Armenia

Sector	Opportunity
Agriculture	Agricultural production contributed about 11 per cent of GDP in 2021, and there may be opportunities for diaspora investors to invest in agricultural production, processing and distribution, including sales of products.
Manufacturing	Manufacturing value added contributed about 11 per cent of GDP in 2021, with a particular focus on textiles, food processing and pharmaceuticals. Diaspora investors may be interested in investing in these sectors or in setting up manufacturing operations in the country.
Real estate	Property prices have been on the rise in recent years, and there may be opportunities for diaspora investors to (further) invest in the country's real estate market.
Technology	Armenia has a thriving technology sector, in part driven by diaspora investment, with several companies that have an average growth rate of 20 per cent. Armenia is home to a number of successful tech start-ups. Diaspora investors may be interested in investing in technology companies, for example to support scale-up activities or start new tech ventures in the country.
Tourism	Armenia has a rich cultural heritage and a growing tourism industry, contributing around 15 per cent of GDP in 2022, according to data from Invest in Armenia. Some diaspora investors have already invested in hotels, restaurants and other tourism-related businesses in the country and may be interested to continue with this kind of investment.

Source: UNECE.

Policies address agriculture and rural development and the expanding innovation infrastructure for agriculture, though some potential for diaspora support remains untapped

The agriculture sector plays an important role in the economy. About 36 per cent of the population lives in rural areas, where about 80 per cent of workers are employed in the agriculture sector (Government of Armenia, 2018; ADB, 2020; Armstat, 2022c). Plant cultivation accounts for 60 per cent of agricultural production and animal husbandry for 40 per cent. In 2019 the share of agrifood products in total exports was 30 per cent, according to the Ministry of Economy (MoE) – an increase of more than 12 per cent over the previous year.[67] Volumes of agricultural production in Armenia are increasing; Belgium, Bulgaria and the Russian Federation received 39 per cent of these exports (EC, 2020b; UNCTADstat, 2022). The Armenian diaspora is investing in dairy projects such as collection and processing of milk and manufacturing of products such as cheese, as well as cultivation of berries and nuts, greenhouse flowers, and fruits and vegetables.

The Armenia Transformation Strategy 2020–2050 assumes that investment can drive industrial output and productivity through sustainable economic transformation, industrial diversification and digitalization based on innovation and technology transfer (Government of Armenia and UN Armenia, 2020). Various components relevant to diaspora investment in innovative projects in agriculture are industrial competitiveness and market access, with

67 MoE, "Agro-processing", https://www.mineconomy.am/en/page/1327#:~:text=In%202019%2C%20agrifood%20products%20worth,30.2%25%20of%20the%20total%20exports.

a focus on innovation and digitalization, sustainable agribusiness and support of SMEs as well as energy efficiency, renewable energy and sustainable environmental management. There are also plans to strengthen agriprocessing value chains and to establish various agricultural cooperatives in different provinces of Armenia. Also, new technologies are being developed for the protection of plants. These include ecologically clean technologies as well as technologies aiming to assess the harm to plants caused by chemicals and the decontamination period.

Agriculture and rural development are among the targets of the Armenian Development Strategy for 2024–2025.[68] The strategy also mentions other areas in which diaspora investment in innovative projects has the potential to spur the growth of the sector, including projects with the following aims:

- Developing commercial agricultural organizations, cooperatives and family farms integrated with market infrastructure through the application of knowledge-intensive technologies
- Using the comparative advantage of external trade in agriculture and food products
- Improving labour productivity
- Producing agriculture products with high added value in plant cultivation and animal husbandry

The Armenian Development Strategy for 2014–2025 also stipulates expansion of the innovation infrastructure in the agriculture sector by leveraging the potential for private investment. This expansion includes new technoparks and incubators and support for expanding digital technologies in the sector. Innovative projects are planned in seed production, animal breeding and product processing. The ambition is to stimulate innovation through providing support, by promoting modern technologies in credit programmes, and through technical modernization and upgrading, by applying leasing mechanisms in line with specific characteristics of the agriculture sector.

The Digital Agriculture Strategy 2021–2030 and its action plan, proposed by the Food and Agriculture Organization, intends to transform the sector by increasing adoption of digital technologies and innovative activities. This transformation can help increase food production, establish new markets, and bridge the digital and socioeconomic divide in rural areas. Armenia is also deliberating an e-agriculture strategy to enhance the application of ICT in agriculture, including for crops, livestock, fisheries and forestry. Various technologies are under consideration, from traditional ones (radio, television and mobile phones) to newer digital ones (drones, satellites, sensor technology, the Internet of Things and machine-to-machine communication).[69]

Additional drivers are created by Armenia's vision for transitioning to a knowledge-based economy and strengthening human creativity – seen as major elements for developing

68 Government of Armenia (2015), Armenia Development Strategy for 2014–2025. Annex to RA Government Decree, No. 442-N, 27 March 2014, https://policy.asiapacificenergy.org/sites/default/files/Development%20Strategy%20of%20the%20Republic%20of%20Armenia%20for%202014-2025_ENG.pdf.

69 FAO, "ENPARD (European Neighbourhood Partnership agriculture and rural development) programme supports the development of agricultural cooperation in Armenia", 25 September 2015, https://www.fao.org/armenia/news/detail-events/en/c/332079.

goods and services for global markets and commercializing R&D results (UNECE, 2002). This requires further research on various aspects: the drivers of knowledge-intensive industries in Armenia; the methodology for identifying key elements, gaps and obstacles to developing a knowledge-based economy in Armenia; target countries for export of Armenian knowledge-based goods and services; and the contribution of these industries to GDP. This research should be followed by the elaboration of a strategy for developing a knowledge-based economy, including a road map for its implementation and an action plan as well as the concept of cooperation with donors. Recently, the MoE established a department of knowledge-based economy, which is currently working in this direction. Diaspora involvement in the knowledge-based economy should become one of the elements of the strategy. Challenges to establishing connections with the diaspora should be identified and recommendations on how to overcome them provided.

Despite these efforts, additional support is needed to spur innovation through innovation-enhancing diaspora investment in the agriculture sector, particularly through digitalization and clean technologies

Although there are opportunities to invest in the agriculture sector as well as ideas for projects, at the moment many such initiatives lack valid business plans that could prepare them for investment. Additional support for developing and implementing these ideas can be provided through incubators and business accelerators. The recently published UNECE publication on Business Incubators for Sustainable Development examines the potential of accelerators and incubators in the SPECA subregion (UNECE, 2023b). New technologies and innovation in the agriculture sector in Armenia are most promising in two areas: digitalization and clean technologies.

Digitalization

Digitalization includes the Internet of Things, advanced robotics, 3D printing and other digital technologies. The agriculture sector would also benefit from implementing technologies such as global positioning satellite guidance systems, sensors, robotics, control systems, farm management software, drones and telematics. All these technologies are used frequently to increase the quantity and improve the accuracy of information available to farmers for maximizing returns, to improve the efficiency of production and to reduce waste. The MoHTI is preparing a Concept on Development of Digital Economy of Armenia, focusing on improving productivity by using digital technologies in services and production in various sectors, including agriculture. Armenia is developing action plans for 25 digital economy projects. These projects aim not only to provide digital tools for various sectors but also to achieve the overall digital transformation of the economy, government services and society.

Armenia has great potential to become a hub for large IT companies that want to relocate their business or parts of their business to the country, an opportunity that would benefit various sectors, including agriculture.[70] Such companies could drive innovation and technology transfer in the agriculture sector. The process of business relocation requires support to facilitate market entrance, dispute settlement mechanisms and a greater understanding

70 Reshoring, the relocation of production back to the home country – or near-shoring, if to a nearby nation – is the term used to describe this activity. Possible justifications include manufacturing digitization and cost changes, proximity of invention and production, and challenges to intellectual property.

of IT company needs as well as to create financial mechanisms that cover risk, such as a cash-back mechanism for relocated companies. Support for small IT companies can be provided through a venture fund, which is currently being developed. Support for SMEs in the IT sector already exists in the form of tax benefits such as reductions in income taxes for IT companies or laws on support of IT start-ups. However, further efforts are needed for relevant IT projects in agriculture to develop specialized support programmes and capacity-building, infrastructure and financing. These will have a positive effect on the productivity of various companies in the agriculture sector and will improve their competitiveness and chances in the global market (UNCTAD, 2019).

As mentioned, digitalization is an important element in upgrading and modernizing the agriculture sector. Efforts to introduce digital technologies are under way in animal husbandry (box 5.2) in such areas as vaccination of animals, control of diseases, agrichemical expertise in soil and improvement of soil production, and numbering of cattle. Projects are also under way in plants and vegetation, such as digital accreditation of seeds and certification, as well as development of centres for both. Currently, more than 4,000 varieties of plants have been assigned QR codes, although more resources are required to continue this work. Developing a digital database on livestock and seeds could also be quite beneficial.

Further support for digitalization, for example in laboratories, greenhouses and other infrastructure, is missing (UNCTAD, 2019). Laboratories lack capacities and staff, and will require additional funding to attract new people. Equipment such as computers, as well as training on how to use software, is also needed. There is great potential for introducing digital technologies in seed certification, laboratory research and testing, registration of new and imported varieties, plans and materials certification. Currently, the level of digitalization in this area is very basic. For example, many seeds are not certified and therefore their quality cannot be verified. The same is true for seedlings, as only a few organizations provide certificates that a seedling is of a particular type of fruit. QR codes could be a solution for certifying seed quality. Armenia also needs to implement digitalization systems for processing activities in the wine industry and for processing of animal products. The aim should be to have one unified registry for all processing activities as well as complementary mechanisms to motivate farmers to enter information in this system on a regular basis. Such mechanisms should also be created to engage and motivate veterinarians to enter data in the registry.

With the exception of the wine industry, the diaspora is not involved in these projects, for a few reasons. The first is lack of information. Another is lack of specialized and trained human resources. Some support mechanisms exist, such as assistance for purchasing raw materials, targeted credits for processing factories and subsidies on interest rates for credits. According to Repat Armenia, it is easy and straightforward to open a bank account in the country, requiring only a few days and a small fee. Non-residents can even open a bank account remotely. Owning an account in Armenia provides individuals with the option of receiving a credit, but loans are available only to residents or nationals of Armenia. Agricultural loans usually have interest rates of about 10 per cent but, depending on the currency obtained, can be up to 24 per cent.[71] There is also leasing support in the agrifood

71 Repat Armenia, "How to open a bank account in Armenia?", https://repatarmenia.org/repatriate/practical-information/first-steps-after-your-move/opening-a-bank-account-in-armenia.

sector, which includes subsidies on interest rates for leasing. However, interviews revealed that information about these financial products, such as leasing opportunities, needs to be more accessible to interested parties. Currently, very few banks provide leasing possibilities for the agrifood sector, and the required prepayment is between 30 and 50 per cent of the amount needed. Also needed are educational and awareness-raising programmes in rural areas, especially among farmers, on the benefits of digital technologies and on how to use them (chapter 3). Educational programmes for farmers and veterinarians should become a priority.

Box 5.2 UN/CEFACT efforts to digitalize standardization and certification mechanisms in the agriculture and food sector

The United Nations Centre for Trade Facilitation and Electronic Business (UN/CEFACT) standards for the safety and quality of international agricultural trade include the eAnimal Passport, which enables EU inspection authorities to identify and verify individual animals being transported across borders, and the Rapid Alert System for Food and Feed, which enables countries to quickly exchange information about measures taken in response to serious risks. UN/CEFACT's eCERT electronic certificates also help control phytosanitary certificates, to prevent the spread of pests. To support policymakers in adopting these standards, UNECE published the *Handbook on Implementing UN/CEFACT e-Business Standards in Agricultural Trade* in 2016. The handbook, which is accessible online (ECE/TRADE/428), could be a valuable tool for policymakers looking to enhance the competitiveness of Armenia's agricultural trade. UNECE and UNCTAD have also jointly published "Specifications for an Electronic Quality Certification System for Fresh Fruit and Vegetables". This functional system specification can be used as a template for technical development and implementation of such a system or to improve an existing system with best practices.

UN/CEFACT is a subsidiary body of the UNECE with global membership. It supports UN Member States in developing recommendations and electronic business standards for facilitating national and international transactions with the goal to simplify and harmonize international trade transactions and relevant information flows. UN/CEFACT standards support sustainable supply chain management and digital operations in trade, transport and logistics, cross-border management, environment, travel and audit, and agricultural value chains, among others. This intergovernmental body acts as a semantic hub that develops trade facilitation recommendations and e-business standards that guide international trade for inclusive and sustainable development.

UN/CEFACT standards are also critical for supporting innovation by providing a common framework for data exchange. The framework enables effective communication and information sharing, and, as such, facilitates implementation of new technologies and cross-border trade, while ensuring more efficient and accurate business operations, and cheaper and faster business transactions.

In addition, UNECE and ESCAP (the UN Economic and Social Commission for Asia and the Pacific) have established the Electronic Permit Information eXchange (EPIX) Task Force of the Convention on International Trade in Endangered Species of Fauna and Flora (CITES). It aims to support interested management authorities and stakeholders in initiating and carrying out pilot-based and/or live electronic exchanges of CITES permits, which may help prevent fraudulent use of CITES permits, facilitate legal trade, and improve the preparation and submission of CITES annual reports. Any interested management authorities can participate in the Task Force.

Source: UNECE.

Clean technologies

Political will is the major driver for clean technologies in Armenia, signalling certainty to investors. Various strategies have been implemented, including a green economy strategy, a low-carbon development strategy, an action plan for water adaptation to climate change and a green procurement strategy. There are also government programmes for electromobility projects, drip irrigation and biofuels. However, this political will needs to be combined with a range of instruments. For example, as renewable energy sources (especially large-scale projects) require high upfront investment (with lower investment levels during the operational phase), support instruments – de-risking mechanisms – are needed to cover investment costs (UNDP, 2016). Furthermore, respective markets should be created. For example, as seen in the Middle East, the lack of a market for services such as installation or repair of photovoltaic panels is a big barrier. For decentralized electricity generation as well as changes required on the demand side, awareness-raising campaigns and measures to stimulate engagement in energy transition are needed.

Given its population, geography and industrial history (World Bank, 2020a), Armenia could become a hub for R&D and a prototyping testbed for global cleantech companies to support greater use of clean technologies for climate change mitigation and adaptation. In addition to alternative energy solutions, cleantech solutions include products and services that mitigate negative environmental impacts. These encompass a wide range of technologies in reclamation and in soil and water treatment, including biofiltration, sediment capping, soil flushing, dredging and chemical stabilization. The industry includes SME innovators and researchers as well as large multinationals responding to topographical, environmental and regulatory challenges. Diaspora members' knowledge of and expertise in clean technologies can further facilitate the transfer and deployment of these technologies.

Further developing and encouraging diaspora engagement and investment to help drive innovation-led growth in agriculture requires more targeted policy support and coordination

In addition to initiatives by the diaspora, international partners such as the International Organization for Migration (IOM) (box 5.3) and the Government of Armenia are implementing programmes to attract diaspora investment in various sectors. During the interviews for this study, a few examples of these programmes were mentioned; they are outlined in table 5.2. Among these examples mentioned are programmes that provide information and raise awareness inside and outside the country, to develop capacity, to facilitate investment and to help to manage projects once investment has been made. These efforts could be strengthened by considering the priorities of the different types of diaspora investors: individuals, diaspora-connected individuals and diaspora-connected corporates.

Discussions are under way about several instruments to support diaspora investment, from information provision to financing and further support. These instruments should have three goals: to provide information about potential opportunities in order to attract investment to spur innovation, to facilitate investment through various support mechanisms and help sustain it, and to help manage the business. Further incentives should be provided for investment in areas associated with risk such as high-quality production or investment in the regions and outside the capital. These incentives should consider the associated

risks and contribute to the profitability of the investment, moving away from the "charity investment" model commonly used.

One of the major recent changes in instruments for engaging the diaspora is connected with opportunities provided by the globalization of talent and knowledge networks. Earlier diaspora engagement strategies focused on physical return to Armenia, whereas the current supporting mechanisms include short-term, temporary and virtual returns.

Box 5.3 International Organization for Migration project: Enhancing Development through Diaspora Engagement in Armenia

In 2022, the International Organization for Migration (IOM) launched a project to assess the potential of the diaspora to act as a catalyst for sustainable development in Armenia. The project was carried out as part of the UN Network on Migration in the Republic of Armenia and in close collaboration with the United National Development Programme (UNDP) and other UN agencies, as well as the Resident Coordinator's Office.

In its analysis, the IOM examined the diaspora's role in driving progress in three priority sectors – agriculture development, tourism, and science and education. The IOM assessed projects and initiatives undertaken by the diaspora in the three sectors, identified opportunities for engaging the diaspora, defined institutional enhancements for a mutually beneficial link between Armenia and its diaspora, and developed a road map for diaspora financing in support of the Sustainable Development Goals (SDGs). The final report, *Enhancing Development through Diaspora Engagement in Armenia*, contains targeted and actionable recommendations on identifying and developing innovative financing mechanisms for a broader and inclusive engagement of the diaspora in the process of moving towards sustainable development (IOM, 2023). The tools examined included the financial sector's regulatory flexibility, as well as pooled development funds, diaspora-led crowdfunding and micro-capital funding, portfolio investment, impact investment, venture impact funds and green finance.

Policy recommendations included (i) engaging diaspora skills and contacts to promote the certification and availability in diaspora centres of Armenian agricultural products; (ii) continuing the policy of funding and expanding opportunities for agricultural workers in Armenia by way of diaspora-led partnerships and crowdfunding campaigns; (iii) developing innovative funding opportunities in farm credit (e.g., peer-to-peer) that are open to diaspora participation from abroad; (iv) introducing crop insurance for local growers as both revenue protection options and damage-based or yield-based options, leveraging trends in diaspora financial diversification; (v) sustaining and improving the operational environment for venture funds, drawing on diaspora expertise; and (vi) developing capacity for local initial public offerings for large agriculture sector entities, with the aid of diaspora expertise. In addition, substantial benefits can be derived from initiatives to recognize skills equivalency, thereby fostering meaningful integration of diaspora professionals considering either repatriation or temporary or distance-based engagement with the economy.

Like this I4SDR, the IOM report fills a gap in the literature on innovation-enhancing diaspora investment in agriculture. Most previous publications focused on the role of the diaspora in supporting ICT innovation and entrepreneurship. In contrast, the adoption of new manufacturing techniques and process improvements in the sector could be significantly accelerated with a pragmatically structured and comprehensive framework for attracting diaspora investment and expertise. The innovative finance angle and the focus on the agriculture sector adopted by the IOM study thus complement this wider UNECE study, providing an in-depth analysis of concrete mechanisms for diaspora investment. Armenia's substantive and sustainable engagement with its diaspora, as argued by the IOM study, depends on introducing a strategic diaspora engagement plan consistent with the country's development and economic growth.

Source: IOM.

Table 5.2 Examples of selected programmes for attracting diaspora investment in Armenia

Programmes and projects (selected examples mentioned during interviews)	Needs for further improvement
Information and awareness raising inside and outside the country	
Step Home programme, implemented by the High Commissioner for Diaspora Affairs with the aim to promote cultural and linguistic values among Armenian diaspora members in 24 countries Come Back Home programme, involving young people in 36 countries; implemented by the Ministry of Economic Development and Investment Young Leaders Training Programme, implemented by the High Commissioner for Diaspora Affairs, with the aim to facilitate knowledge and experience transfer between diaspora members Invest in Armenia platform, covering legal issues and providing an information platform for diaspora investment; implemented by the Ministry of Economy	Information about potential innovative projects in the agriculture sector is lacking. Databases should include a list and descriptions of potential projects as well as the skills available in the diaspora. Information about such databases should be disseminated inside and outside the country.
Facilitating investment	
EU–Armenia Comprehensive and Enhanced Partnership Agreement (CEPA) for 2021–2027, with the aim to promote a functioning market economy and a favourable business and investment climate, with the goal to leverage public and private investment, as well as to facilitate resilient digital transformation; total funding of €180 million for 2021–2024	Support instruments to cover the risks of investment in innovative projects in the agriculture sector are lacking. The country could benefit from introducing instruments such as leasing, insurance schemes and guarantee funds or, if they are available, to provide better information about them. Financial support instruments need to be diversified, while also addressing available diaspora capacities and requirements. For example, crowdfunding platforms, diaspora bonds and venture funds can help channel investment from investors in an organized manner and could be a vehicle to cover the risks for several individual investors.
Capacity-building	
Neruzh programme for young Armenian entrepreneurs, a programme implemented by the MoHTI in cooperation with the Foundation for Armenian Science and Technology, supporting several start-ups, with the involvement of diaspora in various countries LEAD-Armenia project to develop diverse and innovative diaspora investment instruments Repatriation Support Programme, with the aim to provide support to diaspora members, including information, capacity-building, housing and loans for moving to Armenia	Capacity-building programmes are lacking, especially connected with introducing innovative projects in the agriculture sector. Capacity-building organizations mainly focus on the capital and large cities. Possible support programmes could include strengthening digital skills of farmers as well as extending support to cover various regions.

Infrastructure development	
Regional Economic Corridor Improvement Project, aiming to improve regional connectivity and transportation links Liveable Cities Project, aiming to improve the urban environment in selected towns Sustainable Urban Development Investment Program of the Asian Development Bank, aiming to improve urban infrastructure in 12 Armenian cities Infrastructure and Rural Finance Support Programme of the International Fund for Agricultural Development, aiming to contribute to development of rural areas	Infrastructure to benefit from ongoing processes such as regional integration and export orientation has not been developed. For example, infrastructural facilities such as dry ports can provide logistical support for exports of agrifood products.

Source: UNECE.

Note: The list of diaspora support programmes included in this table is not exhaustive. Several institutions and organizations are involved in coordinating diaspora engagement, and especially in facilitating diaspora investment. These organizations are active at both ministerial and subministerial levels. Also involved are organizations outside of Armenia. Further research is needed to map their competencies and mandates in order to coordinate their efforts efficiently and to avoid overlapping of mandates and competencies.

The lack of information and exchange about innovation investment opportunities between the diaspora and local businesses is one of the main impediments to innovation

Information about investment opportunities is often unavailable abroad. Instruments and measures are needed that provide information about such opportunities (*recommendation 5.1.1*). Such information can be provided by, for example, the Armenian embassies or during dedicated events abroad such as trade fairs, with special representatives from the foreign ministry, trade representatives, business delegations or honorary consuls available to stakeholders abroad and domestically. It would be beneficial for Armenia to map and provide information about investment opportunities for innovation, including those targeting the agriculture sector, such as various factors of agricultural production, by region and by areas within regions, as well as map diaspora skills available to facilitate investment, consolidated into a unified digital database (*recommendation 5.1.2*). Some examples already exist, such as the Invest in Armenia platform; however, these should be scaled up and also include various regions and sectors. This effort should also include the development of a database of diaspora skills. Digital maps can also spur innovation investment in the agriculture sector. One example is the development of geographical digitalized maps of agricultural lands; another is the improvement of the animal identification system being prepared by the MoE. The OHCDA could organize talks, exhibitions and information exchanges that highlight success stories of diaspora investment as well as provide a forum for diaspora members to talk about their experience, further facilitating diaspora engagement (*recommendation 5.1.3*). This effort can also include further support for integration centres in Armenia that support repatriated citizens as well as the establishment of a call centre to provide information and discuss repatriation and investment opportunities.

Diversified financial engagement mechanisms can further help address the needs of each type of diaspora investor

Crowdfunding platforms, such as that recently launched by the Armenian National Interests Fund,[72] can be a mechanism to help bring together ideas and financing and connect stakeholders such as investors and project developers (*recommendation 5.2.1*). Invest in Armenia is an example of such a platform, providing information about local production trends and opportunities for investment. ReArmenia is another platform that provides opportunities for investment in social initiatives in Armenia that have socioeconomic development components. It provides access to various possibilities, from investment to mentorship.

Other financial instruments for diaspora investment include diaspora bonds[73] and guarantee funds, such as an agricultural guarantee fund for agricultural loans. Diaspora bonds might help leverage the emotions of diaspora members willing to support projects in their native country through bonds with lower interest rates, long-term maturities and low yields (*recommendation 5.2.2*). Guarantee funds have the potential to aggregate resources and provide good governance frameworks. Implementing these initiatives should be accompanied by good governance measures to ensure people trust such instruments and Government actions.

Venture funds could further support SMEs in the agriculture sector, especially high-growth technology-intensive businesses. These funds can follow the example of the Venture Capital Fund for Armenia, which was established to support development of ICT (chapter 4). Such funds could be represented by various investment companies. The model can be based on that of a private equity fund, adapted to the local environment, with opportunities to invest in greenfield projects or established companies. Some such funds have already been established; however, further efforts are needed to provide information about them to diaspora members. These venture funds can be also connected to technical support funds to support innovation, acceleration funds to sustain projects, and investment or social impact investment funds (*recommendation 5.2.3*) (EC, 2019).

Several risks of investment in innovative projects are not covered or are covered only partially, for example currency exchange risk. The MoHTI developed a proposal to cover this risk by decreasing the profit tax and mitigating the losses caused by the devaluation of the US dollar and the euro. Here, various financial and insurance mechanisms will need to be considered. A good example is the Foreign Exchange Contract Insurance and Export Insurance Agency of Armenia.[74] It settles the forward rate of the currency and helps to stabilize proceeds in the currency. The agricultural insurance system is another example that can be used to cover certain types of production such as crops or cereals. This system is not connected with exchange risk but with other kinds of risks. Leasing is another option to facilitate purchase of agricultural machinery by diaspora members. Implementing such an instrument should be combined with further development and strengthening of the regulatory framework.

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72 Armenian National Interests Fund: https://anif.am/investors/invest-through-arfi-platform-by-anif.

73 A diaspora bond is a type of government debt security that attracts investors from the nation's citizens who reside abroad, their families or those with other ties to the country.

74 Export Insurance Agency of Armenia: http://www.eia.am/en/.

Procedures and infrastructure for agricultural trade activities need to be strengthened

Significant improvements are needed to facilitate trade across borders, including compliance with technical regulations of other countries and regions, such as the European Union (EU). In terms of time and costs, export procedures are more problematic than import procedures. The costs of documentary compliance for both export and import in Armenia are much higher than the European average (World Bank, 2020e). Further efforts are needed to streamline and standardize procedures for agricultural products and services and to benefit from digital technologies by simplifying and digitalizing custom procedures. This includes improving a seed and plant material certification system (box 5.4).

The logistical infrastructure, a challenge that inhibits further development of the agriculture sector and export of sectoral products and services, needs to be further strengthened to provide opportunities for exports. As the country is landlocked, exports must cross borders and control points. In this context, dry ports could be a mechanism to facilitate diaspora investment (*recommendation 5.3.1*). Dry ports,[75] sometimes called inland ports, are intermodal terminals that connect directly by road or rail to a seaport. Their main feature is their high capacity: In comparison with other logistical centres, dry ports have more storage, as well as customs and other services. A promising development in this regard is the dry port of Gyumri, which is also an FEZ with various tax incentives; Gyumri is the second largest city and the dry port is located near the airport and the railroad. The logistical infrastructure could also expand to include new logistical centres with all necessary support and a system of subsidies for national cargo. Another promising development is the special cargo terminal for fresh food and vegetable exports at the Zvatnots airport, which currently operates significantly below capacity.

Along with relevant investment support, policies will also need to build capacities of both investors and organizations from the diaspora for innovation in the country

Investment readiness is an issue for companies in the agriculture sector. For example, investors may be reluctant to support innovative project ideas because investment risks are too high or there is a lack of people qualified for such projects. Another issue is that information about such projects does not always reach potential investors. This speaks to the need to have a database of potential projects, of information and networking platforms, and of the skills required, combined with capacity-building measures.

Capacity-building support in the agriculture sector, such as assistance in developing business plans and assessments of business profitability, with follow-up action plans for

75 According to the UN, a dry port of international importance is a location in a country's territory that has a logistics centre connected to one or more modes of transport, intended for handling, temporary storage and statutory inspection of goods transported in the course of international trade. Dry ports typically perform customs control functions and formalities, operate as a centre for transshipment of sea cargo to inland destinations and are important logistical hubs located on major transport routes of international importance. At dry ports, goods are loaded and unloaded based on proximity to the border, changes in mode of transport and available storage facilities. Dry ports play a critically important role, especially as points for moving cargo goods from one transportation means to another one. Goods are delivered to dry ports, sorted there and then shipped farther using different transportation means, including railroads, trucks, and air. Goods that came from seaports can be redistributed to be transported further by rail or road, and goods that came by rail or road can be redistributed to be transported to seaports. (United Nations, Treaty Series, vol. 2323, No. 41607 and United Nations, Treaty Series, vol. 2596, No. 46171)

Box 5.4 UNECE studies on regulatory barriers to trade

In 2019, UNECE conducted a Study on Regulatory and Procedural Barriers to Trade (RPBT) for Armenia. Recognizing that the Government has made a strategic effort to integrate the country into regional trade partnerships, including by joining the Eurasian Economic Union in 2015 and CEPA with the EU in 2017, UNECE supported Armenia in addressing regulatory and procedural barriers in international supply chains (UNCTAD, 2019). The recommendations from the RPBT contributed to Armenia's efforts to transition towards a paperless trading system, implement the country's commitments under the World Trade Organization Agreement on Trade Facilitation, develop its national quality assurance system, further improve its metrology system and enhance the technological capability of its manufacturing enterprises. This study emphasized a critical role for the diaspora in facilitating exports of Armenian enterprises by helping them establish relations of trust with transnational corporations. The RPBT study also enabled a better understanding of how to best leverage trade for structural transformation, gender equality and job creation (SDGs 5, 8 and 9, respectively).

UNECE's country-specific RPBT studies provide an in-depth analysis of non-tariff barriers to trade in goods by identifying country needs and suggesting recommendations on how to improve trade regimes to reap the expected benefits from economic and trade reforms. The aim of these studies is to help countries achieve greater regional and global economic integration, inform donors as to where assistance might be required, and support policy discussions on trade facilitation, regulatory cooperation, standardization policies and trade-related infrastructure.

Source: UNECE.

implementing these businesses, could also facilitate diaspora investment. Capacity-building should include tailored advice, mentoring and counselling. Offering an investment advisory service that can help to prepare investment proposals could be a good practice. Such services should also provide entrepreneurship and start-up support (chapter 4). Mentoring and counselling activities can provide information on legislation, regulation, taxation, licensing, standardization and certification. Entrepreneurship and start-up support can help establish new start-ups, provide support in realizing new business initiatives and upgrade business knowledge. This start-up support can also facilitate access to finance and provide support through start-up credits or loan guarantees. They could also link Armenian start-ups to international donor activities or programmes, for example through various innovation matching grants or technology entrepreneurship programmes (*recommendation 5.3.2*).

Private or government-owned companies that prepare all necessary information for investors are also drivers of diaspora investment. There are some good examples in the country, such as Enterprise Armenia; however, their capacities and the number of such entities should be increased and their coverage for various regions expanded. They can help in many ways: identifying locations for innovation investment opportunities, soliciting construction permits, purchasing property and liaising with authorities. Such entities can also help with dispute settlements, including land use issues; translate cultural values of the investor to local values; and identify suitable regulatory procedures. Repat Armenia is another example of capacity-building support related to various areas connected to repatriation, from providing information about opportunities to executing various stages of investment, including managing projects. It also provides information about integration instruments such as schools, education, language and courses. Capacity-building should

also include capacity development and empowerment of diaspora organizations. Also, various offices for technology transfer can be created (chapter 4).

Creating trust between the diaspora and the Government is key if implemented support is to succeed in creating the desired effect

Further efforts need to be invested in creating a mutual feeling of trust between the Government and diaspora investors. This trust can be created through various programmes that provide a welcoming environment for diaspora members or people who plan to repatriate to Armenia. Trust can also improve by creating an environment in which diaspora efforts are appreciated and the needs of the diaspora understood.

Policy vehicles through which such trust can be attained are public-private partnerships (PPPs) (box 5.5) as well as various programmes that support diaspora self-identification and safety. PPPs help engage the diaspora in decision-making processes. Granatus Investment is an example of a PPP in emerging technologies (chapter 4). Various successful regional development projects include the Tatev Revival Project and PPP projects in the IT sector, such as those implemented with Microsoft and IBM.

Ensuring that governance is participatory can also contribute to a feeling of ownership, thereby increasing the level of trust. Systematically engaging diaspora in policy governance, including policy coordination, processes and implementation, also helps further the spread of innovation and technology transfer. In this context, diaspora members and national stakeholders can engage in processes of co-creation. By participating in policy governance, diaspora members could become co-implementers, co-designers or co-initiators of policy interventions. This would make it possible to better integrate diaspora knowledge and expertise and to identify compromises and solutions to challenges.

A dedicated diaspora engagement framework (*recommendation 5.4.1*) can help include the diaspora in decision-making processes and provide an opportunity for them to provide feedback and express concerns (Gevorkyan, 2022b; UNECE, 2022). The diaspora can participate in decision-making processes in a variety of ways, such as by voting, consultation and advocacy. Measures of good governance are also an essential element to improve the degree of trust. Facilitating such engagement includes several steps, among them gaining an understanding of who diaspora members are and further developing policies and approaches tailored to engaging them (including sector-specific engagement, capacity-building and targeted programmes). This can be followed by promoting diaspora networks and funding and creating space for integration and dialogue with the diaspora through consultation meetings and processes.

Two official ways in which the diaspora may be represented in decision-making organizations are by forming diaspora representative offices or appointing diaspora individuals to advisory or decision-making roles. In cooperation with the OCHDA, the MoE could participate in advisory activities (*recommendation 5.4.2*). It would be beneficial, for example as part of the overall diaspora engagement framework, to introduce the practice of involving diaspora representatives in consultations on ministry strategies through related working groups or through involving some diaspora members of such groups directly in consultations (chapter 3), based on a comprehensive matrix of stakeholders (*recommendation 5.4.3*). The political structure of the country, the views and preferences of the diaspora, and decision-makers' readiness to consult and interact with the diaspora are just a few of the variables

Box 5.5 Public-private partnerships and their role in facilitating diaspora engagement

The diaspora can be a crucial ally in the PPPs for the SDGs approach to infrastructure development. Given its large size and close ties to its historic homeland, the Armenian diaspora could bring expertise, experience and knowledge of international best practices to projects. They can provide financial resources and investment to support sustainable PPP projects and promote these projects among their networks, both within the diaspora and in Armenia. In 2021, UNECE hosted a policy dialogue called "Leveraging Diasporas to Promote Innovation for Sustainable Development". During the session, policymakers from UNECE member States, IOM and the United Nations Conference on Trade and Development as well as experts from the private sector and academia highlighted the importance of conducting regular outreach, involving diaspora members in decision-making, establishing concessional finance mechanisms that target diaspora investment and developing an overarching strategy to coordinate efforts to engage the diaspora. Participants also reviewed several successful case studies of diaspora engagement.

Through its work on public-private partnerships (PPPs), a collaboration between the Government and the private sector to jointly deliver a public service or infrastructure project, UNECE enhances the ability of governments to identify, develop and implement successful PPP projects aligned with the SDGs. UNECE achieves this by promoting the sharing of knowledge and experiences among its member States and in expert discussions. These exchanges lead to development of standards, guidelines, best practices and innovative tools that can be used in capacity building initiatives and training programmes.

Since 2015, UNECE has taken the pioneering "PPPs for the SDGs" approach, focusing on the three sustainability pillars: social, economic and environmental. The goal is to ensure that PPPs and infrastructure projects help support the world's most vulnerable and integrate sustainability, resilience and circularity. In 2021, the UNECE Working Party on PPPs adopted the "PPP and Infrastructure Evaluation and Rating System" (PIERS), a methodology to evaluate PPPs and infrastructure projects on the basis of their contribution to sustainable development. PIERS has been used on more than 100 projects in several countries, including Armenia, Kyrgyzstan, Ukraine and Uzbekistan.

Source: UNECE.

that may have an impact on this type of diaspora engagement. In some instances, the diaspora may participate in decision-making processes through unofficial routes, such as through consultations with diaspora organizations or by attending public gatherings and conversations with other citizens. Including the diaspora in decision-making processes is an important element of connecting members with Armenia and can be a major contributor to their engagement and future investment.

Policy messages and recommendations

Table 5.3 outlines the main findings and recommendations of this chapter that address the major challenges to diaspora investment in innovative projects in the agriculture sector. Armenia has introduced support institutions, such as the OHCDA, and programmes to encourage diaspora investment for innovation, including the use and diffusion of digital and clean technologies. The remaining challenges, however, hinder diaspora investment for innovation across other sectors of the economy that show great potential to drive sustainable growth. These challenges include risks connected with investment in innovative projects,

in general, and risks for investment in projects in the rural areas of the country, in particular. Barriers also arise from the information asymmetry related to available opportunities and innovation needs in the agriculture sector, compounded by the lack of capacity for implementing such innovative projects as well as the lack of logistical infrastructure required by regional integration processes for exports of agricultural products. Among other issues is the need to introduce measures that raise the degree of trust among diaspora members in such projects. This effort should include addressing the needs of diaspora members and creating possibilities for engaging them in decision-making processes. Also, various financial instruments are needed to cover investment and operational risks connected with investment in innovative projects in the agriculture sector.

Table 5.3 Summary of policy recommendations for engaging the diaspora to spur innovation in the agriculture sector

Recommendation 5.1: Increase **awareness of and information on potential opportunities** for investment, to drive innovative growth in the agriculture sector.

Although the diaspora has the capacity and motivation to invest in the development of the economy, many lack sufficient awareness of and information on the opportunities available and the requirements, especially in the agriculture sector.

Actions	Priority	Time frame	Actors
5.1.1 **Strengthen information exchange inside and outside Armenia** on opportunities for investing in the agriculture sector and innovative projects.	②	Short-term	Foreign representatives of Armenia, representatives for diaspora affairs within the country, private and civil society networking platforms
5.1.2 **Map opportunities in the agriculture sector**, including various factors of agricultural production, if possible, by region and by areas within regions, as well as available diaspora investment skills, and develop a unified digital database.	①	Short-term	OHCDA, MoE
5.1.3 **Create and support development of networking platforms** and events to provide opportunities for exchanges of experience among diaspora members on projects in the agriculture sector.	②	Medium-term	OHCDA, MoE

Recommendation 5.2: Provide diversified **financing mechanisms and instruments** for diaspora investors that consider the heterogeneity of their specific needs.

Financial mechanisms and instruments need to be further developed and diversified to respond to the needs of diaspora investors, especially for innovative projects in the agriculture sector.

Actions	Priority	Time frame	Actors
5.2.1 **Support the development of crowdfunding platforms** and mechanisms that bring together ideas on innovative projects in the agriculture sector and financing.	①	Short-term	OHCDA, MoE
5.2.2 **Examine the feasibility of and mechanisms available for implementing diaspora bonds**, leasing and insurance mechanisms to cover the risks of investing in innovative projects in agriculture.	②	Medium-term	OHCDA, MoE
5.2.3 **Establish venture and guarantee funds for innovative projects in agriculture** combined with good governance measures, and disseminate information about these funds.	①	Long-term	OHCDA, MoE

Recommendation 5.3: Strengthen the logistical infrastructure and implement capacity-building support measures for diaspora members and support organizations.			
Despite some progress, logistical infrastructure needed for developing agricultural projects is missing, especially in rural areas. In addition, gaps remain in the skills and knowledge needed to implement innovative projects.			
Actions	**Priority**	**Time frame**	Actors
5.3.1 **Expand the logistical infrastructure** to benefit from ongoing regional integration processes and the export of agricultural products, including logistical hubs and dry ports.	②	Medium-term	MoE
5.3.2 **Implement capacity-building measures for diaspora members** on doing business in Armenia and on the specificities of the agriculture sector.	①	Short-term	OHCDA, MoE
Recommendation 5.4: Improve trust between the diaspora and the Armenian Government to facilitate engaging the diaspora in policy formulation and implementation.			
The low levels of engagement of the diaspora in policy- and decision-making processes in the country leads to a lack of the trust needed for diaspora investment.			
Actions	**Priority**	**Time frame**	**Actors**
5.4.1 **Create a diaspora policy engagement framework** to include the diaspora in decision-making processes, with an opportunity to provide feedback and express concerns.	①	Medium-term	OHCDA
5.4.2 **Establish diaspora representative offices and/or provide diaspora members with advisory or decision-making roles** for policy intervention.	②	Medium-term	OHCDA, MoE
5.4.3 **Involve diaspora representatives, based on comprehensive stakeholders matrix, in consultations** on ministry strategies through dedicated working groups.[a]	①	Short-term	Government of Armenia, MoE, MoHTI, MoESCS, OHCDA

Source: UNECE.

[a] This recommendation is related to recommendation 3.2.1.

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ANEL: https://anel.am
Armenia Startup Academy: https://www.startupacademy.am
American University of Armenia: https://aua.am
BANA: https://bana.am
EIF: http://eif.am
EPIC Incubator: https://epic.aua.am
EU4Business: https://eu4business.eu/armenia
FAST: https://www.fast.foundation
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Hero House: https://www.herohouse.am
ImpactAim Accelerator: https://impactaim.com
IRIS Incubator: https://www.irisbi.am/en
SmartGate VC: https://www.smartgate.vc
EU-TUMO Convergence Center: https://www.convergence.center/about
Government of the Republic of Armenia: https://www.gov.am/am
Ministry of Economy: https://www.mineconomy.am
Ministry of High-Tech Industry: https://hti.am/?lang=3&page_id=1&id=0&page_name=default
State Science Committee: http://www.scs.am/en/home
National Statistical Committee of Armenia: https://www.armstat.am/en
TUMO: https://tumo.org

ANNEX

Table A3.1 Mega goals of the Armenia Transformation Strategy 2020–2050

Number	Objective
1	Educated and informed citizens
2	Well-defended borders
3	Effective and accountable governance
4	Healthy and safe citizens
5	Large and prosperous families
6	Rule of law
7	Export-oriented manufacturing base
8	Clean and green environment
9	Sustainable regional development
10	Productive and responsible agriculture
11	Large-scale repatriation and integration
12	Globally connected
13	Renewable and accessible energy
14	Attractive for industry
15	Knowledge-based economy
16	Recognized, respected and welcoming

Table A4.1 Acceleration and incubation programmes: components and outcomes

Programme	Stage	Funding	Components	Outcomes
Armenia Startup Academy	Seed	International (EU-SMEDA Project)	*Pre-acceleration programme.* Assists in prototyping, idea validation, customer development, strategy formation and pitching processes *Traction programme.* Support to boost further development of start-ups that have initial traction through mentorship and advisory programmes	Over €10 million raised More than 100 experts and mentors enrolled More than 190 sessions and workshops conducted 7 batches of 121 start-ups supported, of which more than 70 per cent have graduated
American University of Armenia EPIC Incubator	Pre-seed	International (USAID), Diaspora (alumni philanthropic community)	*STRIVE Pre-incubation.* A 10-week educational programme for developing entrepreneurial skills in individuals *EPIC Incubation.* A 15-week capacity-building and mentorship programme with a wide network of advisors and investors, as well as access to collaboration spaces and a prototyping laboratory	10 generations of graduates, including 70 start-ups and 180 entrepreneurs
HeroHouse AI Incubator	Seed, Series A+	International (EU4Business ITTD Project)	*Entrepreneurial Assistants' School.* A programme that inculcates a set of applicable entrepreneurial skills (e.g. customer development, growth marketing, VC, product management and analytics) *AI Incubation.* A 12-week programme targeting undergraduate researchers developing AI solutions for the private sector	*EA School* 6 batches of students 500 mentorship hours 9 of 10 graduates employed in the tech industry
			HeroHouse Innovation Hub. A co-working space hosting more than 40 start-up teams and individuals involved in the IT industry	*AI Incubator* 3 batches of teams 19 start-up and 35 researcher graduates Tangible commercial results (e.g. patentable technologies, letters of intent)

Programme	Stage	Funding	Components	Outcomes
ImpactAim Thematic Accelerators	Pre-seed, Seed	International, Government, Private	*Accelerator #5 – Tech Skills of Women and Kids.* Enhances digital and entrepreneurial skills of Armenian children (7–14 years old) and youth and women (15+ years old) *AgriTech Accelerator.* A 10-week incubation and 12-week acceleration programme implemented jointly with the Agrarian University of Armenia, backed by a physical facility in the university for training, product testing and pitching *Climate Change Technology Accelerator.* A 16–20-week programme implemented in cooperation with EIF that offers both monetary (up to $10,000) and non-monetary incentives (e.g. introduction to an international network of potential stakeholders) *GovTech Accelerator.* Executed in cooperation with the MoHTI and designed for pre-seed/seed-stage start-up projects	*ImpactAim accelerators* About $600,000 invested through the four accelerators described here as well as two others and two incubators More than 700 individuals enrolled in mentorship and training 36 alumni start-ups
ASCENT and InVent by FAST Foundation	Pre-seed, Seed	International, Private	*ASCENT initiative.* Comprises four stages: *Exploration.* Works on AI and biotech solutions in research groups *ProtoCo.* Conducts feasibility studies and product testing, and develops and patents a prototype *NewCo.* Establishes a start-up company and assists in raising investment *GrowthCo.* Helps the newly launched companies expand sales and enter new markets	AI track: 150 venture ideas generated 8 ideas shortlisted 1 idea prototyped
			InVent initiative. A 15-week programme implemented in cooperation with Aston University. Enrolled teams form start-up companies based on the AI or biotech solutions developed during ASCENT receiving a $5,000 seed-funding prize and an opportunity to do an early-stage pitch to the Science and Technology Angel Network.	Biotech track: 100 venture ideas generated 2 ideas shortlisted

Programme	Stage	Funding	Components	Outcomes
IRIS Business Incubator and Academy	Pre-seed, Seed	International	Targeting innovative and high-impact solutions in non-tech sectors (e.g. agriculture, industry and tourism) through three components: • *Spark*. Grants of up to $5,000 • *Build*. A mix of grant and loan support of up to $20,000 • *Start*. Loans of up to $20,000	44 companies from Yerevan and the regions have received Grants in a total amount of about €275,000 Loans of in a total amount €137,000
BANA Startup Incubator	Pre-seed	International (EU4Business ITTD Project), Private	Aims to create B2B start-ups ready to enter the SAP Startup Factory acceleration programme, through three components: • A *three-day boot camp* of workshops and assignments, preparing for upcoming incubation • A *32-week educational programme* of training, workshops and one-on-one meetings based on assessed needs of the start-ups selected • *Demo Day*. A pitch opportunity for investors, experts and potential customers	First batch, 2021: • 37 applicants (1 start-up and 36 individuals) • 11 start-ups in the bootcamp • 5 start-ups selected for the demo day
SAP Startup Factory by BANA	Seed	International (EU4Business ITTD Project), Private	Acceleration programme building start-ups on the basis of the needs of SAP[a] clients in three main stages: • *Selection*. of start-ups to participate in the acceleration programme • *Programme*. A 16-week mentorship in and technical support from the SAP Learning Hub • *Graduation*. An opportunity to pitch to potential investors, clients and partners	First batch, 2021: • 10 mature start-ups engaged • 8 start-ups graduated

Source: UNECE.

[a] SAP is the global industry leader in enterprise software, with products and services used by more than 440,000 clients across 180 nations.

Table A4.2 Operational models and outcomes of technological and educational centres in Armenia

Programme	Stage	Financing	Description	Outcome
Innovative Solutions and Technology Centre) Foundation	Pre-seed, Seed	International, Government	Technology hub located at Yerevan State University Joint initiative of EIF, the Government and IBM Equipped with both hardware and software capacities for delivering educational programmes and facilitating R&D in the IT sector Implements three programmes: • *Research Grant Programmes*. Financial support for collaborative research in AI, cloud computing, big data analytics, IoT and other fields • *Master's Programme in Data Science*. Implemented with Yerevan State University • *IBM Academic Initiative*. Technology and knowledge transfer provided by IBM experts	More than 2,000 students engaged from all universities More than 35 research projects and more than 30 start-ups supported
Engineering City	Seed, Series A+	International, Government, Private	Contains scientific museums, co-working spaces, an engineering business accelerator and an industry-based department of the National Polytechnic University of Armenia Hosts several local and international companies in high-tech and engineering Equipped with modern research and prototyping laboratories, production facilities and machinery, which are open to use by all resident companies Offers a set of educational programmes and skills training Targets industries ranging from automotive and electronic to aerospace and IoT	About 14 tech start-ups and established companies hosted, including the Armenian Office of National Instruments More than 50 guest lectures held on engineering and general topics About 20 specialized courses and trainings provided on a regular basis

Programme	Stage	Financing	Description	Outcome
Gyumri and Vanadzor Technological Centres	Pre-seed, Seed, Series A+	International, Private	Established by EIF with the support of the Government and the World Bank Located in two of the largest cities after Yerevan Gyumri: specific focus on creative industries Vanadzor: specializes in engineering Main operations: • *Educational programmes.* IT-focused or business skill development courses and training, along with thematic lectures and events Vanadzor: located near the local branch of the National Polytechnic University of Armenia. Gyumri: hosts the regional office of the American University of Armenia. • *Business development.* support to start-ups and established enterprises in the regions through the provision of consulting services (e.g. business optimization, needs assessment, marketing, investment), as well as access to office space and supporting facilities	More than 25 tech companies, 150 international clients and 200 professional trainers engaged at Gyumri Training provided at Vanadzor to more than 270 employees and more than 5,000 schoolchildren; 19 companies hosted
Armath Engineering	Pre-seed	International, Government	Educational programme developed and run by the Union of Advanced Technology Enterprises Promotes education in science, technology, engineering and mathematics to schoolchildren between the ages of 10 and 18 through after-school programmes, innovative competitions, camps and the like Equips schools with the software and hardware resources to develop students' skills in programming, robotics, design and 3D modeling Curriculum has three levels: • Basic programming and animation • Robotics • 3D modeling and prototyping	More than 220 science and technology hubs across the country More than 5,000 children engaged 84 per cent of students entered tertiary education, and 43 per cent combined work with studies, at an average monthly wage of $280 45 per cent of working students employed as programmers, and the rest in other IT specializations 1 out of 10 employed students founding their own start-ups

Programme	Stage	Financing	Description	Outcome
Armenian National Engineering Laboratories	Pre-seed	International, Government, Private	Initiated in 2013 by EIF with the support of the Government, USAID, the State Engineering University of Armenia (SEUA) and National Instruments About 30 specialized units (i.e. educational, research and industrial applications labs and a general workroom) located at the SEUA campus in Yerevan Courses covering specializations ranging from cybernetics to power energy and machine building	About 2,500 students enrolled in training programmes annually About 100 engineering programmes run annually, of which 10 per cent have an innovation component (e.g. generation of know-how), enrolling more than 400 researchers and entrepreneurs About 140 idea-stage start-up teams engaged since establishment, of which 20 have matured into established companies
Microsoft Innovation Centre (MIC)	Pre-seed, Seed	International, Private	Global network of the MIC operating at the SEUA in 2011 Established jointly by EIF, USAID and Microsoft Corporation Designs and carries out a range of projects and initiatives • *Microsoft BizSpark Program.* Integrates local entrepreneurs in the international community, accelerating the generation of high-growth potential start-ups • *MIC Armenia Acceleration Programme.* Provides mentoring, networking, business and tech consulting services, financial and legal support to start-ups and IT specialists • *Training and educational programmes.* Development of digital, soft and business skills • *Access to resources and infrastructure.* Includes conference rooms, laboratories, hardware and software	More than 7,500 students trained, 84 per cent now employed in the sector 57 innovative start-ups supported Investments of about $2 million generated

Programme	Stage	Financing	Description	Outcome
TUMO Centre for Creative Technologies	Pre-seed, Seed	International, Private	Free educational programme for technology- and design-driven teenagers Located in Yerevan, Dilijan and Gyumri, with other small-scale facilities operating in neighbouring towns Target sectors include creative industries (e.g. animation, game development, filmmaking, music, graphic design) and information technologies (e.g. programming, web development, 3D modelling) Educational programmes implemented in self-learning, project lab and workshop formats	11 centres established 6 TUMO Boxes installed More than 200 monthly workshops conducted About 20,000 students engaged and more than 6,000 graduated
Armenian-Indian Center for Excellence in ICT	Pre-seed, Seed	International, Government	Implemented jointly by the Governments of Armenia and India, EIF and the Centre for Development of Advanced Computing Located at Yerevan State University Delivers both short-term and long-term training in IT, business and design, targeting both individuals and groups Equipped with R&D capacities, including software and hardware tools, co-working space, course materials and reference books (including a library of about 6,000 IT books)	More than 500 researchers, students and entrepreneurs involved in training programmes annually

Source: UNECE

Box A4.1 Graduate Startup Survey Questionnaire

UNECE conducted a survey of 20 start-ups to examine the impact of the support provided by selected programmes in the innovation infrastructure. The survey was conducted with 20 graduate start-ups, 10 of which were enrolled in the Armenia Start-up Academy, 8 in the SAP Start-up Factory and 3 in the BANA Start-up Incubator. Only four participated in more than one of the selected programmes. The majority operate in the IT sector and a few in the health care, marketing, education and entertainment industries. Over half focus on B2B clients; only six engage with B2C clients. Most offer software or marketplace/e-commerce services; only three have manufacturing as a component of their business model. The survey (box A4.1) asked about employment, revenue and investment figures of graduate start-ups before and after they participated in the programmes. The start-ups were asked to rate the importance and availability of aspects of support. Average assessment scores by surveyed firms on the importance and availability of selected support initiatives were then determined.

This survey is conducted within the framework of the Innovation for Sustainable Development Review (I4SDR) programme implemented by the United Nations Economic Commission for Europe, in cooperation with the "Innovative Tourism and Technology Development for Armenia" (EU-ITTD) Project. The survey aims to assess the efficiency of the following programmes:

- BANA Startup Incubator
- Armenia Startup Academy
- SAP Startup Factory by BANA

Confidentiality

Your answers will be treated with utmost confidentiality. Information of individual respondents will not be presented, but only aggregated results and findings. The information will be used solely in the framework of the afore-mentioned programme and within the context of the work of GIZ Armenia.

SECTION A: GENERAL INFORMATION ON THE INTERVIEW

Respondent's name and surname _____

Respondent's company _____

Respondent's position _____

Country _____ City _____

Date _____

SECTION B: GENERAL INFORMATION ON THE RESPONDENT

1. Gender

1 ☐ Male
2 ☐ Female

2. Age

1 ☐ 18-29
2 ☐ 30-39
3 ☐ 40-49
4 ☐ 50-59
5 ☐ 60 and over

3. General information on the start-up

3. Funding round

1 ☐ Idea/pre-seed
2 ☐ Seed
3 ☐ Series A
4 ☐ Series B
5 ☐ Series C+

4. Number of employees

_____

5. Expected annual revenue for 2022, $

1 ☐ Not generating revenue
2 ☐ up to 100k
3 ☐ 101k-200k
4 ☐ 201k-300k
5 ☐ 301k-400k
6 ☐ Over 400k

6. Industry

1 ☐ SaaS
2 ☐ FinTech
3 ☐ Marketing
4 ☐ Health
5 ☐ Transportation
6 ☐ Other, please specify _____

7. Client focus

1 ☐ B2B
2 ☐ B2C
3 ☐ B2B & B2C

8. Business model

1 ☐ Manufacturing
2 ☐ Marketplace and Ecommerce
3 ☐ SaaS

9. The amount of funds raised in dollars

1 ☐ No funds raised
2 ☐ up to 50k
3 ☐ 50k-120k
4 ☐ 120k-250k
5 ☐ 250k-500k
6 ☐ 500k-1m
7 ☐ 1m-2m
8 ☐ Over 2m

10. Number of investors

1 ☐ 1
2 ☐ 2
3 ☐ 3
4 ☐ 4
5 ☐ Over 4

11. Number of foreign investors

1 ☐ 0
2 ☐ 1
3 ☐ 2
4 ☐ 3
5 ☐ Over 3

_____

(Ask Questions 3.8, 3.9 and 3.10 if the respondent chose "Seed/Series A/Series B/ Series C+" under Question 3.1)

4. Startup background

4. Years of operations

1 ☐ Less than 1 year
2 ☐ 1-3 years
3 ☐ 4-6 years
4 ☐ Over 7 years

5. Number of founders

1 ☐ 1
2 ☐ 2
3 ☐ 3
4 ☐ 4
5 ☐ Over 4

6. Number of international founders

1 ☐ 0
2 ☐ 1
3 ☐ 2
4 ☐ 3
5 ☐ Over 3

7. Number of founders with past entrepreneurial experience

1 ☐ 0
2 ☐ 1
3 ☐ 2
4 ☐ 3
5 ☐ Over 3

SECTION C: PARTICIPATION IN SUPPORT PROGRAMS

5. Which of these programmes has your start-up been enrolled in?

1 ☐ BANA Startup Incubator
2 ☐ Armenia Startup Academy
3 ☐ SAP Startup Factory by BANA
4 ☐ Other, please specify _____

6. How many people did your team consist of at the beginning of the programme?

_____

7. What was the range of revenues generated by your start-up at the beginning of the programme? (in dollars)

1 ☐ Not generating revenue
2 ☐ up to 100k
3 ☐ 101k-200k
4 ☐ 201k-300k
5 ☐ 301k-400k
6 ☐ Over 400k

8. Has your start-up raised investment before being enrolled in the programme?

1 ☐ Yes, my start-up has raised investment before the programme
2 ☐ No, my start-up has not raised investment before the programme

9. How important to you are the following aspects of support?
(if multiple, then assess the average results of the programmes)

	Type of support	1 - Not important at all	2 - Slightly important	3 – Important	4 – Very Important	5 - Extremely important
1	Shared working space (conference, office, co-working)	☐	☐	☐	☐	☐
2	Prototyping and production labs	☐	☐	☐	☐	☐
3	Training programmes	☐	☐	☐	☐	☐
4	Mentorship programmes	☐	☐	☐	☐	☐
5	Networking events and roadshows	☐	☐	☐	☐	☐
6	Pitch sessions with investors	☐	☐	☐	☐	☐
7	Business development services (market research, strategy, business plan evaluation)	☐	☐	☐	☐	☐
8	IP rights registration and protection	☐	☐	☐	☐	☐
9	Direct financing (e.g. provision of grants)	☐	☐	☐	☐	☐

10. Please assess the extent to which the following services are available in the start-up ecosystem of Armenia?

	Type of support	1 – Not offered	2 – Offered rarely, limited capacity to address my needs	3 – Offered occasionally, mixed in terms of meeting my needs	4 – Offered regularly, mostly meeting my needs	5 – Offered systematically, adaptive for my needs
1	Shared working space (conference, office, co-working)	☐	☐	☐	☐	☐
2	Prototyping and production labs	☐	☐	☐	☐	☐
3	Training programmes	☐	☐	☐	☐	☐
4	Mentorship programmes	☐	☐	☐	☐	☐
5	Networking events and roadshows	☐	☐	☐	☐	☐
6	Pitch sessions with investors	☐	☐	☐	☐	☐
7	Business development services (market research, strategy, business plan evaluation)	☐	☐	☐	☐	☐
8	IP rights registration and protection	☐	☐	☐	☐	☐
9	Direct financing (e.g. provision of grants)	☐	☐	☐	☐	☐

11. Please assess the extent to which you agree/disagree with each of the following statements

	Statement	1 – Strongly disagree	2 – Disagree	3 – Neither agree, nor disagree	4 – Agree	5 – Strongly agree
1	The ecosystem should expand support for innovative tech solutions in non-tech sectors	☐	☐	☐	☐	☐
2	Establishment of additional shared working facilities and laboratories is required in the regions	☐	☐	☐	☐	☐
3	Increased pre-seed stage funding will expand the pipeline of innovative projects in Armenia	☐	☐	☐	☐	☐
4	Armenian start-ups experience regulatory barriers when attracting investment and commercializing technologies	☐	☐	☐	☐	☐
5	Support provided by acceleration and incubation programmes is effective and needs further expansion	☐	☐	☐	☐	☐
6	Tech transfer support should focus on commercializing locally developed solutions not only in international, but also in the Armenian economy	☐	☐	☐	☐	☐
7	Tech transfer support should facilitate technology absorption by adjusting international solutions to the needs of local economy	☐	☐	☐	☐	☐

Innovation for Sustainable Development Review of Armenia 2023

To foster sustainable development, including progressing towards an increasingly circular economy and building resilience to events such as the COVID-19 pandemic, innovation and the creation of new value with ideas and technologies must become systematic across UNECE member States' economies and societies.

The Innovation for Sustainable Development Review contains the findings of a participatory policy advisory service undertaken at the request of the national authorities. It considers possible policy actions aimed at stimulating innovation activity in the country, enhancing its innovation capacity. It also provides policy recommendations on how to harness innovation to achieve national priorities under the United Nations 2030 Sustainable Development Agenda.

UNECE supports closer cooperation among its 56 member States in the pursuit of the United Nations Sustainable Development Goals and the 2030 Agenda. Its Economic Cooperation and Trade Division (ECTD) assists member States in working towards economic integration and in promoting a better policy and regulatory environment. The Innovative Policies Development Section within ECTD focuses on promoting a supportive environment for innovative development and knowledge-based competitiveness. Activities include policy dialogue, presentations, case studies and trainings on recommendations and good practices, analytical reviews and capacity-building.

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Website: http://www.unece.org

ISBN 978-92-1-117331-4

Designed at United Nations, Geneva – 2307237 **(E)** – May 2023 – 216 – **ECE/CECI/34**